

Port of Portland Rail Plan

September 9, 2013

Prepared for:

Port of Portland
7200 NE Airport Way
Portland, OR 97218

Prepared by:

HDR Engineering
1001 SW 5th Avenue
Suite 1800
Portland, OR 97204

This page is intentionally blank.

Table of Contents

1.0	THE PORT OF PORTLAND DEFINES A 21ST CENTURY PORT RAIL STRATEGY	1
1.1	Introduction, Purpose and Need for the Rail Plan.....	1
1.1.1	Port Vitality is Inter-Linked with Rail Transport	1
1.1.2	Greater Portland Export Plan: Doubling Exports in Five Years	2
1.1.3	Rail Plan Goal: Implementation of Strategic Port of Portland Rail Projects.....	3
2.0	RAIL PLAN ORGANIZATION AND STUDY METHODOLOGY.....	5
2.1	Rail Plan Scope	5
2.2	Plan Methodology	5
2.2.1	Rail Plan Goals Help Establish the Study Area.....	5
2.2.2	Analytical Methodology	5
3.0	GLOBAL AND NATIONAL TRENDS DRIVING THIS PLAN	8
3.1	Logistics Trends, Business Models and Economic Factors	8
3.2	Port/Rail Technologies.....	8
3.3	Relevant Freight and Passenger Rail Plans, Related Studies & Project Lists.....	9
4.0	OVERVIEW OF EXISTING CONDITIONS AND FUTURE OPERATIONS.....	10
4.1	Environmental Baseline Conditions	10
4.2	Class 1 Railroad System Service	10
4.3	Port/Rail Interface at Terminals 2, 4, 5 & 6 and Key Rail Yards	12
4.4	Track Inventory and Conditions in the Marine Terminals.....	14
4.4.1	General Findings	15
4.5	Current Volumes and Expected Growth in Port Rail Traffic.....	16
4.6	Main Line Capacity Analysis	17
5.0	RAIL NEEDS, BUSINESS OPPORTUNITIES AND PROJECT DEVELOPMENT	19
5.1	Rail Operational Issues and Potential Solutions – Stakeholder Perspectives	19
5.1.1	Class 1 Operational Issues	19
5.1.2	Additional Railroad Observations	20

5.1.3	Port Tenant Perspectives on Terminal Operations	20
6.0	PROJECT DEVELOPMENT: FROM CANDIDATES TO PRIORITIES	22
6.1	Candidate Rail Projects.....	22
6.2	Project Evaluation.....	25
6.3	Preliminary Assessment of Permitting/Review Requirements	26
6.4	When Will Projects be Needed?.....	31
7.0	PROJECT IMPLEMENTATION	33
7.1	Value of the Rail Plan Project List.....	34
7.1.1	Beginning at the Local Level: City of Portland	35
7.1.2	Class 1 Railroad Project Development	36
7.2	Outreach and Relationship-Building for Successful Project Implementation.....	36
7.2.1	Get the Message Out: Port Rail Project Costs and Benefits	37
7.2.2	Stay in Touch with Stakeholders	39
7.2.3	Work with State Officials, Legislators and the Oregon Delegation.....	40
7.2.4	Summary of Key Implementation Factors and Steps	41
7.3	Partnering and Funding	41
7.3.1	US Department of Transportation Funding Opportunities.....	41
7.3.2	Oregon Department of Transportation (ODOT) Administered Funds	44
7.3.3	Local and Regional Funding.....	45
7.3.4	Port of Portland Project Funding and Financing Capacity	46
7.3.5	Public-Private Partnerships.....	47
7.4	Considerations for Development of Inter-Related Projects	47
7.5	The First Five Years – Ten Priority Projects	48
8.0	REFERENCES	59

List of Tables

Table 1: Forecast Average Annual Growth Rate for Rail Cargo by Train Type, Portland Area (2011-2030).....	17
Table 2: Port Area Rail Conflicts, Constraints or Needs Identified by Tenants.....	20
Table 3: Port of Portland Rail Plan Candidate Project List.....	23
Table 4: Port of Portland Rail Plan - Project Performance Rankings.....	26
Table 5: Rail Plan Project List Permitting/Review Matrix	29
Table 6: Port of Portland Rail Projects - When Projects Are Needed	31
Table 7: Port of Portland Rail Plan Projects – Partnering, Funding and Project Development Summary	51

List of Figures

Figure 1: Port of Portland Rail Plan Study Area	7
Figure 2: Port of Portland Rail Plan – Recommended Projects Location Map	24
Figure 3: Generalized Workflow.....	33
Figure 4: Planning Process for TIP Funding	35

List of Appendices

Appendix A: Project Descriptions, Costs and Associated Maps	
Appendix B: Rail Inventory and Conditions in the Marine Terminals	
Appendix C: Environmental Conditions Baseline Report	
Appendix D: Rail Operations Overview (Railroad Interviews)	
Appendix E: Port of Portland Tenant Interviews	
Appendix F: Main Line Capacity Analysis Technical Memorandum and Portland Rail Forecast	
Appendix G: Portland Rail Port Technologies	
Appendix H: Evaluation Framework	
Appendix I: Detail of Project Rating and Ranking – Technical Memorandum	
Appendix J: Project Cost Escalation Factors	
Appendix K: Project List Permit Review	

Acronyms and Abbreviations

BNSF	BNSF Railway
Class 1	Class 1 Railroads (BNSF Railway and Union Pacific Railroad, in the plan area)
CCI	Construction Cost Index
CO (I, II, etc.)	<i>Connect</i> Oregon I, II, III, IV, etc.
COP	City of Portland
CTC	Centralized Traffic Control
CRC	Columbia River Crossing
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GIS	Geographic Information Systems
GPI	Greater Portland Inc.
HDR	HDR Engineering Inc.
HSIPR	High-Speed Intercity Passenger Rail
LOI	Line Occupancy Index
MAP-21	Moving Ahead for Progress in the 21st Century Act
MTIP	Metropolitan Transportation Improvement Program
ODOT	Oregon Department of Transportation
OTC	Oregon Transportation Commission
OTIB	Oregon Transportation Infrastructure Bank
PDX	Portland International Airport
PE	Preliminary Engineering
PIC	Portland International Center
PNRS	Projects of National and Regional Significance Program
PNWR	Portland and Western Railroad
PPP or P3	Public-Private Partnership
PTIP	Port Transportation Improvement Plan
PTRC	Portland Terminal Railroad Company
PT	Peninsula Terminal Company
RPWG	Rail Plan Working Group
RRIF	Railroad Rehabilitation and Improvement Financing
RTC	Southwest Washington Regional Transportation Council
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
T-2	Terminal 2
T-4	Terminal 4
T-5	Terminal 5
T-6	Terminal 6

TIFIA	Transportation Infrastructure Finance and Innovation Act
TRIP	Troutdale Reynolds Industrial Park
TWC	Track Warrant Control
UP/UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
WHI	West Hayden Island
USDOT/DOT	U.S. Department of Transportation
WSDOT	Washington State Department of Transportation

Acknowledgments

BST Associates	Paul Sorenson, Brian Winningham
Burgel Rail	Bill Burgel
BNSF	Colleen Weatherford
Convergent Pacific	Hardy Li
HDR	Kurt Reichelt, Mark Hemphill, Richard Degman
ODOT Rail	Robert Melbo
P&W Railroad	David Anzur
Port of Portland	David Breen, Derek Jaeger, Jeff Krug, John Akre, Kathryn Williams, Nicole Miranda, Phil Healy, Randy Fischer, Robin McCaffrey, Roger Anderson, Sebastian Degens, Steve Mickelson
Port of Vancouver	Curtis Shuck
PTRC	Ray Niiranen, Andy Yeduck
Redman Consulting	Deborah Redman
T.Y. Lin	Sorin Garber
Union Pacific Railroad	Brock Nelson
WSDOT	Jeannie Beckett

1.0 THE PORT OF PORTLAND DEFINES A 21ST CENTURY PORT RAIL STRATEGY

1.1 Introduction, Purpose and Need for the Rail Plan

A decade ago, the I-5 Rail Capacity Study (2003) provided the region with a road map for directing freight rail investment for both the public and private sectors. As trade expanded and volumes grew during the boom years, the railroads, the states of Oregon and Washington and local agencies, and the Ports of Portland and Vancouver invested heavily in port-serving rail infrastructure. The region has collectively built a resilient and increasingly efficient rail system as projects from the Study have been undertaken along with other improvements. A decade has passed since the 2003 study. Unforeseen economic currents have vastly changed the nation's collective business model since 2008. New strategic initiatives are changing the way transport and railroads operate in the Pacific Northwest (i.e. "high"-speed rail in the I-5 corridor, the implementation of Positive Train Control technology, the Columbia River Crossing, or the maturation of the West Hayden Island planning process). It is an appropriate time to revisit the strategies and rationalizations that have driven rail transportation investment in the region.

With the economic recession of 2008, industry saw container ships and railcars mothballed throughout the world. Locally, businesses were shuttered as neighbors lost their jobs, savings, homes and security. Although the recession officially ended in December 2009, above average unemployment, low home prices, and the slow economic rebound signal that the Pacific Northwest continues to struggle.

Through the worst of this period, the Port kept steadfast to its goal of serving the region's exporters, and today, the traded sector¹ continues to serve a critically important role in the economies of Oregon and the Pacific Northwest. The Port through its activities provides family-wage jobs, tax revenues and multiplier effects for the Portland/Vancouver area and the entire state.

In order to ensure the efficient movement of this cargo, to spur on economic recovery, and to take advantage of upcoming opportunities, the Port of Portland has prepared this update of its 20-year Rail Plan. The Plan identifies facility improvements both within the Port and around the region that will help the Port retain its competitive advantage. The Port formed a Rail Plan Working Group (RPWG) to assist in developing a pragmatic conceptual approach to rail system improvements for the next 20 years.

1.1.1 Port Vitality is Inter-Linked with Rail Transport

The Port of Portland, along with the other ports of the lower run of the Columbia River have benefitted greatly from the collective investment. The Port has long recognized the significance of its landside connectivity as a means of overcoming the marine side disadvantage of being located inland and upstream from the Columbia River Bar at Astoria. The Columbia River Gorge offers low-elevation water level routes to the West Coast for the two primary Class 1 railroad carriers in the Western United States: Union Pacific and BNSF.

¹ "Traded sector means industries in which member firms sell their goods or services into markets for which national or international competition exists." Definition accessed at <http://www.oregonlaws.org/ors/285A.010>. Colloquially, traded sector refers to businesses that bring money into a region by selling products or services outside that region.

By virtue of the Gorge, the rail routes running east from Portland-Vancouver require less energy to move heavily laden trains than through the mountain passes to the north and south. Train speeds tend to be higher on average and the through-capacity of the Gorge route is superior to the mountain pass routes. Both railroads have capitalized on this, investing in large classification yards at places like Hinkle, OR, and Pasco, WA, to efficiently sort, build, stage, and dispatch trains through to the coastal areas. Both railroads have invested in capacity-increasing projects along the Gorge route such as siding extensions, advanced signaling systems, and classification yards in the Portland-Vancouver area.

This combination of geography augmented by railroad capital investment has been paralleled by investment by the Port of Portland, its neighboring ports on the lower run of the Columbia, and the many shippers that operate large terminals and other facilities along the Columbia. Through investment in infrastructure, the region has developed into a leader for the export of bulk products originating from points east. Shippers and the railroads take advantage of the water level route to move commodities in unit trains quickly from east to west. And of course, many other products in large volumes too numerous to account for here are moved both east and west through the Columbia Gorge.

Since the Port of Portland's maritime success relies on the efficiency of its landside rail connections, the Port and the region as a whole have a vested interest in assessing, forecasting, and planning for strategic infrastructure projects to ensure that this relative competitive advantage is not eroded by time and events elsewhere. Hence, the Port has commissioned this effort to identify key projects and strategies to carry the rail system forward over the next 20 years.

1.1.2 Greater Portland Export Plan: Doubling Exports in Five Years

In 2011, the Portland region successfully competed with other national metropolitan areas, for one of the four slots in a pilot program partnering with the Brookings Institution on a Metro Export Initiative (MEI). As part of this effort, a Market Assessment, Export Plan and Policy Memo have been prepared to help the region double exports within five years. The Market Assessment noted that although the Great Recession was deeper in the Pacific Northwest than in the nation as a whole, we have also been on the forefront of the economic recovery. Significantly, the report notes that

Exports are at the core of Greater Portland's economic resilience and potential. Between 2003 and 2010, Portland increased its export volume by 109.3 percent, creating 45,863 new jobs. This growth made Portland the second-fastest growing export market among the 100 largest metropolitan areas. The region was 12th largest by volume in 2010, with \$21 billion in exports, and had the third highest export intensity, with exports accounting for 18.2 percent of its economy.²

Given the importance of exports to the regional economy, a chief objective of the Metro Export Initiative's (MEI) Greater Portland Export Plan to "reduce leakage of export products, directing maximum trade through metro ports." A related objective aims to maintain and protect "the location advantages that brought the computer and electronics industry to Greater Portland."³ This Rail Plan represents a significant attempt to realize those objectives, by ensuring effective rail service to the traded-sector businesses that are or could use rail to access the Port of Portland.

² *Greater Portland Export Plan/Metro Export Initiative, Brookings, 2012, P.5*

³ *Ibid., P.8*

1.1.3 Rail Plan Goal: Implementation of Strategic Port of Portland Rail Projects

The goal of this rail plan is to create and build consensus around a set of rail infrastructure projects that will serve the Port of Portland and the region by solving existing and future capacity and through-put problems. Solving these issues proactively will aide the Port in taking advantage of emerging opportunities in the coming years.

With the Greater Portland Export Plan as background to the Port's overall economic development approach, the following section summarizes the numerous aspects of technical, business, community and environmental concerns that have been incorporated into the development of the recommended projects that form the practical heart of this Rail Plan:

A Results-Oriented Planning Process

1. It builds off stakeholder-vetted visions for both local and regional rail solutions for identified problems.
2. It is in alignment with overall growth in capacity requirements, given increased reliance on freight rail as a desired transportation mode and desired growth in passenger rail.
3. It leverages enthusiasm and interest in and supports the objectives of the Greater Portland Export Plan by building support for needed port rail infrastructure.
4. The Plan continues the tradition of Port of Portland leadership in green technology and emission reduction, by supporting the movement of freight via rail whenever possible.
5. Infrastructure projects will be implemented in the context of technology-related capacity improvements.

Projects were Developed Strategically

The list of projects considered in the Plan was developed with the following goals in mind:

1. Maintaining and improving the relative advantage of the Port's landside connections by making railroad infrastructure improvements that are both locally and regionally significant. This plan recognizes that improvements up- and downstream on the rail system have a direct impact on the efficient movement of trains to and from the Port, as well as the number of trains that ultimately can be moved to the Port.
2. Projects were also identified through interviews with key stakeholders such as the Port, Class 1 and shortline railroads, major rail shippers, and terminal operators.
3. Identifying sections of rail lines near Portland-Vancouver that are candidates for expansion to stage trains waiting to enter the terminal area or move east through the Gorge. This can be accomplished through a combination of eliminating at-grade crossings, expanding sections of double-track, improving crew-change locations, etc. This is particularly applicable to the BNSF Fallbridge and UP Kenton lines between the metro area core and the entrance to the Columbia River Gorge.
4. Identifying projects that improve the multi-modal flow of goods and people near the harbors and the rail corridors. As the numbers of trains increase and as the average length of trains increases, the Port and the community will need to implement projects that diminish conflicts between trains, vehicles, and other modes (i.e. grade separations, re-routing infrastructure to disentangle it).

5. Consideration was given to rail industry developments that are somewhat external to the Port. Examples would be:
 - a. How does the Port maintain its access to the rail infrastructure given the possibility of coal traffic passing through the Columbia Gorge in the next few years?
 - b. How is main line capacity maintained for freight movements in light of plans to expand daily Amtrak service north and south?

2.0 RAIL PLAN ORGANIZATION AND STUDY METHODOLOGY

2.1 Rail Plan Scope

Key tasks in the development of the Rail Plan included:

- Creating a Rail Study Work Group;
- Forecasting rail cargo volumes, including a low and high range for a period of 20 years;
- Assessing main line capacity and updating the Line Occupancy Index tool developed in the 2002 Master Plan;
- Documenting opportunities and constraints identified by stakeholders;
- Examining future technological innovations that will affect rail freight;
- Identifying rail alternatives at the terminal or in the study area to address infrastructure and operational needs;
- Developing a comprehensive list of evaluation criteria to compare alternatives; and
- Rating and ranking the candidate projects to arrive at a prioritized list of recommended alternatives for the Rail Plan.

This Rail Plan documents the completion of the scope and provides:

- A summary of Rail Plan goals and methodology, with references to the respective technical reports;
- Key findings that led to development of the candidate rail plan projects;
- Descriptions of candidate rail plan projects;
- A final list of rated and prioritized projects that will improve the Port of Portland's current operations and enhance future growth opportunities over the next 20 years;
- A discussion of how projects can be implemented (phased and funded); and
- Appendices providing technical background on all phases of the work that led to the set of recommended projects.

2.2 Plan Methodology

2.2.1 Rail Plan Goals Help Establish the Study Area

The Port is focused on identifying improvements to benefit the overall performance of the rail network both in its immediate vicinity and along the rail lines that directly affect the movement of trains to/from the Port. As such, the study's geography includes the Port areas, the broader Portland-Vancouver metro area, extends east to The Dalles or Wishram (UP or BNSF, respectively) north to Centralia on the BNSF and south to Eugene on the UP. Beyond those points, it is assumed that the railroads themselves and the respective state rail plans are addressing capacity and infrastructure improvements.

2.2.2 Analytical Methodology

Updating Baseline Conditions and Forecasts: The study team reviewed and updated conditions within the study area to determine the state of the rail inventory, shippers' needs and volumes, and environmental constraints that could affect the range of feasible projects. The study team conducted the following activities:

- Reviewed and updated the rail network in the Study Area (Appendices C and E)
- Reviewed and updated Port rail terminal operations (in the body of this report)

- Prepared an environmental baseline conditions report that summarized issues and permitting associated with major environmental constraints at or near the Port of Portland (Appendix C)
- Prepared a mid- and high-range rail volume forecast for the Portland area, for 2020 and 2030; and (Appendix F)
- Conducted a line occupancy index (LOI) analysis to quickly ascertain chokepoints within the study area based on current and forecasted rail traffic flows (Appendix F)

Looking at System Needs to Develop Projects: More than a simple inventory of needs and deficiencies, this Plan is intended to refine rail project definitions to respond adeptly to potential business opportunities. To that end, the study team:

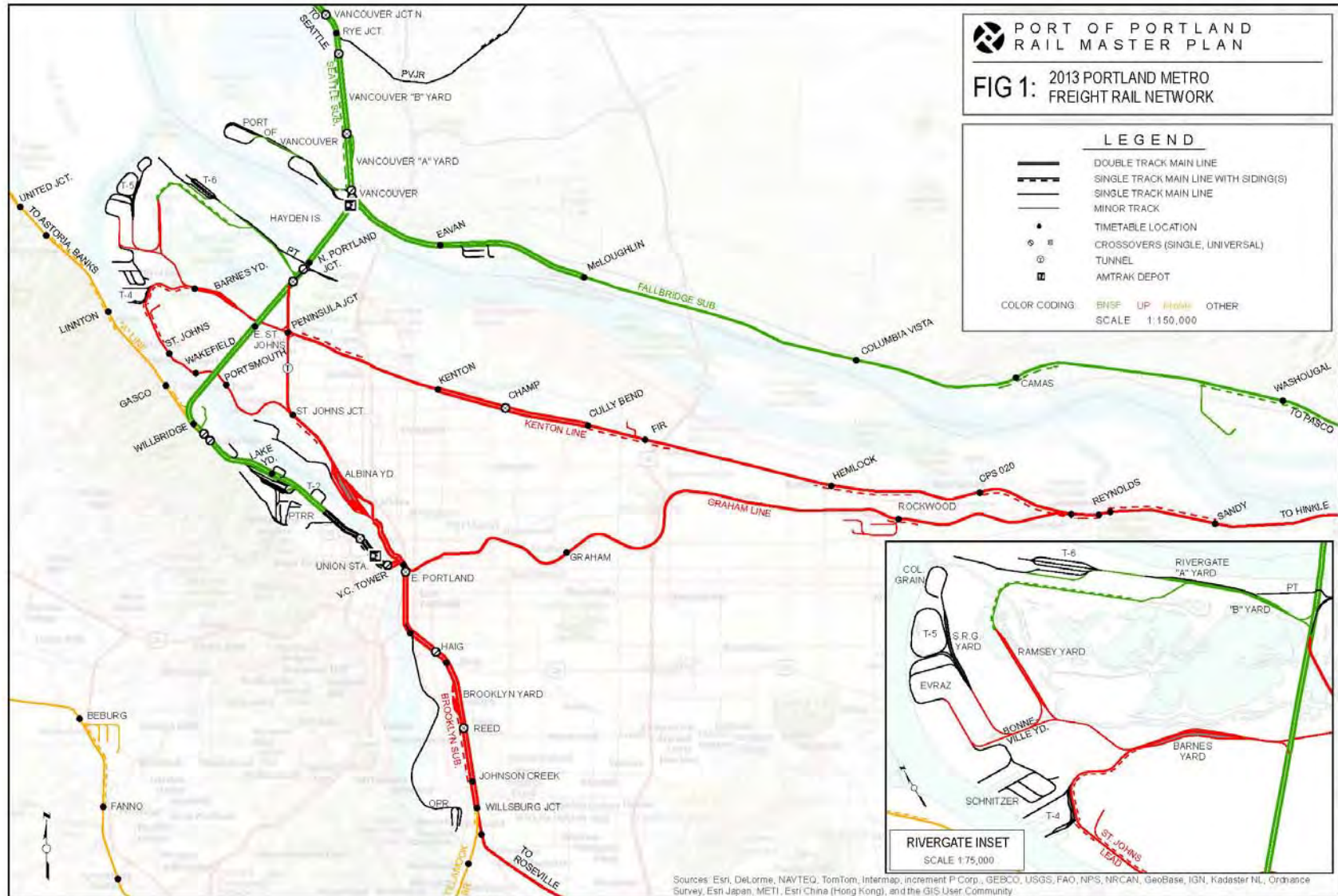
- Prepared a main line capacity analysis memorandum based on 2011 train movement data, and future (2020 and 2030) forecasted train volumes (Appendix F) ;
- Presented findings and obtained feedback at periodic Rail Plan Study Group meetings;
- Reviewed rail system issues and operations with railroad representatives (Appendix D) ;
- Examined technologies that will impact the Port's rail-dependent businesses now and into the future (Appendix G) ;
- Consulted with stakeholders to assess business and operational needs related to rail infrastructure in the study area (Appendix E) ;
- Reviewed and updated projects recommended by previous efforts that have not yet been constructed in terms of their use going forward and escalating construction costs to the current year (Appendix A) ;
- Developed new projects to address identified needs, in consultation with affected stakeholders (Appendix A) .

Bringing the Partners Together for Implementation: Finally, the projects must be shaped into a coherent strategy for implementation that builds consensus among key stakeholders. To that end, the study team:

- Sought consensus on project definitions, through ongoing Rail Plan Study Group meetings;
- Developed screening criteria to rate projects for performance against critical measures (Appendix H) ;
- Rated and ranked projects for prioritization (Appendix I) ;
- Identified triggers for development, as well as projects that should be carefully phased, sequenced or clustered for best results (Appendix I); and
- Identified project sponsors, partnerships and benefits associated with each project (Appendix I).

Note that the study team used current rail industry costs for new projects and escalated older costs from previously studied projects using the team's in-house experience and knowledge of rail construction costs and trends over the last decade.

Figure 1: Port of Portland Rail Plan Study Area



3.0 GLOBAL AND NATIONAL TRENDS DRIVING THIS PLAN

3.1 Logistics Trends, Business Models and Economic Factors

Changing economic, market, and geographic trends are shaping changes that broadly affect the U.S. For example, import goods moved in intermodal containers, a traffic flow that came into existence in the 1970s and grew dramatically to dominate transcontinental rail lanes between the West Coast and the U.S. interior by the 1990s appears to have peaked. Now, with rapid industrialization of China and the Pacific Rim countries, demand for export mineral and food commodities produced by the U.S. is driving a rapid growth in unit train traffic from the interior to the West Coast.

Increases in the cost of trucking driven by fuel costs, driver safety and hours-of-service regulations, congestion, and emissions regulations are steadily reducing the mileage threshold at which rail service is cost-effective. From 1,000-mile minimums in the last decade, rail intermodal is now cost-effective in some 300- to 500-mile freight corridors. As trucking costs continue to rise, there appears to be more opportunity for rail to compete in even shorter distance markets (200-400 mile) if sufficient quantities to fill trainloads can be economically aggregated.

Factors influencing the rail landscape in the near term include:

- The steadily increasing length of unit trains and the challenge to fit these longer trains into ports and sidings.
- Limited availability of developable land at deep-water ports, increasing ship size driven by fuel and labor costs, the complex permitting processes to make port improvements and develop new space, and
- The drive to push increased passenger traffic onto freight corridors

All these factors pose industry challenges that must be considered in the development of projects.

3.2 Port/Rail Technologies

New and emerging technologies can significantly increase the efficiency and lower the costs of intermodal transfers that occur at the exchange points between rail and all other modes, notably marine and truck, at the Port of Portland. BNSF and UP develop rate structures based on the rate of unloading, or the time required to unload/load a train. Thus costs, capacity and technologies are interrelated. In some situations, these technologies beyond the traditional rail infrastructure solution set can substitute for infrastructure-based new capacity. The key to inter-connectivity and access revolves around each of the following system components:

- Speed and efficiency of transfer
- Access between modes with minimal restrictions
- Capacity at interface points
- Reducing restrictions regarding weight and dimensional size
- Application of tracking and scheduling technology
- Cost

Port Rail Infrastructure: Combined efficiencies of technologies will be critical to help the Port increase logistics efficiencies, and will require a continued focus on the separate and related

efficiencies of marine and rail facilities at the Port. Given the wide range of cargo the Port handles, there is no single solution regarding infrastructure.

There are various methods of intermodal exchange between vessels and rail systems, though the fundamental methodology is infrastructure-based, and relies on the functionality associated with property utilization.

Tracking and Scheduling Technology: Advanced technologies in the near term will include improved scanning for Homeland Security purposes, as well as more precise technologies for holistic origin-to-destination tracking of shipments. The integration of devices such as optical scanners, camera systems, automatic vehicle and railcar identification, portal monitors, personnel access and control and numerous other capabilities is expected to be integrated into a single transportation operating system comprised of a variety of existing and planned components. The most significant step for the port and transportation interests in the Port of Portland is the possible integration of all technology into a single operating platform with a broadband “mesh” coverage system allowing all components to feed into the platform (Appendix G).

3.3 Relevant Freight and Passenger Rail Plans, Related Studies & Project Lists

In the past decade, rail projects have been identified, listed, and re-listed as references in numerous planning and project development documents in the Pacific Northwest. This attests to the level of consensus reached by milestone studies and the quality of the collaboration among participants in such efforts as the Portland/Vancouver I-5 Trade and Transportation Corridor studies and the West Coast Corridor Coalition.

A brief, but useful summary of plans is available in the Bureau of Planning and Sustainability’s *North Portland Rail Analysis Summary of Existing Studies*, listed in the references at the end of this Rail Plan.

Although this document was focused on pragmatic rail improvements, the development and rating of projects did entail consideration of some important local and regional planning efforts undertaken within the past decade. This section briefly identifies the plans which were consulted as sources of project lists and descriptions and which provided an understanding of local and regional system constraints. These planning documents should be referenced for insight about project-specific details and larger scale policies and history that could impact partnering and future implementation of projects recommended in this Rail Plan. Note that the first two documents listed below were primary sources for projects that had been vetted regionally and/or by the Port’s key stakeholders.

- I-5 Trade and Transportation Corridor Partnership Rail Capacity Study (2003)
- Port of Portland 2020 Marine Terminal Master Plan (2003)
- Oregon Rail Study (2010)
- Statewide Rail Capacity and Needs Study & Addendum (2006)
- City of Portland Freight Master Plan (2006)
- Metro Regional Freight Plan 2035 (2010)
- Clark County Freight Mobility study
- Washington State 2010-2030 Freight Rail Plan (2009)
- Washington State Long-Range Plan for Amtrak Cascades (2006)
- Washington State Amtrak Cascades Mid-Range Plan (2008)
- West Coast Corridor Coalition Trade and Transportation Study (2008)

4.0 OVERVIEW OF EXISTING CONDITIONS AND FUTURE OPERATIONS

4.1 Environmental Baseline Conditions

The Port of Portland is a leader in developing facilities that place great value in resource conservation, environmental protection, and sustainable building practices from the planning stages through to execution. As part of the rail planning effort, the Port has sought to identify the known environmental conditions and constraints with regards to its internal rail facilities. This effort was primarily accomplished through a review of information retained by the Port and Metro including existing literature, studies, digital mapping data, and several other readily available public sources. This environmental overview provided the foundation for identifying more specific resource impacts and permitting requirements that allowed for subsequent environmental feasibility rating of candidate projects. The full environmental baseline conditions study is contained in Appendix C. The report included a summary of environmental resources, identification of site constraints on existing Port-owned land parcels, a discussion of environmental considerations relevant to future rail facility development, and identification of additional studies required for environmental permitting.

The following types of environmental and natural resource constraints were identified within the environmental study area:

- Wetlands and Waters
- Wildlife
- Contaminated Land
- Stormwater
- Floodplain Development
- Land Use and Zoning
- Noise
- Air Quality

No field analysis or verification was conducted because no data gaps were identified. However, future follow-up fieldwork may be required as part of the development of a specific project.

4.2 Class 1 Railroad System Service

The Port of Portland's excellent access to the national railroad network through two Class 1 carriers is a major advantage that helps offset the Port's location 105 miles upriver along the Columbia River navigation channel. The Port of Portland is served by two Class 1 railroads, BNSF Railway (BNSF) and Union Pacific Railroad (UP). BNSF connects the Port to the national rail network via its primary main line that follows the north bank of the Columbia River east from Portland-Vancouver into eastern Washington, thence through the Idaho Panhandle and Montana into the Midwest and Chicago. UP connects to the Port via its primary main line that follows the south bank of the Columbia River to eastern Oregon, thence through Idaho's Snake River Valley and Wyoming into the Midwest and Chicago. In addition, both railroads connect the Port northward to Tacoma, Seattle and Canada via a jointly operated main line, and both railroads connect the Port southward to California via separate north-south main lines (the BNSF travels south through Central Oregon on the "Oregon Trunk" line and the UP travels south from Portland on the Brooklyn Subdivision). The Port thus has direct, competitive rail service via primary main lines into the central U.S., as well as primary rail connections to the principal cities of the West Coast. This delivers to the Port rail connectivity that is equivalent in quality and importance to all of the major West Coast U.S. ports.

At a local level, BNSF enters the Port of Portland by crossing the Columbia River from its east-west main line on the north bank of the Columbia River at Vancouver, Washington. The Port is immediately west of BNSF's north-south main line that extends from Portland Union Station through Vancouver, Washington, to Tacoma, Seattle, and Vancouver, B.C. This affords BNSF direct access to the Port's North Rivergate (T-6) facility and, via the Columbia Slough Bridge, the T-5 facility in South Rivergate and West Hayden Island in the future.

UP enters the Port of Portland from its east-west main line on the south bank of the Columbia River via one of two routes, the Kenton line and the Graham Line. These two lines, which diverge at Troutdale, Oregon, on the eastern edge of Portland, run parallel and enter the Port from the center and from the south, respectively. The Graham Line connects to UP's north-south main line near downtown Portland. UP enters via trackage rights—the BNSF's north-south main line to Tacoma at a location near BNSF's access to the Port. UP provides rail access to the Port of Portland's T-4 and T-5 areas with limited access to T-6.

Both railroads can deliver and receive unit trains directly to the Port. BNSF supports carload service via its local yards at Vancouver and Lake Yard near Portland Union Station. BNSF has additional support yard facilities at its Rivergate "A" and "B" yards and East Saint Johns located along its main between the Willamette River and Columbia Boulevard. UP supports carload service via its local primary classification yard at Albina and bulk traffic handled primarily through Barnes and South Rivergate yards, located adjacent to the Port. UP also supports autorack service through its small yard at Kenton in North Portland. From a network perspective, much of the Port-bound traffic passes through the regional classification yards at Pasco, WA, and Hinkle, OR (BNSF and UP, respectively). These local and regional yards enable both railroads to classify dedicated trains for Port of Portland customers, and to provide adequate car supply and good connectivity between the Port and national rail traffic lanes.

Rail access and switching at the Port's marine terminals is divided among the rail carriers as follows:

- BNSF is the managing carrier in North Rivergate, providing unit train delivery and switching service for the entire T-6 terminal and all nearby industry shippers.
- UP is the managing carrier in South Rivergate, providing unit train delivery for itself and general switching service at T-5 and the other nearby industrial shippers for both Class 1 carriers. BNSF does have the rights to deliver a Columbia Grain unit train direct to South Rivergate. Numerous tenants in the T-5 area provide their own internal switching (Evraz, Canpotex, and Columbia Grain, for example).
- UP is the managing carrier at T-4 and provides unit train delivery, switching, track maintenance, dispatching, etc., for all rail traffic.
- BNSF is the managing carrier for the Ramsey Lead that connects BNSF's Rivergate "A" Yard to the UP system at Bonneville. Ramsey Yard adjacent to Bonneville is operated by UP.
- Portland Terminal Railroad provides switching for T-2, supported by Guilds Lake Yard.
- The lone rail customer on Swan Island provides its own switching after UP sets cars out from Albina Yard.

More detail on the Class 1 rail network is included in Appendix D of this report.

4.3 Port/Rail Interface at Terminals 2, 4, 5 & 6 and Key Rail Yards

Overview: The Port of Portland's marine terminals are located along the Willamette and Columbia Rivers, each having direct road and railroad landside connections. These terminals serve different functions including bulk, break-bulk, autos, and containers. Depending on the commodity shipped, the Port has worked closely with both BNSF and Union Pacific to enhance the existing rail infrastructure that provides access to each terminal. In many cases, the Port has facilitated the implementation of rail infrastructure specific to each commodity shipped. This public-private partnership has had the effect of reducing overall shipping costs for Port tenants by improving the rail/port interface and greatly increasing rail efficiency.

Terminal 2: Located on the west bank of the Willamette River, Terminal 2 is devoted to the break-bulk market. An array of commodities and products (for example: railroad rails, bulk cotton seed, steel plate, bulk urea, bulk ores, etc.) are transloaded from ship to shore to land transportation. The Terminal provides on-dock warehousing as well. Volumes are relatively low through Terminal 2 compared to the Port's other terminals and the existing rail infrastructure has been sufficient. The rail layout of the terminal consists of a "balloon" loop that connects to a running track alongside the main line (trains enter the Terminal from the south and exit to the south). Spurring off from the loop are several storage tracks, dockside track that runs the length of the berth, and loading dock spurs to one warehouse. The Portland Terminal Rail Company provides switching in the Terminal. The tracks are fully embedded in pavement throughout the terminal, allowing for easy loading from almost any point. Much of the rail in the Terminal is lighter 90-lb rail and the curves of the balloon track tend to be much sharper than current railroad standards of curvature. However, 90-foot flatcars are brought into the terminal nonetheless. If the Terminal sees a significant rise in rail traffic over an extended period of time, the embedded light 90-lb track and switches should be upgraded to a minimum of 115-lb rail or larger. Replacing the rail would most likely also necessitate a 100% crosstie replacement program as well.

Terminal 4: Major Port tenants including Toyota and Kinder Morgan are located at Terminal 4 on the east side of the Willamette River near its confluence with the Columbia River. Terminal 4 lies adjacent to Union Pacific's Saint Johns Industrial Lead which connects north to Barnes Yard and south to Albina Yard. The railroad and Port have developed an extensive rail physical plant adjacent to Terminal 4 to quickly deliver and depart loaded/empty rail cars to these shippers for handling. Recently, Union Pacific completed a siding project so that there are presently two siding tracks running nearly the full length of Terminal 4 along the Industrial Lead to support its customers there. A recent project rebuilt the soda-ash unit train yard that serves Kinder Morgan. New tracks were constructed with heavier rails and concrete crossties to modernize the facility. Toyota also relocated its railcar loading ramps closer to the ship berth and constructed an 8-track loading ramp capable of holding about 48 autorack railcars. Formerly, Cargill operated a grain facility at Pier 1. However, the nation-wide transition from carload to unit train grain shipments was a dis-incentive in using T-4 as a grain export facility. The facility shut down and the Port eventually demolished much of it to clear the way for future re-development. IRM and Cereal Food Processing are still rail served T-4 tenants on Pier 1. Much of the rail on Pier 1 that served the former grain terminal is lighter 90-lb rail. This rail should be replaced with heavier rail (115-lb or greater) if future development plans call for heavy rail use. The McDermott Lead that heads south from the soda-ash yard to connect to the Saint Johns Industrial Lead is also constructed of lighter rail and should be replaced if train traffic picks up substantially on the track.

BNSF "accesses" Terminal 4 shippers by trucking commodities and product (including autos) to nearby railheads.

Terminal 5: Just north of T-4 is South Rivergate's Terminal-5 and adjacent Port-facilitated industrial areas. The area has been extensively developed over the years for rail transportation and delivery of unit trains. Long term tenants include Columbia Grain, Land-o-Lakes, Canpotex, and EVRAZ (Oregon Steel), among others. ADM is the most recent rail-served customer to land in the area with a new facility set to open in 2013.

The Terminal 5 rail physical plant connects to the rest of the rail network via a Union Lead running south to Bonneville Yard. From Bonneville Yard, trains can head north through Ramsey Yard to BNSF territory or southeast to UP's Barnes Yard.

The central piece of rail infrastructure at Terminal 5 is the South Rivergate Yard. It serves both manifest traffic and can be used to stage unit trains for the export terminals at T-5. It is critical in terms of providing near-dock rail capacity and simultaneously serving to expedite rail traffic away from the main lines of the Portland area. The Yard was recently expanded by the Port using a *ConnectOregon* grant by adding 5 tracks that can hold on the order of 330 62-foot railcars. The expanded capacity is primarily used to stage bulk unit trains to either Canpotex or Columbia Grain (the trains must be stored in halves on two tracks). Union Pacific provides switching for this yard and spots/pulls local area industry. BNSF has the right to deliver a unit train directly to the South Rivergate Yard with UP then spotting the commodity to the shipper (because BNSF must cut each train in half in order to fit the yard tracks; once broken, UP needs to complete the switching moves necessary to deliver the cuts of cars to the shipper). BNSF delivers unit trains via the CMAQ-funded Slough Bridge.

The potash facility operated by Canpotex was recently expanded to a total of three loop tracks, each capable of holding a full unit train. The facility has its own locomotives for moving the trains through the loading pits. The Columbia Grain facility has five semi-circle tracks, each capable of holding a portion of a train and the facility also performs its own internal switching.

The Evraz-Oregon Steel facility has a myriad of internal tracks that that serve as storage or as access to the various process buildings on their site. Evraz operates its own fairly extensive switching operation internally.

Terminal 6: Terminal 6 is served by BNSF via a primary rail corridor that bisects the Terminal, seated halfway between the Columbia River shoreline on the north and Marine Drive on the south. The east end of this corridor connects to the BNSF main line via a "wye" track arrangement, allowing trains to head north or south from the area. At the east end, BNSF operates the "A" and "B" yards, each having 4 tracks and situated in-line with one another. The yards support local customers in and around T-6. Running around both yards are four additional tracks some 5,800' long used for building and storing trains. Around the outside of those tracks is the Port's T-6 lead, a dedicated track that bypasses the yard area and allows an intermodal train to proceed straight from the main line to the container terminal at T-6. A lead track heads south and west from the "A" yard to connect to Bonneville Yard and serves as the BNSF's unit train route to South Rivergate.

Towards the west end of the T-6 trackage lies the 8-track intermodal railcar yard with intermediate strips for sorting chassis and containers. The primary container storage yard is immediately north of the rail yard. A BNSF track continues past the intermodal yard to service the Hyundai auto import facility. There are two other auto import rail loading ramps as well as numerous other rail customers in and around T-6.

Ancillary Port Rail Facilities

Ramsey Yard. Ramsey Yard sits due east of South Rivergate and was completed in 2011 with *ConnectOregon* funds. It is parallel to a lead track constructed by the Port in 1997 to facilitate BNSF unit train movements to South Rivergate. The yard is six tracks across (including the running lead) and boasts a capacity of about 185 62-ft long railcars. The project that constructed the yard also constructed a second lead track some 13,000 feet long headed north out of the yard.

Swan Island Lead. The Port owns the lead track that runs out from the north end of the UP Albina Yard and parallels N. Going Street to the west end of Swan Island. The track is composed of 90-lb rail which is likely adequate at the current time given the demand for rail service on Swan Island. The sole rail customer on Swan Island is an operation at Shipyard Commerce Center (the dry-dock and associated facilities at the westerly tip of the Island) that receives tank cars of waste oil products for reprocessing. The customer uses a trackmobile to fetch railcars from the UP near Albina Yard and pulls them the entire length of the lead to the customer's facility and then returns the railcars when finished. If demand for rail service picks up substantially on the Island, the rails should be replaced with heavier sections (115-lb or greater).

Reynolds Lead. After the Port purchased the former Reynolds Aluminum site in Troutdale, it also took over the 1.3-mile lead track connecting the plant site to the Union Pacific's Kenton Line. Although the track has been disconnected at the Union Pacific main line and all the internal plant tracks removed, the lead track itself remains. The Lead is disused at present, but could be reactivated if need be (as there is developable industrial land available at the Reynolds site). The Lead includes a 1,500' siding and signalized crossing equipment at NE Marine Drive. The track itself is 100RE rail, which is adequate for low- to moderate levels of rail traffic at lower speeds. The Lead track will require some investment to be returned to service (vegetation control, some crosstie replacement, etc.).

4.4 Track Inventory and Conditions in the Marine Terminals

As part of the Rail Plan, an evaluation of existing track infrastructure at Port facilities was undertaken with the purpose of:

- Understanding the ability of the Port's rail infrastructure to support modern rail service;
- Programming extra-ordinary maintenance projects that may fall outside the limits of typical operating budgets;
- Assessing the strategic value of assets versus the potential lifecycle costs;
- Identifying the level of effort required to put idle rail infrastructure back into service;
- Identifying specific locations where continued safe and reliable service to existing customers will require track work;
- Identifying conditions that may place the general public at risk (primarily roadway crossings);

The evaluation results and recommendations are detailed in Appendix B. The effort produced seven identified maintenance projects that the Port should anticipate undertaking in the next several years. These maintenance projects collectively make up PRP-1 (see Section 6.1 for a discussion on the list of Rail Plan recommended projects and Appendix A for further information about PRP-1).

4.4.1 General Findings

Terminal 6. Heavy investment in the late 1990's and 2000's in track at T-6 has left the terminal in good general condition. The tracks are constructed to modern rail standards for such a facility and no significant recommendations are made.

Terminal 5. Terminal 5, consisting primarily of a 3-track potash unloading loop and connections, is in generally good condition. The terminal's tracks underwent major renovation and expansion in the late 2000's and are up to modern standards for the level of traffic handled at the Terminal. No significant recommendations are made.

Terminal 4. Terminal 4's tracks are a mixture of modern and antiquated construction and materials. The Terminal has been in operation for many decades and has been divided into a multitude of uses during that time. At present, the terminal's tracks are broken down into sub-areas. The tracks comprising Toyota and the soda-ash unloading areas are mostly modern construction and adequately serve the those business lines. Much of the track that serves the Pier 1 area of the Terminal (including Cereal Foods, International Raw Materials, the former Cargill site) is in poor condition and is inadequate to serve high volumes of modern railcars. Moreover, some of the track does not reliably serve the rail traffic that presently uses it. PRP-1 and Appendix B describe in detail projects that would bring these tracks up to modern standards.

Terminal 2. T2's track and its configuration is typical of a World War II (or prior) port facility. The majority of the track at T2 is undersized by modern standards, has very tight curvature, and track lengths are not long enough to efficiently support modern railcars. The Terminal's track infrastructure would be hard-pressed to serve medium-to-high volumes of railcars daily, due both to internal factors and external railroad factors (i.e. efficient staging for railcars). The terminal could be reconstructed to serve a use with higher-volume rail demands, although it would require a near 100% rebuild of tracks inside the terminal and a siding expansion project outside the Terminal to stage railcars for it. Nevertheless, the present rail infrastructure is in need of substantial refurbishment to continue supporting the rail needs of the terminal's break-bulk business. PRP-1 proposes a maintenance project to modernize the existing trackage while PRP-22 explores the possibility of reconstructing the Terminal to serve unit-train traffic volumes.

Swan Island. The Port-owned Swan Island Lead track is of light-duty construction and will soon need a substantial investment in maintenance to ensure that it will continue to serve rail traffic on the Island (see PRP-1E). Also, there are recommended safety improvements in PRP-1F to two North Channel Avenue crossings to maintain public safety. All total, nearly \$700,000 in maintenance and safety improvements are recommended on Swan Island.

Ramsey Yard. Ramsey Yard is a modern rail yard constructed in 2010 and no maintenance recommendations are given.

Reynolds Lead. This track was not evaluated since it is not operational and no operations are foreseen. However, aerial photo observation suggests that a vegetation control program is warranted to keep the track in near-ready condition and preserve the value of the track materials. If no strategic purpose in leaving the track in place is identified, the Port might consider removing the track and using the materials elsewhere to modernize track (depending on the type and condition of the track materials). New rail, plates, bars, and anchors (but not ties or ballast) can cost on the order of \$65 per foot of track for those materials alone. At roughly 8,000', this would potentially be a savings on the order of \$0.5M in lieu of purchasing new track

materials (less the cost of reclaiming and moving the materials). The signal crossing equipment at NE Marine Drive, depending on type and condition, could also be used elsewhere.

4.5 Current Volumes and Expected Growth in Port Rail Traffic

Over 17 million tons of cargo moves through Portland each year. Twelve million tons of this cargo moves through the Port of Portland-owned facilities. The Port's major exports are wheat, soda ash, potash and hay. Major imports include automobiles, steel, machinery, mineral bulks and other varied products. Annual imports and exports at the Port total approximately \$15.4 billion. The Port estimates that over one thousand logistics and marine-related businesses use the Port's marine facilities.

The Port exports the largest amount of wheat in the United States, and is the third largest wheat port in the world. It is the 5th largest port for overall tonnage in the United States, 3rd largest automobile import port, the largest mineral bulk port on the West Coast, and the 17th largest U.S. port handling cargo containers. Seven container ocean carriers service the Port, including:

- COSCO
- Hamburg Sud
- Hanjin
- Hapag-Lloyd
- K-Line
- Westwood Shipping Lines
- Yang Ming

Currently, the major port-related cargo types that are transported by rail include international containers, import and export automobiles and export dry bulk commodities (including grain and oilseeds, potash, soda ash, coal, and others) as well as various other commodities. Key domestic cargo types include containers, automobiles, forest products, chemicals and petroleum products, and frozen commodities.

To help pinpoint and quantify local and regional rail needs, this plan developed a forecast of rail traffic in the Portland region. (See the complete Portland Rail Forecast Final Report, BST Associates, October 15, 2012, in Appendix F.) Because a substantial share of rail traffic in the region is related to port activities, the first step in the analysis was to produce updated forecasts of port volumes, based on recent analyses. Then, based on those projected cargo volumes and the origin/destination of the cargo, forecasts were developed for the average daily number of trains expected to operate on key mainline segments.

Forecasts for Amtrak passenger trains (Cascades, Coast Starlight, and Empire Builder), "Z" trains, and other freight trains were developed and allocated to key main line rail segments. Z trains are high-priority freight trains, including those carrying containers, trailers, and automobiles. Freight trains include all other train types such as manifest freight (multiple car types and commodities), dry bulk unit trains (i.e., grains, metal ores, minerals, fertilizers, coal, and others), liquid bulk trains (i.e., crude oil, petroleum products, chemicals).

Average annual growth rates for rail movements are summarized in Table 1:

Table 1: Forecast Average Annual Growth Rate for Rail Cargo by Train Type, Portland Area (2011-2030)

Train Type	Moderate/Mid-Range Forecast	High Forecast
Passenger (Amtrak)	Seattle-Portland daily trains to increase from 10 (today) to 14 (2020) and 26 (2030). Portland-Eugene daily trains to increase from 6 (today) to 10 (2020) and 12 (2030). Portland-Chicago daily trains to remain at 2, via BNSF Columbia Gorge line.	
Z-Train International Containers	2.5%	5.1%
Z-Train Domestic Intermodal	2.5%	3.5%
Z-Train Automobiles	2.5%	4.4%
Freight – Grains & Oilseeds	1.0%	3.1%
Freight - Coal	Assumes 70 million metric tons of coal per year shipped by 2030.	Assumes 140 million metric tons of coal per year shipped by 2030.
Freight – Other Dry Bulks, Petroleum	Potash and soda ash are significant now and could increase; current low volumes of crude petroleum from North Dakota to Puget Sound refineries could grow substantially.	

Source: *Portland Rail Forecast, BST Associates (2012)*

4.6 Main Line Capacity Analysis

Line Occupancy Index Analysis: Given the existing⁴ and forecast growth in rail volumes, the next step in the study was to examine how the current and future “build” scenario would handle those volumes. A Line Occupancy Index (LOI) analysis was conducted. This is a commonly used and industry-accepted method for identifying system bottlenecks at both a macro and micro geographic scale. LOIs are an empirical analysis tool that compares a rail line’s nominal (or “standard”) train capacity as a function of its number of main tracks, method of operation, and maximum speeds with the actual number of trains that will occupy the rail line. The maximum available occupancy per day is adjusted⁵, based on type of train movement authority and non-through train movements that consume track capacity. Non-through train movements (such as locals, on-line switching and so forth) are determined through consultation with local operating staff regarding how much time is spent performing switching and yard transfers. A rail line or line segment with similar features (such as number of tracks and Methods of Operation) is assessed and categorized for its Level of Service (LOS). Typically, and for this study, an LOS of 70 and above indicates that the rail line segment has exceeded its practical capacity, and maintenance activities will likely result in interruption and delays to train traffic, rerouting of train traffic to other lines, temporary reductions in rail service levels offered to shippers, or all three.

The mainline infrastructure analyzed for this LOI assumed the completion of the following known projects:

- WSDOT/BNSF High Speed Intercity Passenger Rail (HSIPR) – Vancouver Bypass
- WSDOT/BNSF HSIPR – Vancouver New Middle Lead
- WSDOT/BNSF HSIPR – Kelso to Martin’s Bluff – Toteff Siding
- WSDOT/BNSF HSIPR – Kelso to Martin’s Bluff – New Siding
- WSDOT/BNSF HSIPR – Kelso to Martin’s Bluff – Kelso to Longview Jct.

⁴ Existing and future numbers of trains are calculated (not provided by railroads) based on cargo forecast and assumed train sizes.

⁵ Train movement authority adjustments for Centralized Traffic Control (CTC) and Track Warrant Control (TWC) are 0.8 and 0.6 respectively.

- ODOT/BNSF HSIPR – Willbridge Crossovers
- UP Graham Line Mid-Point Siding, 10,000 feet long
- UP East Portland Connection between Graham Line and Brooklyn Subdivision
- UP Double-track extension Willsburg Jct. south to Clackamas (4.1 miles)

Based on the LOI analysis, no study segments appeared to exceed practical capacity (LOS at 70 or above) by year 2020. The identified improvements listed above which are assumed to be completed by 2020 will address the segments which were approaching capacity, by adding infrastructure, reducing system delays, re-routing trains or combinations thereof.

By year 2030, five segments appear to exceed practical capacity, based on the forecast train volumes, unless additional capacity is provided either by adding infrastructure, reducing system delays, re-routing trains or combinations thereof. The five segments are:

- Centralia to Centralia South (BNSF I-5 Corridor)
- Centralia South to Kelso North (BNSF I-5 Corridor)
- Longview Jct South to Kalama North (BNSF I-5 Corridor)
- McLoughlin to Avery (BNSF Fallbridge Sub.)
- Albina to East Portland (UP)

Projects recommended for inclusion in the 20-year Rail Plan will address these segments. More detail on train volume forecasts and main line capacity analysis is contained in Appendix F.

5.0 RAIL NEEDS, BUSINESS OPPORTUNITIES AND PROJECT DEVELOPMENT

5.1 Rail Operational Issues and Potential Solutions – Stakeholder Perspectives

5.1.1 Class 1 Operational Issues

Local management representatives from both Class 1 railroads have identified locations where current track, signal and operational characteristics are impeding fluidity and efficiency in terminal operations (see Appendix D). What follows is the list of improvements that the BNSF and UP representatives feel would significantly improve operations in the Portland and Vancouver terminal areas.

BNSF and UP operational impacts:

- North and south ends of Lake Yard: Lake is the primary interchange point between BNSF and UP. Currently, access to the yard from both north and south ends is controlled by hand-operated switches with timers. Crews must set the timers and wait several minutes for the timers to run out before they can set the switches for the desired train movement. This ties up one of the two main tracks on the Fallbridge Subdivision between the Willamette River Bridge, Portland Union Station, and the primary connection with the UP at the Steel Bridge. In addition to UP and BNSF main line, intermodal and interchange traffic, 10 Amtrak trains per day traverse this line segment with four additional round trips funded and slated to begin operations soon. Installation of dispatch-controlled power switches would allow BNSF dispatchers to line movements from their Ft. Worth dispatch center in a fraction of the time currently needed.

BNSF operational constraints:

- Crossovers on the BNSF Fallbridge Subdivision between Willbridge and Vancouver: the Fallbridge Sub is double track, bi-directional CTC along this line segment, providing significant operational flexibility. The crossovers on this segment, however, are rated for only 10 mph train movement. The 10 daily Amtrak trains are a major user of this line. There are major financial performance incentives and penalties built into the BNSF-Amtrak operating agreement, meaning that BNSF cannot cross an Amtrak train from one main track to another without significantly delaying that Amtrak train and possibly losing the incentive bonus for that train.

This basically means that freight traffic in both directions is restricted to only one main line track when Amtrak trains are operating on the Sub, severely restricting the ability of BNSF to route trains in the most efficient manner possible. This also impacts operations of UP trains running on BNSF trackage rights. The installation of higher speed crossovers on this track segment would greatly improve operational flexibility and capacity over this densely-trafficked corridor which includes the Columbia River Bridge.

UP operational constraints:

- North Rivergate Boulevard roadway crossing, Rivergate Yard: Due to the short length of the tracks at Rivergate and the presence of the at-grade crossing, inbound trains must be broken into and outbound trains must be assembled from two tracks, resulting in the

road being blocked for extended periods of time. If a train needs a significant amount of time to be built, air tested and depart, the crossing needs to be left open and a transfer air test is required, adding 3-4 hours to the train's departure time. Consideration should be given to eliminating the at-grade crossing.

- North Portland Junction to Kenton Line Crew Change: UP is required to change crews at or near Champ for all trains routed between their north/south and their east/west main lines. UP would like the crew change point closer to the junction to speed the crew change process and minimize the delays to both UP and BNSF from the current operation. However, several at-grade road crossings would be blocked if the crew change location were moved closer to North Portland and Penn Junctions.
- Brooklyn Yard derails: Currently, the north and south switches connecting the yard to the Brooklyn Sub main are power switches, but these switches are protected by manually operated derails. Installation of power derails would improve yard efficiency significantly and reduce potential delays to Amtrak, UP, BNSF and PNWR trains.⁶

5.1.2 Additional Railroad Observations

- PTRC indicated that powering the switches at Terminal 2 (Lake Yard) could greatly benefit operations. Another option would be to lengthen the Oceanic lead that has the challenge of being close to Union Station. The Port indicated a second rail loop might be added to T-2 in the future.
- Union Pacific identified the Kenton Line at-grade crossing at N. 11th and N. Lombard as a bottleneck. This at-grade crossing limits the railroad's flexibility along the corridor, because they cannot stop a train on the crossing for extended periods of time.
- Blocked at-grade crossings are a common complaint within T5 and T6. Challenges in T-5 and T-6 include the blocking of tenant access by trains being spotted for other customers. Other problematic blockages occur at Penn Junction.

5.1.3 Port Tenant Perspectives on Terminal Operations

Port staff, railroad representatives and businesses located on Port property were interviewed in 2011 to identify problems, solutions and opportunities.

Table 2: Port Area Rail Conflicts, Constraints or Needs Identified by Tenants

Business	Tenant-Identified Conflicts or Capacity Constraints
Canpotex	Canpotex wants to increase from 130-car to 170-car unit trains. Facility constraints and siding restrictions on UP's prevent this.
Cereal Foods	CFP has track capacity for 7 cars per day, but could process 9 cars per day.
Columbia Grain	CG believes capacity is limited by number of rail cars it can receive. CG has explored putting in another pit, but there is not room for more track. Departure of empty unit trains to UPRR is restricted because an air test is required to move trains from Rivergate to UP Barnes Yard.
EVRAZ	EVRAZ has major conflict with North Rivergate Blvd. at-grade crossing, which is sometimes blocked for 20-30 minutes. EVRAZ runs 120 truck trips per day from the Port, so the blockages are significant.

⁶ Note that since the interviews were conducted in 2011, UPRR has progressed the project to power the derails at Brooklyn Yard.

Business	Tenant-Identified Conflicts or Capacity Constraints
Honda	Blocked rail crossings within the plant boundaries (T-6 lead) significantly impact daily operations. Facility constraints on vehicle storage are exacerbated by BNSF lead to T-6 container terminal which severs their property in two.
ICSTI	Soda ash or potash unit trains block crossings (up to 45 minutes) at the Marine Drive access [<i>this train may actually be the BNSF grain unit train for Columbia Grain – Ed.</i>].
Kinder Morgan	No road crossing or capacity constraints identified.
SSA T2	No road crossing or capacity constraints identified. However, track switch conditions vary from fair to poor.
Toyota	Blocked rail crossings affect Toyota operations due to soda ash train switching at T-4.

Source: Port of Portland Tenant Interviews, HDR Engineering (2011)

6.0 PROJECT DEVELOPMENT: FROM CANDIDATES TO PRIORITIES

6.1 Candidate Rail Projects

Using the methodology described in Section 2 of this plan, and based on the identified problems, initial solutions offered, and probable future volumes of goods requiring efficient rail service to the Port of Portland, the project team developed, refined and rated a group of projects.

Table 3 is the final list of 29 recommended projects designed to address problems and enhance growth opportunities at the Port of Portland, and is intended to serve as a guide to implementation for the Port's 20-year Rail Plan. These are the projects that were evaluated, rated and ranked for prioritization.

Note that while some projects address localized issues, others are designed to address larger systemic needs in the rail network that serves Portland and maintains the Port's land-side transportation network advantage in rail. The latter category includes projects such as the Fallbridge Sub and Kenton Line double tracking to allow BNSF and UPRR, respectively, to move goods and empties to and from the Port more efficiently. Although both railroads are chipping away at these large multi-phase projects, they are nonetheless included here because they remain as needs until they are completed.

Projects were developed in response to current and forecast needs and opportunities for the businesses, shippers and rail operators serving the Port. Since this basic approach replicates previous efforts to identify good projects, the study team started by reviewing existing project lists to determine whether they had been fully implemented, whether they were still needed and whether their original definitions needed revision to meet current and coming needs. The study team met with representatives of the Port, BNSF, UPRR, Port tenants and the Peninsula, Portland Terminal and Portland and Western railroads. As needed, they also spoke with other ongoing study or project implementation teams, including consultants and local and state governments, to ascertain the progress of specific projects.

Projects were developed or compiled from numerous sources, including professional judgment of the consultant team and consultation with rail, port, shipper and public agency stakeholders. Project-specific documents consulted include project studies, concept drawings, cost estimates, environmental checklist or permitting documents, and those referenced for background or cited directly are noted within the respective project narrative found in Appendix A of this Rail Plan. Additionally, a number of larger-scale planning and project development reports were used as a baseline for this plan, including Port of Portland 2020 Marine Terminal Master Plan (2003), the I-5 Trade and Transportation Rail Capacity Study (2003).

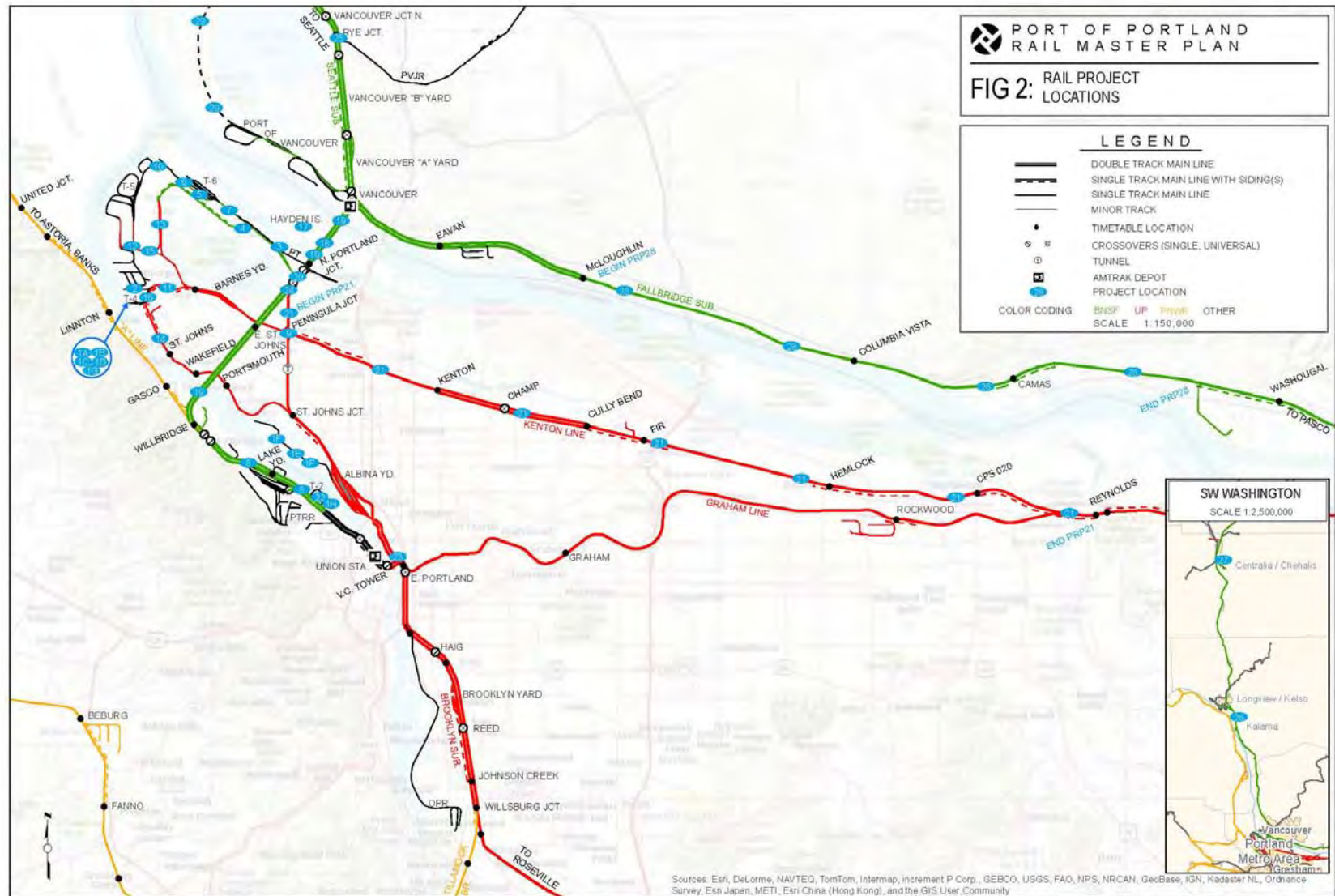
Most projects were brought up to date in one or more of the following ways:

- Projects were redefined based on partial implementation or design and permitting progress;
- Projects were redefined based on changing business needs; and/or
- Project costs were updated;
- Project costs were identified (where there were no previous estimates);
- Anticipated project permitting/review mechanisms were evaluated.

Table 3: Port of Portland Rail Plan Candidate Project List

Port of Portland Master Rail Plan - Candidate projects that were evaluated, rated, and ranked
PROJECTS ON OR CONNECTING TO PORT OF PORTLAND PROPERTY
PRP-1. Port of Portland Rail Terminal Maintenance and Repair Projects
PRP-2. T-4 Pier 1 Rail Yard Improvements
PRP-3. Peninsula Terminal Railroad: BNSF/PT Rail Connection at Suttle Road
PRP-4. Port of Portland Marine Drive Grade Separation Project
PRP-5. Port of Portland Pave Unpaved Area at T-6 Intermodal Yard
PRP-6. Port of Portland T-6 Access Improvement
PRP-7. Port of Portland T-6 Berth 607 Grade Separation
PRP-8. BNSF/UP/Portland Terminal Railroad – Lake Yard Main Line Access Improvement
PRP-9. Columbia Boulevard Grade Separation Project (Raise Columbia Blvd. over UPRR at Penn Jct.)
PRP-10. South Rivergate Rail Access: Second Slough Bridge
PRP-11. UP: Barnes Yard to T-4 Direct Connection (includes new N. Lombard overcrossing)–
PRP-12. North Rivergate Boulevard Grade Separation
PRP-13. Ramsey Yard Utilization
PRP-14. Cathedral Park Quiet Zone and Track Improvements
PRP-15. Bonneville Yard Build-Out
PRP-16. T-4 Soda Ash Storage Tracks
PRP-17. West Hayden Island Main Line Access
PRP-18. West Hayden Island Unit Train Loops
PRP -22. T-2 Track Reconfiguration and Siding Extension
OREGON - MAIN LINE PROJECTS WITH PORT OR PORT TENANT BENEFITS
PRP-19. BNSF: Increased Speed Over the Willamette and Columbia River Bridges
PRP-20. UP: North Portland Crossover Improvements
PRP-21. UP Kenton Line: Completing Double Track from North Portland to Troutdale and Train Crew Change Out Improvements
PRP-23. UP Main Line: Track Realignment South of Albina ("6 MPH Curves")
PRP-24. UP North Portland: Undoing the "X" (Option 1)
WASHINGTON - MAIN LINE PROJECTS WITH PORT OR PORT TENANT BENEFITS
PRP-25. BNSF I-5 Corridor: Rye Junction Improvements
PRP-26. BNSF I-5 Corridor: WSDOT Projects between Longview and Kalama
PRP-27. BNSF I-5 Corridor: BNSF/PSAP Centralia Connection (Third Main, Depot, and Pedestrian Overpass)
PRP-28. BNSF Fallbridge Line: Completing Double Tracking - Vancouver to Washougal
PRP-29. BNSF I-5 Corridor: Port of Vancouver Main Line Connection at Felida

Figure 2: Port of Portland Rail Plan – Recommended Projects Location Map



6.2 Project Evaluation

The screening criteria were developed with the Port's principles and values—notably, its ongoing commitment to a vibrant regional economy as well as the environmental health and quality of the Portland area—in mind. Thus, any request for Port capital expenditures or political support would be in alignment with the Port's short-term and long-range goals. Incorporation of the Port's concerns, along with those of other critical stakeholders (particularly the Port's tenants and customers, the directly affected railroads, and the communities that might be affected by proposed improvements and whose support or acceptance is often critical to implementation) resulted in performance metrics that can be grouped into the following six broad categories:

- Rail System
- Port Operations
- Environmental Feasibility
- Institutional, Political and Public Feasibility
- Economic Factors
- Time Frame when Projects are Needed

These categories reflect the Port's need for rail and port operational efficiency, as well as environmental sustainability of identified candidates. By including criteria related to public support, funding, and compatibility with local and regional multimodal freight plans, and freight and passenger rail plans, the project ensures that top-rated projects are perceived to be of benefit to both users and neighbors. Table 4 shows the results of the performance evaluation by ranking (i.e., total project score with 1 being the highest total score). Projects are grouped by functional categories, and shown in numerical order by project number. The functional projects categories are four-fold:

- 1.) **Port Access.** Projects that improve rail access to the Port of Portland – improved ability to arrive, store, and depart trains adjacent to the Port's facilities;
- 2.) **Main Line Capacity.** Projects that improve main line capacity – main line speed increases, additional track capacity, and more fluid connections between railroads;
- 3.) **Port Rail Operations.** Projects that improve the Port's capability to serve more train traffic– improve track conditions or configurations which currently limit the efficiency of rail service, add new Port rail capacity, improve efficiency, or reduce internal road/rail conflicts; and
- 4.) **Impact Mitigation.** Projects that mitigate impacts to the public caused by increased or new rail movements, primarily through reducing public roadway/railroad conflicts and increasing safety at crossings.

Additional detail on the specific performance measures associated with the screening criteria is included in Appendix H of this report.

Table 4: Port of Portland Rail Plan - Project Performance Rankings

Project No.	Project Name	Performance Ranking
IMPROVES RAIL ACCESS TO THE PORT OF PORTLAND		
PRP-10	South Rivergate Rail Access: Second Slough Bridge	2
PRP-11	UP: Barnes Yard to T-4 Direct Connection	1
PRP-13	Ramsey Yard Utilization	3
PRP-15	Bonneville Yard Build-Out	4
IMPROVES MAINLINE CAPACITY		
PRP-3	Peninsula Terminal Railroad: BNSF/PT Rail Connection at Suttle Road	11
PRP-8	BNSF/UP/Portland Terminal Railroad – Main Line Lake Yard Access Improvement	12
PRP-20	UP: North Portland Crossover Improvements	10
PRP-19	BNSF: Increased Speed Over the Willamette and Columbia River Bridges	3
PRP-21	UP Kenton Line: Completing Double Track from North Portland to Troutdale and Train Crew Change-Out Improvements	1
PRP-23	UP Main Line: Track Realignment South of Albina ("6 MPH Curves")	8
PRP-24	UP North Portland: Undoing the "X" (Option 1)	2
PRP-25	BNSF I-5 Corridor: Rye Junction Improvements	7
PRP-26	BNSF I-5 Corridor: WSDOT Projects between Longview and Kalama	5
PRP-27	BNSF I-5 Corridor: BNSF/PSAP Centralia Connection (3 rd Main, Depot, and Pedestrian Overpass)	6
PRP-28	BNSF Fallbridge Line: Completing Double Tracking - Vancouver to Washougal	4
PRP-29	BNSF I-5 Corridor: Port of Vancouver Main Line Connection at Felida	9
IMPROVES PORT RAIL OPERATIONS		
PRP-1	Port of Portland Rail Terminal Maintenance and Repair Projects	5
PRP-2	T-4 Pier 1 Rail Yard Improvements	7
PRP-5	Port of Portland Pave Unpaved Area at T-6 Intermodal Yard	6
PRP-16	T-4 Soda Ash Storage Tracks	4
PRP-17	West Hayden Island Main Line Access	2
PRP-18	West Hayden Island Unit Train Loops	3
PRP-22	T-2 Track Reconfiguration and Siding Extension	1
MITIGATION PROJECTS		
PRP-4	Port of Portland Marine Drive Grade Separation	4
PRP-6	Port of Portland T-6 Access Improvement	1
PRP-7	Port of Portland T-6 Berth 607 Grade Separation	6
PRP-9	Columbia Boulevard Grade Separation Project (Raise Columbia Blvd. over UPRR at Penn Jct.)	3
PRP-12	North Rivergate Boulevard Grade Separation	2
PRP-14	Cathedral Park Quiet Zone and Track Improvements	5

Source: Port of Portland Rail Plan Evaluation Rating Matrix, Appendix I (HDR, 2013)

6.3 Preliminary Assessment of Permitting/Review Requirements

The Port of Portland is a leader in developing intermodal freight facilities that take environmental quality seriously from planning to execution and use. The project team has prepared a preliminary planning-level analysis of the broad environmental/resource impacts for each project and the likely permitting/review mechanisms triggered in each case. A memorandum describing the methodology undertaken along with brief project-by-project summary of findings is

presented in Appendix K. Table 5 provided below is a quick-reference permitting/review matrix of all the Rail Plan projects. This information will be used to develop an approach to implementation.

No field analysis or verification was conducted in the preparation of this Rail plan. All investigations regarding the environmental impacts and permitting requirements were the result of reviewing documentation that already exists for a number of the Rail Plan projects and by a comparative analysis of project footprints in relation to publically available data regarding sensitive resources, permitting overlays, public lands and facilities, federal/state/local legislation concerning resource conservation, etc.

This page is intentionally blank.

Table 5: Rail Plan Project List Permitting/Review Matrix

Project	Federal: Clean Water Act (CWA) 401 Water Quality Certification	Federal: Section 404 CWA	Federal: Work in Navigable Waters, Section 10	Federal: Endangered Species Act Section 7 Consultation	Federal: Bridge Permit, Section 9 Rivers and Harbors Act	Oregon: Fish Passage Permit	Oregon: Wetland and Waters Removal-Fill Permit	Archaeological Excavation Permit	Washington: Aquatic Use Authorization	Floodplain Development Permit	Washington: Forest Practices Permit	Washington: Hydraulic Project Approval (HPA)	Private Aids to Navigation	Washington: Wetlands	Washington: SEPA	Local: Building, Grading, or Demolition Permit	Local Environmental Permit (Shorelines, Critical Areas)	State Rail Agency Crossing Order	Environmental Feasibility Rating
PRP-1. Port of Portland Rail Terminal Maintenance and Repair Projects																			4
PRP-2. T-4 Pier 1 Rail Yard Improvements																x			3
PRP-3. Peninsula Terminal Railroad: BNSF/PT Rail Connection at Suttle Road				x												x			4
PRP-4. Port of Portland Marine Drive Grade Separation Project				x				x								x		x	2
PRP-5. Port of Portland Pave Unpaved Area at T-6 Intermodal Yard																			3
PRP-6. Port of Portland T-6 Access Improvement																x		x	4
PRP-7. Port of Portland T-6 Berth 607 Grade Separation	x															x		x	2
PRP-8. BNSF/UP/Portland Terminal Railroad – Lake Yard Mainline Access Improvement																			5
PRP-9. Columbia Boulevard Grade Separation Project (Raise Columbia Blvd. over UPRR at Penn Jct.)								x								x		x	2
PRP-10. South Rivergate Rail Access: Second Slough Bridge	x	x	x	x		x	x	x								x	x	x	2
PRP-11. UP: Barnes Yard to T-4 Direct Connection (includes new N. Lombard overcrossing)–	x							x										x	4
PRP-12. North Rivergate Boulevard Grade Separation	x					x										x	x	x	2
PRP-13. Ramsey Yard Utilization Project		x				x											x		3
PRP-14. Cathedral Park Quiet Zone and Track Improvements	x															x	x	x	3
PRP-15. Bonneville Yard Build-Out																	x	x	4
PRP-16. T-4 Soda Ash Yard Improvements								x									x		4
PRP-17. West Hayden Island Main Line Access		x		x			x	x		x									3
PRP-18. West Hayden Island Unit Train Loops	x	x	x	x		x	x	x		x						x			2
PRP-19. BNSF: Increased Speed Over the Willamette and Columbia River Bridges										x							x		4
PRP-20. UP: North Portland Crossover Improvements	x	x		x			x										x		4
PRP-21. UP Kenton Line: Completing Double Track from North Portland to Troutdale and Train Crew Change Out Improvements		x		x		x		x								x		x	2
PRP-22. UP: T2 Track Reconfiguration & Siding																x		x	5
PRP-23. UP Main Line: Track Realignment South of Albina (“6 MPH Curves”)								x								x			3
PRP-24. UP North Portland: Undoing the “X” (Option 1)	x	x	x	x		x	x									x	x	x	3
PRP-25. BNSF I-5 Corridor: Rye Junction Improvements	x	x	x	x	x			x		x		x	x	x	x	x	x	x	3
PRP-26. BNSF I-5 Corridor: WSDOT Projects between Longview and Kalama	x	x	x	x	x			x		x		x	x	x	x	x	x	x	2
PRP-27. BNSF I-5 Corridor: BNSF/PSAP Centralia Connection (Third Main, Depot, and Pedestrian Overpass)	x	x		x	x			x							x	x	x	x	4
PRP-28. BNSF Fallbridge Line: Completing Double Tracking - Vancouver to Washougal	x	x	x	x	x			x		x		x	x		x	x		x	2
PRP-29. BNSF I-5 Corridor: Port of Vancouver Main Line Connection at Felida	x	x	x	x	x			x		x		x	x		x	x	x	x	2

6.4 When Will Projects be Needed?

Table 6, below, shows when projects are likely to be needed to solve congestion or other identified problems. The table groups projects by functional type, and shows projects in order of their project number. Eleven projects are likely to be needed in the first five years of the plan, from 2013-2018. Note that some projects can be triggered by unplanned opportunities such as a new Port tenant or business expansion requiring increased capacity or improved operations within the system. This will be discussed further as part of the implementation plan in Section 7.

Table 6: Port of Portland Rail Projects - When Projects Are Needed

Port of Portland Rail Plan – Project Implementation Port of Portland Rail Plan Project Implementation (Grouped by Project Function)*							
		Implementation Time Frame (Years)					
Project No.	Project Name	0 to 5	5 to 10	10 to 15	15 to 20	> 20	Performance Ranking
IMPROVES RAIL ACCESS TO THE PORT OF PORTLAND							
PRP-10	South Rivergate Rail Access: Second Slough Bridge					X	2
PRP-11	UP: Barnes Yard to T-4 Direct Connection	X					1
PRP-13	Ramsey Yard Utilization	X					3
PRP-15	Bonneville Yard Build-Out	X					4
IMPROVES MAIN LINE CAPACITY							
PRP-3	Peninsula Terminal Railroad: BNSF/PT Rail Connection at Suttle Road			X			11
PRP-8	BNSF/UP/Portland Terminal Railroad – Main Line Lake Yard Access Improvement	X					12
PRP-20	UP: North Portland Crossover Improvements	X					10
PRP-19	BNSF: Increased Speed Over the Willamette and Columbia River Bridges			X			3
PRP-21	UP Kenton Line: Completing Double Track from North Portland to Troutdale and Train Crew Change-Out Improvements					X	1
PRP-23	UP Main Line: Track Realignment South of Albina (“6 MPH Curves”)	X					8
PRP-24	UP North Portland: Undoing the “X” (Option 1)			X			2
PRP-25	BNSF I-5 Corridor: Rye Junction Improvements			X			7
PRP-26	BNSF I-5 Corridor: WSDOT Projects between Longview and Kalama				X		5
PRP-27	BNSF I-5 Corridor: BNSF/PSAP Centralia Connection (3 rd Main, Depot, and Pedestrian Overpass)				X		6
PRP-28	BNSF Fallbridge Line: Completing Double Tracking - Vancouver to Washougal					X	4
PRP-29	BNSF I-5 Corridor: Port of Vancouver Main Line Connection at Felida					X	9
IMPROVES PORT RAIL OPERATIONS							
PRP-1	Port of Portland Rail Terminal Maintenance and Repair Projects	X					5
PRP-2	T-4 Pier 1 Rail Yard Improvements(1)	X					7
PRP-5	Port of Portland Pave Unpaved Area at T-6 Intermodal Yard	X					6
PRP-16	T-4 Soda Ash Storage Tracks (1)	X					4
PRP-17	West Hayden Island Main Line Access (1)					X	2
PRP-18	West Hayden Island Unit Train Loops (1)					X	3
PRP-22	T-2 Track Reconfiguration and Siding Extension (1)	X					1

Port of Portland Rail Plan – Project Implementation Port of Portland Rail Plan Project Implementation (Grouped by Project Function)*							
		Implementation Time Frame (Years)					
Project No.	Project Name	0 to 5	5 to 10	10 to 15	15 to 20	> 20	Performance Ranking
MITIGATION PROJECTS							
PRP-4	Port of Portland Marine Drive Grade Separation			X			4
PRP-6	Port of Portland T-6 Access Improvement			X			1
PRP-7	Port of Portland T-6 Berth 607 Grade Separation			X			6
PRP-9	Columbia Boulevard Grade Separation Project (Raise Columbia Blvd. over UPRR at Penn Jct.)			X			3
PRP-12	North Rivergate Boulevard Grade Separation	X					2
PRP-14	Cathedral Park Quiet Zone and Track Improvements			X			5
Level of Investment Per Time Frame (in millions, order of magnitude)		\$77.1	\$0	\$122.8	\$93.7	\$267.3	N/A

Notes:

(1) Projects whose primary trigger is an outside business development opportunity may occur during any time frame or not at all. Thus, their costs may be re-distributed across other time horizons shown in the table.

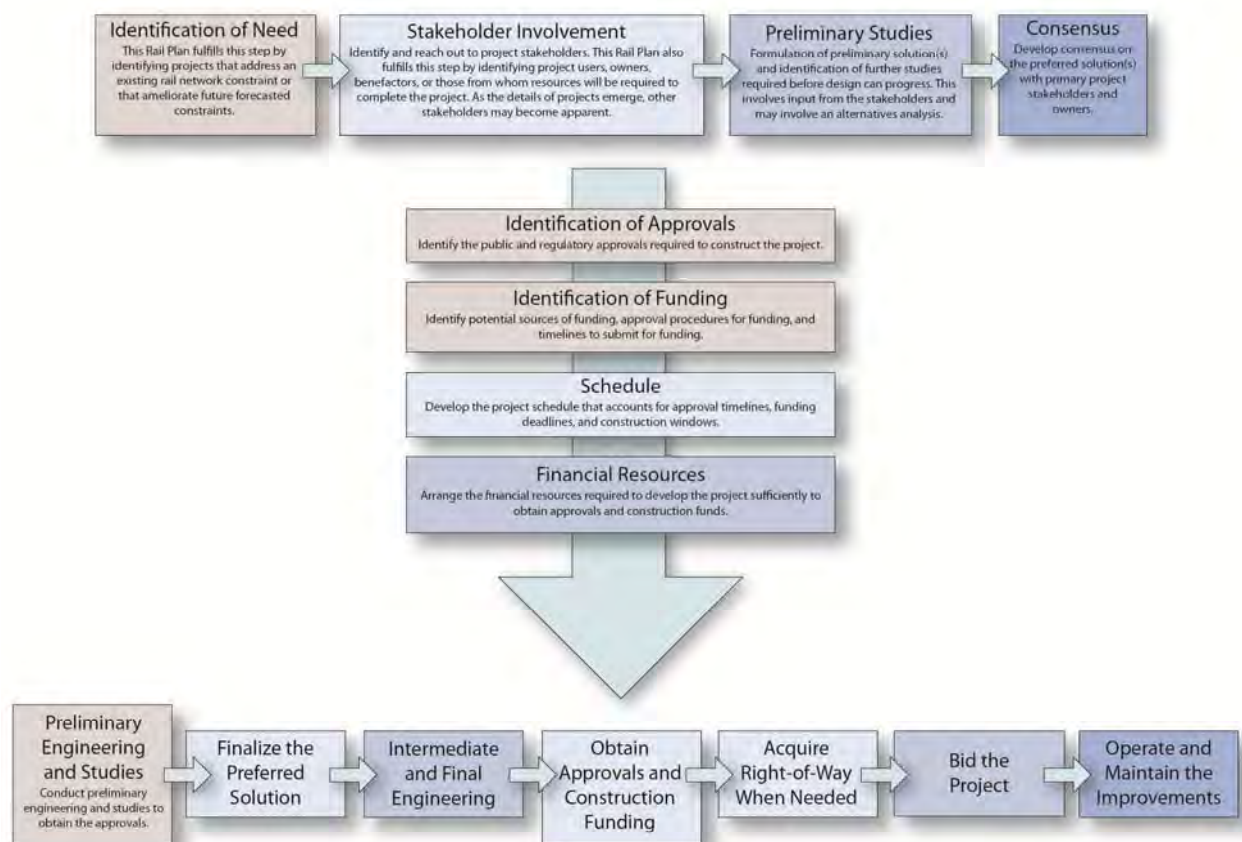
7.0 PROJECT IMPLEMENTATION

Each Rail Plan project will ultimately follow its own evolutionary pathway to implementation as no single model can consistently account for the development of all projects, even at the macro level. As project complexity grows, many processes can move in parallel (as opposed to linearly in series), causing the development to become iterative until consensus arises. Project development pathways typically grow in complexity and longevity based on:

- Number of stakeholders and/or partners;
- Overall project cost;
- Source(s) of funding;
- Mitigation requirements;
- Degree of public support or opposition.

Common to nearly all projects that require some level of public collaboration and public funding/partnering, however, is the generalized workflow (Figure 3).

Figure 3: Generalized Workflow



All of these steps inherently involve elements of public outreach, stakeholder vetting, risk identification, further detailed technical study, and possibly identification of additional interest groups. All of these factors have the potential to make any one step an iterative one. All of these factors work in parallel to add to project complexity.

While the Rail Plan does not attempt to identify the evolutionary development process for individual projects, it does address global project considerations, such as:

- Working with certain public agencies, public processes, or railroads (Section 7.1);
- Messaging, outreach, and partnering (Section 7.2);
- Partnering and Funding (with detail on federal, state, and local funding programs – Section 7.3); and
- Considerations for developing inter-related projects (Section 7.4)

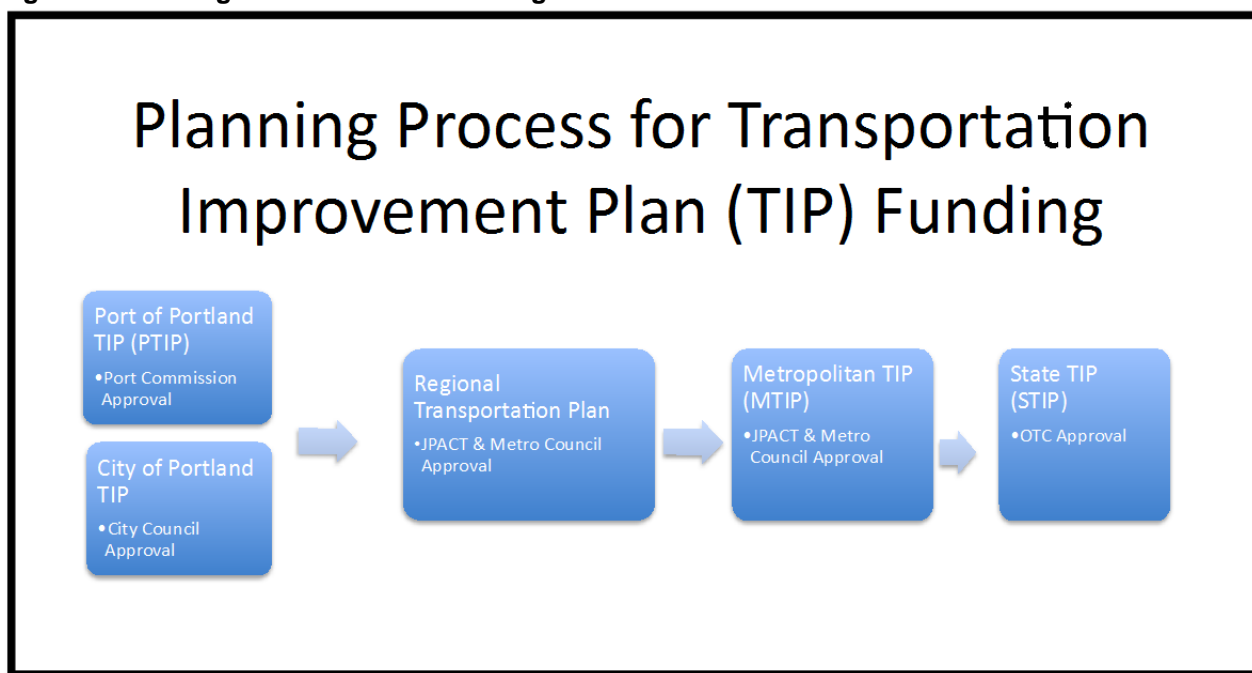
Lastly, the project implementation discussion calls for focus on ten specific Rail Plan projects in the next five years (Section 7.5). Because these projects are needed so quickly, the next steps need to be taken soon in order to implement them within that time frame.

7.1 Value of the Rail Plan Project List

Projects requiring public sources of funding are most successful when they are adopted into the public policy documents that are approved by the governing bodies which ultimately hold the keys to funding. This is often a multi-layer approval process starting at the local level and rising up to the level of that public body which approves funds for construction. Inclusion in the Port Rail Plan would be among the first steps toward ultimately constructing the improvements identified herein. The project list (and each discrete project accompanied by a purpose/need statement, a planning level cost estimate, and graphical figure) acts as a platform for presenting the projects in other public forums, calling attention to them, and elevating them to the next level of approval or policy adoption. The list allows the Port and other stakeholders to quickly respond to calls for eligible projects and demonstrates to other authorities that the projects have already been through some degree of public discourse and ratification.

The figure below shows the typical stages of public policy adoption encountered when a local project within the City of Portland aims to receive State funds for construction. Implicit but not shown are the intermediate processes such as public outreach, sub-committee work, etc.

Figure 4: Planning Process for TIP Funding



7.1.1 Beginning at the Local Level: City of Portland

Since most of the projects in the Rail Plan fall within the city limits of Portland, it is appropriate to provide discussion on working with the City to obtain approvals. Proponents for any project within City of Portland boundaries that includes elements such as street or sidewalk improvements, storm drainage or sanitary sewer extensions, or that impact public rights-of-way (e.g., at-grade road/rail crossings) will need to engage the staff at the City of Portland as early as possible. Projects that could preclude future development by the City—for example, rail or highway overcrossings or other structures that could preclude sidewalk construction or widening—would also be subject to City review, and would likely trigger requests for design accommodation.

Portland's Public Works Permitting Process provides a comprehensive point of contact for other city bureaus, including Environmental Services, Transportation and Water. Proponents should submit a Public Works Inquiry and schedule either a basic inquiry meeting (with a \$150 fee) or a more comprehensive Detailed Consultation Meeting (\$3,000 fee) to begin the permit process.⁷ This triggers a one-year clock in which to submit the required permits. The project descriptions, drawings and estimated costs comprising Appendix A of this Rail Plan provide information to use in filling out the inquiry request form. Depending on project complexity, applicants are expected to move through the process (Inquiry Meeting – 30% Concept Development – 60% Design Development – 90% Plan Review and Pre-mylar Check) to Permit Approval within about two to three years. Applicants can move through these steps at their desired pace, within maximum elapsed times established by the City. Fees are required at each step.

For its part, the City guarantees that staff will complete final plan review and permitting within 11 weeks of receiving a complete and proper submittal. Again, early engagement with the City is recommended.

⁷ Steps are outlined in detail at <http://www.portlandonline.com/index.cfm?c=53147>

7.1.2 Class 1 Railroad Project Development

For Class 1 Railroads such as BNSF and UP, when the volume of trains increase demand on existing rail capacity this demand may be met by new infrastructure, operational changes, or business strategies that redirect traffic to other lines, or a combination of all three. However, other economic, social, or regulatory changes could redirect or reduce other traffic that uses these main lines, with the result that little or no new infrastructure is required.

Implementation of the capital investments in the form of where and how much new track to construct is beyond the scope of this analysis. Generally railroads follow a four-step process to make these decisions:

1. Identify through operations simulation modeling the key congestion points on a line segment
2. Identify where it is least expensive to build or extend a second track, or extend a siding
3. Develop an operating plan and model the least expensive improvements, iteratively adding more expensive improvements if necessary, until the desired capacity is reached.
4. Where additional track is critical but prohibitively costly, use operational strategies such as fleeting or directional running to resolve the capacity bottleneck.

Railroads have numerous ways to absorb traffic increases without constructing track:

1. Change operational patterns. Large traffic volumes can often be economically absorbed by directional-running schemes (e.g., westward loaded trains running on the gentle water-level grades of the Columbia River Gorge, and eastward empty trains over Stampede Pass). Railroads can also “fleet” trains at high traffic volumes, meaning running multiple trains in one direction at once, then after they arrive, running multiple trains in the other direction.
2. Use congestion pricing to incentive low-value traffic to use longer or slower routes, or to incentive it to consolidate small shipments into large unit-train volumes that railroads can operate more efficiently.
3. Improve track quality or improve track maintenance efficiency. Train speed is limited by track quality. Railroads have frequently simply improved track quality to achieve very high capacity increases, and can often accomplish this work in a matter of months.
4. Operate longer trains or heavier trains. Railroads are investing capital into research of improved metallurgy for rails, into new detection systems that enable trains to operate at heavier weights without increased risk of damage to track, cars, or derailments, and into braking, locomotive and train-control system that permit longer trains.

7.2 Outreach and Relationship-Building for Successful Project Implementation

It is not sufficient merely to have a good project, defined project benefits and reliable cost estimates. The Port and other champions will need to work with a range of partners and the public to successfully compete for scarce investment dollars. An openly communicative and inclusive project development approach will help to avoid costly delays that may force a revisit of basic project assumptions and workflows.

Given the agency funding eligibility determination and approval processes for various funding tracks, as well as the need to gain railroad concurrence and neighborhood acceptance for many projects, the list for outreach will include:

- Businesses and business or shipper associations using rail;
- UP, BNSF, PNWR and Amtrak;
- City of Portland and ODOT Region 1;
- State DOT Rail offices (Oregon and Washington);
- Metro Councilors, JPACT and Metro MTIP staff;
- Southwest Washington Regional Transportation Council (RTC);
- Port of Vancouver;
- Neighborhood associations in areas where projects may present significant impacts;
- Other groups that will become apparent as planning for individual projects moves forward.

7.2.1 Get the Message Out: Port Rail Project Costs and Benefits

The success of the Oregon economy depends in large part on maintaining and improving a complex, intermodal freight network that includes rail as well as highway, marine and air modes. It is the superior rail connectivity found in the Portland-Vancouver greater metro area that has allowed the Port of Portland to be a player in global trade, despite its 100-mile distance from deep open waters. The degree to which the area's economy, job base, and ultimately livability depend on this connectivity is not a story that is widely known beyond those who are immediately affected by it. Thus, an important purpose of this Rail Plan is to build public awareness for improvements to the regional rail network. Each of the 29 recommended Rail Plan projects can have community values ascribed to them, such as job creation, energy efficiency, safety improvements, reduction in vehicle traffic congestion, etc. These benefits are described within the Appendix A narratives that accompany each project.

The benefits as identified should be lauded by project proponents, and the precise manner of communicating them should be tested with directly affected stakeholders and the general public, for effective messaging. Elevating public awareness of projects helps with funding (e.g., public matching funds) or building consensus for programs such as *ConnectOregon*, and for strengthening working relationships with passenger rail interests, environmental, community, and non-freight interests.

Aligning Rail Plan Project Benefits with Relevant Planning Goals: To be persuasive in local, state and regional planning bodies which have discretion over funding allocations, it is important to identify how Rail Plan project benefits align with widely accepted, over-arching public policy. Where possible, projects should demonstrate adherence to ODOT's least cost planning principles.

Several RTP goals that are used in Metro's funding decision-making process are in alignment with Port Rail Plan projects and strategy, and should be referenced when seeking public funding:

RTP Goal 2: Sustain economic competitiveness (including the reliable movement of freight and goods)

RTP Goal 6: Promote environmental stewardship (i.e., projects that reduce carbon emissions, such as those in the Rail Plan that improve the efficiency of our freight rail system)

Metro 2040 Growth Concept: Encourages efficient land use, including maximizing industrial lands with multi-modal access.

Relevant Oregon Department of Transportation (ODOT) goals that are found throughout planning and policy documents and funding programs include Oregon Highway Plan Policy 4A: Efficiency of Freight Movement and Policy 2G: Rail and Highway Compatibility. Policy and technical analysis support for some Rail Plan projects can be found in the State Rail Plan and the Statewide Freight Plan, as well.

Additionally, the policy direction of the Metro Export Initiative provides a framework to help position and advance the critical rail projects that enhance a rail-dominated Port of Portland.

The Message: The Port can use its internal resources to develop a range of materials based on the Rail Plan that can be adapted to technical audiences, community and civic groups, local governments and elected officials, and potential funding partners.

The Port and its partners should keep these messages fresh and in front of the public and decision-makers. General and technical summaries to materials should always be ready for opportunities such as speaking engagements, as the Port and its partners need to make clear repeatedly in public forums the business case for the priority projects on this list.

Messages can be built around the following themes:

Rail system investments improve the great advantage Portland's Port currently enjoys with its superior landside connections (rail in particular), so that:

- Trade increases (import and, importantly, export) by increasing the Port's attractiveness to shippers. This results in more vessel calls, more local family-wage jobs, and economic multipliers in the region and state;
- Freight mobility and access to domestic and global markets are enhanced for regionally produced goods;
- Capital investment by the private railroads is encouraged in our region; and
- Intercity passenger rail service continues to expand without impacting critical freight rail systems.

The costs of not implementing needed rail projects are high and often irreversible:

- Failure to build strategic projects will result in bottlenecks that will delay shipments, and eventually divert trade to other locales or onto other transport modes.
- Expect a loss in competitive position to other West Coast cities and ports, and an inability to retain or attract investment by businesses that drive the local economy.
- Growth in system volumes without accompanying improvements degrades public safety.

Success in this arena requires partnerships:

- Public-private partnerships for funding and implementation need to find policy and programmatic support in Oregon.
- Interagency partnerships are essential to realize the missions of transportation, land use and economic development agencies.

7.2.2 Stay in Touch with Stakeholders

Consistent and timely stakeholder contact and discussion is the foundation in project implementation. To that end, the Rail Plan implementation program includes the following recommendations:

- Establish a Project Working Group, meeting on an as needed basis, to move projects forward. An efficient process to meet with stakeholders during the first few years of the Rail Plan will allow the Port and its partners to address changes in funding programs, to incorporate and progress new projects, and to seize on new tenant, railroad, or technological development opportunities. Important studies now underway include the Port's Stormwater Master Plan and ODOT Rail's environmental and engineering work in North Portland Junction. The findings of these efforts will inform the scope and design of several Rail Plan projects.
- The Working Group could also be used to help disseminate news on project progress, and movement toward achieving Rail Plan goals. *It is recommended that, following Port staff internal discussions, a working group be called no later than late summer or early*

fall of 2013. This will give Port staff time to make informed recommendations for projects to be included in the Port TIP.

- Coordinate with Greater Portland Inc. (GPI), the region's public-private economic development organization. Since they are charged with implementation of the Metro Export Initiative's goals, including preventing loss of business to other ports, they should be enlisted in the implementation of this Rail Plan.
- Maintain an active presence and role in several groups that convene regularly to address freight mobility issues and raise awareness, including:
 - PFAC – Portland Freight Advisory Committee;
 - OFAC – Oregon Freight Advisory Committee;
 - ODOT Rail's Rail Advisory Committee;
 - ORULE – Oregon Rail Users' League. Since the STIP Stakeholder Committee includes representation from the OFAC and Oregon Ports, continued Port participation in those forums is vital to increase the chances for port rail project funding in the next STIP cycle.
- Review and early consultation between the Port and other lead agencies or permitting agencies, as well as affected railroads is crucial. This effort is repaid by avoiding wasted planning or design time, and can aid in mobilizing the railroads' own resources effectively.

7.2.3 Work with State Officials, Legislators and the Oregon Delegation

Engagement with state elected officials and the Oregon Congressional delegation is a particularly important category of "stakeholder contact." The Port of Portland works with lobbyists to inform state and federal legislators about the Port's conditions and needs, and to stay informed about relevant policy, funding and legislative initiatives.

To ensure a maximally freight-friendly (and freight *rail*-friendly) funding environment, the Port and other stakeholders should continue to collaborate and meet with the Oregon Transportation Commission as it periodically establishes funding targets for ODOT Program Areas. Port partners should work with the OTC and ODOT staff, as appropriate, on refinement of program rules on eligibility and prioritization criteria for projects that will ultimately receive State Transportation Improvement Program (STIP) Funding. Participation in the STIP Stakeholder Committee is important, as mentioned above. Maintaining connections with state legislators, their staff and committees, will help policy-makers keep port rail infrastructure needs at the top of their respective priority lists.

In the "post-earmark" era, projects that would have typically been funded via earmarks have sometimes been funded through federal grant programs. Under the current MAP-21 legislation (discussed above), PNRS grants represent the only source of funds for the freight-rail projects on the Port's list. Those focused on economic recovery (since 2008) have been very competitive. Successful projects have often benefitted from being discussed in concept and promoted by local proponents through the various levels of government, and by making effective use of contacts with the Oregon congressional delegation. This pattern will likely continue, underscoring the need for a vetted and focused list of a few well-defined projects with clear benefits, accurate cost estimates and evidence of progress with identified pre-construction planning, permitting and design work.

7.2.4 Summary of Key Implementation Factors and Steps

Table 7 shows the 29 Port Rail Plan projects, grouped by functional category. Five-year work program projects are identified by green shaded rows. The table provides a quick summary of project cost estimates, likely project champions and partners, potential funding sources, project triggers and synergies (if any) and a brief review of critical path design issues, permitting requirements and planning needs that are known as of March 2013. Refer to Appendix K for more detail on permitting requirements and additional studies likely to be needed for each project. Note that any time a project rises for regional action toward implementation, a review of all these implementation factors and requirements is called for. Conditions evolve quickly, and funding sources and opportunities are subject to change.

7.3 Partnering and Funding

Partners. Successful projects have more than performance benefits in their favor: they have champions, partners and interested stakeholders supporting them. For each project, likely project proponents are identified (see Table 7.) Partnering is also required for some funding applications, as the Port or a private railroad may not be an eligible funding recipient.

Funding. The future of traditional federal funding sources (i.e., “earmarks” or long-running programs requiring Congressional re-authorization) is unknown. Here in Oregon, constitutional restrictions on motor vehicle fees preclude spending those funds on non-roadway uses, and sales tax revenues that are used for transportation purposes in most other states are unavailable.

Creative Collaboration. In the current funding climate, the Port and its public and private partners must be creative and persistent in applying for the available funding sources. The partners must engage local, state and federal legislative and policy-making bodies at the same time to promote needed changes and expansion in funding programs for future public investment in freight-rail infrastructure. Given this environment, it may be useful for an initial brainstorm session with regional, state and federal leaders and infrastructure funding experts to determine the most appropriate funding pursuits for priority projects. This needed level of institutional cross-talk is discussed below.

7.3.1 US Department of Transportation Funding Opportunities

Over recent years, the amount of federal funding for surface transportation has not materially increased except for funding provided through the Recovery Act. At the same time, the ability for Congress to provide earmarks for specific projects has been eliminated. Congress has authorized TIGER (Transportation Investment Generating Economic Recovery), which is a competitive grant program. While federal funding has declined, the federal government has increasingly looked to prioritize limited funding with strategic national goals such as the movement of freight and goods. The current federal surface transportation program expires on September 30, 2014. While it is difficult to predict what changes will occur when surface transportation funding is reauthorized, it is likely that funding will be limited due to austerity, and it is likely that the limited funding available for freight rail projects will include more loan assistance than grant assistance. Grant assistance is likely to favor projects that demonstrate a national significance in terms of enhancing economic competitiveness, improving the flow of freight, improving safety, and leveraging substantial additional funding and/or loans.

Projects of National and Regional Significance Program (PNRS)

This federal funding program was first established under the 2005 Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) surface transportation reauthorization. The program provides federal funding for high cost projects that provided significant national or regional benefit. MAP-21 (Moving Ahead for Progress in the 21st Century Act) extended the program with some modifications by essentially merging it with the TIGER grant program and providing authorization of \$500 million for fiscal year 2013. This is the only grant program authorized under MAP-21 for which freight rail projects serving ports are eligible. Under Map-21, the Port of Portland (or for that matter any port, city, county or other local jurisdiction) would no longer be an applicant as they were under SAFETEA-LU. However, the Oregon Department of Transportation could apply for the funds and transfer them to the Port of Portland for implementation. The program emphasizes shovel ready projects that, at a minimum, have completed preliminary engineering and have significant non-federal commitment from the applicant. The statutory requirements⁸ for projects are listed below:

- (i) to generate national economic benefits, including creating jobs, expanding business opportunities, and impacting the gross domestic product;
- (ii) to reduce congestion, including impacts in the State, region, and Nation;
- (iii) to improve transportation safety, including reducing transportation accidents, injuries, and fatalities;
- (iv) to otherwise enhance the national transportation system; and
- (v) to garner support for non-Federal financial commitments and provide evidence of stable and dependable financing sources to construct, maintain, and operate the infrastructure facility;

Due to uncertainty of the federal budget at the time of the development of the Rail Plan, it may be that no federal funding is appropriated for this program. Rather, federal funds may be available through the TIGER grant program, where freight rail projects are eligible.

Funding for the PNRS (also known as the National Infrastructure Investments Program) would need to be appropriated by Congress and would be made available through a Notice of Funds Availability published in the *Federal Register*. Since the Port of Portland is not an eligible grantee they would have to seek assistance through the Oregon Department of Transportation to apply for funds for projects included in the rail plan. Further, under MAP-21 the United States Department of Transportation (US DOT) must develop a report to Congress by October 1, 2014 identifying potential projects of national significance. The Port of Portland should investigate the steps required to list rail projects in the US DOT Report as Congress may use the report to demonstrate that demand for the PNRS justifies continuation of the program beyond MAP-21.

Loan Programs

Railroad Rehabilitation and Improvement Financing (RRIF)

The Railroad Rehabilitation and Improvement Financing (RRIF) loan program⁹ was established in 1998 by Congress and amended under SAFETEA-LU in 2005. The RRIF is administered by the Federal Railroad Administration to help support the development of the U.S. rail system. The program can provide direct loans or loan guarantees from a \$35 billion pool of revolving credit. The program does not require annual appropriations, as applicants who are approved

⁸ 23 U.S.C. 101 note; 119 Stat. 1198

⁹ US DOT Federal Railroad Administration Website - [Railroad Rehabilitation & Improvement Financing http://www.fra.dot.gov/Page/P0128](http://www.fra.dot.gov/Page/P0128)

must pay their own subsidy to account for the risk of the loan as required by the Credit Reform Act of 1990.

RRIF loans may be used to pay for up to 100% of a railroad project and are paid back over a period of up to 35 years at very low interest rates (i.e., the rates are the same as US Treasury securities at the time the loan is made for the same term as the loan). As a public agency, the Port of Portland is an eligible applicant for the RRIF program. In addition to paying the credit risk premium, an applicant must also provide collateral such as a completed capital project or other assets owned by the applicant or through existing and/or future user fees.

One caveat for consideration about the RRIF program is that the application to approval process can take several years to complete. The reason for this is that while the processing period within the Federal Railroad Administration is relatively quick, the loan application must ultimately be approved by the US DOT's Federal Credit Council and by the Office of Management and Budget. While not required, most successful RRIF applicants hire an external advisor to help them prepare their application and guide them through the application process.

Transportation Infrastructure Finance and Innovation Act (TIFIA)

The Transportation Infrastructure Finance and Innovation Act was created in 1998 and greatly expanded under MAP-21 for projects that meet the following eligibility criteria¹⁰:

- credit worthiness
- facilitate projects with significant public benefits
- encourage new revenue streams with private participation
- fill capital market gaps for secondary/subordinate capital
- be a flexible, “patient” investor willing to take on investor concerns about investment horizon, liquidity, predictability and risk
- limit federal exposure by relying on market discipline

MAP-21 greatly expanded the TIFIA by increasing the amount of subsidy available to make loans and transforming it from a competitive program to a non-competitive program in which the first applications approved get funded until the funds available to subsidize the loans are exhausted. Like the RRIF program, the TIFIA program is subject to the Credit Reform Act of 1990, but unlike RRIF the credit risk is absorbed by the government through appropriated funds. The TIFIA program may fund up to 49 percent of a total eligible project using a TIFIA secured loan or 33 percent of a project using a TIFIA standby line of credit.

Under MAP-21, the use of TIFIA for rail projects was restricted to public freight rail projects and private freight rail projects which provide a direct benefit to highway users by way of a direct highway-rail freight interchange. Eligibility is also restricted to projects that are at least \$50 million in size. TIFIA debt is always subordinate to other debt, and the senior (i.e., first in priority to be paid even in the event of a shortfall) debt must be rated investment grade by two rating agencies in order for a project to be eligible for TIFIA. As with the RRIF loan program, most successful applicants for TIFIA loans use external advisors to guide them through the loan application and approval process.

¹⁰ 45 U.S.C Chapter 17, Subchapter

7.3.2 Oregon Department of Transportation (ODOT) Administered Funds

The Oregon Transportation Commission (OTC) determines how federal and state funding sources are allocated to ODOT Program areas. The OTC also determines program eligibility, consistent with any relevant federal guidelines for specific revenue sources.

State Transportation Improvement Program (STIP): The current (2015-2018) STIP cycle included projects in two categories: Enhance and Fix-It. This represents a departure from previous STIP processes, representing ODOT's efforts to allow maximum flexibility in the use of its limited funds. Projects such as the proposed grade separations could be funded under the Enhance program as it was defined this cycle.

ODOT closed applications on November 27, 2012, for the 2015-2018 STIP projects. As of this writing (September 2013) ODOT has not determined how the next cycle will be structured, but applications are likely to open again in the fall of 2014.

ConnectOregon: The *ConnectOregon* program (CO I, II, III, IV, etc.) has been hailed nationally as a model for funding non-roadway freight projects that are typically not eligible for traditional public funding sources. The Port of Portland, the Class 1 railroads, short line railroads, and several shippers have been successful over the years in funding projects that have chipped away at previous rail bottlenecks and addressed rail-served customer needs. CO applicants must make a business case for the project, as well as an economic case (jobs, economic development) for the public investment. While some project applicants have the resources to prepare the applications in-house, others have sought consultant assistance to ensure a complete and high-quality project submittal.

The CO program is authorized (or not) during each legislative session. There is no predetermined total amount, nor is there a specific amount allocated to freight rail (as opposed to other competing freight modes—barge, air, marine). Matching funds of 20% of projects costs have been required for this program in the past, and additional consideration has been provided for overmatching.

SB 247 (ConnectOregon Plus): Several bills are in development to reauthorize CO along the lines of previous programs, or to expand the program and stabilize its funding. As of this writing, the Oregon legislature is considering a possible "*ConnectOregon Plus*" program that would stabilize and make permanent the funding for CO through a continuous appropriation from the State Lottery Fund, while expanding the potential uses of that program to pedestrian, bicycle, and additional transit projects. The Port is involved in helping shape this important policy and funding initiative, but it is currently evolving and nothing is firm.

Rail Funding Task Force/Non-Roadway Funding Task Force: Rail Funding Task Force recommendations were taken up for consideration by the related state-level effort on Non-Roadway Funding Task Force. These were in turn included in a May 2012 Report to the Governor. They were a factor in the development of SB 247, *ConnectOregon Plus*, discussed above. The findings of these task forces can be an ongoing reference for future funding policy discussions that should be undertaken as part of outreach efforts.

High-Speed Intercity Passenger Rail (HSIPR): Currently, ODOT Rail is using HSIPR funds awarded in 2010¹¹ to prepare a statewide freight and passenger rail plan, and to conduct environmental clearance and preliminary design for components of PRP-20, UP: North Portland

¹¹ See http://www.oregon.gov/ODOT/RAIL/docs/passenger/fact_sheet_1_final.pdf for more detail.

Crossover Improvements. WSDOT is using its nearly \$800 million award to make improvements on the Pacific Northwest Rail Corridor, spanning the 466-mile rail corridor between Eugene, OR and Vancouver, British Columbia. Several WSDOT projects are identified in this Rail Plan.

Public funding or shared (public/railroad) funding on the I-5 north-south corridor could be warranted because increased capacity from new sidings has the main purpose of allowing faster passenger trains to pass freight trains, and thus facilitating the passenger rail plans of Oregon and Washington. There are no unallocated HSIPR funds in Oregon or Washington. However, future passenger rail funding and cooperative ventures between Washington, Oregon and the local and federal governments, might offer opportunities to fund passenger rail projects that are needed to maintain freight service quality in the plan area. If HSIPR agencies receive or become eligible for additional or new funding avenues, Rail Plan project proponents should consider them for projects that provide significant speed, operational or safety benefits to Amtrak passenger service. ODOT Rail might consider projects developed sufficiently (i.e., through environmental review and preliminary engineering) to submit to FRA for future funding. This is an area to monitor.

Oregon Transportation Infrastructure Bank (OTIB): OTIB is a statewide revolving loan fund administered by ODOT's Financial Services office.¹² Relevant to the Rail Plan, ports and private entities (among others) are eligible to borrow for highway projects such as roads, intersection improvements and bridges. Projects must be eligible for funding under Title 23 or Title 49 of the Code of Federal Regulations (CFR). Thus, for example, a grade separation must be on a major collector or higher, and open to the public. OTIB loans can cover up to 100% of the project cost. Applications are accepted at any time.

7.3.3 Local and Regional Funding

Metropolitan Transportation Improvement Program (MTIP):¹³ The MTIP is a federally required document, updated every two years, which accounts for a four-year cycle of all federal and some state transportation funds directed to defined projects in the region.

To be eligible for ODOT STIP funding, a project must first be defined with the MTIP. The STIP then incorporates regionally defined funding programs, without change, into the MTIP. The MTIP is the result of regional-level discussions and negotiations that result in projects becoming defined and listed in the Regional Transportation Plan (RTP). Within the Portland Metro region, this means a give and take among the Port, ODOT, counties and cities, as the limited amount of available funding is allocated to projects.

MTIP funds are administered by ODOT, TriMet, South Metro Area Rapid Transit (SMART), and Metro, with TriMet and SMART funding going to transit investments only. ODOT's MTIP funding has specific programs and project criteria, as described above. The bulk of the smaller amount administered by Metro is already programmed, but a modest amount remains for an important

¹² See http://www.oregon.gov/ODOT/CS/FS/docs/other/otib_des.pdf for additional detail and program contact information.

¹³ "Metro is required to prepare the MTIP document every two years and includes the scheduling of project funding over a four-year period. The MTIP is incorporated without change into the State TIP. Current programming of funds and projects is also available in the State Transportation Improvement Program." For more detail on Metro's 2012-15 MTIP (February 2012) see http://library.oregonmetro.gov/files//2012-15_mtip_appendix_updated.pdf

regional source of funds that is attractive for Port Rail Plan investments in that the funds are more flexible. In fact, they are known as the “Regional Flexible Funds.”¹⁴

For the RFF allocation of 2014-2015 funds, approximately \$23 million was allocated between two program types: Active Transportation/Complete Streets (targeting 75% of the \$23 M) and Green Economy/Freight Initiatives (targeted to receive the 25% balance of available funding). In Spring 2011, the nomination, rating and prioritization, and selection process resulted in a total of \$5,125,000 of projects allocated among Clackamas, Multnomah and Washington counties, and the City of Portland. Funding for a regional freight and passenger rail study was identified in the amount of \$400,000. This project has not yet been scoped, and since the project was originally conceived, conditions have changed. With appropriate engagement in Metro decision-making processes, it may be possible to redirect some of it to planning purposes that would advance the Port Rail Plan projects.

The current MTIP RFF cycle (2016-2018) is in process, and again includes a category for Green Economy and Freight Initiative Projects, as well as a Regional Economic Opportunity Fund. The City of Portland has advanced a project in South Rivergate¹⁵ as part of the former; the Port has partnered to advance a set of freight-related improvements in the Troutdale Reynolds Industrial Park area of East Multnomah County as part of the latter. It is uncertain how the next cycle of MTIP flexible funding will be structured.

City of Portland Funding: City transportation funding is, like that of most local governments, oversubscribed. Burdened with a large transportation system maintenance and repair backlog, the City is currently looking at more significant budget cuts and has been challenged to find even the 10% or 20% matching funds usually necessary to garner regional, state or federal monies for transportation projects.

7.3.4 Port of Portland Project Funding and Financing Capacity

The Port of Portland’s revenue sources come primarily from user fees for Port facilities (all freight modal users as well as passenger airline fees). A small amount of public moneys (approximately 8% of total revenues) are also included.

The Port has some flexibility to fund desired projects or match grants and create its own financing. As Rail Plan projects move into line for implementation, those that are Port led will become subjects of internal Port financing and funding discussions.

Port of Portland Transportation Improvement Plan (PTIP)

The Port of Portland’s Transportation Improvement Plan (PTIP) identifies the Port’s surface transportation needs over specified time periods, and is updated in December and finalized the following January of each year. These updates include project recommendations from Port staff, and are officially adopted by the Port of Portland Commission. Once adopted, the projects may then be submitted for possible inclusion as a funded or programmed project in the decision-making processes associated with the Regional Transportation Plan, the Metropolitan Transportation Improvement Plan and the State Transportation Improvement Plan (RTP, MTIP and STIP, respectively).

¹⁴ Regional Flexible Funding sources include federal Urban Surface Transportation Program (Urban STP) and Congestion Mitigation/Air Quality (CMAQ) funds.

¹⁵ The City of Portland is preparing \$3.2 S. Rivergate Freight Improvement proposal for use of Portland’s 2016-18 RFFA funding; Alternatives analysis, ITS, intersection project.

The 2012 Port TIP includes PRP-4 (Marine Drive Grade Separation), PRP-11 (Barnes Yard to T-4 Direction Connection), PRP-15 (Bonneville Yard Build-out), and PRP-21 (Kenton Line Double-Tracking).

7.3.5 Public-Private Partnerships

Public Agencies often engage in public-private partnerships (PPP's or P3's), whereby a combination of both private and public resources are brought together to construct an infrastructure project as a means of expanding the number and complexity of projects that can feasibly be delivered. In terms of the Rail Plan, a 3P can be an appropriate arrangement where (1) no one party realizes enough benefit to undertake a project by itself, or (2) a private party realizes a substantial enough benefit from public investment that some level of private funding is warranted. By identifying project benefits for different interests (main line, local/regional, port business, etc.) the project descriptions are intended to further the ability of the Ports to identify the best opportunities for those P3s. Many of the projects in the Rail Plan could be wholly or partially funded through a P3 between the Port and the benefitting private party(ies).

Any P3 will require demonstration of public need and benefit, private assessment of feasibility and risk, proper third-party due diligence to verify financial assumptions, public outreach and “buy-in” and development of a transparent process that supports a true partnership where both public and private partners are sharing risks and rewards of the partnership. It is very likely that additional economic demand estimating or forecasting would be required to support investment-grade analysis. Ultimately, the share of funding by participants comes about as a negotiation on the value of the benefits realized by each party. Both BNSF Railway and Union Pacific Railroad have participated in P3's in the past.

7.4 Considerations for Development of Inter-Related Projects

The Rail Plan projects have been ranked in terms of performance and assessed with respect to time horizon. However, some of the projects have inherent synergies that need to be taken into account, even if they differ radically in terms of their performance ranking. The two primary types of synergy are:

1. Capacity: Where one project may give rise to significant volumes of new rail traffic or increases in existing movements, another project may create the system capacity elsewhere required to deliver that rail traffic. Said another way, if the demand for rail service exists but no capacity is available to supply it, that project would be of little economic value.
2. Mitigation: Where one project may have an undesirable side effect, another project may specifically remedy that side effect.

Thus, the opportunity to co-develop projects should not be overlooked where the sum of the parts creates a greater basket of benefits than can be achieved individually. Taking advantage of these synergies may allow projects that rank lower individually to be funded and built more quickly than might otherwise be the case. Also, blending projects together may strengthen the overall eligibility for funding by aggregating benefits or offsetting costs when viewed through the classic “cost-benefit ratio” lens. Lastly, when developing a project to achieve a primary goal, adding a secondary project may expand funding possibilities by making it eligible for additional programs (i.e. eligibility due to safety benefits or multi-modalism). As a simple example, a project that gives rise to new rail traffic may exact a high economic cost in terms of vehicular delay at road crossings. Combining it with a project to build a grade separation would serve to offset that ongoing economic cost.

Specific examples of projects in the Rail Plan that exhibit these types of synergy are:

1. PRP-2 (T-4 Pier 1 Rail Improvements) and PRP-11 (UP Barnes Yard to T-4 Direct Connection) exhibit a capacity synergy. PRP-2 would aggregate developable tracts together into a single site that could potentially require high volumes of rail service. However, capacity outside T-4 to provide rail service is limited because of rail congestion between Barnes Yard and T-4. PRP-11 builds a new running track between the two that could be used to offer new rail service to a tenant on Pier 1 that would otherwise be unlikely.
2. PRP-10 (South Rivergate Rail Access 2nd Sough Bridge) exhibits a mitigation synergy with PRP-4, -6, and -7 (grade separation projects near T-6). The new rail access to T-5 from the north could substantially increase the number of slow moving trains around Marine Drive and T-6, hampering traffic on local streets and blocking access to businesses. The projects that add grade separations over the track at Marine Drive, Berth 607, and T-6 would offset the undesirable traffic delays.

7.5 The First Five Years – Ten Priority Projects

The Rail Plan particularly distinguishes an immediate 5-year work plan because the 10 projects that are needed within that time frame require their first steps to be taken quickly if they are to be implemented by the end of the five years. The results of the performance evaluation and identification of when projects are needed (see Table 6) informs as to how a project addresses specific plan goals. The projects identified as being needed in the next five years are intended to be stand-alone with no particular order of priority.

The factors that can help narrow the implementation focus include the following:

- Numerical performance ranking of the projects
- Projects that are part of a needed cluster of projects providing substantial project synergies if implemented together or in a defined sequence
- Projects that enjoy current substantial community, stakeholder or funder support;
- Projects that can take advantage of newly emerging or unanticipated funding opportunities; and
- Projects that respond to increases in system-level rail volumes, new business needs or changes in economic conditions in the region.

Considering evolving conditions, project performance and the estimated time when projects are likely to be needed, we can begin to target a smaller range of projects within the larger list, to work on project implementation in the first five years of this Rail Plan. This section provides additional explanation about the 12 projects selected for prioritization and possible implementation in the 2013-2018 timeframe. It represents a starting point where the Port and its partners should focus effort in the first five years of the Rail Plan.

The projects are listed by the four functional types:

1. **Port Access.** The top three priority projects that improve the ability of the Port's facilities to quickly and efficiently serve inbound/outbound trains from the BNSF and UP main lines near the terminals are:
 - **PRP-11 UP Barnes Yard to T-4 direct connection.** This project is a priority because it will help to accommodate a new tenant(s) as well as increase use of T-4 facilities.

- **PRP-13 Ramsey Yard utilization.** This project increases unencumbered track capacity to store a T-5 unit train intact. The project also eliminates a conflict between BNSF and UPRR trains arriving or departing T-5.
 - **PRP-15 Bonneville Yard build-out.** This project includes two additional storage tracks and double tracking from the Bonneville Yard to the end of the Barnes Yard bypass. The full benefits of the Barnes Yard bypass project would be realized with the completion of this project, including the ability to accommodate simultaneous moves from Barnes Yard to both South Rivergate (T-5) and Ramsey Yards. Unit trains destined for South Rivergate (T-5) could be staged on the Barnes Yard bypass track without affecting Barnes Yard switching or servicing of General Motors.
2. **Main Line Capacity.** The top three priority projects that improve main line capacity are:
- **PRP-8 BNSF/UP/Portland Terminal Railroad – Lake Yard Main Line Access.** Improvement increases the efficiency and speed for the BNSF and UPRR to arrive and depart trains resulting in additional BNSF north-south main line capacity. This project benefits BNSF, UP, PNWR, PTRC, and Amtrak.
 - **PRP-20 UP North Portland Crossover Improvements.** This project increases the speed at which UP trains enter or depart the heavily congested BNSF north-south main line.
 - **PRP-23 UP Main Line Realignment South of Albina (“6 mph curves”).** This project increases the speed of trains on the UP main line. This project would positively affect the majority of the UP trains to, from, and through Portland. The project will also aid in freeing up the main line for passenger trains by expediting freight trains.
3. **Port Rail Operations.** The top three priority projects that improve Port rail operations are:
- **PRP-16 T-4 Soda Ash Storage Tracks** increases the ability to store empty and loaded rail cars for bulk commodity customers at T-4. This is likely a new or existing tenant driven project as T-4 storage tracks are at capacity to support existing T-4 tenants. Given the lack of nearby UP storage, new or expanded service would require additional storage and unloading/loading tracks. The storage track to loading/unloading track ratio would be 2 to 1.
 - **PRP-1 Port of Portland Rail Terminal Maintenance and Repair Projects** improve or maintain safety and service reliability in the terminals, which allows the Port to retain existing tenants and attract new ones. These projects also allow the Port to make most effective use of valuable on-dock and near-dock rail facilities, and avoid more expensive repairs in the future. The work included in this umbrella project is listed below (See PRP-1 in Appendix A for additional detail).
 - PRP-1A: T-4 Track 701 (Cereal Foods) Rehabilitation(concurrent with or prior to PRP-2)
 - PRP-1B: T-4 Track 702 (Cereal Foods) Rehabilitation
 - PRP-1C: T-4 Track 401 (Soda Ash) Rehabilitation
 - PRP-1D: T-4 Tracks 704-709 (Cargill) Rehabilitation (driven by demand for additional railcar storage or loading/unloading)
 - PRP-1E: Swan Island Lead Track Rehabilitation
 - PRP-1F: Swan Island Lead Track: Channel Avenue Crossing Improvements
 - PRP-1G: T-4 Track 500 (McDermott Lead) Rehabilitation
 - PRP-1H: T-2 Track Rehabilitation

- **PRP-2 T-4 Pier 1 Rail Yard Improvements.** The project maximizes the size of a developable parcel on Pier 1 by relocating redundant railroad tracks. The project is given priority because there is a high demand in 2013 for developable sites on the West Coast with both marine cargo and rail access. This project should be paired with PRP-11 to create the requisite rail capacity to serve the site.
- 4. **Mitigation.** The top priority project that needs to be done as a result of current or near term increases in rail traffic is:
 - **PRP-12: North Rivergate Boulevard grade separation.** This project will mitigate increased blockage by trains of the North Rivergate Boulevard/UP at-grade crossing, generated by the recent expansion and use of T-5 tenants, including ADM, Columbia Grain, Portland Bulk Terminal (Canpotex), and Evraz. This project would improve railroad efficiency and the speed of arriving or departing trains, thus allowing for new Port business.

The other mitigation projects would be triggered by Port Rail Operations and Port Access projects and should be considered together. For example, the Marine Drive Grade Separation project (PRP-4), which grade separates Marine Drive over the BNSF lead track to Ramsey Yard and T-6 mitigates for increased blockage of the Marine Drive /BNSF at-grade crossing. The increased rail and road traffic is generated by the recent expansion at T-5 by tenants such as Columbia Grain and increased business at BNSF Rivergate Automotive Facility.

Table 7: Port of Portland Rail Plan Projects – Partnering, Funding and Project Development Summary

Project No.	Green Shading Indicates Projects included in 5-Year Work Program	CHAMPION Partners	Project Cost	Funding Options (as of 2013)	Project Triggers and Project Synergies*	Critical Path Design, Permitting, Planning Studies (See Table 5 and Appendix K for environmental permitting and additional studies detail)
IMPROVE RAIL ACCESS TO THE PORT						
PRP-10	South Rivergate Rail Access: Second Slough Bridge	PORT OF PORTLAND	\$10,840,000	<ul style="list-style-type: none"> • RRIF • Port funding • P3 	Consider building PRP-6 (T-6 Access) and PRP-7 (T-6 Berth 607 Grade Separation) before or along with this project to leverage benefits.	<ul style="list-style-type: none"> • Initiate City of Portland Public Works Inquiry meeting • Substantial permitting effort, including FCWA 404, 401 Certification • Address environmental and ROW requirements/impacts (including an electric substation, Kelly Point Park, and the Columbia Slough) • Possible Section 4(f) of USDOTA or LWCA 6(f) studies required (potentially 24 months) • Explore potential for new operating agreement between BNSF and UPRR (allowing UP to operate through N. Rivergate would improve main line capacity and thus reduce need for PRP-24 (Undoing the "X")) • Permitting – 9-24 months • Final design - 6 months • Construction - 10 months
PRP-11	UP: Barnes Yard to T-4 Direct Connection	PORT OF PORTLAND	\$4,543,000 (excluding N. Lombard St. Overcrossing, if necessary)	<ul style="list-style-type: none"> • ConnectOregon • UPRR • City of Portland (for overcrossing, if necessary) 	Project will be triggered by a new T-4 tenant.	<ul style="list-style-type: none"> • Depending on project elements, initiate City of Portland Public Works Inquiry meeting; discuss with City of Portland need for N. Lombard highway bridge replacement – coordinate with possible seismic upgrade • FCWA 401 Certification • ROW requirements • Potential archeological resource studies • Final design - six months • Construction – 12 months
PRP-13	Ramsey Yard Utilization	PORT OF PORTLAND	\$1,667,000	<ul style="list-style-type: none"> • ConnectOregon • Port funding 	Consider PRP-15 (Bonneville Yard Buildout) and PRP-12 (N. Rivergate Grade Separation) to leverage benefits.	<ul style="list-style-type: none"> • FCWA 404 • Permitting – 6 months or less (with minimal wetland fill) • Final design – 4 months • Construction – 6 months

Project No.	Green Shading Indicates Projects included in 5-Year Work Program	CHAMPION Partners PORT OF PORTLAND	Project Cost	Funding Options (as of 2013)	Project Triggers and Project Synergies*	Critical Path Design, Permitting, Planning Studies (See Table 5 and Appendix K for environmental permitting and additional studies detail)
PRP-15	Bonneville Yard Build-Out	PORT OF PORTLAND	\$3,606,000 (excluding utility relocations)	<ul style="list-style-type: none"> ConnectOregon Port funding Potential for new tenant funding partnership UPRR 		<ul style="list-style-type: none"> Initiate City of Portland Public Works Inquiry meeting Determine ROW costs and impacts for approximately 12,000 sq. ft. required from several businesses Determine need to relocate power transmission line tower on west side of Lombard overpass, and estimate cost Determine stormwater requirements ROW acquisition- 12 months or more Final design – 4 months Construction – 9 months
PRP-29	BNSF I-5 Corridor: Port of Vancouver Main Line Connection at Felida	Port of Vancouver & BNSF	\$34,161,000	<ul style="list-style-type: none"> Port of Vancouver funding 		<ul style="list-style-type: none"> Significant environmental and local permitting requirements (ESA consultation, Nationwide USACE permit) Engage BNSF to fully vet and refine project as needed Determine ROW requirements, impacts, costs Substantial additional studies Permitting – 6 – 9 months Final design – 8 months Construction – 12 months
IMPROVES MAIN LINE CAPACITY						
PRP-8	BNSF/UP/Portland Terminal Railroad – Main Line Lake Yard Access Improvement	BNSF & PTRC	\$10,805,000	<ul style="list-style-type: none"> Railroad funding City of Portland ConnectOregon 		<ul style="list-style-type: none"> No or minimal permitting Final design – including utilities (four months) Construction (six months)
PRP-20	UP: North Portland Crossover Improvements	ODOT Rail	\$23,636,000 [revise based on upcoming environmental and PE results]	<ul style="list-style-type: none"> HSIPR agencies 		<ul style="list-style-type: none"> Monitor ODOT Rail preliminary engineering and environmental analysis findings (fall 2013) Modify trackage rights agreements to access Peninsula Terminal Railroad Initiate City of Portland Public Works Inquiry meeting Determine ROW requirements Final design – 4 months Construction 6 months
PRP-23	UP Main Line: Track Realignment South of Albina (“6 MPH Curves”)	PPP (City/Metro/UPRR)	\$23,726,000	<ul style="list-style-type: none"> P3 that could include city, county, regional government, railroads, HISPR and private developers 		<ul style="list-style-type: none"> Initiate City of Portland Public Works Inquiry meeting Permitting – 6 months or less (if no ESA-listed species) Final design – 6 months (track realignment only) Construction – 10 months (track realignment only)

Project No.	Green Shading Indicates Projects included in 5-Year Work Program	CHAMPION Partners	Project Cost	Funding Options (as of 2013)	Project Triggers and Project Synergies*	Critical Path Design, Permitting, Planning Studies (See Table 5 and Appendix K for environmental permitting and additional studies detail)
PRP-24	UP North Portland: Undoing the "X" (Option 1)	PORT OF PORTLAND BNSF/UPRR/ Amtrak/HSIPR	\$33,598,000	<ul style="list-style-type: none"> P3 with railroads and Port, possible partnering with major shippers 	Consider PRP-19 (BNSF Increased Speed Over River Bridges) and PRP-20 (North Portland Crossover Improvements) to leverage benefits	<ul style="list-style-type: none"> Initiate City of Portland Public Works Inquiry meeting Moderate level of environmental and local permitting ROW acquisition Permitting - 6-9 months Final design - 8 months Construction - 12 months
PRP-27	BNSF I-5 Corridor: BNSF/PSAP Centralia Connection (3 rd Main, Depot, and Pedestrian Overpass)	WSDOT BNSF	\$15,250,000	<ul style="list-style-type: none"> WSDOT HSRIP funding 		<ul style="list-style-type: none"> Significant environmental and local permitting ROW - to be determined Permitting could require 9-24 months Final design - 4 months Construction - 6 months
PRP-19	BNSF: Increased Speed Over the Willamette and Columbia River Bridges	BNSF	\$10,751,000	<ul style="list-style-type: none"> Potential P3 with BNSF, Amtrak, HSIPR agencies (WSDOT/ODOT) 	Consider PRP 20 (North Portland Crossover Improvements) to leverage benefits	<ul style="list-style-type: none"> Refine project scope and design Initiate City of Portland Public Works Inquiry meeting Determine if project could be classified as railroad maintenance; if so, Final design - 6 months Construction - 9 months
PRP-21	UP Kenton Line: Completing Double Track from North Portland to Troutdale and Train Crew Change-Out Improvements	UPRR	\$139,166,000	<ul style="list-style-type: none"> Railroad funding 	Consider PRP-19 (BNSF: Increased Speed Over River Bridges), PRP-20 (UP N. Portland Crossover Improvements) and PRP-9 (Columbia Blvd. Grade Separation) to leverage benefits.	<ul style="list-style-type: none"> Advance work: engage neighborhoods and planning agencies to reduce potential for more land use conflict, by limiting incompatible uses along the alignment Substantial community outreach and coordination with cities, counties, ODOT on treatment of at-grade highway/rail crossings Determine if/how much ROW is required Possible Archaeological Excavation Permit Permitting - 9-24 months without EIS Final design - 12 months Construction - 24 months

Project No.	Green Shading Indicates Projects included in 5-Year Work Program	CHAMPION Partners	Project Cost	Funding Options (as of 2013)	Project Triggers and Project Synergies*	Critical Path Design, Permitting, Planning Studies (See Table 5 and Appendix K for environmental permitting and additional studies detail)
PRP-28	BNSF Fallbridge Line: Completing Double Tracking - Vancouver to Washougal	BNSF	\$72,576,000	<ul style="list-style-type: none"> BNSF 		<ul style="list-style-type: none"> Advance work: engage neighborhoods and planning agencies to reduce potential for more land use conflict, by limiting incompatible uses along the alignment Significant environmental and local permitting, including ESA consultation, Individual USACE permit Substantial community outreach and coordination with cities, counties, WSDOT on treatment of at-grade highway/rail crossings Permitting – 9 – 24 months Final design – 10 months Construction – 24 months
PRP-26	BNSF I-5 Corridor: WSDOT Projects between Longview and Kalama	WSDOT & BNSF	\$78,462,000	<ul style="list-style-type: none"> WSDOT/HSIPR agencies 		<ul style="list-style-type: none"> Significant level of permitting required. Monitor ongoing WSDOT-led environmental clearance as part of its high-speed rail program Permitting – 6 months (with no wetlands impacts); 9-24 months with ESA consultation and Individual USACE permit Final design -10 months Construction – 24 months
PRP-25	BNSF I-5 Corridor: Rye Junction Improvements	BNSF	\$9,552,000	<ul style="list-style-type: none"> BNSF 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Revisit Clark County design and assessment of permitting/review requirements Permitting – 9-24 months Final design – 6 months Construction – 9 months
PRP-3	Peninsula Terminal Railroad: BNSF/PT Rail Connection at Suttle Road	PORT OF PORTLAND (if benefits to Port)	\$2,588,000	<ul style="list-style-type: none"> P3 Railroad funding 	Consider PRP-3 (BNSF/PT Rail Connection at Suttle Road) to leverage additional benefits	<ul style="list-style-type: none"> Need to assess costs and extent of ROW, property impacts, utility relocation, stormwater conveyance and treatment Permitting – 6-9 months (with No Effects to ESA species determination) Final design (four months) – costs not included in estimate
IMPROVES PORT OPERATIONS						
PRP-1	Port of Portland Rail Terminal Maintenance and Repair Projects	PORT OF PORTLAND Tenants	1A: \$251,000 1B: \$150,000 1C: \$98,000 1D: \$450,000 1E: \$404,000 1F: \$293,000 1G: \$403,000 1H: \$2,629,000	<ul style="list-style-type: none"> Port funding Tenant funding P3s (Port/tenant) 	Project 1A should be done prior to or concurrently with PRP-02.	<ul style="list-style-type: none"> Low or no clearance required if it is a railroad maintenance project. Periodic inspections of track and facilities Construction for identified projects – one month

Project No.	Green Shading Indicates Projects included in 5-Year Work Program	CHAMPION Partners	Project Cost	Funding Options (as of 2013)	Project Triggers and Project Synergies*	Critical Path Design, Permitting, Planning Studies (See Table 5 and Appendix K for environmental permitting and additional studies detail)
PRP-2	T-4 Pier 1 Rail Yard Improvements	PORT OF PORTLAND	\$248,000	<ul style="list-style-type: none"> Port funding ConnectOregon 	•	<ul style="list-style-type: none"> Federal CWA 401 Certification Permitting – 6 months or less Phase I – Final Design (two months) Phase I – Construction (three months, including bidding)
PRP-5	Port of Portland Pave Unpaved Area at T-6 Intermodal Yard	TENANT Port of Portland	\$4,531,000	<ul style="list-style-type: none"> P3 between Port and tenant(s) 	•	<ul style="list-style-type: none"> Determine extent of stormwater conveyance and treatment (refer to Port's Stormwater Master Plan, in process now) Initiate City of Portland Public Works Inquiry meeting Final design (1 month) Construction (6 months or less)
PRP-16	T-4 Soda Ash Storage Tracks	PORT OF PORTLAND	\$4,112,200	<ul style="list-style-type: none"> Port funding Possible tenant co-funding ConnectOregon 	•	<ul style="list-style-type: none"> Initiate City of Portland Public Works Inquiry meeting Local environmental permitting (modest level of effort) Final design – 3 months Construction – 5 months
PRP-17	West Hayden Island Main Line Access	PORT OF PORTLAND	\$911,000	<ul style="list-style-type: none"> Port funding BNSF funding Private developers P3s RRIF MTIP Economic Opportunity Funds (if continued) 	Trigger: Contingent on successful annexation of WHI by City of Portland	<ul style="list-style-type: none"> Contingent on successful annexation of WHI by City of Portland Coordinate with BNSF: ROW would be folded in to development and permitting of WHI marine terminal; possible BNSF ROW required Coordinate with both railroads regarding possible UPRR access to the new terminal Initiate City of Portland Public Works Inquiry meeting Moderate permitting requirements (ESA Section 7 Consultation, Oregon Wetlands and Waters Removal-Fill Permit, Archaeological Excavation, Floodplain Permitting – 6 months Final design – 6 months Construction – 12 months

Project No.	Green Shading Indicates Projects included in 5-Year Work Program	CHAMPION Partners	Project Cost	Funding Options (as of 2013)	Project Triggers and Project Synergies*	Critical Path Design, Permitting, Planning Studies (See Table 5 and Appendix K for environmental permitting and additional studies detail)
PRP-18	West Hayden Island Unit Train Loops	PORT OF PORTLAND	\$9,702,000	<ul style="list-style-type: none"> Port funding BNSF funding Private developers P3s RRIF 	Trigger: Contingent on successful annexation of WHI by City of Portland Consider PRP-17 (WHI Main Line Access) and PRP-19 (BNSF: Increased Speed over River Bridges) to leverage benefits.	<ul style="list-style-type: none"> Coordinate with BNSF: ROW would be folded in to development and permitting of WHI marine terminal; possible BNSF ROW required Coordinate with both railroads regarding possible UPRR access to the new terminal Initiate City of Portland Public Works Inquiry meeting Significant environmental and local permitting Permitting –9-24 months Final design – 6 months Construction – 8 months
PRP-22	T-2 Track Reconfiguration & Siding	Port of Portland	\$8,920,000	<ul style="list-style-type: none"> Port funding Tenant funding P3 (Port/tenant) ConnectOregon 		<ul style="list-style-type: none"> Initiate City of Portland Public Works Inquiry meeting Final design – 6 months Construction – 12 months
MITIGATION PROJECTS						
PRP-4	Port of Portland Marine Drive Grade Separation Project	PORT OF PORTLAND	TO BE DEVELOPED -\$10- 15 M	<ul style="list-style-type: none"> Port funding City of Portland STIP 	Trigger: added rail volumes or capacity in South Rivergate resulting in more BNSF trains crossing Marine Dr.	<ul style="list-style-type: none"> Initiate City of Portland Public Works Inquiry meeting Final design- 8 months Construction-12 months
PRP-6	Port of Portland T-6 Access Improvement	PORT OF PORTLAND	\$17,302,000 (Access Alternative 3)	<ul style="list-style-type: none"> Port funding City of Portland funding MTIP 	Trigger: PRP-10, (Second Slough Bridge)	<ul style="list-style-type: none"> Should precede PRP-10 (Second Slough Bridge) if that goes forward Initiate City of Portland Public Works Inquiry meeting Review and update the 2008 Alternatives Report to select and refine a preferred access alternative, and frontage road alignment, and best design option for Marine Dr./Bybee Lake Rd intersection Determine impacts to public ROW and Port property Final design (6 months) Construction (12 months)

Project No.	Green Shading Indicates Projects included in 5-Year Work Program	CHAMPION Partners	Project Cost	Funding Options (as of 2013)	Project Triggers and Project Synergies*	Critical Path Design, Permitting, Planning Studies (See Table 5 and Appendix K for environmental permitting and additional studies detail)
PRP-7	Port of Portland T-6 Berth 607 Grade Separation	PORT OF PORTLAND	\$3,766,000	<ul style="list-style-type: none"> Port funding Tenant funding P3 (Port/tenant) 	Trigger: Increased level of rail traffic and/or shipping activity	<ul style="list-style-type: none"> Federal CWA 401 Certification Determine extent of utility relocation: South of tracks may include gas, water, sanitary and storm sewer, underground and overhead electric and telecommunication lines, lighting. Electric line and yard lighting relocation may be required north of the tracks. Conduct geotechnical exploration to establish foundation type Initiate City of Portland Public Works Inquiry meeting Final design (6 months) Construction (12 months)
PRP-9	Columbia Boulevard Grade Separation Project (Raise Columbia Blvd. over UPRR at Penn Jct.)	CITY OF PORTLAND Consortium of area businesses/shippers	\$28,935,000	<ul style="list-style-type: none"> MTIP/STIP Possible P3 could include City of Portland, area freight/industrial stakeholders, regional and state funding, possibly UPRR 		<ul style="list-style-type: none"> Consult UPRR Initiate City of Portland Public Works Inquiry meeting Endangered Species Act Consultation; Archaeological Excavation Permit Final design (5 months) Construction (10 months)
PRP-12	North Rivergate Boulevard Grade Separation	CITY OF PORTLAND & PORT OF PORTLAND	\$10,294,000 (includes bridge and utilities)	<ul style="list-style-type: none"> MTIP/STIP Funding 	Roadway traffic on North Ramsey Boulevard should be monitored for vehicle delay due to expanding unit train operations in the area.	<ul style="list-style-type: none"> Initiate City of Portland Public Works Inquiry meeting Assess ROW costs – 4,362 sq. ft. of Port and private property Permitting – 6 months or less Final design – 9 months Construction - 8 months
PRP-14	Cathedral Park Quiet Zone and Track Improvements	City of Portland Metro	\$3,639,000	<ul style="list-style-type: none"> ConnectOregon Metro MTIP 	Neighborhood support, likely due in part to increased conflicts between train movements and roadway, pedestrian and bicycle users will trigger this project.	<ul style="list-style-type: none"> Initiate City of Portland Public Works Inquiry meeting ODOT Rail/Federal Rail Administration review ROW impacts and street vacation Final design – 4 months Construction - 6 months

This page is intentionally blank.

8.0 REFERENCES

Additional technical references supporting project development are identified within each project description in Appendix A.

Brookings Institution, 2012

Greater Portland Export Plan: Metro Export Initiative, The Brookings Institutions, Metropolitan Policy Program, 2012

City of Portland, 2012.

North Portland Rail Analysis Summary of Existing Studies, Bureau of Planning and Sustainability, 2012.

City of Portland, 2012.

West Hayden Island Final Report, Worley Parsons, March 2, 2012.

City of Portland, 2006.

City of Portland Freight Master Plan, City of Portland Office of Transportation, Adopted May 10, 2006.

Metro, 2010

Metro Regional Freight Plan, June 2010.

Non-Roadway Transportation Working Group, 2012

Report to the Governor, Final Report, Economic & Planning Systems, Inc. and Smart Growth America, May 24, 2012.

Oregon Department of Transportation, 2011.

Oregon Rail Needs and Potential Funding Sources Memo, Cambridge Systematics, 2011.

Oregon Department of Transportation, 2011.

Oregon Potential Rail Funding Sources Technical Analysis, Cambridge Systematics, 2011.

Oregon Department of Transportation, 2011.

Oregon Rail Funding Task Force Final Recommendations, Cambridge Systematics, 2011.

Oregon Department of Transportation, 2010.

Oregon Rail Study, Oregon Department of Transportation Rail Division, 2010.

Oregon Department of Transportation, 2010.

ConnectOregon III Application Package – Peninsula Terminal Co. Suttle Road rail upgrade, May 2010.

Port of Portland, 2012.

South Rivergate North Ramsey Boulevard/North Rivergate Boulevard Grade Separation Type, Size and Location Memorandum, HDR Engineering, June 2012.

Port of Portland, 2009.

Terminal 4 Pier 1 Facility Plan, TEC, Inc., March 2009.

Port of Portland. 2008.

St. Johns – Cathedral Park Quiet Zone Project Description, 2008.

- Port of Portland. 2008.
Stuttle Road Improvement Options- Draft Report, Parametrix, March 2008.
- Port of Portland. 2008.
Terminal 6 Access Improvement Alternatives – Final Report, Parametrix, March 2008.
- Port of Portland, 2008.
T6 Analysis – Draft Executive Summary, Main Line Management, 2006.
- Port of Portland. 2007.
Cathedral Park “Whistle Free Zone” Strategic Options – Final Report, Parametrix, December 2007.
- Port of Portland, 2006.
Honda Facility Rail Overpass Bridge, Type, Size and Location Study, Berger/Abam, April 2006.
- Port of Portland, 2006.
T-6 Honda Overcrossing Budget Estimate, Port staff worksheet, May 28, 2006.
- Port of Portland. 2005.
Cathedral Park Train Horn Noise Mitigation Study, HDR, Inc., June 2005.
- Port of Portland. 2003.
Marine Terminal Master Plan 2020, Volume 4 Alternatives—Final Draft, PB Ports & Marine, Inc., March 2003.
- Portland/Vancouver I-5 Trade and Transportation Partnership, 2003.
I-5 Rail Capacity Study, HDR, February 2003.
- Southwest Washington Regional Transportation Council, 2010.
Clark County Freight Mobility Study Tech Memo 4B, Recommended Regional Actions, RTC, 2010.
- Washington State Department of Transportation, 2009.
Washington State 2010-2030 Freight Rail Plan, WSDOT State Rail and Marine Office, December, 2009.
- Washington State Department of Transportation, 2008.
Washington State Amtrak Cascades Mid-Range Plan, WSDOT State Rail and Marine Office, December 2008.
- Washington State Department of Transportation, 2006.
Washington State Long-Range Plan for Amtrak Cascades, WSDOT Freight Systems Division, February 2006.
- Washington State Transportation Commission, 2006.
Statewide Rail Capacity and System Needs – Final Report, Cambridge Systematics/HDR, December 2006.
- West Coast Corridor Coalition, 2008.
Trade and Transportation Study, Cambridge Systematics/HDR, 2008.

Appendix A: Project Descriptions, Costs and Associated Maps

PRP-1. Port of Portland Rail Terminal Maintenance and Repair Projects – Summary of Factors

Project Description	<p>This project consists of several individual sub-projects that can be classified as heavy maintenance activities as opposed to building new capital infrastructure. The sub-projects are likely to fall outside the Port's normal rail maintenance operating budget. The track infrastructure at Terminals 2 and 4 and Swan Island were evaluated. Terminals 5 and 6 were not evaluated owing to the fact that the capital-intensive efforts in recent years to build out rail service at these terminals has resulted in a good functioning physical plant that adequately meets the needs of rail service. The sub-projects were identified based on the information contained in the <i>Rail Infrastructure Existing Conditions Report</i> in Appendix C.</p> <p>The intention is to identify opportunities to rehabilitate existing rail infrastructure to ensure that:</p> <ul style="list-style-type: none">• Port rail facilities continue to suitably serve existing rail customers and existing rail traffic patterns;• The Port can broaden the range of possible products and railcars handled at the terminals to respond to future demand;• Increased volumes of railcars can be reliably handled at the terminals in response to future demand. <p>The primary evaluation factors were:</p> <ul style="list-style-type: none">• Deteriorating track conditions that threaten safe, reliable service for existing rail traffic;• Maintenance conditions that generally do not meet FRA Class 1 track standards which would limit the number of hazardous material railcars that can be handled by one train (and hence limit the possible range and volume of product);• Excessively tight curvature that would limit the length of railcars;• Side and overhead clearance impairments that would limit movement of rail cars;• Old, light-weight track infrastructure that would not be able to accommodate a significant increase in rail traffic given modern rail car weights and lengths.• Conditions at public roadway-railroad crossings that warrant improvement
Local Benefit	Safety and service reliability in the terminals will be improved.
Regional Benefit	Maintains the reliability of Port-area rail infrastructure, which helps retain existing tenants and attract new tenants.
Main Line Capacity	Project does not impact main line capacity.
Project Development Status	<p>Environmental Clearance: Low to no clearance required so long as project is classified as a railroad maintenance project.</p> <p>Right-of-Way: None required.</p> <p>Final Design: Project requires no final design.</p> <p>Construction: Construction could be completed in 1 month.</p>
Class I Competition Maintains or Increases	The competitive balance between Class 1 carriers will be unaffected. There are maintenance recommendations for track operated by each railroad.

Port of Portland Rail Plan: Project Descriptions

PRP-1A: T-4 Track 701 (Cereal Foods) Rehabilitation - \$251,000

Track 701 has a segment of track about 1,150' in length composed of light rail ("90RA" rail) in poor condition that should be addressed in order to support safe and reliable railcar delivery to Cereal Foods. The majority of railcars bound for Cereal Foods move on Track 701. A significant amount of the rail has little remaining head thickness or exhibits heavy curve wear. The ballast rock is 100% fouled due to the adjacent access road shedding rainwater and sediment directly onto the track. The rails have poor surface and line (that is, constant gage between rails, deviation from true cross-level, and deviation from a true straight line). One rail had a vertical split head crack longer than 2". At rail joints, gage-side and head mis-match between rails is common. Several rail joints were unsupported (meaning no crosstie effectively holds up the joint). One center-cracked joint bar was noted, a condition requiring replacement per the FRA.

Recommendations:

1. Replace ~1,150 feet of light rails with a minimum of 115RE rail;
2. Raise ~700 feet of track with a minimum of 4" of ballast to elevate track out of mud;
3. Install a timber plank crossing on the east side of the Cereal Foods facility to replace the mud/rock crossing currently used;
4. Examine ways to re-direct stormwater and sediment from the adjacent road that fouls the ballast rock

Note: Project should be done prior to or concurrently with PRP-02.

PRP-1B: T-4 Track 702 (Cereal Foods) Rehabilitation - \$150,000

Track 702 also serves Cereal Foods, although it appears the majority of rail cars are spotted to track 701. Track 702 consists of very light 75-lb rail. It travels through a narrow passage between vertical storage bins to the Cereal Foods flour mill. There is a track switch within the flour mill for two very short stub tracks used for spotting railcars. Due to age and small size, this rail is generally unfit to bear modern railcars weighing up to 286,000 lbs. PRP-02 calls for the re-routing of this track by shifting it to come off of Track 701 on a new alignment. This would still, however, leave a 300' segment of light duty track in place between the vertical storage bins and the flour mill, as well as a lightweight track switch. This segment should be replaced with heavier rail and new ties in conjunction with PRP-02. If the realignment of Track 702 via PRP-02 does not occur, then the entire 1,400' run of light rail should be replaced along with a high percentage of crossties.

PRP-1C: T-4 Track 401 (Soda Ash) Rehabilitation - \$98,000

Although the soda ash yard was recently reconstructed, a ~500' portion of Track 401 (outbound empty soda ash cars) was left as 90-lb rail. While the track structure is in good condition generally and the 90-lb rail will hold up in the near future, the replacement of the lighter rail with at least 115RE should be programmed in a 5-year time horizon.

PRP-1D: T-4 Tracks 704-709 (Cargill) Rehabilitation - \$450,000

Most of the yard is currently unused, except for a small amount of railcar storage for International Raw Materials (IRM). Tracks 708 and 709 are out of service due to track switches out of service at both the east and west ends. The majority of the rail in the body of the yard is 90-lb, while the lead track at the east end is 132-lb rail. A number of the switch frogs have had heavy welding repairs made in the past, suggesting that they are near the end of their service lives. At least one center-cracked joint bar was noted, indicating there are likely more present. To keep the yard functioning as a lightly used railcar storage facility and to restore use to the out-of-service tracks, the following is recommended:

- Replace 2,000 timber crossties
- Service 250 rail joints
- Surface, line, and dress 6,400' of track
- Recondition twelve 90-lb turnouts (welding repairs, re-gaging, tightening fasteners, etc.)
- Replace missing turnout components (notably a 90-lb frog and a switch point)

Notes:

- The project is scalable in order to re-furbish only those tracks that are required for railcar storage. To find the rehabilitation cost per track as an order of magnitude, divide the total project cost by the number of tracks (\$450K / 6 = \$75K).
- If use of the facility expands to regularly-scheduled, high-tonnage rail service, a complete track reconstruction project will be required. This would also be likely to drive a change in the configuration of the yard tracks.

Port of Portland Rail Plan: Project Descriptions

PRP-1E: Swan Island Lead Track Rehabilitation - \$404,000

The Swan Island Lead is approximately 2.2 miles in length, running from UP's Albina Yard west to the end of Swan Island along North Channel Avenue. There is one customer that uses its own TrackMobile to move rail tank cars the full length of the Island to its facility at Shipyard Commerce Center. The track consists mostly of 90-lb rail in a tight envelope, closely surrounded by buildings, Channel Avenue, and tree canopy. The track is nearly 100% encased in either mud/rock or in asphalt and only the heads of the rails are visible. There is no ability for the track to drain away stormwater and leaf fall blankets the track each autumn. It is quite likely that a high percentage of the crossties are failing and that the track is somewhat held in place by mud, rock, and asphalt. Very light use over the last few decades has likely allowed the track to hold up relatively well. However, the time horizon for intensive maintenance is approaching in the next few years. Assuming that the demand for railcars on the Island remains relatively low, the 90-lb rail will likely suffice for a number of years to come. However, an intensive program of tie replacement, surfacing, lining, joint servicing, and tamping is recommended. Most of the track switches along the lead, many of which are for long-disused spurs, should be removed. Spreading gage width between the rails at many joint locations indicates that ties and spikes are no longer holding fast. The very high frequency of asphalt driveway crossings and the tight corridor envelope will tend to complicate and slow down rehabilitation work.

Recommendations:

1. Replace at least 2,000 timber crossties (25% total replacement);
2. Remove 5 track switches;
3. Cut back the vegetation canopy to improve side/overhead clearance and reduce leaf fall;
4. Uncover the tops of the crossties;
5. Surface, line, and dress the Lead track;
6. If the demand for rail service rose significantly in the future, then the 90-lb rail should be upgraded to a minimum of 115-lb.

PRP-1F: Swan Island Lead Track: Channel Avenue Crossing Improvements - \$293,000

The Swan Island Lead Track crosses North Channel Avenue three times as it switches sides of the road back and forth several times. North Channel Avenue is an eastbound one-way arterial street that serves as the primary egress route from the Island to all other points in Portland and has heavy P.M. peak traffic flows. It is a wide 3-lane roadway where cars were observed to move at speeds between 35 and 50 m.p.h., despite the posted speed. Two of the rail-road crossings warrant improvements.

Channel Avenue near Anchor Street:

The rail crossing is at a high skew relative to Channel Avenue. The length of the track in the street is ~260'. Both the road and the track are curving within the crossing. The surface of the crossing is paved in asphalt with guard rails (such that one sees a total of four rails in the pavement). The asphalt surface surrounding the rails is rough, with significant cracks and gapping developing along the rails. The amount of steel in the crossing surface makes the crossing slick when wet. The crossing should be rehabilitated by:

- Replacing the light 90-lb rail with 115-lb rail or greater
- Installing concrete crossing panels
- 100% replacement of wood crossties under the crossings
- Weld all rails joints that fall within the crossing

Channel Avenue near Dolphin Street:

The rail crossing is also at a high skew relative to Channel Avenue. The length of the track in the street is ~140'. The track curves within the crossing. The surface of the crossing is paved in asphalt with guard rails (such that one sees a total of four rails in the pavement). The asphalt surface surrounding the rails is very rough, with significant cracks and large voids in the asphalt developing along the rails. The guard rails are loose and bounce significantly underneath light vehicles. Standing water is visible at the base of the rails. It is likely that the wood crossties are almost entirely broken up. The crossing should be rehabilitated by:

- Replacing the light 90-lb rail with 115-lb rail or greater
- Installing concrete crossing panels
- 100% replacement of wood crossties under the crossings
- Weld all rails joints that fall within the crossing

Port of Portland Rail Plan: Project Descriptions

PRP-1G: T-4 Track 500 (McDermott Lead) Rehabilitation - \$403,000

McDermott Lead begins at the UP Saint Johns Lead near the Toyota “hill” crossing, proceeds northbound across North Terminal Road, continues north in between that road and the soda ash rail yard, and ties into track 122 at the north end of that rail yard, just before North Terminal Road crosses the tracks. McDermott Lead is owned by the Port, but leased to Union Pacific. The track is mostly 90-lb rail with decent tie and surface/line condition. The crossing of North Terminal Road near Toyota, ~425’ of track, was reconstructed with 136-lb rail and concrete cross ties. To continue effectively serving rail traffic given modern weight and lengths of rolling stock, the remainder of the rail (~1,600’) should be upgraded as conditions and traffic levels warrant. To keep craftsmanship and materials consistent with the segment already upgraded, 136-lb rail on concrete cross ties would be required. One track switch for a spur to the Gearlocker building would also need replacement.

PRP-1H: T-2 Track Rehabilitation - \$2,629,000

Portions of the track infrastructure within Terminal 2 require rehabilitation in the near term to ensure safe and reliable rail service for break-bulk and transload operations at the terminal. The rehabilitation effort should focus primarily on the tracks and turnouts in the south half of the terminal, which includes the stub-ended storage tracks and the primary lead track into the facility. Tracks along the berths and in the north half of the terminal are generally in fair condition with some minor work needed. The following is recommended:

- Reconstruct 325’ of the southerly lead track from where it departs the BNSF to the crossing of Naito Parkway with all new ties and heavy rail. Lift this section on 4" of new ballast rock;
- Replace the 3 No. 9 turnouts near the southerly rail gate with new, heavy rail turnouts;
- Replace ~ 2,575 feet of light-duty track with heavy rail. The track should be installed using a “bath tub” style concrete panel system that obviates the need for cross ties. Cross ties are undesirable where the track is poorly drained and fully embedded in pavement;
- Remove a No. 9 turnout and a 170’ spur track that is of limited use at the southerly end of the terminal;
- Repair rail expansion joints where the northerly half of the balloon tracks transitions from the concrete pad to asphalt;
- Resurface, line, and gage ~40’ of track embedded in asphalt at the same location to correct conditions noted Rail Infrastructure Existing Conditions Report in Appendix C;
- Make welding repairs to the cracked crane-rail/tee-rail frog as noted in the Rail Infrastructure Existing Conditions Report in Appendix C. It is recommended that one of these frogs be removed from the track and fully inspected to determine the severity of the wheel flange ruts in the body of the casting. A monitoring and repair/replacement schedule for all such frogs should be developed based on the findings.

Note: Although the balloon track of Terminal 2 does have fairly tight curvature versus modern railroad standards, broadening the curvature as part of a maintenance project is unlikely because it would require substantial re-configuration of the tracks within Terminal 2. PRP-22 is a project that proposes a complete reconfiguration of the tracks within the terminal for new rail service, if the need came to pass.

Port of Portland Rail Plan: Project Descriptions

PRP 1A - PRELIMINARY CONSTRUCTION COST ESTIMATE - FEB 2013

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	SUB TOTAL
1.0 General				
1.01 Right-of-Way Impacts/Property Acquisition		Acre		\$ -
1.02 Environmental Permitting		LS		\$ -
2.0 Civil & Track Work				
2.01 Replace Track	1150	TF	\$ 150	\$ 172,500
2.02 Raise Track	700	TF	\$ 18	\$ 12,600
2.03 Timber Crossing	1	EA	\$ 8,000	\$ 8,000

Subtotal	\$	193,100
Contingency	30%	\$ 57,930
TOTAL	\$	251,030

PRP 1B - PRELIMINARY CONSTRUCTION COST ESTIMATE - FEB 2013

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	SUB TOTAL
1.0 General				
1.01 Right-of-Way Impacts/Property Acquisition		Acre		\$ -
1.02 Environmental Permitting		LS		\$ -
2.0 Civil & Track Work				
2.01 Replace Track	300	TF	\$ 150	\$ 45,000
2.02 Turnout #9, hand thrown	1	EA	\$ 70,000	\$ 70,000

Subtotal	\$	115,000
Contingency	30%	\$ 34,500
TOTAL	\$	149,500

PRP 1C - PRELIMINARY CONSTRUCTION COST ESTIMATE - FEB 2013

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	SUB TOTAL
1.0 General				
1.01 Right-of-Way Impacts/Property Acquisition		Acre		\$ -
1.02 Environmental Permitting		LS		\$ -
2.0 Civil & Track Work				
2.01 Replace Track	500	TF	\$ 150	\$ 75,000

Subtotal	\$	75,000
Contingency	30%	\$ 22,500
TOTAL	\$	97,500

Port of Portland Rail Plan: Project Descriptions

PRP 1D - PRELIMINARY CONSTRUCTION COST ESTIMATE - FEB 2013

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	SUB TOTAL
1.0 General				
1.01 Right-of-Way Impacts/Property Acquisition		Acre		\$ -
1.02 Environmental Permitting		LS		\$ -
2.0 Civil & Track Work				
2.01 Replace 2000 timber crossties	2000	EA	\$ 115	\$ 230,000
2.02 Service Rail Joints	250	EA	\$ 35	\$ 8,750
2.03 Surface Line and Dress Track	6400	TF	\$ 5	\$ 32,000
2.04 Recondition Turnout	12	EA	\$ 5,000	\$ 60,000
2.05 Replace Turnout Components	1	LS	\$ 15,000	\$ 15,000

Subtotal	\$	345,750
Contingency	30%	\$ 103,725
TOTAL	\$	449,475

PRP 1E - PRELIMINARY CONSTRUCTION COST ESTIMATE - FEB 2013

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	SUB TOTAL
1.0 General				
1.01 Right-of-Way Impacts/Property Acquisition		Acre		\$ -
1.02 Environmental Permitting		LS		\$ -
2.0 Civil & Track Work				
2.01 Replace Timber Crossties	2000	EA	\$ 115	\$ 230,000
2.02 Remove Turnout	5	EA	\$ 3,500	\$ 17,500
2.03 Surface Line and Dress Track	11616	TF	\$ 5	\$ 58,080
2.04 Recondition Turnout	1	EA	\$ 5,000	\$ 5,000

Subtotal	\$	310,580
Contingency	30%	\$ 93,174
TOTAL	\$	403,754

PRP 1F - PRELIMINARY CONSTRUCTION COST ESTIMATE - FEB 2013

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	SUB TOTAL
1.0 General				
1.01 Right-of-Way Impacts/Property Acquisition		Acre		\$ -
1.02 Environmental Permitting		LS		\$ -
2.0 Civil & Track Work				
2.01 Full Depth Concrete Crossing	500	TF	\$ 450	\$ 225,000

Subtotal	\$	225,000
Contingency	30%	\$ 67,500
TOTAL	\$	292,500

Port of Portland Rail Plan: Project Descriptions

PRP 1G - PRELIMINARY CONSTRUCTION COST ESTIMATE - FEB 2013

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	SUB TOTAL
1.0 General				
1.01 Right-of-Way Impacts/Property Acquisition		Acre		\$ -
1.02 Environmental Permitting		LS		\$ -
2.0 Civil & Track Work				
2.01 Replace Track	1600	TF	\$ 150	\$ 240,000
2.02 Turnout #9, hand thrown	1	EA	\$ 70,000	\$ 70,000

Subtotal	\$	310,000
Contingency	30%	\$ 93,000
TOTAL	\$	403,000

PRP 1H - PRELIMINARY CONSTRUCTION COST ESTIMATE - FEB 2013

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	SUB TOTAL
1.0 General				
1.01 Right-of-Way Impacts/Property Acquisition		Acre		\$ -
1.02 Environmental Permitting		LS		\$ -
2.0 Civil & Track Work				
2.01 Replace Track	325	TF	\$ 150	\$ 48,750
2.02 Precast Rail System	2575	TF	\$ 650	\$ 1,673,750
2.03 Turnout #9, hand thrown	3	EA	\$ 85,000	\$ 255,000
2.04 Remove Turnout	1	EA	\$ 5,000	\$ 5,000
2.05 Remove Track	170	TF	\$ 20	\$ 3,400
2.06 Recondition Crane Rail Frog and Expansion Joints	1	LS	\$ 30,000	\$ 30,000
2.07 Recondition Paved Track	40	TF	\$ 150	\$ 6,000

Subtotal	\$	2,021,900
Contingency	30%	\$ 606,570
TOTAL	\$	2,628,470

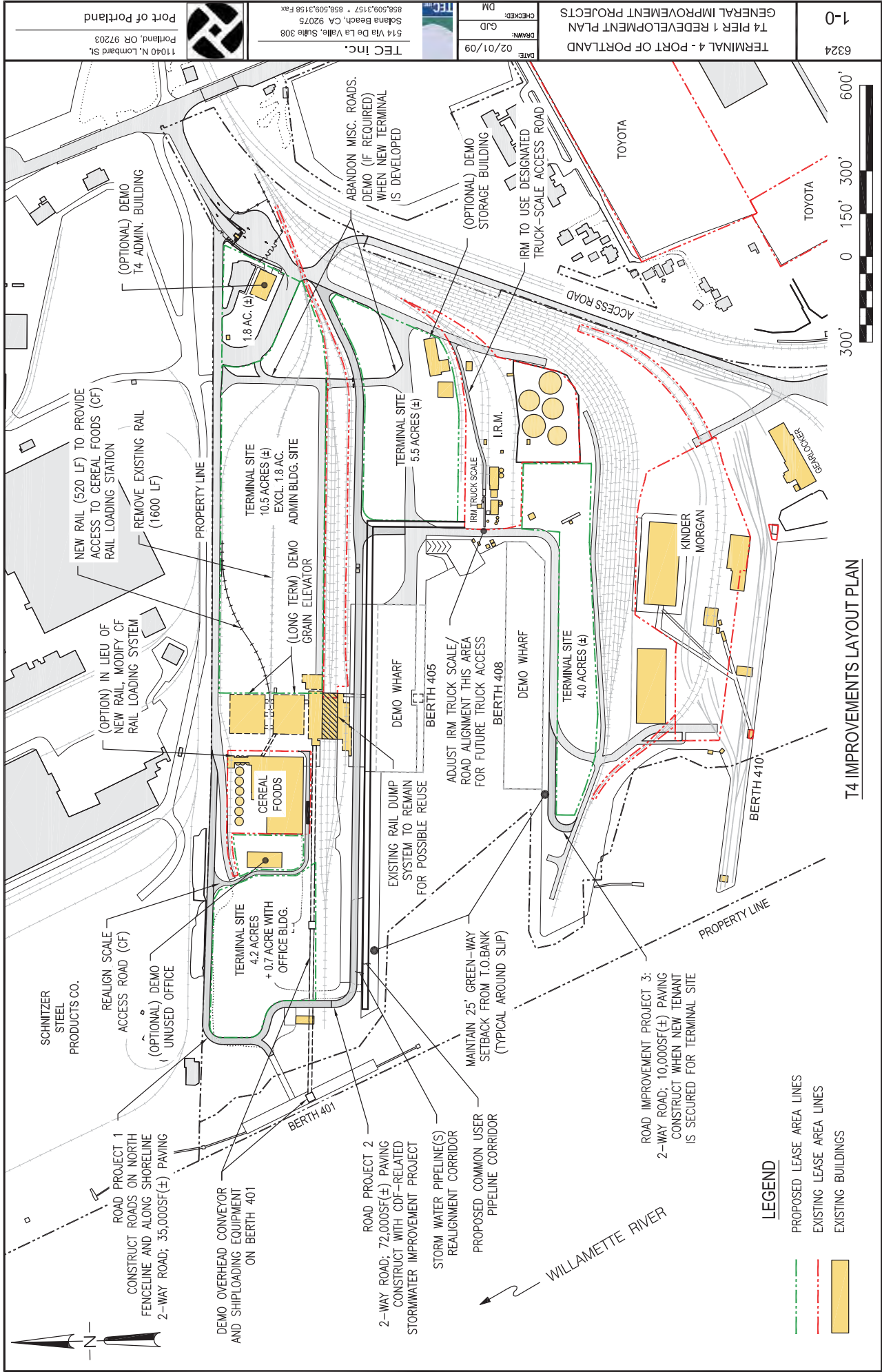
ASSUMPTIONS

Estimates only indicate probable cost of construction

This page is intentionally blank.

PRP-2. T-4 Pier 1 Rail Yard Improvements -

Project Description	<p>Terminal 4 (T-4) Pier 1 Rail Yard Improvements consists of only the rail improvements identified as part of a larger pier rehabilitation project. The rail improvements are programmed in two phases:</p> <ol style="list-style-type: none"> I. Realignment of the Cereal Foods Processing (CFP) loading track. II. Modernization of the remaining tracks on Pier 1, including upgrading the rails from 90-lb to a more modern rail type such as 136-lb. This future phase will be development- and need-driven. An estimated cost is not presented here and this phase is not considered further in this Plan. <p>Phase 1 will re-align the CFP loading track so that it no longer bisects the site immediately east of CFP that once contained 8 large vertical bulk storage bins. This, in turn, will maximize the size and appeal of that site for re-development. The full Pier 1 rehabilitation project is described in detail in the <i>Terminal 4 Pier 1 Facility Plan</i> (March 2009). Note that this project description includes only the projects recommended for consideration as part of the Port of Portland Rail Plan.</p> <p>The short term rail-associated improvements include the following project identified as Phase I of the larger set of projects at Pier 1: Realign rail access to Cereal Food Processors (CFP). This phase would remove existing rail (1600 LF) and build new rail (520 LF) to provide access to CFP rail loading station.</p> <p>Project Reference: Port of Portland Terminal 4 Pier 1 Facility Plan (TEC, Inc., March 2009)</p>
Cost	\$248,000 (Realigned rail access to CFP))
Local Benefit	Reduces the amount of redundant track and maximizes developable land on Pier 1.
Regional Benefit	The enlarged development site offers more capacity and flexibility to potential businesses seeking a rail-served dockside location. This enhances the Port's ability to compete against other West Coast ports for new development and maximizes the potential for new jobs creation and economic growth for Oregon.
Main Line Capacity	No effect on main line capacity.
Project Development Status	<p>Environmental Clearance: No progress to date.</p> <p>Right-of-Way: The project is contained within existing Port right-of-way.</p> <p>Preliminary layouts shown in Port of Portland Terminal 4, Pier 1 Facility Plan (March 2009), Appendix A, Drawing 1-0</p> <p>Final Design: 2-month period</p> <p>Construction: Construction could be completed in a 3-month period, including time required to bid the project.</p>
Class I Competition Maintains or Increases	UPRR would be the primary beneficiary of this project, assuming it leads to new development on the Pier.



PRP 2 - PRELIMINARY CONSTRUCTION COST ESTIMATE - JAN 2013

DESCRIPTION		QUANTITY	UNIT	UNIT PRICE	SUB TOTAL
1.0 General					
1.01	Right-of-Way Impacts/Property Acquisition		Acre		\$ -
1.02	Environmental Permitting		LS		\$ -
2.0 Civil & Track Work					
2.01	Remove track	1600	TF	\$ 10	\$ 16,000
2.02	Remove turnout	1	EA	\$ 3,500	\$ 3,500
2.03	New track	520	TF	\$ 175	\$ 91,000
2.04	Turnout #11, hand thrown	1	EA	\$ 80,000	\$ 80,000
3.0 Structural Work					
	NA				
4.0 Signal Work					
	NA				

Subtotal	\$	190,500
Contingency	30%	\$ 57,150
TOTAL	\$	247,650

ASSUMPTIONS

Estimates only indicate probable cost of construction
 Right-of-way or property impact costs are not included
 Environmental permitting is not included
 Engineering Design costs are not included
 Utility relocation costs are not included
 stormwater conveyance and treatment costs are not included
 Earthwork is an assumed 24' wide, 4' height and 2:1 slopes the track length

This page is intentionally blank.

PRP-3. Peninsula Terminal Railroad: BNSF/PT Rail Connection at N. Suttle Road Summary of Factors

Project Description	<p>Peninsula Terminal Railroad and BNSF Railway currently have an inefficient interchange arrangement that requires BNSF to use time on their main line for what is essentially a local switching move. This can be alleviated by constructing a new interchange near the west end of N. Suttle Road. This project would construct a new 2,000' interchange track parallel to and north of the Port's T-6 Lead track by coming off the Port's track at its easterly turnout off the BNSF. The track would pass under the Marine Drive overpass, requiring a retaining wall against the bridge abutment to replace the fill slope. A short connection would be constructed between this new interchange track and the existing PT lead track at the west end of N. Suttle Road. The new interchange track would affect only about 150' of the Port's T-6 Lead at its easterly end. PT-bound railcars from BNSF would be placed in the BNSF's "B" Yard. To interchange with PT, BNSF would pull back the PT cars east out of the "B" Yard towards the signal on the wye guarding the entrance to the main line. BNSF would then shove the PT-bound cars west into the new interchange track. PT would then pull the trains back east along N. Suttle Road. The process would reverse itself when the PT sets cars out for the BNSF. The project also entails upgrading the PT's track along NE Suttle Road to replace worn out 90-lb rail. Note that the project as shown in this Plan differs from the configuration (and cost) of a project similar in nature submitted to <i>ConnectOregon</i> based on input from Port staff.</p> <p>Project References: Suttle Road Improvement Options Draft Report (Parametrix, March 2008)</p>
Cost	\$2,588,000
Local Benefit	The upgrade improves the existing PT track along N. Suttle Road, improving its safety and reliability. This is a benefit in a tight, congested area where vehicles and trains operate in close quarters and there are numerous industrial track crossings over N. Suttle Road.
Regional Benefit	Increase capacity along the BNSF I-5 corridor main line by removing an interchange movement that currently requires BNSF to cross over the main from west to east.
Main Line Capacity	The current use of the BNSF main line track for the PT to access the Port of Portland Terminal 6 will be eliminated
Project Development Status	<p>Environmental Clearance: No progress to date.</p> <p>Right-of-Way: The project will require sufficient right-of-way from the Port to construct the interchange track north of the Port T-6 Lead and some right of way from the westerly dead-end of NE Suttle Road to construct the connection.</p> <p>Final Design: Final design could be completed in four months.</p> <p>Construction: Construction could be completed in six months.</p>
Class I Competition Maintains or Increases	<p>The competitive balance between BNSF and UP remains unchanged.</p> <p>BNSF, UPRR, Amtrak and PT will benefit from this improvement by displacing the need for BNSF to use the main to interchange traffic with PT.</p>



LEGEND
EXISTING TRACK
PROPOSED TRACK
PROPOSED STRUCTURE

QUANTITIES
3318' NEW TRACK
2 EA NO. 11 HITO
200'x12' RETAINING WALL



PORT OF PORTLAND - RAIL PLAN
PRP-3 PENINSULA TERMINAL RAILROAD:
BNSF/PT RAIL CONNECTION AT SUTTLE ROAD

DATE

01/30/2013

FIGURE

1/1

NOTE: ALL CONCEPTUAL DESIGN BASED OFF OF AERIAL IMAGERY

PRP 3 - PRELIMINARY CONSTRUCTION COST ESTIMATE - JAN 2013

DESCRIPTION		QUANTITY	UNIT	UNIT PRICE	SUB TOTAL
1.0 General					
1.01	Right-of-Way Impacts/Property Acquisition		Acre		\$ -
1.02	Environmental Permitting		LS		\$ -
2.0 Civil & Track Work					
2.01	Embankment (or Excavation)	15735	CY	\$ 25	\$ 393,363
2.02	New Track	3319	TF	\$ 175	\$ 580,825
2.03	Track Rehabilitation	2500	TF	\$ 150	\$ 375,000
2.04	Turnout #11, hand thrown	2	EA	\$ 80,000	\$ 160,000
2.05	Turnout #9, hand thrown	5	EA	\$ 70,000	\$ 350,000
3.0 Structural Work					
3.01	Wall (200'x12')	2400	SF	\$ 55	\$ 132,000
4.0 Signal Work					
	NA				

Subtotal	\$	1,991,188
Contingency	30%	\$ 597,356
TOTAL	\$	2,588,544

ASSUMPTIONS

Estimates only indicate probable cost of construction
 Right-of-way or property impact costs are not included
 Environmental permitting is not included
 Engineering Design costs are not included
 Utility relocation costs are not included
 stormwater conveyance and treatment costs are not included
 Earthwork is an assumed 24' wide, 4' height and 2:1 slopes the track length

This page is intentionally blank.

PRP-4. Port of Portland Marine Drive Grade Separation – Summary of Factors

Project Description	<p>This project would create a grade separation by constructing a highway overcrossing over the BNSF lead track to Ramsey Yard near 5909 N Marine Drive. The overcrossing will accommodate a future second track. The multi-use pathway on the south side of Marine Drive will be left at ground-level and will cross the BNSF Railway at-grade. Access to an affected warehouse complex on the north side of Marine Drive would be provided through a frontage lane along Marine Drive that would pass underneath the west end of the new overpass.</p> <p>Identified as “Marine Dr. Improvement Phase 2” in the 2012 Port Transportation Improvement Plan (2/08/2012, p. 40). Also in the Metro Regional Transportation Plan, project 10379.</p> <p>This project was identified as a need in the Port of Portland’s June 2002 Marine Terminal Master Plan 2020. Conflicts between vehicles on Marine Drive and trains can occur during shift changes at businesses in the Rivergate area as well as blocking general traffic and emergency vehicles. Slow-moving unit trains can block the crossing for nearly 30 minutes at a time.</p> <p>Project Reference: Figure 3.1-A2, Port of Portland Marine Terminal Master Plan 2020, Volume 4 Alternatives Final Draft (PB Ports & Marine, Inc., March 2003)</p>
Cost	\$12,978,000
Local Benefit	Eliminates vehicle/train conflicts on Marine Drive, which is the primary access road to the Rivergate area. Improves access for emergency vehicles.
Regional Benefit	The Federal Railroad Administration strongly promotes the elimination of all at-grade highway/rail crossings. Grade separating this intersection will increase the overall safety of the local and regional road and rail system.
Main Line Capacity	This project does not affect main line capacity.
Project Development Status	<p>Environmental Clearance: No progress to date.</p> <p>Right-of-Way: May require that discussions be held with BNSF about the position of the bridge structure relative to the tracks. The project will impact driveways and property of parcels in the northwest quadrant of the grade crossing. Impacts to other properties should be fully determined in a broader preliminary engineering study.</p> <p>Final Design: Final design could be completed in 8 months.</p> <p>Construction: Construction could be completed in 12 months.</p>
Class I Competition Maintains or Increases	<p>Competitiveness between BNSF and UP remains unchanged.</p> <p>There is no substantial benefit to either BNSF or UP.</p>



NORTH MARINE DRIVE
PLAN
SCALE: 1" = 100'

CONCEPTUAL - NOT FOR CONSTRUCTION

<div><div><div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div></div></div></div>									
---	--	--	--	--	--	--	--	--	--

Port of Portland Rail Plan: Project Descriptions

PRP 4 - MARINE DRIVE GRADE SEPARATION ESTIMATE OF PROBABLE COST - PLANNING STUDY

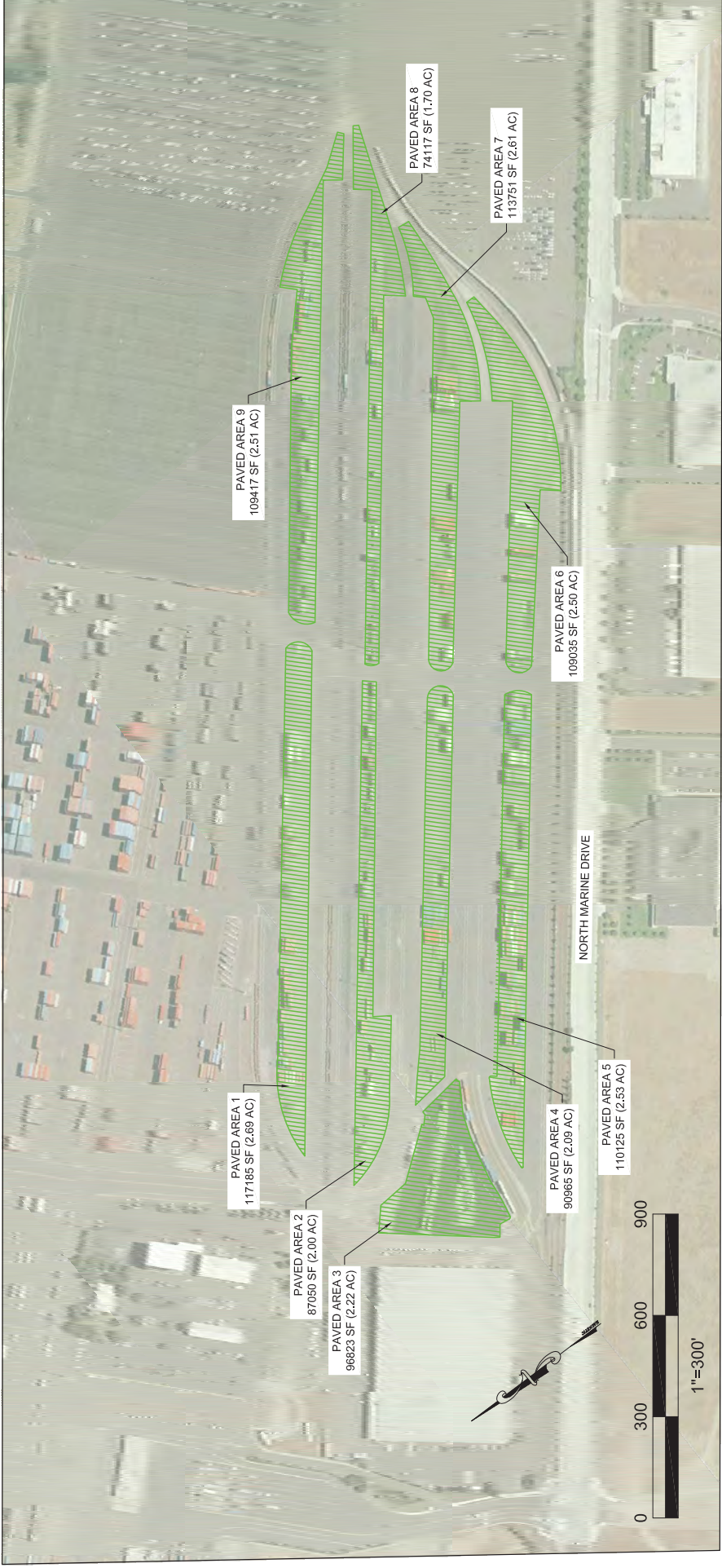
Item No.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	SUBTOTAL
1	Mobilization and General Conditions	1	LS	10%	\$854,786.80
2	Roadway Demolition / Removal	16,000	SQYD	\$ 14	\$ 216,000
3	Concrete Sidewalks - 4" concrete surfacing	10,200	SQFT	\$ 7.00	\$ 71,400
4	Concrete Curb and Gutter	4,800	LF	\$ 13	\$ 61,392
5	Concrete Driveways - Industrial	3	EACH	\$ 16,032	\$ 48,096
6	Level 3, 3/4" dense HMA, 8" thickness	7,800	TON	\$ 91	\$ 713,544
7	Roadway Aggregate Base, 10" thickness	9,200	TON	\$ 23	\$ 207,736
8	Storm Drainage - New Pipe Conveyance	1,250	LF	\$ 85	\$ 106,250
9	Storm Drainage - Mechanical Water Quality	1	LS	\$ 162,250	\$ 162,250
10	Reinforced Concrete Bridge End Panels	350	SQYD	\$ 200	\$ 70,000
11	Retaining Wall, MSE	17,600	SQFT	\$ 65	\$ 1,144,000
12	32 Inch Type "F" Traffic Barrier Coping with Moment Slab	1,830	FOOT	\$ 250	\$ 457,500
13	Bridge - Steel Plate Girder	23,140	SQFT	\$ 225	\$ 5,206,500
14	Concrete Bridge Rail Transition	80	FOOT	\$ 200	\$ 16,000
15	Protective Screening	960	FOOT	\$ 70	\$ 67,200
Subtotal					\$ 9,403,000
Construction Contingency @ 20%					\$ 1,881,000
Project Development (Design, CM, Closeout) @ 15%					\$ 1,411,000
Project Development Contingency @ 20%					\$ 283,000
Estimate Total					\$ 12,978,000

Notes:

When bridge depth increased by 1'-0" during the QC process, the approach runout was not increased assuming that length increases to the project would be minimal and already captured (in terms of cost) by the conservative estimates above.

PRP-5. Port of Portland Pave Unpaved area at T-6 Intermodal Yard – Summary of Factors

Project Description	This project was developed in response to a need identified during Port of Portland tenant interviews conducted in July 2012. The independent international container terminal operator, ICTSI, is a rail served tenant of the Port, with direct service from BNSF. Terminal 6 tenants are concerned that dust generated from the strips of land between intermodal yard tracks affects the working conditions on the Terminal and impacts products such as import/export automobiles staged nearby. Currently the container terminal operator treats the surface to keep the dust down. The area to be paved is approximately 21 acres.
Cost	\$4,597,000* *Note: assumes use of pervious pavement and dry wells. Therefore no stormwater treatment/conveyance system is required.
Local Benefit	Reduces the effects of dust on terminal workers and helps Port tenants maintain the value of products such as the import/export automobile fleets.
Regional Benefit	Reduces dust and other particulate matter entrained in the atmosphere, helping to clear the Metro area's air, especially on days when Oregon DEQ issues clean air alerts.
Main Line Capacity	N/A
Project Development Status	Environmental Clearance: No progress to date. Right-of-Way: No acquisition required. Final Design: Final design could be completed in one month. Construction: Construction could be completed in six months or less.
Class I Competition Maintains or Increases	Competitiveness between BNSF and UP remains unchanged. N/A



LEGEND
PROPOSED PAVED AREA

TOTAL PROPOSED PAVED AREA:	
AREA 1	117185 SF
AREA 2	87050 SF
AREA 3	96823 SF
AREA 4	90965 SF
AREA 5	110125 SF
AREA 6	109035 SF
AREA 7	113751 SF
AREA 8	74117 SF
AREA 9	109417 SF
TOTAL AREA	908468 SF

2.69 AC
2.00 AC
2.22 AC
2.09 AC
2.53 AC
2.50 AC
2.61 AC
1.70 AC
2.51 AC
20.86 AC

PORT OF PORTLAND - RAIL PLAN
PRP-5 PORT OF PORTLAND PAVE UNPAVED
AREA AT T-6 INTERMODAL YARD



NOTE: ALL CONCEPTUAL DESIGN BASED OFF OF AERIAL IMAGERY

PRP 5 - PRELIMINARY CONSTRUCTION COST ESTIMATE - JAN 2013

DESCRIPTION		QUANTITY	UNIT	UNIT PRICE	SUB TOTAL
1.0 General					
1.01	Right-of-Way Impacts/Property Acquisition		Acre		\$ -
1.02	Environmental Permitting		LS		\$ -
2.0 Civil & Track Work					
2.01	Pervious Asphalt Pavement	908,468	SF	\$ 4.40	\$ 3,997,259

Subtotal	\$	3,997,259
Contingency	15%	\$ 599,589
TOTAL	\$	4,596,848

ASSUMPTIONS

Estimates only indicate probable cost of construction

Right-of-way or property impact costs are not included

Environmental permitting is not included

Engineering Design costs are not included

Utility relocation costs are not included

stormwater conveyance and treatment costs are not included

The Port provided 2005 total construction cost of a pervious paving project. The total construction cost divided by area provided a \$3.50 per square foot unit cost. The cost was inflated by 3% per year over eight years to reach a unit cost of \$4.40.

This page is intentionally blank.

PRP-6. Port of Portland T-6 Access Improvement – Summary of Factors

Project Description	<p>A BNSF lead track crosses at-grade the main access driveway to Terminal 6 immediately adjacent to its intersection with Marine Drive. When trains are present, vehicular access in and out of the main gate is blocked. Vehicles stack up in the right-hand westbound lane of Marine Drive waiting for the train to pass. Vehicle queues in the main gate driveway frequently extend back to Marine Drive and can block the railroad track. This poses a safety issue due to train/vehicle conflicts and the increased potential for rear-end collisions on Marine Drive.</p> <p>A 2008 study recommended that a new frontage road along the north of Marine Drive be constructed between N. Bybee Lake Road and the main gate of Terminal 6, with a new roadway bridge crossing over the BNSF lead tracks to Hyundai. The new roadway and bridge will allow traffic to flow in and out of the main T-6 gate without interference from BNSF trains switching the Hyundai facility. It should be noted that the new frontage road would still cross at-grade two of the internal tracks of the intermodal terminal and as such, vehicles would still be blocked at these two tracks to the extent that trains use them to switch intermodal railcars.</p> <p>The project would impact the T-6 intermodal rail yard by removing the southerly intermodal track.</p> <p>This project would also be a critical element that would need to precede PRP#10 (Second Slough Bridge), should that project come to fruition. The additional through-trains destined for South Rivergate would cause a commensurate rise in vehicular congestion at the T-6 main gate.</p> <p>Project References: Terminal 6 Access Improvement Alternatives Final Report (Parametrix, March 2008); T6 Analysis Draft Executive Summary (Main Line Management, 2006)</p>
Cost	<p>\$17,302,000</p> <p>Original project cost estimate by others in 2008 were escalated by HDR to 2013 dollars. The detailed original cost estimate is not available.</p>
Local Benefit	<p>Access Alternative 3 provides the greatest flexibility of operations and best accommodation of forecasted traffic volumes. Local through-traffic benefits from reduction in conflicts between through-traffic and terminal traffic.</p>
Regional Benefit	<p>Local/regional benefits include enhancing safety by reducing rail/vehicle conflicts, and increasing terminal operational efficiencies by reducing vehicle delays.</p>
Main Line Capacity	<p>This project does not impact main line capacity.</p>
Project Development Status	<p>Project development is documented in Port of Portland's Terminal 6 Access Improvement Alternatives-Final Report (Parametrix, March 2008). A final option was not selected; further discussion is required to determine the best access alternative, as well as determination of frontage road alignment and design options for the N Marine Dr./N Bybee Lake Rd. intersection and the N Marine Dr./N Pacific Gateway Blvd. intersection</p> <p>Environmental Clearance: No progress to date.</p> <p>Right-of-Way: All options considered by Parametrix would impact existing public right-of-way and Port of Portland property.</p> <p>Final Design: Final design could be completed in six months.</p> <p>Construction: Construction could be completed in 12 months.</p>
Class I Competition Maintains or Increases	<p>Competitive balance between BNSF and UP remains unchanged.</p>

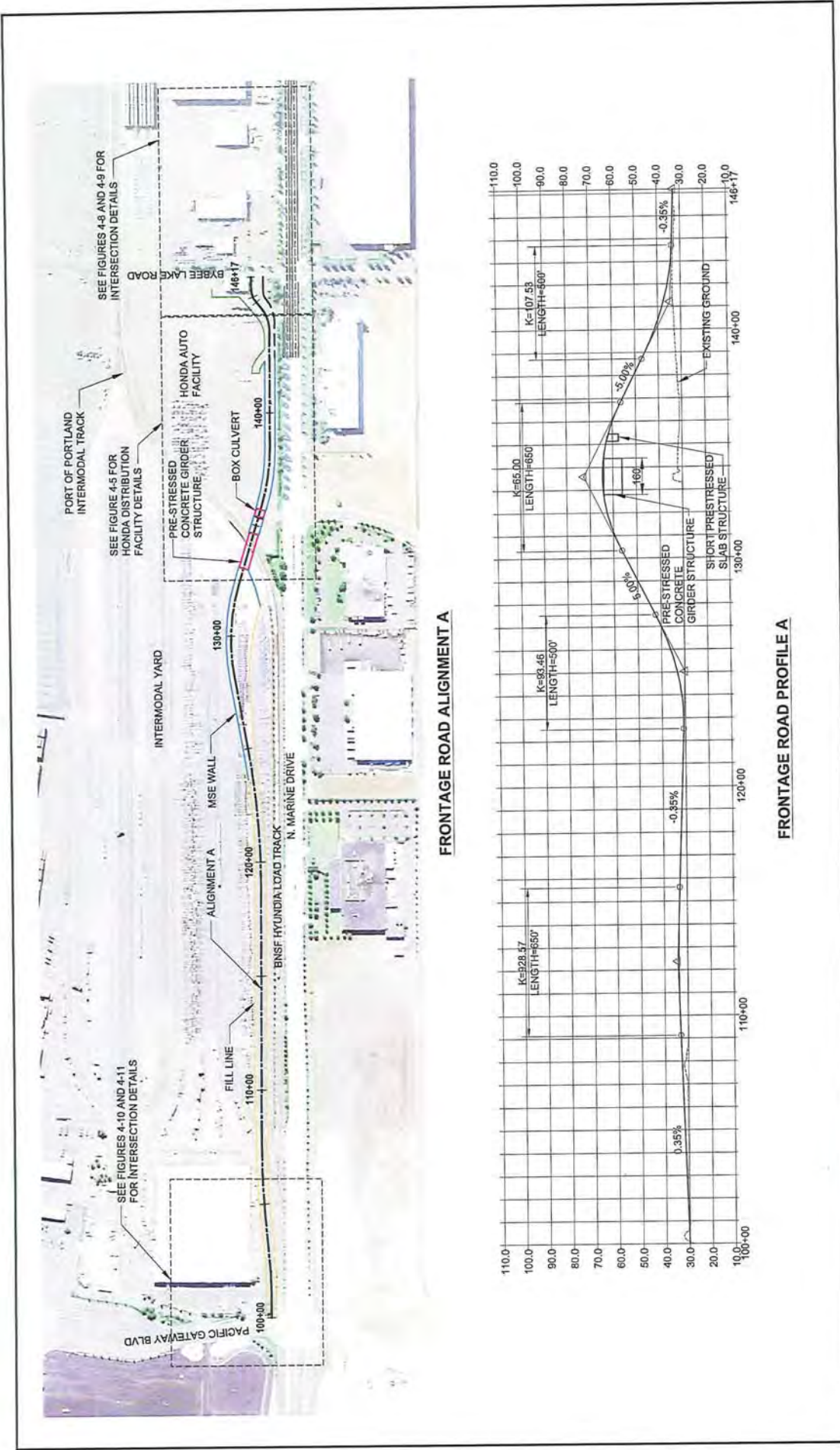
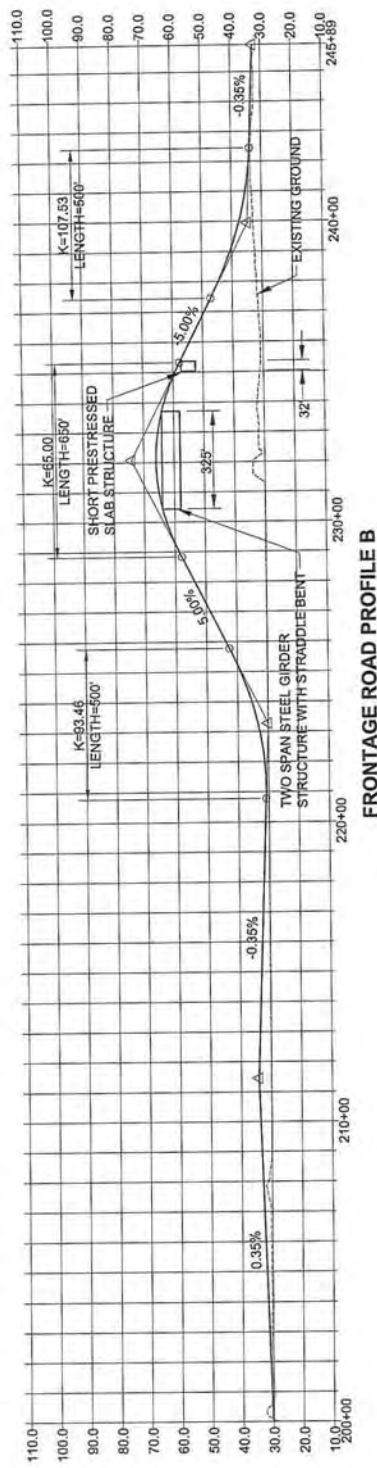


Figure 4-4
Plan and Profile
Frontage Road Alignment A



FRONTAGE ROAD ALIGNMENT B



Parametrix DATE: 06/16/2008 FILE: PD332017.dwg

- MSE WALL
- EMBANKMENT LIMITS
- STRUCTURE
- FENCE



Figure 4-6
Plan and Profile
Frontage Road Alignment B

This page is intentionally blank.

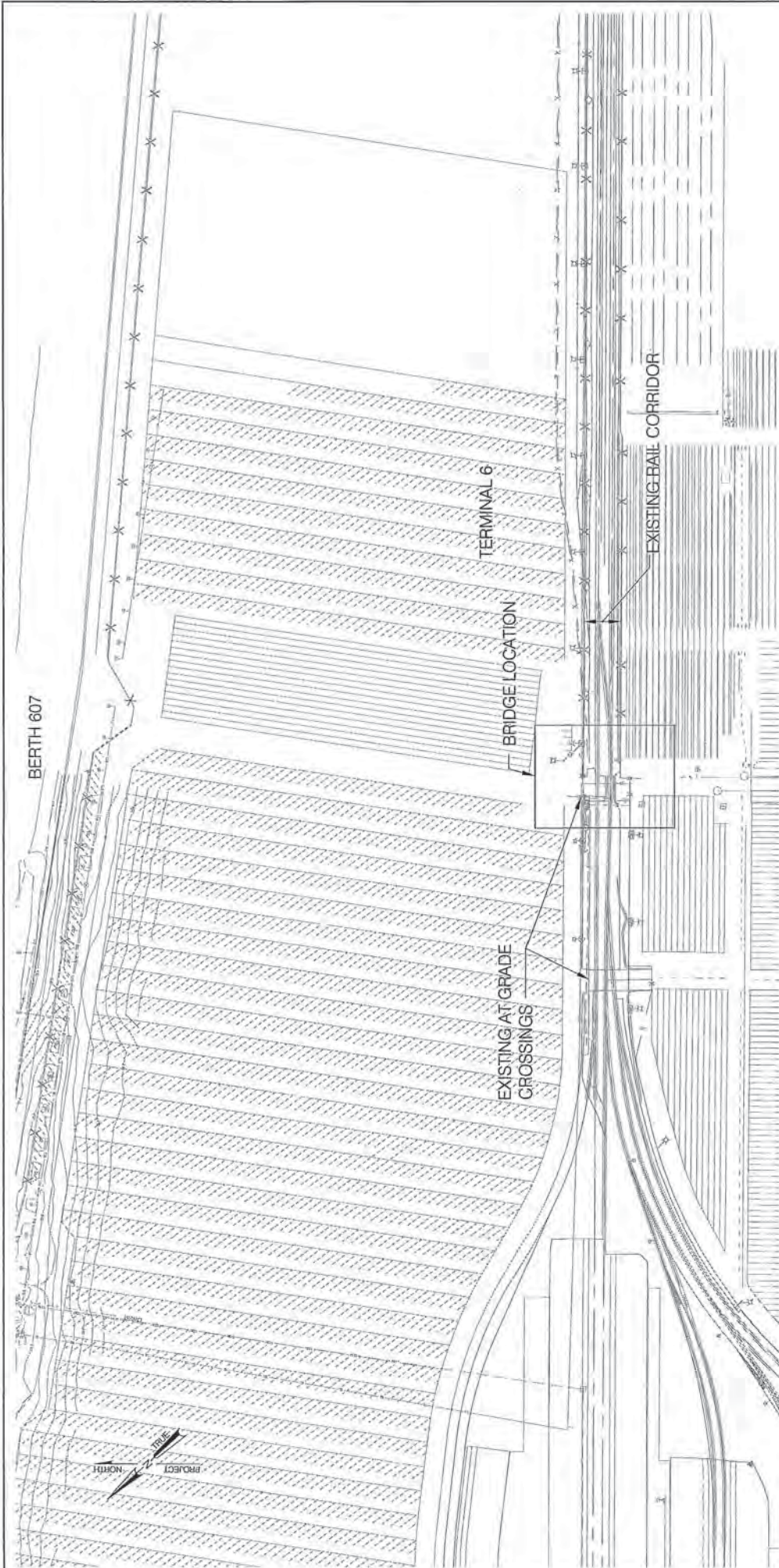
PRP-7. Port of Portland T-6 Berth 607 Grade Separation – Summary of Factors

Project Description	<p>Honda ships and receives automobiles at Terminal 6, Berth 607. The facility is bisected by the BNSF Rivergate Lead and the Port T-6 Lead (three tracks total) to the T-6 container terminal. Two at-grade rail crossings link the northern auto storage yard to the processing facility south of the tracks. When rail traffic to the intermodal yard and Hyundai is frequent, severe delays are caused in the internal movement of cars from the inbound car holding area to the processing facility and rail loading ramps.</p> <p>Honda, the Port of Portland, UP and BNSF had previously agreed to fund the relocation of loading tracks to the pier side of the facility. This project was put on hold after the downturn in the economy. Tenant interviews conducted in 2012 indicated that blocked rail crossings within their facility still present a burdensome delay problem.</p> <p>A prior study commissioned in 2006 proposed a 25.5-foot-wide roadway, including two 11-foot travel lanes and a 3.5-foot sidewalk. The road design speed is 20 MPH. A low design speed has the advantage of minimizing the project footprint by shortening the approach ramps to the overcrossing. The recommended bridge type was a 99-foot long single-span prefabricated steel bridge, generally following the existing westerly access drive. Option G, with two main tracks plus access roads on each side of the track corridor, was chosen in order to provide connectivity for both the storage yard to the north and the process facilities to the south of the tracks. The alternative represents the lowest bridge cost. It minimizes construction timeframes, approach ramp lengths, utility disruptions and footprint of the overcrossing.</p> <p>Project References: Port of Portland Honda Facility Rail Overpass Bridge, Type Size and Location Study (Berger/Abam Engineers Inc, 2006); Port of Portland T-6 Honda Overcrossing Budget Estimate (Port staff, May 28, 2006)</p>
Cost	<p>\$3,776,000</p> <p>Original project cost estimate by others in 2006 were escalated by HDR to 2013 dollars. The detailed original cost estimate is not available.</p>
Local Benefit	<p>The project maximizes the internal processing efficiency of the automobile export/import facility, ensuring that Terminal 6 remains a competitive place for this type of operation. This is especially important if the overall number of trains operating in the area increases due to increased container traffic or completion of PRP#10 (Second Slough Bridge). Safety of train crews and auto terminal workers is enhanced by removal of this conflict.</p>
Regional Benefit	<p>Helps ensure that Terminal 6 continues to serve the auto import/export business model efficiently, which correlates to retaining a diverse family-wage job base for the Metro area.</p>
Main Line Capacity	<p>Main line track capacity is not affected.</p>
Project Development Status	<p>A Type, Size and Location Study (TS&L) for the Honda Overpass Bridge was completed in April 2006. Typical roadway and bridge cross sections were developed. A 30-foot high embankment would require 60 additional feet on each side of the bridge for fill, assuming a maximum 2H:1V slope. Alternatively a retaining wall approach could be used. Cost estimates included a welded wire MSE wall.</p> <p>Utility relocation south of the tracks may include gas, water, sanitary and storm sewer, underground and overhead electric and telecommunications lines, and lighting. North of the tracks may require electric line and yard lighting relocation.</p> <p>Environmental Clearance: 2006 TS&L did not address environmental and permitting impacts.</p> <p>Limited survey and geotechnical data were available for the 2006 TS&L. Geotechnical explorations will need to be conducted to establish foundation types.</p> <p>Right-of-Way: No acquisition required.</p> <p>Final Design: Final design could be completed in 6 months.</p> <p>Construction: Construction could be completed in 12 months.</p>

PRP-7. Port of Portland T-6 Berth 607 Grade Separation – Summary of Factors

**Class I Competition
Maintains or Increases**

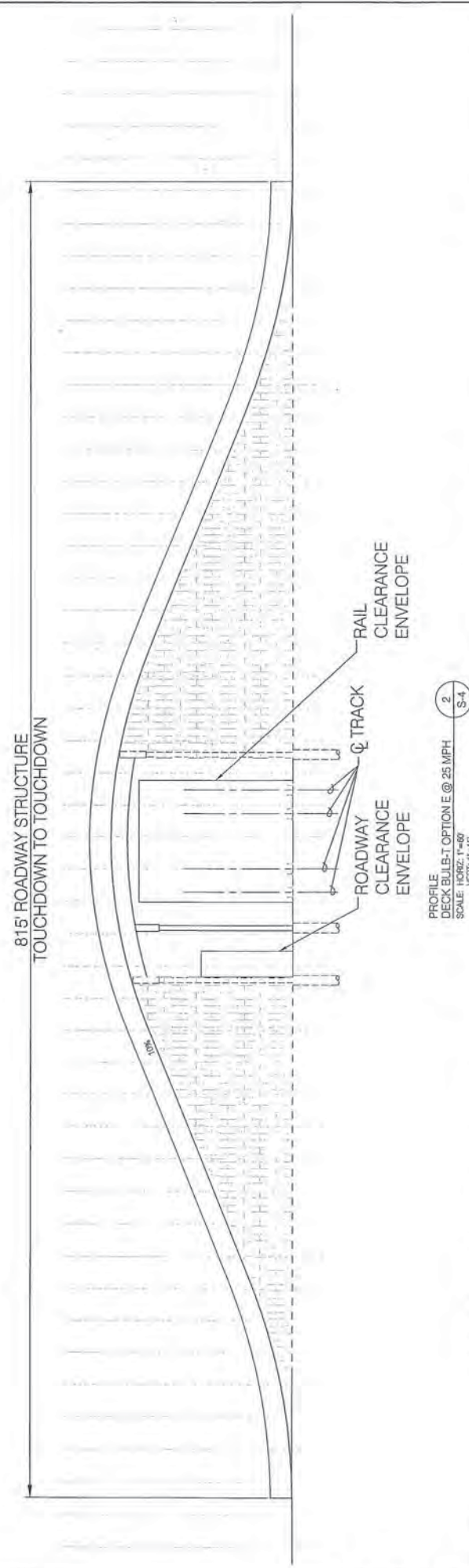
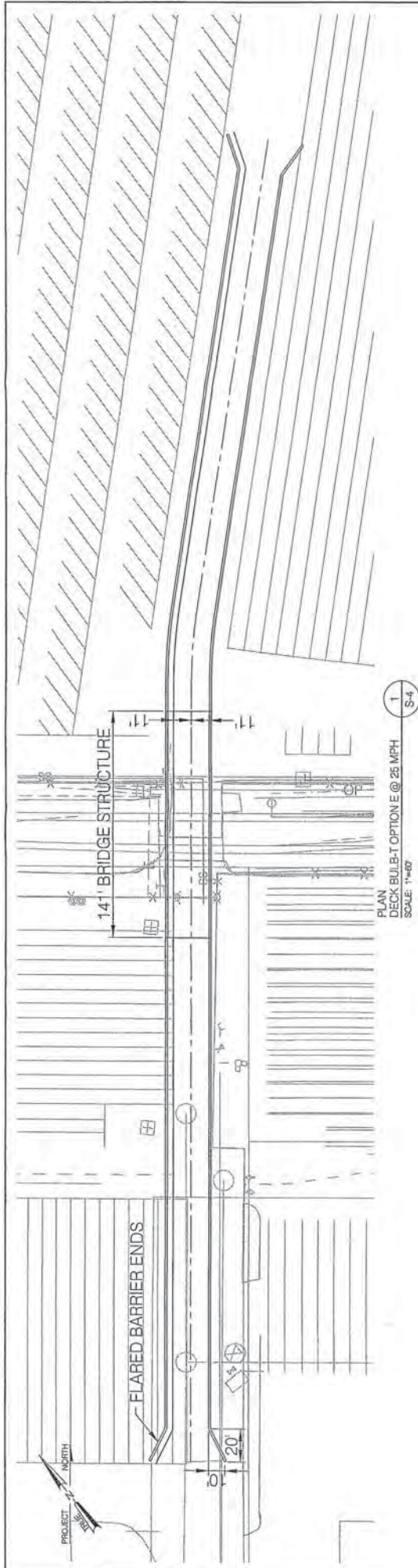
Competitive balance between BNSF and UP remains unchanged.



LOCATION PLAN
SCALE: 1"=150'

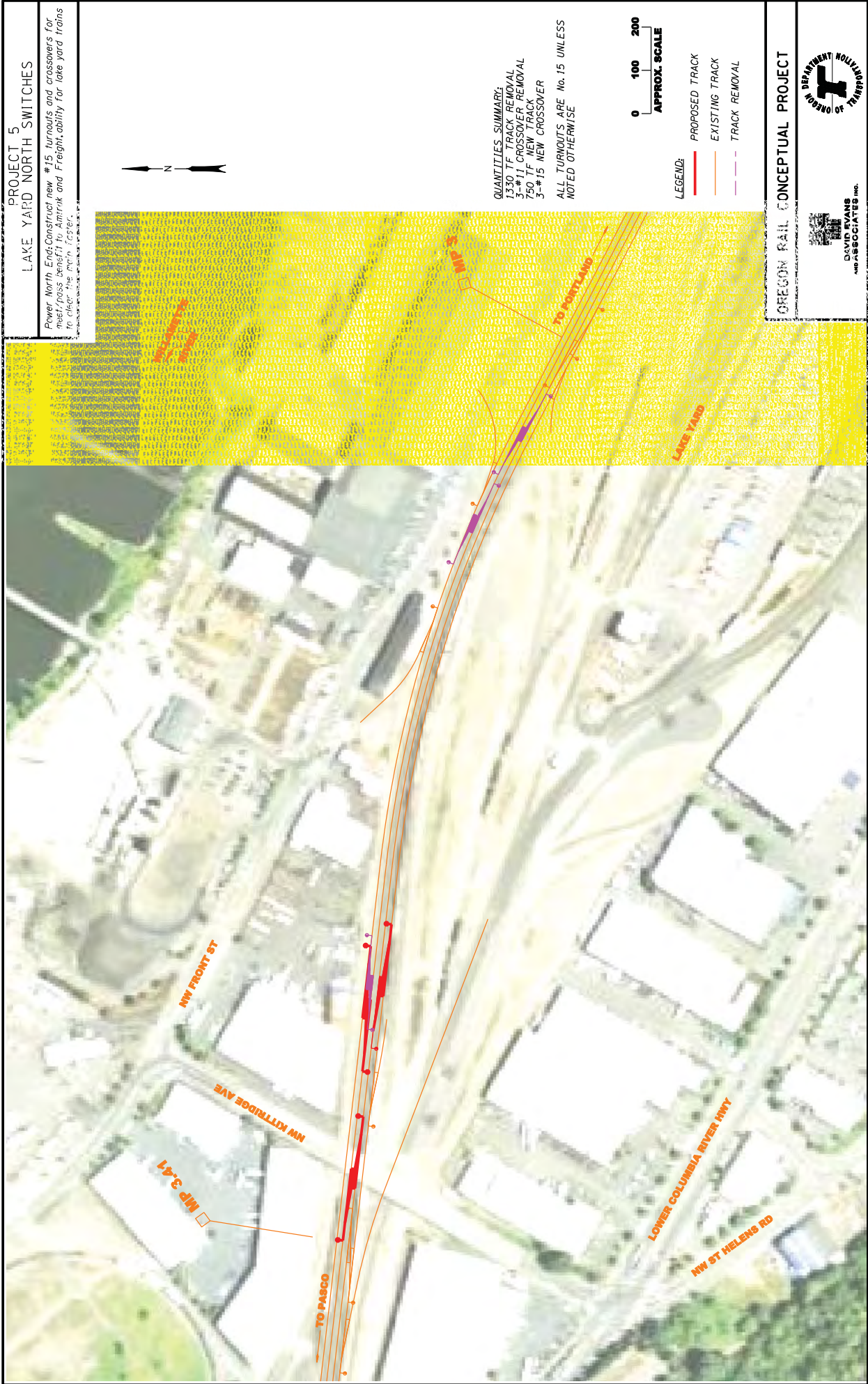
1
F-1

										PORT OF PORTLAND PORTLAND, OREGON 										DESIGNED BY: S. MCMANUS DRAWN BY: L. REE CHECKED BY: M. WELLS DATE: APR 2008 SCALE: 1"=150'										TERMINAL 6 HONDA OVERPASS TSL LOCATION PLAN									
PROJECT NUMBER: 1234567890										DRAWING NO.: 1/13										F-1																			

[illegible]

PRP-8. BNSF/UP/Portland Terminal Railroad - Lake Yard Main Line Access Improvement – Summary of Factors

Project Description	<p>The Lake Yard/Portland Terminal Yard is a combined intermodal yard and classification yard located in NW Portland along US Highway 30. The northern portion of the yard, known as Lake Yard, is a classification yard and the primary intermodal yard for BNSF serving the entire Oregon and SW Washington market. The southern half is a classification yard controlled by the Portland Terminal Railroad Company (PTRC). Both facilities accommodate over-the road trains as well as interchange traffic between other Portland-area carriers. Currently, Lake Yard is separated from Terminal-2 by the BNSF main line and access to Lake Yard from the north and south requires three main line crossovers/switches with timers that take an average of five minutes to cycle. Crews must set the timers and wait for the timers to run before they can set the switches for the desired train movement. This procedure ties up normally one and often two main tracks on the Fallbridge Subdivision between the Willamette River Bridge, Portland Union Station, and the primary connection with the UP at the Steel Bridge. This action has the potential to delay the 10 Amtrak trains per day that traverse this line segment as well as other freight trains operating at that time.</p> <p>The BNSF/Portland Terminal Railroad Main line Access Improvement Project includes the installation of dispatcher controlled power switches at both the north and south end of the Lake Yard complex that will increase capacity for rail freight flowing through Portland by allowing BNSF dispatchers to line movements from their Ft. Worth dispatch center in a fraction of the time currently needed. The project would improve speed and efficiency for PTRC to travel from Lake Yard to T-2, and would consequently increase main line capacity for all freight traffic and 10 daily Amtrak trains (not to mention the 4 additional Amtrak trains scheduled to begin service in the near future).</p> <p>Project Reference: Lake Yard North and South Switches, Environmental Checklist for Class 2 Categorical Exclusion (DEA, 8/21/09)</p>
Cost	<p>\$10,805,000</p> <p>Original project cost estimate by others in 2009 were escalated by HDR to 2013 dollars. The detailed original cost estimate is not available.</p>
Local Benefit	<p>Local rail bottleneck improved. Trains will arrive and depart Lake Yard more quickly, thus improving overall yard efficiency and main line capacity along the Fallbridge Subdivision.</p>
Regional Benefit	<p>Removal of local choke point increases capacity along the BNSF Railway Fallbridge Subdivision main line that connects the Pacific Northwest to major rail hubs in Chicago and Houston and from Canada to Mexico.</p> <p>Greatly improves BNSF's ability to operate Amtrak trains on-time along this portion of the Pacific Northwest High Speed Rail Corridor.</p>
Main Line Capacity	<p>Project will expedite movements that cross over both main tracks, blocking each for extended lengths of time due to the use of the timers. This will increase main line capacity and will open up additional time windows for the crossing movement to be made.</p>
Project Development Status	<p>Environmental Clearance: The environmental clearance may be either none or minimal provided the project is classified as a railroad maintenance project.</p> <p>Right-of-Way: No acquisition required.</p> <p>Final Design: Final design could be completed in four months.</p> <p>Construction: Construction could be completed in six months.</p>
Class I Competition Maintains or Increases	<p>Equal competitive access will be maintained.</p> <p>BNSF, UPRR, P&W, PTRC and Amtrak will all benefit from this improvement.</p>





This page is intentionally blank.

PRP-9. Columbia Boulevard Grade Separation (Raise Columbia Blvd. over UPRR at Penn Jct.) – Summary of Factors

Project Description	<p>Known as I-5 Trade Corridor Railroad Capacity Improvements, Project Number 12. UPRR's merger with SPTC has changed how rail traffic flows through the Portland area. Up to 8 trains per day now operate through the SE quadrant at Peninsula Junction on a typical day. Because of the restrictive track curve, these movements block N. Columbia Blvd. for a significant length of time. N. Columbia Blvd. is a vital route for truck access to the Rivergate Industrial Area. Also, northbound trains moving between Albina and Seattle must stop south of the 6,000' tunnel located at the south end of Penn Jct. Constructing an overpass over these legs of the UPRR will greatly free up both rail freight as well as truck freight in this vital area.</p> <p>Project Reference: I-5 Rail Capacity Study, Portland/Vancouver I-5 Trade and Transportation Partnership (HDR, February 2003)</p>
Cost	<p>\$28,935,000</p> <p>Original project cost estimate by others in 2003 were escalated by HDR to 2013 dollars. The detailed original cost estimate is not available.</p>
Local Benefit	<p>The project reduces the amount of train delays experienced by Port-bound traffic on N. Columbia Boulevard.</p> <p>UPRR northbound trains can advance north to North Portland Junction without blocking N. Columbia Boulevard. Currently these trains stop south of the tunnel to avoid air quality problems for the train crews.</p>
Regional Benefit	<p>Trains moving both north-south and those entering/exiting the Kenton Line can be expedited, increasing the flow of trains and goods through the region.</p>
Main Line Capacity	<p>Train speed for movements between Albina Yard and the Kenton Line could be improved by increasing the railroad track superelevation through the SE leg of the wye. This will increase train capacity on both lines.</p>
Project Development Status	<p>No progress made other than preliminary planning in the 2003 I-5 study.</p> <p>Environmental Clearance: No progress to date.</p> <p>Right-of-Way: To Be Determined.</p> <p>Preliminary Drawings: I-5 Trade Corridor Railroad Capacity Improvements Projects Number 12, HDR drawings</p> <p>Final Design: Final design could be completed in 5 months</p> <p>Construction: Construction could be completed in 10 months</p>
Class I Competition Maintains or Increases	<p>The benefits of the project primarily accrue to UP by increasing capacity through Portland along the southerly and easterly axis of the city (although, the helpful benefits to train movements on the Kenton will be somewhat muted by the current UP project to build a new south-to-east connection at East Portland Junction).</p> <p>The project does not open new markets to any railroad.</p>

PRP-10. South Rivergate Rail Access: Second Slough Bridge– Summary of Factors

Project Description	<p>This project would construct a rail bridge across Columbia Slough to provide rail connection to south Rivergate from Terminal 6. It was listed as a Tier 3 project in the City of Portland Freight Master Plan. This project would likely need to follow after PRP-6 and PRP-7 because it would increase the number of trains moving through North Rivergate, causing vehicular congestion on N. Marine Drive and access issues for businesses located off of N. Marine Drive.</p> <p>The Project would extend a new track from the BNSF Rivergate Lead near Hyundai west towards Kelly Point. The track would pass through Kelly Point Park and a new at-grade crossing of the park entrance road is required. The track would then turn south, crossing over the Columbia Slough on a new bridge and connect to the South Rivergate Yard area near Columbia Grain. Direct rail connectivity could be constructed from this route to Terminal 5, however direct rail access to Columbia Grain is unlikely from the north.</p> <p>Project Reference: Port of Portland Marine Terminal Master Plan 2020, Volume 4 Alternatives Final Draft (PB Ports & Marine, Inc., March 2003)</p>
Cost	\$10,840,000
Local Benefit	The project opens up new rail access to the South Rivergate area by constructing a northerly connection, whereas the only rail access presently is from the south.
Regional Benefit	The connection offers a relief route if train movements into and out of South Rivergate increase substantially over the next 20 years. The Bonneville Yard area could become a source of rail congestion should train traffic increase dramatically because of trains crisscrossing each other to move to various terminals, industries, and yards.
Main Line Capacity	This project has a marginal effect on main line capacity, unless UP is permitted to operate through North Rivergate. This would provide a new route for UP to access the BNSF north-south main line that might reduce the number of trains crisscrossing the “X” at North Portland Junction.
Project Development Status	<p>Environmental Clearance: No progress to date.</p> <p>Right-of-Way: The project would require right-of-way acquisition through an electrical substation, through Kelly Point Park, and over the Columbia Slough.</p> <p>Final Design: Final design could be completed in 6 months</p> <p>Construction: Construction could be completed in 10 months</p>
Class I Competition Maintains or Increases	<p>This project would primarily enhance the BNSF’s access to the South Rivergate area by providing a more direct connection from the north. The UP could potentially use this route as well if the proper operating agreements are reached between the two Class 1 carriers.</p> <p>The project does not create new markets for either Class 1 carrier.</p>



LEGEND
EXISTING TRACK
PROPOSED TRACK
SHIFT TRACK
REMOVE TRACK
PROPOSED STRUCTURE
FUTURE TRACK

QUANTITIES
3655' NEW TRACK
5 EA NO. 11 HTTO
675' DOUBLE RAIL BRIDGE
176' SHIFT TRACK
240' REMOVE TRACK
1 EA DIAMOND CROSSING
2633' FUTURE TRACK
2 EA FUTURE NO. 11 HTTO

NOTE: ALL CONCEPTUAL DESIGN BASED OFF OF AERIAL IMAGERY



PORT OF PORTLAND - RAIL PLAN
PRP-10 SOUTH RIVERGATE RAIL ACCESS:
SECOND SLOUGH BRIDGE

DATE _____

FIGURE

PRP 10 - PRELIMINARY CONSTRUCTION COST ESTIMATE - JAN 2013

DESCRIPTION		QUANTITY	UNIT	UNIT PRICE	SUB TOTAL
1.0 General					
1.01	Right-of-Way Impacts/Property Acquisition		Acre		\$ -
1.02	Environmental Permitting		LS		\$ -
2.0 Civil & Track Work					
2.01	Embankment	17327	CY	\$ 25	\$ 433,185
2.02	New Track	3655	TF	\$ 175	\$ 639,625
2.03	Shift track	176	TF	\$ 20	\$ 3,520
2.04	Remove track	240	TF	\$ 10	\$ 2,400
2.05	Turnout #11, hand thrown	5	EA	\$ 80,000	\$ 400,000
2.06	Diamond	1	EA	\$ 40,000	\$ 40,000
3.0 Structural Work					
3.01	Double Track Bridge over Columbia Slough	420	TF	\$ 16,000	\$ 6,720,000
3.02	Road Crossings (Collector)	1	EA	\$ 100,000	\$ 100,000
4.0 Signal Work					
	NA				

Subtotal	\$	8,338,730
Contingency	30%	\$ 2,501,619
TOTAL	\$	10,840,349

ASSUMPTIONS


Estimates only indicate probable cost of construction
 Right-of-way or property impact costs are not included
 Environmental permitting is not included
 Engineering Design costs are not included
 Utility relocation costs are not included
 stormwater conveyance and treatment costs are not included
 Earthwork is an assumed 24' wide, 4' height and 2:1 slopes the track length

This page is intentionally blank.

PRP-11. UP: Barnes Yard to T- 4 Direct Connection– Summary of Factors

Project Description	<p>This project would construct a 3rd running track between UP Barnes Yard and Terminal 4 to the west. Depending on its ultimate configuration, the track length would be approximately 4,400' (or roughly 65 railcars at 62' each plus locomotives). The new running track would provide UP the opportunity to stage an additional train for Terminal 4. This would enable the railroad to serve a new bulk customer at T-4 whereas the railroad currently lacks capacity to stage additional trains for that terminal. It would require reconfiguration of the spur track to NW Container. The manner in which the new runner ties into the Terminal 4 area tracks has yet to be determined. It is also a priority project in the 2012 Port Transportation Improvement Plan, referencing the (2003) Marine Terminal Master Plan 2020.</p> <p>A pedestrian overcrossing of the UP Saint Johns Lead between Chimney and Peninsula Parks is close to construction as of Spring 2013. Further investigation is required to determine the compatibility of that project with the location of a third running track and the initial planning effort that was done in 2005.</p>
Cost	<p>\$4,543,000*</p> <p>*Note: the 2005 study by HDR <u>did not</u> include replacing the N. Lombard Street overcrossing, should it become necessary. Further study of the structure is warranted.</p>
Local Benefit	<p>Creates a new running track that could be devoted to serve new business if Pier 1 at T-4 is redeveloped. Track could also support existing rail operations for soda-ash and automobiles.</p>
Regional Benefit	<p>Improves rail access to Terminal 4 for all future tenants. There is concern that UP cannot stage additional trains on its current network within the Portland Terminal area for new unit-train customers that might locate at or near Terminal 4. A third track provides the capacity needed to support new unit-train or shuttle-train business. This makes economic redevelopment in the Terminal 4 area more appealing to potential shippers by providing the rail infrastructure to support the business.</p>
Main Line Capacity	<p>This project has minimal impact on main line capacity.</p>
Project Development Status	<p>Environmental Clearance: None completed.</p> <p>Right-of-Way: Requires some property boundary changes along the rail corridor, and results in Port ownership of a section of the existing roadway. Further investigation is required regarding the suitability of the N. Lombard overcrossing to accommodate a third track. Confirmation is required that a new pedestrian overcrossing of UP at Peninsula Park under development at the time of this writing is able to accommodate a third track.</p> <p>Note that the Lombard highway bridge is due for seismic upgrade, and design and work for that could be coordinated with this project.</p> <p>Final Design: Final design could be completed in 6 months</p> <p>Construction: Construction could be completed in 12 months</p>
Class I Competition Maintains or Increases	<p>The improvements primarily benefit the UP by increasing its capacity to provide additional unit- or shuttle-train service at Terminal 4.</p> <p>Capacity for additional shuttle or unit trains could give rise to new markets for UP if a shipper was enticed to T-4 by virtue of the added rail capacity (although it has been noted previously that BNSF has a reciprocal switching agreement to T-4 currently).</p>





PORT OF PORTLAND
PORTLAND OREGON

PROJECT NO. 2009-XX-XX-XX-01

CD 2009-XX-XX-XX-01

TERMINAL 4 LEAD TRACK MODIFICATION PROJECT

T4

DATE: 1/2009

SCALE: 1"=100'

BY: J. WILSON

APPROVED BY: A. CHEN

PRP-12. North Rivergate Boulevard Grade Separation – Summary of Factors

Project Description	<p>Several key Port tenants have recently expanded their operations. These include Columbia Grain, Canpotex and Evraz. All three major tenants require unfettered rail access with trains nominally longer than 5,000 feet and approaching 8,000 feet. Because the Rivergate yard is only 4,500 feet in length, North Rivergate Blvd is often blocked as inbound trains have to be broken down onto multiple tracks and outbound trains have to double-over to depart. In addition, trains will be traveling at a speed no higher than 5 MPH through North Rivergate Boulevard as these trains are either just starting or coming to a stop.</p> <p>The Port of Portland (Port) has recently completed the expansion of the South Rivergate Yard to further support unit train operations at Columbia Grain. Another Port tenant at Terminal 5 in the Rivergate Industrial District is evaluating the prospect of expanding unit train operations as well. With this growth in mind, the blockages at North Rivergate Blvd will only likely increase in the future. Constructing a grade separation over North Rivergate will eliminate the delays to the ever-increasing vehicular traffic using this roadway.</p>
Cost	<p>\$ 10,294,000*</p> <p>*Note: Includes bridge and utility estimates. (June 2012 estimate from North Ramsey Boulevard/North Rivergate Boulevard Grade Separations report, HDR. Excludes cost of reconfiguration of impacted tenant facilities, right-of-way, existing utility relocation and other elements outside of direct project footprint.</p>
Local Benefit	<p>Improves reliability of access of local businesses and emergency vehicle access.</p> <p>UP and BNSF main line operational flexibility and capacity would be improved as departing trains could be made ready for departure and held at South Rivergate waiting for main line slots.</p> <p>Supports increased rail related unit train volumes</p>
Regional Benefit	<p>Improves turn-around time for train sets delivering grain to Columbia Grain. This improvement could allow the customer to lower transportation costs for their shippers. This in turn would allow a greater volume of goods to flow through the Port of Portland improving overall regional productivity.</p>
Main Line Capacity	<p>BNSF trains arriving or departing South Rivergate typically must have a clear route onto the BNSF main line all the way to Vancouver, WA. BNSF trains will stage on the main lead track at Rivergate next to Ramsey Yard where they perform outbound air-tests and inspections. As train volumes increase this will become a more significant capacity constraint, creating a chokepoint, causing delays for north-south and east-west rail traffic.</p> <p>UP trains arriving or departing South Rivergate typically must have a clear route onto the UP main line. UP trains will stage on the Barnes Yard Bypass Track or in Barnes Yard. As train volumes increase this will become a more significant capacity constraint, creating a chokepoint, causing delays for east-west rail traffic.</p>
Project Development Status	<p>Environmental Clearance: No progress to date.</p> <p>Right-of-Way: Depending on final design, approximately 4,362 square feet of right-of-way will be required, including Port-owned and private property.</p> <p>Final Design: Final design could be completed in nine months.</p> <p>Construction: Construction could be completed in eighteen months.</p>
Class I Competition Maintains or Increases	<p>Equal competitive access will be maintained.</p> <p>BNSF and UPRR will each benefit operationally from this improvement. Primary beneficiaries are area businesses in locations where roadways are blocked for up to 45 minutes.</p>



RIVERGATE Grade Separation Estimate of Probable Cost - TS&L Level					
Item No.	Item Description	Quantity	Units	Unit Price	Cost
1	Mobilization and General Conditions	1	LS	10%	\$571,225.01
2	Roadway Demolition / Removal	6,960	SQYD	\$ 14	\$ 93,960
3	Concrete Sidewalks - 4" concrete surfacing	11,229	SQFT	\$ 7.00	\$ 78,603
4	Concrete Curb and Gutter	2,760	LF	\$ 13	\$ 35,300
5	Concrete Driveways - Industrial	3	EACH	\$ 16,032	\$ 48,096
6	Level 3, 3/4" dense HMA, 8" thickness	3,370	TON	\$ 91	\$ 308,285
7	Roadway Aggregate Base, 10" thickness	4,007	TON	\$ 23	\$ 90,478
8	Storm Drainage - New Pipe Conveyance	425	LF	\$ 85	\$ 36,125
9	Storm Drainage - Mechanical Water Quality	1	LS	\$ 102,750	\$ 102,750
10	Reinforced Concrete Bridge End Panels	222	SQYD	\$ 200	\$ 44,400
11	Retaining Wall, MSE	34,130	SQFT	\$ 65	\$ 2,218,450
12	32 Inch Type "F" Traffic Barrier Coping with Moment Slab	1,624	FOOT	\$ 250	\$ 406,000
13	Bridge - Precast BT72 Girder	11,120	SQFT	\$ 200	\$ 2,224,000
14	Concrete Bridge Rail Transition	80	FOOT	\$ 200	\$ 16,000
15	Type "C" Protective Fence (6.5' high)	140	FOOT	\$ 70	\$ 9,800
Subtotal					\$ 6,284,000
Construction Contingency @ 20%					\$ 1,257,000
Project Development (Design, CM, Closeout) @ 15%					\$ 943,000
Project Development Contingency @ 20%					\$ 189,000
Estimate Total					\$ 8,673,000

Port of Portland Rail Plan: Project Descriptions

			BUDGET ESTIMATE						
Location:	Rivergate, OR							By:	DRN
Project Name:	Rivergate Overcrossing Existing Utility Relocation Conceptual Cost Estimate							Date orig:	10/17/2012
Project No:								Revision#:	DRAFT
EAN:	1112							Date:	
				THIS ESTIMATE HAS A RATING OF:		3C	(See rating scale guide below.)		
Scope:	This is a conceptual construction cost estimate for relocating the existing utilities for the construction of the Rivergate Blvd. overcrossing. The work consists of relocating the 12" DI water main, but saving the casing under the RR tracks, storm and gas service. This cost estimate does not include any costs for the overcrossing or utilities associated to the overcrossing. This cost estimate assumes that most of the new ROW will be taken from the Port property on the south side of the road and none of the High Voltage power lines will have to be relocated.								
Assumptions:	a. No additional row will be required, other then the 249 SF as shown in the HDR June 2012 Memorandum. There was no value associated with the 4,113 SF of Port property required for ROW dedication.								
	b. No adjacent street trees or landscaping will be required.								
	c. No offsite street, landscaping or utility improvements are required.								
	d. No costs have been included for relocating private utilities.								
	e. This site layout assumes that the majority of the ROW will be taken from the Port property on the south side of the the overcrossing will not infringe on the high voltage power line setbacks.								
	f. The existing utility casings under the RR tracks for the water and gas line will be saved.								
	g. The utilities that are to be abandoned will be plugged and left in place.								
	h. Construction will take placing during the dry season.								
	i. The storm water quality/conveyance system on the overcrossing is not included in this estimate, but in HDR's Cost estimate.								
	j. No site development costs have been included in this cost estimate.								
	k. Costs do not include any inflation due to natural, or manmade disasters.								
	l. Relocation of utilities are based on the conceptual overcrossing design and report developed by HDR, June 2012								
	m. Estimate assumes any environmental remediation work (identification and clean-up) done under a separate effort.								
	n. There has been no pre-application meeting with the City.								
	o. No improvements/construction will take place on the rail road tracks.								
	p. A casing pipe under the overcrossings ramp fill area is acceptable.								
	q. The existing sanitary sewer lines will not have to be relocated.								
	r. Estimate assumes any wetland/wildlife work (identification and mitigation) will be done under a separate effort.								
	s. Construction Cost are based on 2012 dollars and this work will be included as part of the overcrossing project.								
CONSTRUCTION									
JDE						EST.		UNIT	EXTENSION
COST CODE	ITEM DESCRIPTION					QUANT.	UNITS	PRICE	COST
	Mobilization, Demob. & Insurance.					15	%		83,500
	Traffic control					1	LS	15,000.00	15,000
	Finish grade and seed					1	LS	3,000.00	3,000
	Erosion controls					1	LS	7,500.00	7,500
	Dewatering					1	LS	300,000.00	300,000
	ROW Acquisition for non Port property					249	SF	25.00	6,225
	Water:								
	24" DI pipe					1,500	LF	150.00	225,000
	Relocate service and water meter					5	Ea	3,500.00	17,500
	Relocate Fire Hydrant Assembly					2	EA	2,000.00	4,000
	Connect to existing line					4	EA	2,500.00	10,000
	Gate valves					4	EA	1,500.00	6,000
	Sanitary Sewer:								
	Relocate 12" PVC sewer pipe					0	LF	75.00	0
	Relocate 8" PVC sewer pipe					0	LF	50.00	0

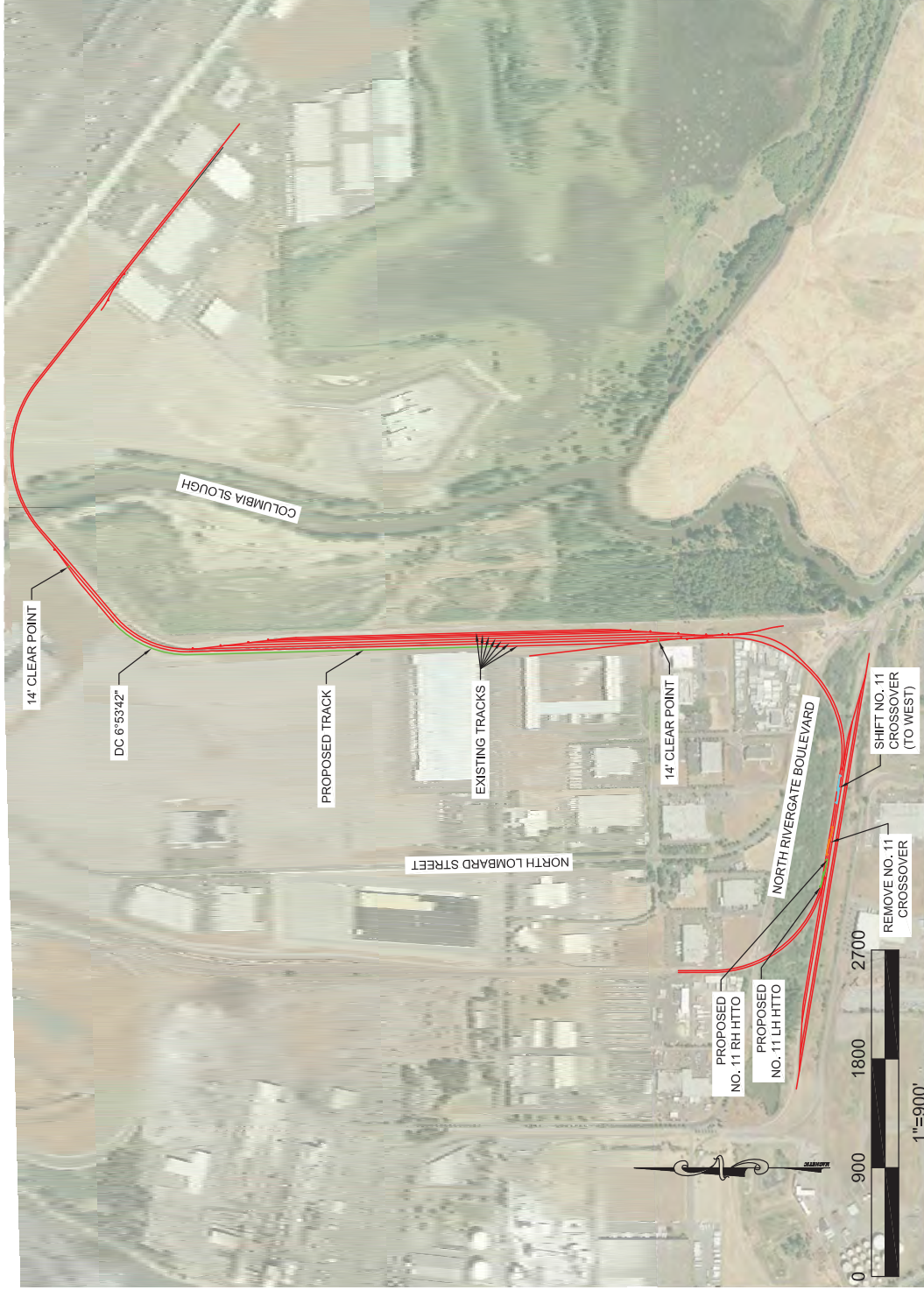
Portland of Portland Rail Plan

PRP-12

This page is intentionally blank.

PRP-13. Ramsey Yard Utilization Project – Summary of Factors

Project Description	<p>Currently, Ramsey Yard is controlled by UP. The original purpose of the yard was to store cars for customers in the Rivergate Industrial Area including unit trains, which are defined in the BNSF and UP agreement as 25 cars. BNSF uses Ramsey Yard improvements today for storing bad order cars set out from outbound unit grain trains. Ramsey Yard is normally not used to store arriving or departing unit trains for the Port of Portland T-5 customers as the tracks are not long enough to store a train in halves on two tracks.</p> <p>The proposed Ramsey Yard Reutilization project includes:</p> <ul style="list-style-type: none"> • Change the use of Ramsey Yard to include the interchange point between BNSF and UP. Currently, interchange takes place at Portland Terminal Railroad Lake Yard. • Connect the existing stub-ended set-out track along the west side of the main lead with the industrial lead near the south end to provide a location to store a 5,100-foot unit-train for Rivergate or South Rivergate. • Reconfigure crossovers on the UP track around Bonneville Yard to allow BNSF to arrive a T-5 unit train without blocking UP movements to South Rivergate from Barnes Yard.
Cost	\$1,667,000
Local Benefit	<p>Port of Portland T-5 customer Columbia Grain will realize it's full capability if more than two unit trains can be stored in the combined Rivergate and South Rivergate area. Currently, South Rivergate can only hold two unit grain trains.</p>
Regional Benefit	<p>Improved main line capacity</p> <p>Supports growth at the Port.</p>
Main Line Capacity	<p>Additional nearby storage location of unit trains off of the main line improves main line capacity Improved efficiency for arriving and departing</p>
Project Development Status	<p>Environmental Clearance: No progress to date; effort would be informed by the effort to permit the Ramsey Yard.</p> <p>Right-of-Way: No acquisition required.</p> <p>Final Design: Final design could be completed in four months.</p> <p>Construction: Construction could be completed in six months.</p>
Class I Competition Maintains or Increases	<p>Competitiveness between BNSF and UP remains unchanged.</p> <p>BNSF and UPRR will each benefit from this improvement.</p>



- LEGEND
- EXISTING TRACK
 - PROPOSED TRACK
 - REMOVE TRACK
 - SHIFT TRACK

QUANTITIES
 3245' NEW TRACK
 2 EA NO. 11 HITO INSTALL
 2 EA NO. 11 SHIFT
 2 EA NO. 11 REMOVE
 CAPACITY
 5176' (CL. PT. TO CL. PT.)

NOTE: ALL CONCEPTUAL DESIGN BASED OFF OF AERIAL IMAGERY



PORT OF PORTLAND - RAIL PLAN
 PRP-13 RAMSEY YARD
 UTILIZATION PROJECT

DATE	01/30/2013
FIGURE	1/1

PRP 13 - PRELIMINARY CONSTRUCTION COST ESTIMATE - JAN 2013

DESCRIPTION		QUANTITY	UNIT	UNIT PRICE	SUB TOTAL
1.0 General					
1.01	Right-of-Way Impacts/Property Acquisition		Acre		\$ -
1.02	Environmental Permitting		LS		\$ -
2.0 Civil & Track Work					
2.01	Embankment	15384	CY	\$ 25	\$ 384,593
2.02	New Track	3245	TF	\$ 175	\$ 567,875
2.03	Turnout #11, hand thrown	4	EA	\$ 80,000	\$ 320,000
2.04	Remove Turnout #11	2	EA	\$ 5,000	\$ 10,000
3.0 Structural Work					
	NA				
4.0 Signal Work					
	NA				

Subtotal	\$	1,282,468
Contingency	30%	\$ 384,740
TOTAL	\$	1,667,208

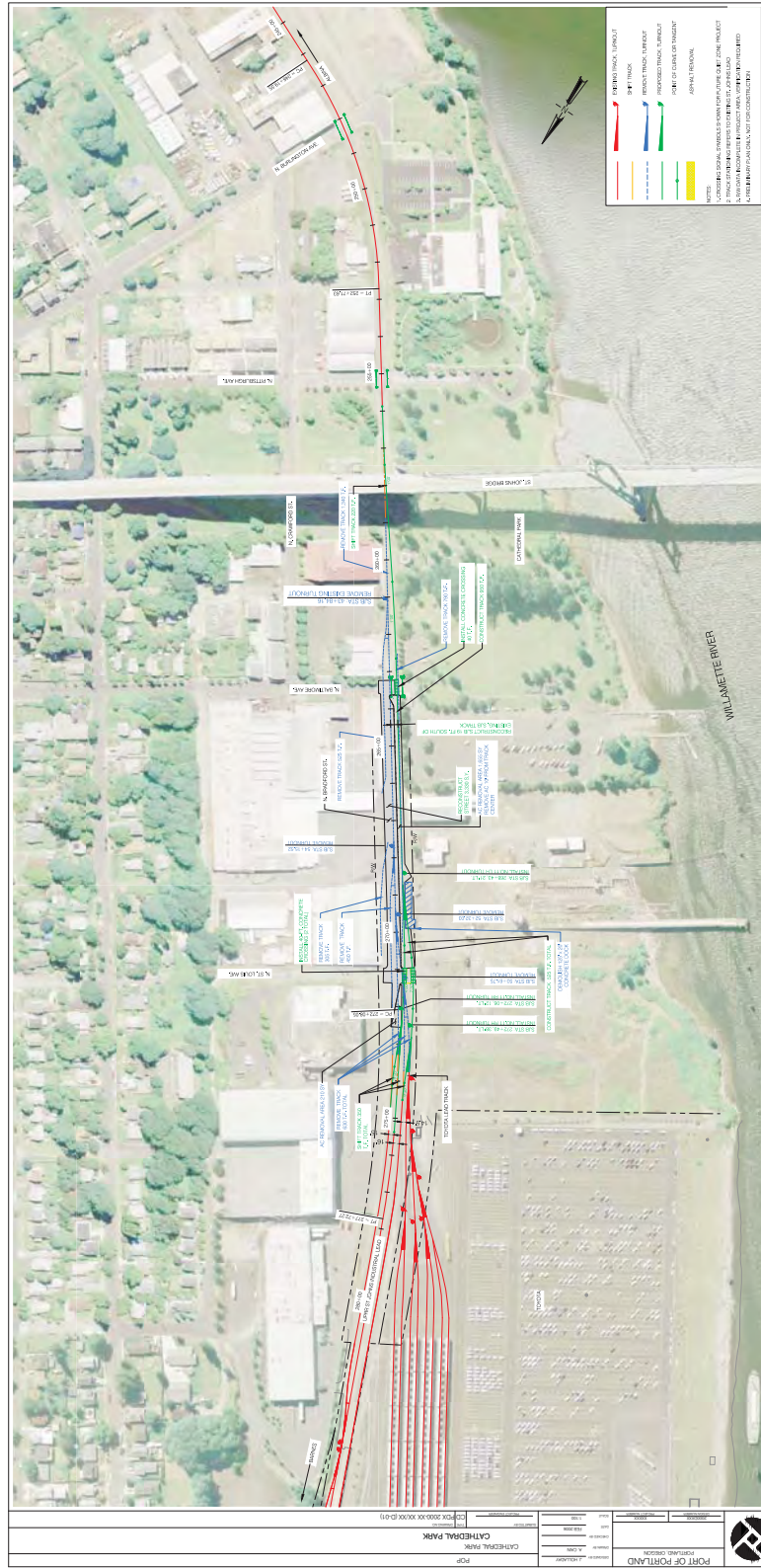
ASSUMPTIONS

Estimates only indicate probable cost of construction
 Right-of-way or property impact costs are not included
 Environmental permitting is not included
 Engineering Design costs are not included
 Utility relocation costs are not included
 stormwater conveyance and treatment costs are not included
 Earthwork is an assumed 24' wide, 4' height and 2:1 slopes the track length

This page is intentionally blank.

PRP-14. Cathedral Park Quiet Zone and Track Improvement – Summary of Factors

Project Description	<p>The Union Pacific rail line accesses north Portland and the Port's Terminal 4 in the heart of St. Johns, via Bradford Street in-street track. The alignment impacts access to several industrial businesses between Bradford and Decatur streets, causing traffic to dodge moving trains to access their sites. This project would address safety as well as rail switching noise due to required whistle blows at unprotected crossings.</p> <p>The project includes three phases, as follows:</p> <p>Phase A: Realign St. Johns lead railroad tracks in Bradford Street approximately 10 feet west, from St. Louis Avenue at the north to the St. Johns Bridge in the South. Realigned tracks will be barrier separated from vehicles and pedestrians.</p> <p>Phase B: Upgrade all crossings (including pedestrian crossings) within the Whistle Free Zone corridor to the required four quadrant gates or other safety devices (except crossing at Baltimore and Bradford streets which are addressed in Phase C).</p> <p>Phase C: Purchase part of Cathedral Park Place building at northeast corner of Baltimore and Bradford streets as well as upgrade crossing to four quadrant gates.</p>
Cost	\$8,340,000 (provided by Port of Portland)
Local Benefit	Local community benefits by reduced noise and increased livability.
Regional Benefit	Local and regional economy benefits from ability to grow auto import operations in North Portland while maintaining and improving livability.
Main Line Capacity	The project does not impact main line capacity.
Project Development Status	<p>This project has been studied and developed over recent years and advanced for various funding opportunities. It is included in the constrained 2035 Regional Transportation Plan, and identified as a 5-year priority for implementation in the Port's 2012 Transportation Improvement Plan.</p> <p>Environmental Clearance: No progress to date.</p> <p>Right-of-Way: Project involves public street right-of-way and likely impacts at least one commercial building.</p> <p>Final Design: Final design could be completed in 4 months</p> <p>Construction: Construction could be completed in 6 months</p>
Class I Competition Maintains or Increases	The project does not impact Class 1 carrier competition.



PRP-15. Bonneville Yard Build-Out – Summary of Factors

Project Description	The project has two primary elements: (a) construct two interior yard tracks at Bonneville within the existing footprint of the yard, and (2) complete the double-track lead from the wye at the east end of Bonneville east to the west end of the UP Barnes Yard Bypass project. The Bypass project begins the process of double-tracking between the two, but would still leave a single-track section in place. This project would also install a universal crossover between each of the tracks of the lead. The net effect would be the ability to store a unit train between Barnes Yard and Bonneville, while passing a second train around it destined for South Rivergate or Ramsey yards.
Cost	<p>\$3,606,000*</p> <p>*Note: the potential impact to a power transmission line tower on the west side of the Lombard overpass is noted, however no estimation of the relocation cost has been made (although the overall project was given a budget contingency of 30% to account for such unknowns).</p>
Local Benefit	The build-out of the yard tracks will provide additional track storage for potential new business near Time Oil Road and North Rivergate Boulevard. It will also provide a double-track link from Barnes Yard to various terminals in the Rivergate area that will make for the efficient movement of trains within the Portland terminal area.
Regional Benefit	The project provides new transportation infrastructure to attract economic development and increase the Metro area jobs base.
Main Line Capacity	This project does not impact mainline capacity.
Project Development Status	<p>Environmental Clearance: No progress to date.</p> <p>Right-of-Way: The interior yard tracks do not require right-of-way acquisition. The completion of the double-track link between Barnes Yard and Bonneville would require acquisition of on the order of 12,000 square feet from several businesses to build the second track east of N. Lombard Street.</p> <p>Final Design: Final design could be completed in 4 months</p> <p>Construction: Construction could be completed in 9 months</p>
Class I Competition Maintains or Increases	The project primarily benefits the movements of UP trains intra-terminal. The project also provides new yard storage capacity to UP at Bonneville.



CAPACITY	QUANTITIES
2536' TRACK A (CL. PT. TO CL. PT.)	6877' NEW TRACK
22287' TRACK B (CL. PT. TO CL. PT.)	6 EA NO. 9 HITTO
23355' TRACK C (PROPOSED TRACK)	4 EA NO. 11 HITTO
	527 REMOVE TRACK
	1 EA REMOVE NO. 11 HITTO

LEGEND
EXISTING TRACK
PROPOSED TRACK
SHIFT TRACK

PRP 15 - PRELIMINARY CONSTRUCTION COST ESTIMATE - JAN 2013

DESCRIPTION		QUANTITY	UNIT	UNIT PRICE	SUB TOTAL
1.0 General					
1.01	Right-of-Way Impacts/Property Acquisition		Acre		\$ -
1.02	Environmental Permitting		LS		\$ -
2.0 Civil & Track Work					
2.01	Embankment	32602	CY	\$ 25	\$ 815,052
2.02	New Track	6877	TF	\$ 175	\$ 1,203,475
2.03	Remove Track	527	TF	\$ 20	\$ 10,540
2.04	Turnout #9, hand thrown	6	EA	\$ 70,000	\$ 420,000
2.05	Turnout #11, hand thrown	4	EA	\$ 80,000	\$ 320,000
2.06	Remove Turnout #11	1	EA	\$ 5,000	\$ 5,000
3.0 Structural Work					
	NA				
4.0 Signal Work					
	NA				

Subtotal	\$	2,774,067
Contingency	30%	\$ 832,220
TOTAL	\$	3,606,287

ASSUMPTIONS

Estimates only indicate probable cost of construction
 Right-of-way or property impact costs are not included
 Environmental permitting is not included
 Engineering Design costs are not included
 Utility relocation costs are not included
 stormwater conveyance and treatment costs are not included
 Earthwork is an assumed 24' wide, 4' height and 2:1 slopes the track length

This page is intentionally blank.

PRP-16. T-4 Soda Ash Yard Improvements – Summary of Factors

Project Description	This project, also known as T4 B410 411 Rail Yard Improvement, would construct several new yard tracks re-organize several others at Terminal 4 to increase both the loaded and empty railcar capacity for the soda ash transfer operation at Terminal 4. The project would also construct a short stub track for loading specialty cargoes.
Cost	\$4,112,000
Local Benefit	Would increase the capacity and efficiency of bulk commodity operations at Terminal 4.
Regional Benefit	Enhances the economic competitiveness of the Port's tenants, providing new opportunities for business growth and adding to the Metro area's economic growth prospects.
Main Line Capacity	Main line capacity is not impacted.
Project Development Status	Environmental Clearance: No progress to date. Right-of-Way: The Port controls all the required right-of-way. Final Design: Final design could be completed in 3 months. Construction: Construction could be completed in 5 months.
Class I Competition Maintains or Increases	Competitiveness between BNSF and UP remains unchanged.

TRACK CAPACITY CHART (LOADED)		
LENGTH	TRACK#	60' CARS*
829'	413	13
590'	412	9
705'	411	11
1579'	410	26
1155'	409	19
1429'	408	23
1686'	407	28
1846'	406	30
1928'	405	32
1814'	404	30
1720'	403	28

TRACK CAPACITY CHART (EMPTY)		
LENGTH	TRACK#	60' CARS*
1861'	402	31
1683'	401	28
1694'	X	28 (11)
1855'	Y	30 (16)

(715' w/o sharing track
403
(885' w/o using
McDemott Lead)

(CAR CAPACITY WITHOUT SHARING TRACK)

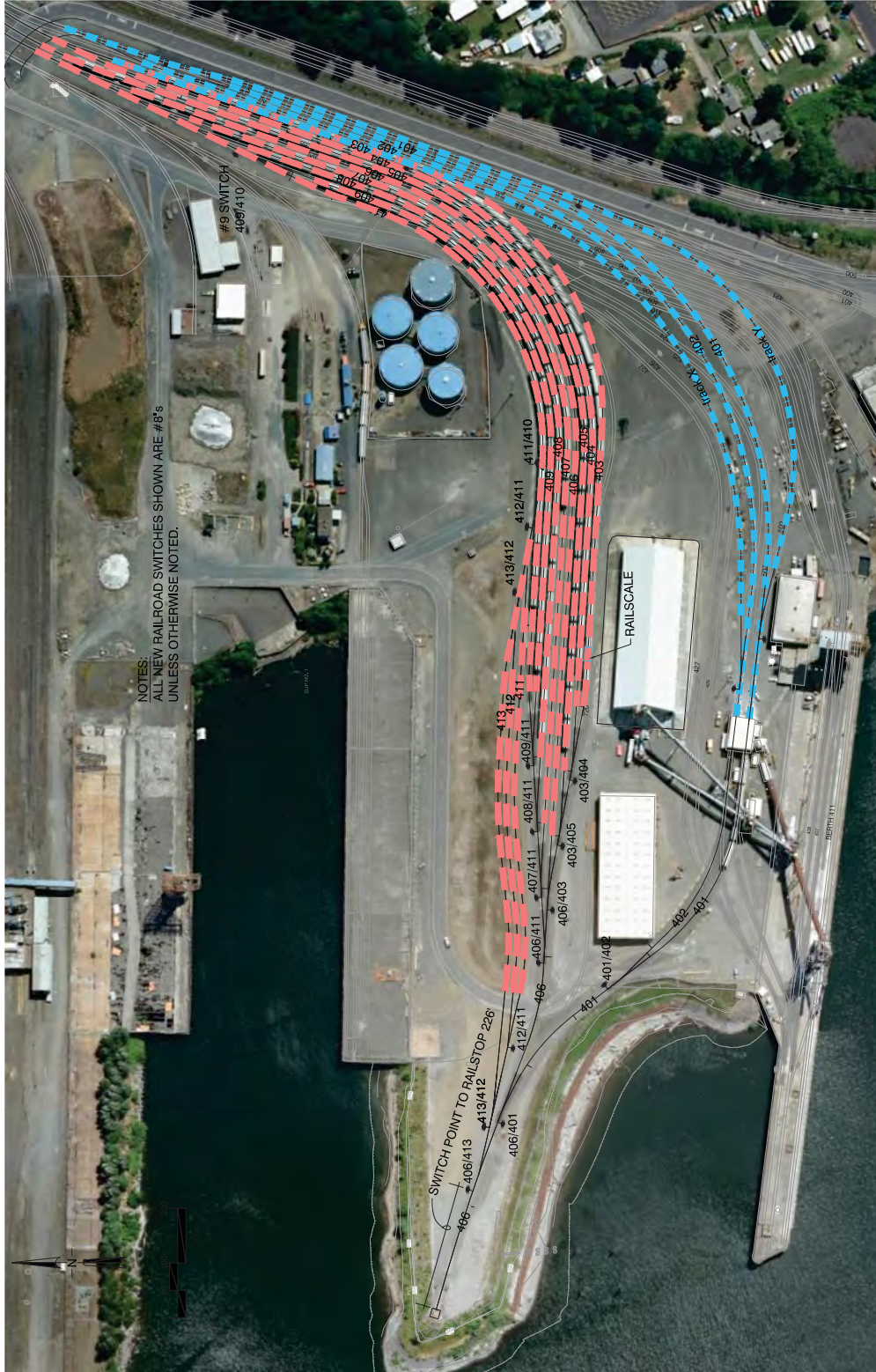
CAPACITY TOTALS

249 LOADED CARS
117 EMPTY CARS
0 BAD ORDER CARS**

*BASED ON 60' CARS & SHARED TRACK
**NEW TRACK REMOVES BAD ORDER TRACK

LEGEND:

LOADED CARS
EMPTY CARS



TERMINAL 4 - RAILYARD CAPACITY - SKETCH
58 EMPTY CAR & 33 LOADED CAR CAPACITY ADDED
DATE: JAN 3, 2013
DESIGNED BY: R.W. ANDERSON
SCALE: 1" = 100'

Port of Portland Rail Plan: Project Descriptions

PRP 16 - PRELIMINARY CONSTRUCTION COST ESTIMATE - JAN 2013

DESCRIPTION		QUANTITY	UNIT	UNIT PRICE	SUB TOTAL
1.0 General					
1.01	Port Provided Base Estimate				\$ 3,989,000
2.0 Civil & Track Work					
2.02	New Track	300	TF	\$ 175	\$ 52,500
2.03	Turnout #9, hand thrown	1	EA	\$ 70,000	\$ 70,000
TOTAL					\$ 4,111,500

ASSUMPTIONS

Estimates only indicate probable cost of construction

Right-of-way or property impact costs are not included

Environmental permitting is not included

Engineering Design costs are not included

Utility relocation costs are not included

stormwater conveyance and treatment costs are not included

Earthwork is an assumed 24' wide, 4' height and 2:1 slopes the track length

This page is intentionally blank.

PRP-17. West Hayden Island Main Line Access – Summary of Factors

Project Description	<p>The project would construct a connection to the BNSF north-south mainline for rail access to the proposed West Hayden Island (WHI) marine cargo terminal. The rail access configuration is assumed to be a “wye” track arrangement coming off the west side of the main line and descending downgrade to meet the lower elevation of the terminal. The wye will allow trains to arrive/depart from either the north or the south. The mainline connection will require signaling improvements to control train movements on/off WHI. An alternative access scheme has been proposed that would descend off the east side of the main line and pass under the south end of the BNSF main line’s Columbia River bridge to access the proposed terminal area.</p> <p>The ultimate configuration depends in part on the results of the WHI master planning exercise and annexation into the City of Portland. The layout of rail infrastructure considered herein was put forth in the City of Portland’s March 2012 <i>West Hayden Island Final Report</i>.</p>
Cost	<p>\$911,000*</p> <p>*Recent 2012 estimate from City of Portland report, therefore no cost escalation was performed.</p>
Local Benefit	<p>Provides direct rail access to WHI to allow for the proposed marine terminal development.</p>
Regional Benefit	<p>Rail access to WHI will allow the terminal to reach its full economic potential as an investment that helps the Portland area compete with other West Coast ports for international marine traffic. It is unlikely that a terminal without direct rail access could efficiently move the product that would be generated by a marine terminal, especially if the primary focus becomes bulk commodities.</p>
Main Line Capacity	<p>Rail access to the proposed WHI marine cargo terminal will need to be designed to maintain mainline capacity.</p>
Project Development Status	<p>Environmental Clearance: City of Portland is studying the likely outcomes of an annexation process to bring the proposed terminal area inside municipal limits.</p> <p>Right-of-Way: The right-of-way for the project would be obtained as part of the greater effort to develop and permit the WHI marine terminal. The wye tracks connecting to the mainline will require some BNSF right-of-way.</p> <p>Final Design: Final design could be completed in 6 months</p> <p>Construction: Construction could be completed in 12 months</p>
Class I Competition Maintains or Increases	<p>The effect on the competitive balance between UP and BNSF is not clear because it is unclear if UP will have open access to the new terminal.</p>

Portland of Portland Rail Plan



PRP-18. West Hayden Island Unit Train Loops – Summary of Factors

Project Description	<p>This project would construct the needed rail infrastructure to support the WHI marine cargo terminal operations. The general configuration of the tracks is anticipated to be a series of concentric loop tracks that allow trains to pull forward into and out of the terminal, several long parallel train storage tracks, and a number of other loading and yard tracks situated around the terminal. The break point between this project and PRP-17 is the point at which the mainline connection tracks come down to the elevation of WHI and can begin to split off into multiple terminal tracks.</p> <p>The ultimate configuration depends in part on the results of the WHI master planning exercise and annexation into the City of Portland. The layout of rail infrastructure considered herein was put forth in the March 2012 West Hayden Island Final Report by WorleyParsons.</p>
Cost	<p>\$9,702,000*</p> <p>*Recent 2012 estimate from City of Portland report, therefore no cost escalation was performed.</p>
Local Benefit	<p>The project builds out rail infrastructure on WHI to support the proposed marine terminal operations.</p>
Regional Benefit	<p>Rail infrastructure is a vital component of the overall scheme to construct a marine terminal that will bring economic development to Oregon and increase the Port's competitive position against other West Coast ports.</p>
Main Line Capacity	<p>Without main line capacity improvements elsewhere, it is likely that rail-served development on WHI will detract from main line capacity by increasing the number of trains operating on the same physical plant.</p>
Project Development Status	<p>Environmental Clearance: City of Portland is studying the likely outcomes of an annexation process to bring the proposed terminal area inside municipal limits.</p> <p>Right-of-Way: The right-of-way for the project would be obtained as part of the greater effort to develop and permit the WHI marine terminal. The wye tracks connecting to the mainline will require some BNSF right-of-way.</p> <p>Final Design: Final design could be completed in 6 months</p> <p>Construction: Construction could be completed in 8 months</p>
Class I Competition Maintains or Increases	<p>The effect on the competitive balance between UP and BNSF is not clear because it is unclear if UP will have open access to the new terminal. Without UP access to the new terminal, the current status quo between the railroads in terms of their overall service to the area's Ports would shift in BNSF's favor. Potential tenants of WHI may suffer on transportation costs due to a lack of competition in rail rates.</p>

Port of Portland Rail Plan: Project Descriptions



PRP-19.BNSF: Increased Speed Over the Willamette and Columbia River Bridges – Summary of Factors

Project Description	<p>Known as I-5 Trade Corridor Railroad Capacity Improvements, Project Number 2. The current maximum authorized speed over the three movable spans is limited to 30 MPH. As a segment of the High Speed Rail Corridor, increasing the speed to 50 MPH would significantly reduce the running time for the Seattle to Portland passenger trains, a key element of the overall incremental approach to WSDOT's and ODOT's High Speed Rail program. The work involves improving the approaches to these bridges to allow an increased operating speed. Also includes the Willamette River Draw Span (not shown in the drawing.)</p> <p>Project Reference: I-5 Rail Capacity Study, Portland/Vancouver I-5 Trade and Transportation Partnership (HDR, February 2003)</p>
Cost	<p>\$10,751,000</p> <p>Original project cost estimate by others in 2003 were escalated by HDR to 2013 dollars. The detailed original cost estimate is not available.</p>
Local Benefit	<p>Reduces running time between Portland and Vancouver for all passenger trains</p>
Regional Benefit	<p>Increasing the speeds on the three bridges will expedite through-train movements for BNSF, UP, and Amtrak.</p>
Main Line Capacity	<p>Main line capacity is enhanced by increasing the speed of trains and therefore the throughput capacity.</p>
Project Development Status	<p>Environmental Clearance: No progress, although it remains to be determined how much effort is actually required if the project could be classified as railroad maintenance.</p> <p>Right-of-Way: The project will not require acquisition of right-of-way provided the work is conducted entirely on the bridges themselves.</p> <p>BNSF has already invested over \$7 million to improve the locking mechanisms on these movable spans. No engineering has been performed to determine what is needed to actually increase the operating speed.</p> <p>Preliminary Drawings: I-5 Trade Corridor Railroad Capacity Improvements Project Number 2 – HDR drawings</p> <p>Final Design: Final design could be completed in 6 months</p> <p>Construction: Construction could be completed in 9 months</p>
Class I Competition Maintains or Increases	<p>The competitive balance between the Class 1 carriers will not shift, as both will enjoy the benefits of increased speed and reduced delay on the north-south I-5 corridor between Portland and Seattle. BNSF trains running on the east-west Fallbridge line may not experience the same degree of benefits because of the slower-speed curves to turn onto the Fallbridge Subdivision.</p>

Project Purpose and Need:

The current maximum authorized speed over the three movable spans is limited to 30 mph. As a segment of the High Speed Rail Corridor, increasing the speed to 50-60 MPH would significantly reduce the running time for the Seattle to Portland passenger trains, a key element of the overall incremental approach to WSDOT's and ODOT's High Speed Rail program. The work involves improving the approaches to these bridges to allow an increased operating speed. Also includes the Willamette River Draw Span (not shown).

Project Status

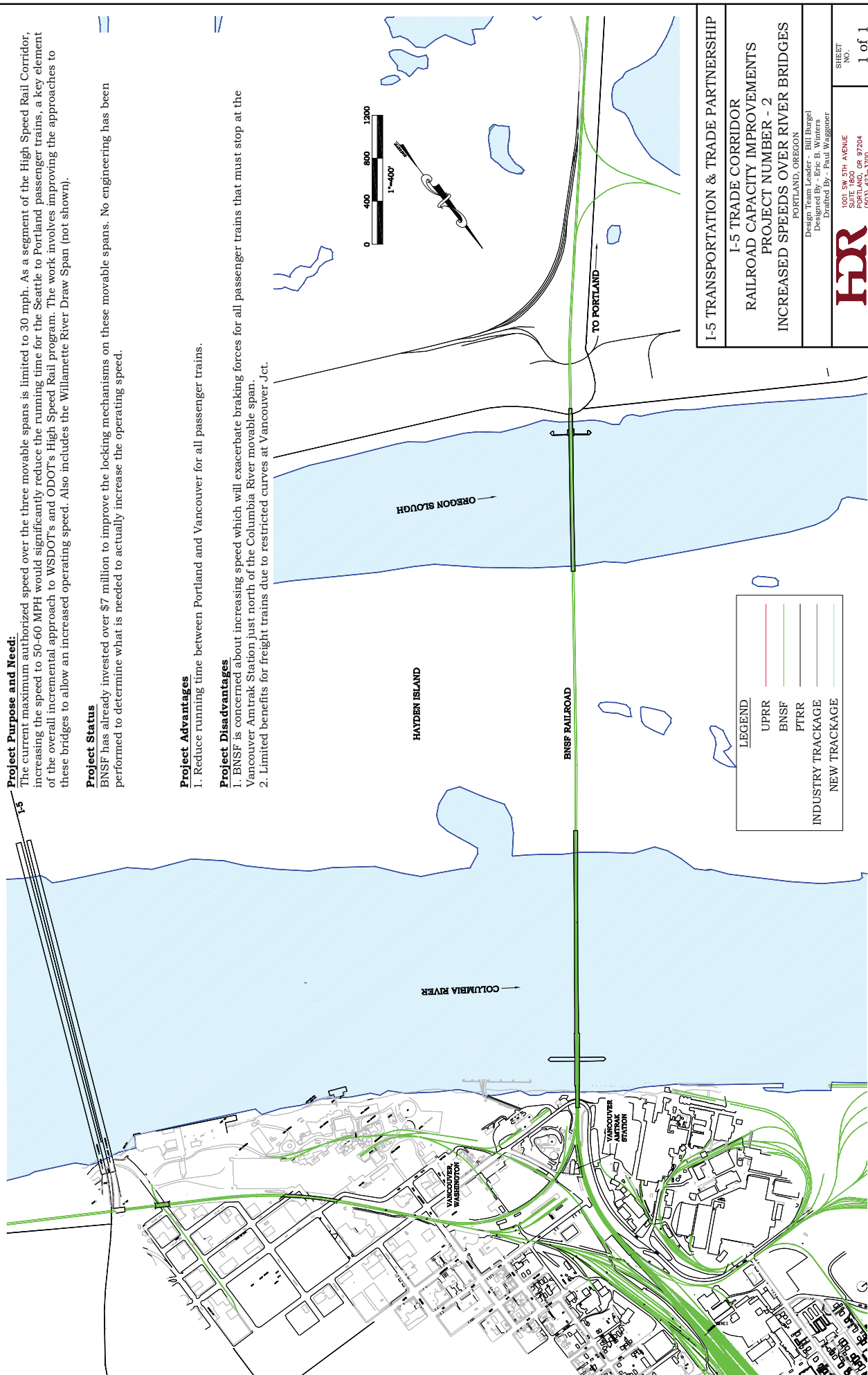
BNSF has already invested over \$7 million to improve the locking mechanisms on these movable spans. No engineering has been performed to determine what is needed to actually increase the operating speed.

Project Advantages

1. Reduce running time between Portland and Vancouver for all passenger trains.

Project Disadvantages

1. BNSF is concerned about increasing speed which will exacerbate braking forces for all passenger trains that must stop at the Vancouver Amtrak Station just north of the Columbia River movable span.
2. Limited benefits for freight trains due to restricted curves at Vancouver Jct.



I-5 TRANSPORTATION & TRADE PARTNERSHIP	
I-5 TRADE CORRIDOR	
RAILROAD CAPACITY IMPROVEMENTS	
PROJECT NUMBER - 2	
INCREASED SPEEDS OVER RIVER BRIDGES	
PORTLAND, OREGON	
Design Team Leader - Bill Buegel Designed By - Eric B. Winters Drafted By - Paul Waggoner	
HDR HDR Engineering, Inc. 1001 SW 5TH AVENUE SUITE 1800 PORTLAND, OREGON 97204 (503) 423-3700	
SHEET NO.	1 of 1

PRP-20.UP: North Portland Crossover Improvements – Summary of Factors

Project Description	<p>Approximately 20-25 Union Pacific trains enter or depart at 10-15 MPH from the BNSF main line at N. Portland Jct. daily. Combine this slow movement with bridge openings and the interfacing of train movements between the two railroads, and the result is Union Pacific trains being held on the BNSF main line just north of Vancouver Jct. for extended periods of time, blocking both BNSF and Amtrak trains. Improving the speed for train movements through the N. Portland Jct. interlocker was identified in the I-5 Partnership Rail Capacity Analysis as a key component needed to reduce congestion in the area rail network.</p> <p>Originally the concept was known as I-5 Trade Corridor Railroad Capacity Improvements, Project Number 3. A variation of the project re-surfaced as part of ODOT's 2009 preliminary planning and environmental classification work in advance of "higher" speed rail. The figure from that study depicting the proposed track configuration is included herein.</p> <p>In 2010 BNSF replaced No. 11 turnouts with three No. 20 power-operated turnouts that are primarily used by BNSF and Amtrak trains, speeding up crossover movements between the two main tracks. It was reported that this improvement generally does not affect UP train movements through this interlocker, which are still subject to low-speed turnouts.</p> <p>ODOT, as of this writing, is having preliminary engineering performed that would replace several No. 9 and No. 11 turnouts used by UP in the North Portland Junction interlocker with faster-speed No. 15 turnouts. This includes the turnout that UP uses to enter the BNSF main line, a turnout that connects UP to the Peninsula Terminal, and the crossover on the BNSF main line that would allow UP to cross completely over the main line to access the wye track to T-6 towards the west. The ODOT project would not, however, improve the speed through the southerly wye track to T-6 on account of its tight curvature and the No. 11 turnout that will remain. This latest project work will not change the array of movements possible through the interlocker.</p> <p>It should be noted that turnouts installed in 2010 and those under ODOT's preliminary engineering now do not appear additively equal up to the entire preliminary 2009 planning effort. It is recommended that this project be re-evaluated as the ODOT work progresses to identify any remaining improvements that could be made at North Portland Junction.</p> <p>Project Reference: I-5 Rail Capacity Study, Portland/Vancouver I-5 Trade and Transportation Partnership (HDR, February 2003) [include both options, per 1-23-13 Port meeting]</p>
Cost	<p>\$23,636,000*</p> <p>*Note: This is the original 2009 estimate developed for the entire project, some of which is now complete or in process. The estimate should be re-evaluated upon further progress of the phase currently underway.</p>
Local Benefit	<p>Increases the speed of trains accessing the main line at North Portland Junction and allowing for quicker crossing movements that routinely block both tracks of the BNSF main line.</p>
Regional Benefit	<p>Improves overall operating speed and on-time reliability for passenger trains associated with high speed rail program, as well as system reliability.</p>
Main Line Capacity	<p>Improves operating speed for all trains moving to and from UP trackage. Trains operate between 10 and 15 MPH through many of the various movement combinations at North Portland Junction. This greatly diminishes the capacity of the main line, especially for through trains (i.e. Amtrak). Increasing diverging speeds off the main from 10-15 MPH to 25 MPH effectively doubles capacity on the diverging routes and clears the main for other movements.</p>

PRP-20.UP: North Portland Crossover Improvements – Summary of Factors

Project Development Status	<p>Requires slight change in trackage rights agreement to access Peninsula Terminal Railroad.</p> <p>Environmental Clearance: As part of High-Speed Intercity Passenger Rail program, ODOT Rail is conducting environmental analysis on North Portland Junction, using approximately \$1.8 M in stimulus funds. This work, including some preliminary engineering, will be completed in summer/fall of 2013.</p> <p>Right-of-Way: May require right-of-way.</p> <p>Preliminary Drawings: I-5 Trade Corridor Railroad Capacity Improvements Project Number 3 – HDR drawings</p> <p>Conceptual design was modeled during the 2002 Bi-State simulation with measurable beneficial results.</p> <p>As of this writing, ODOT is having 30% engineering completed by a consultant team.</p> <p>Final Design: Final design could be completed in 4 months.</p> <p>Construction: Construction could be completed in 6 months</p>
Class I Competition Maintains or Increases	<p>The competitive balance between Class 1 carriers is not affected by this project.</p>

PROJECT 1 (SHEET 1 OF 2)
UP CONN. AT N. PORTLAND & PENINSULA JCTS.

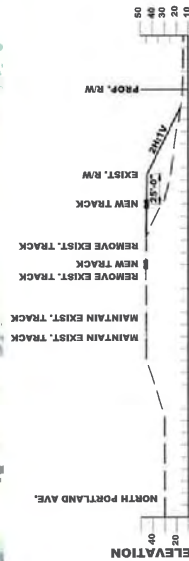
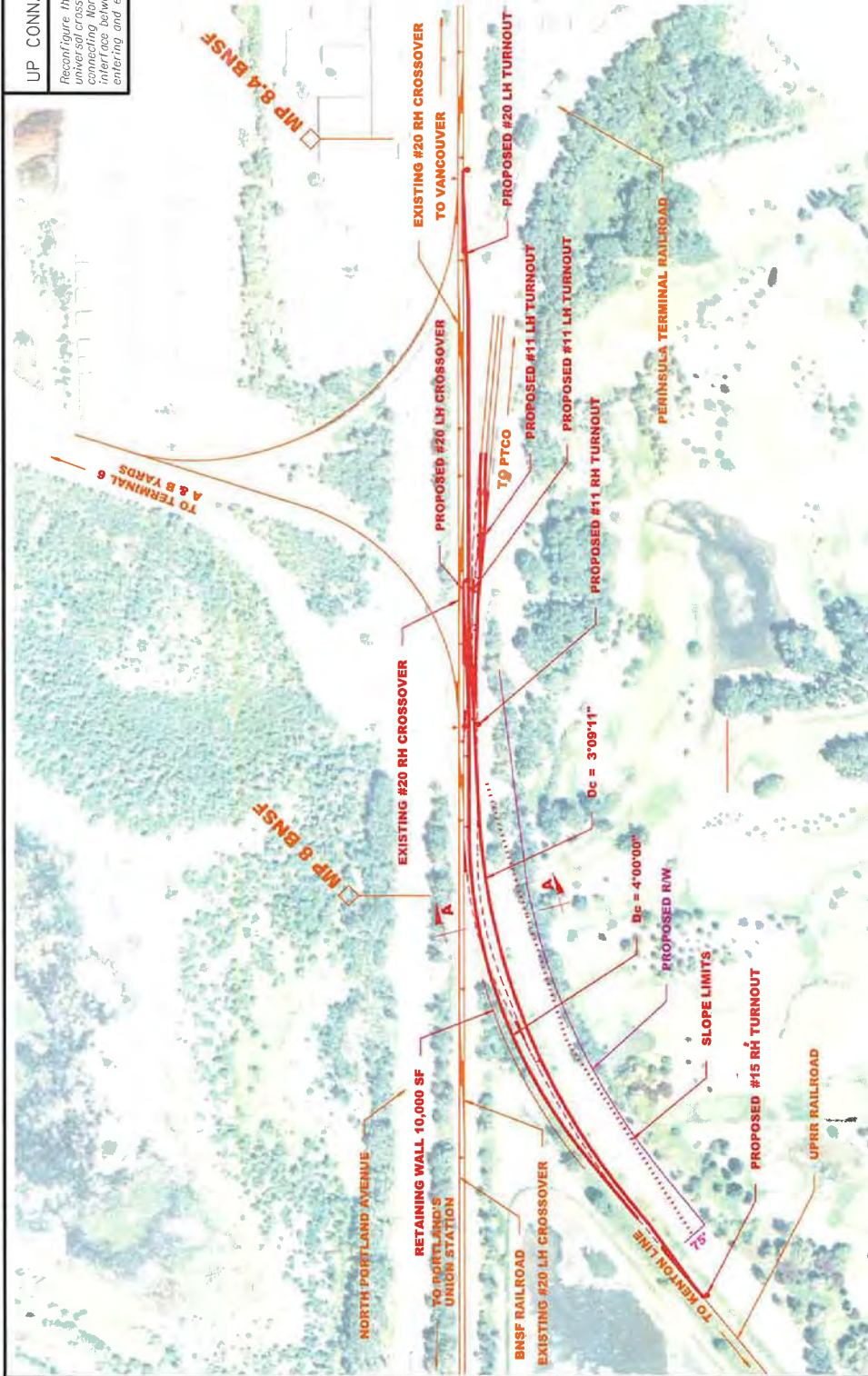
Reconfigure the UP connection at North Portland Jct. installing a No. 20 universal crossover and easing curvature. Ease curvature of trackage connecting North Portland Jct. to the Kenton Line and install a CTC interface between BNSF and UP to insure continuous movement of trains entering and exiting BNSF at North Portland Jct.



QUANTITIES SUMMARY (SHEET 1 of 2)
3400 TF REMOVE TRACK
5-#11 REMOVE TURNOUT
1-#11 REMOVE CROSSOVER
5000 TF NEW TRACK
1-#11 NEW TURNOUT
1-#15 NEW TURNOUT
1-#20 NEW TURNOUT
1-#20 NEW CROSSOVER



LEGEND:
PROPOSED TRACK
EXISTING TRACK
TRACK SHIFT



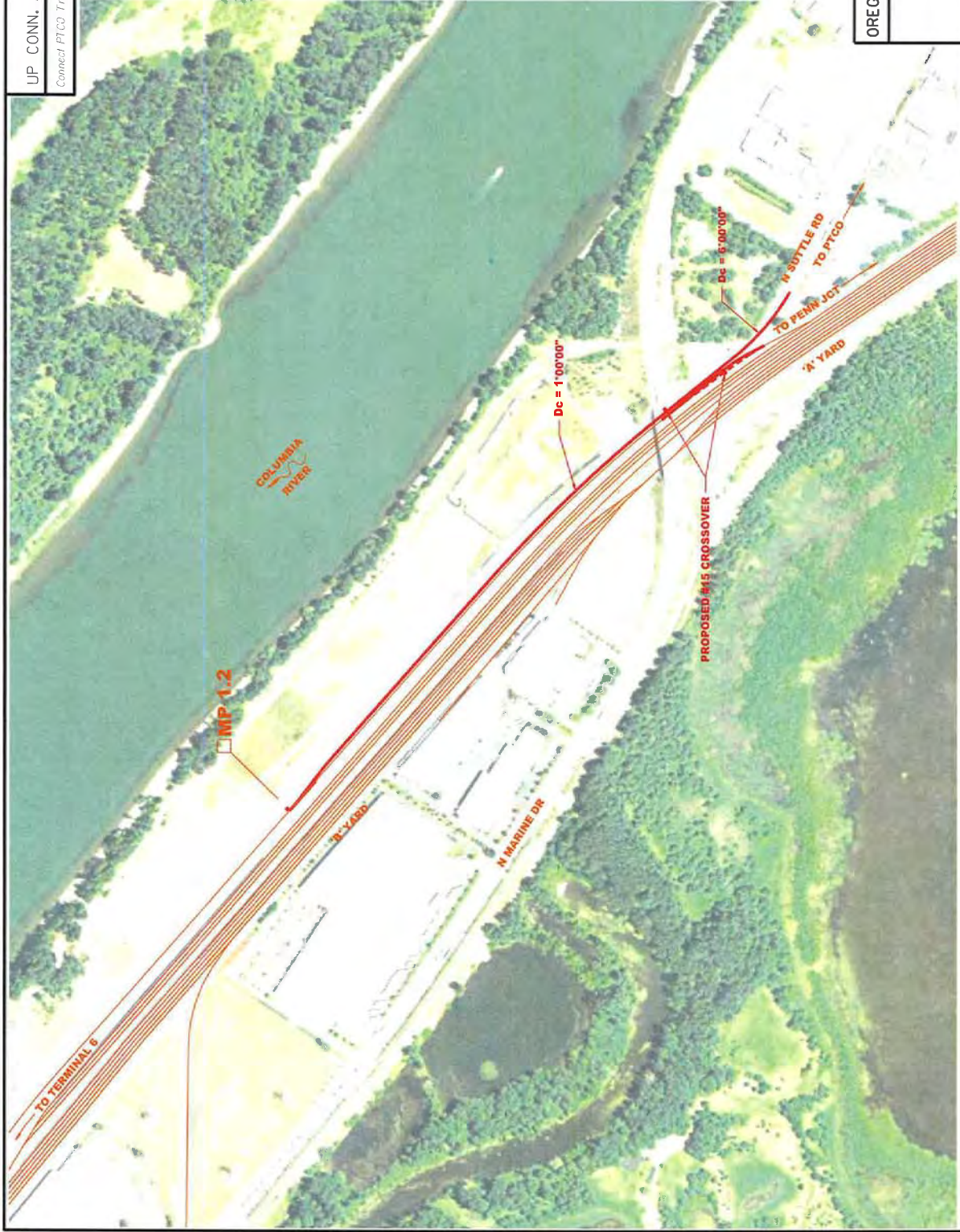
SECTION A-A

OREGON RAIL CONCEPTUAL PROJECT



PROJECT 1 (SHEET 2 OF 2)
UP CONN. AT N. PORTLAND & PENINSULA JCTS.

Connect PTCO Track to BNSF 'A' & 'B' yards.



QUANTITIES SUMMARY SHEET 2-24
350 LF PROPOSED TRACK
350 LF EXISTING TRACK
1-#15 NEW CROSSOVER
1-#15 NEW TURNOUT
ALL TURNOUTS ARE #20 UNLESS
NOTED OTHERWISE

LEGEND:
— PROPOSED TRACK
— EXISTING TRACK
- - - TRACK SHIFT

0 100 200
APPROX. SCALE

OREGON RAIL CONCEPTUAL PROJECT



DAVID EVANS
AND ASSOCIATES, INC.



PRP-21. UP Kenton Line: Completing Double Track from North Portland To Troutdale and Train Crew Change Out Improvements – Summary of Factors

Project Description

Components of this project were identified as I-5 Trade Corridor Railroad Capacity Improvements, Project Number 5, and as the Kenton Rail Line Upgrade, in the 2012 Port Transportation Improvement Plan.

This project is included for consideration with the caveat that UPRR is addressing capacity through extending sidings and operational changes using its own funds. Consultant Project Team is recommending additional improvements in post-20-year time frame, as defined below.

Union Pacific's Kenton main is the primary east-west conduit for not only all of UPRR's traffic en route to and from Washington destinations (including Kalama, Longview, Tacoma, Seattle) but also the rail traffic generated from the region south of Portland extending into California. All this traffic is routed over the single track Kenton main line east of Penn Jct. In addition, this is the segment of track that holds (stages) trains for the Port of Portland terminals.

Complicating the traffic flows in this area is the fact that Union Pacific must change crews at or near Champ on the Kenton Line for all trains, including those en route to Eugene and Roseville to the south, and Kalama, Longview, Tacoma and Seattle to the north, necessitating additional delay.

Typically, what happens is a southbound UP train en route to the Kenton Line is held on the BNSF main line corridor if there's no room on the Kenton Line for that train.

It is for these reasons that UP crew change relocation is recommended, and that the I-5 Partnership Rail Capacity Analysis determined that completing the double tracking of the Kenton line. This project includes four phases, as follows:

Phase I: Kenton Line Traincrew Change Out Location

Project would facilitate faster UP train crew change-outs by moving the location closer to crew terminals and allowing trains to be staged closer to Port areas. The actual crew change-out location itself is merely a section of track where a train can be tied down without blocking grade crossings or other train movements. A crew van must be able to pull alongside the lead locomotive to drop off and pick up the train crew. The crew van pull-out must be located so that it can park for extended periods.

Phase II: Kenton Line Double Tracking N. Portland Jct to NE 105th Avenue near Fir
Constructing double track segments include (1) North Portland Jct to Penn Jct., (2) from the east end of the industrial lead to Kenton, (3) across N. 11th Street, (4) across N. Cully Ave., and (5) between Fir and Owens-Illinois siding to NE 105th Avenue will result in a total of 8.85 miles of double track main line. To complete this project, three bridges will be required: first, a railroad bridge over the Columbia Slough, second, a highway overpass over the Kenton main to provide continuous access to the industrial sanctuary near Nicoli Door and third, a railroad bridge over N. Columbia Blvd.

Phase III: Kenton Line Double Tracking NE 105th Avenue near Fir to Troutdale

Constructing double track segments includes (1) NE 105th Avenue to West Hemlock, (2) East Hemlock to West Reynolds will result in a total of 4.6 miles. Existing highway bridges over NE 122nd and NE 223rd will be required.

Phase IV: Movement (Railroad and Highway) Rationalization along the Kenton Line

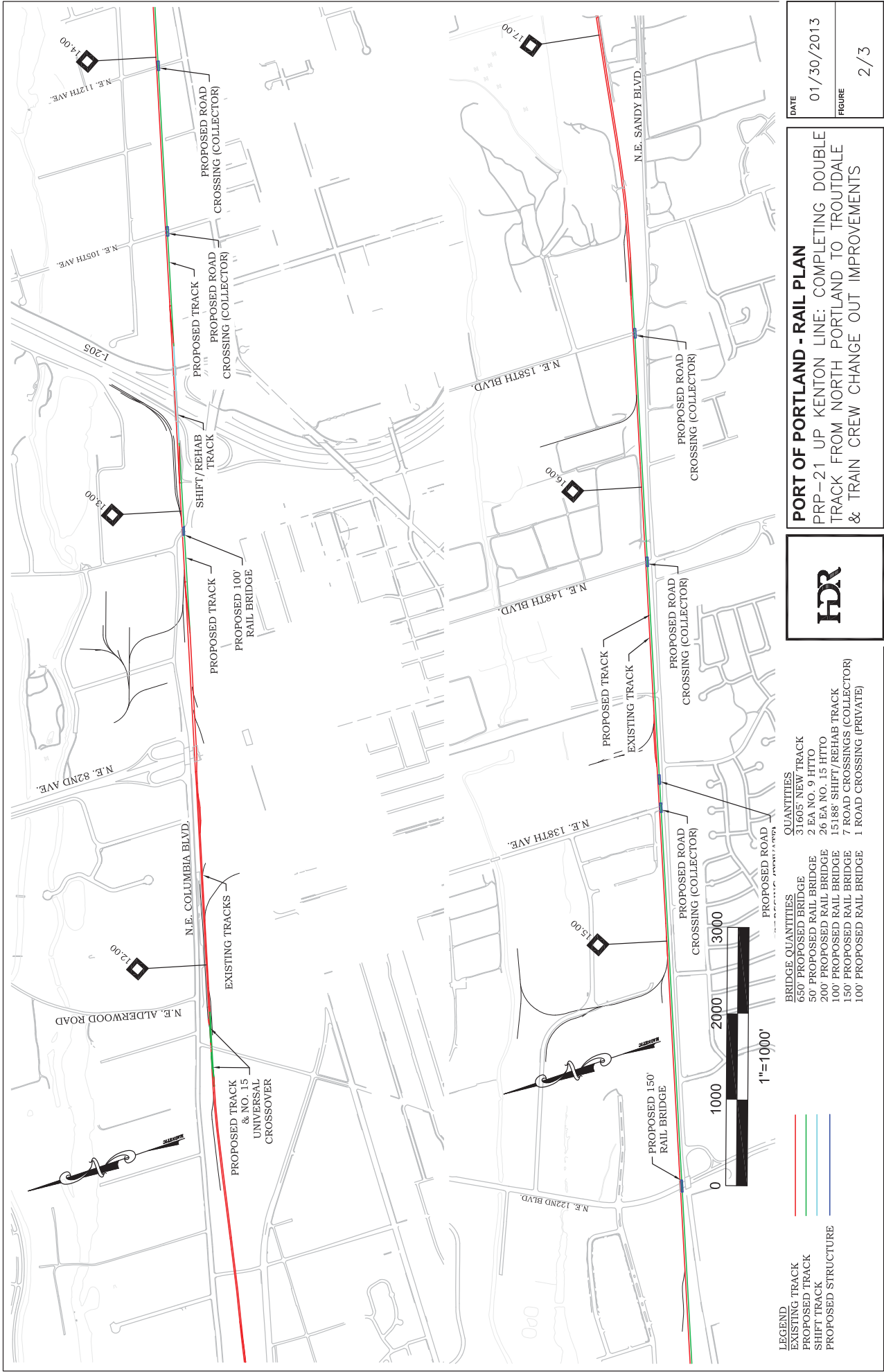
Constructing several highway overpasses will allow Union Pacific to stage longer trains enroute to the Port. Also, these grade separations should be coupled with the locations of UP's Control Point locations along the Kenton Line. These locations might include CP's at West Kenton, Center Champ (existing), East end of Owens-Illinois Siding at NE 105th, West Hemlock (half of a CP already exists) and West Reynolds (half of a CO already exists). Grade separations may be required at NE 11th, NE Cully, NE 105th Avenue, NE 112th Avenue, NE 138th Avenue, NE 148th Avenue, NE 158th Avenue

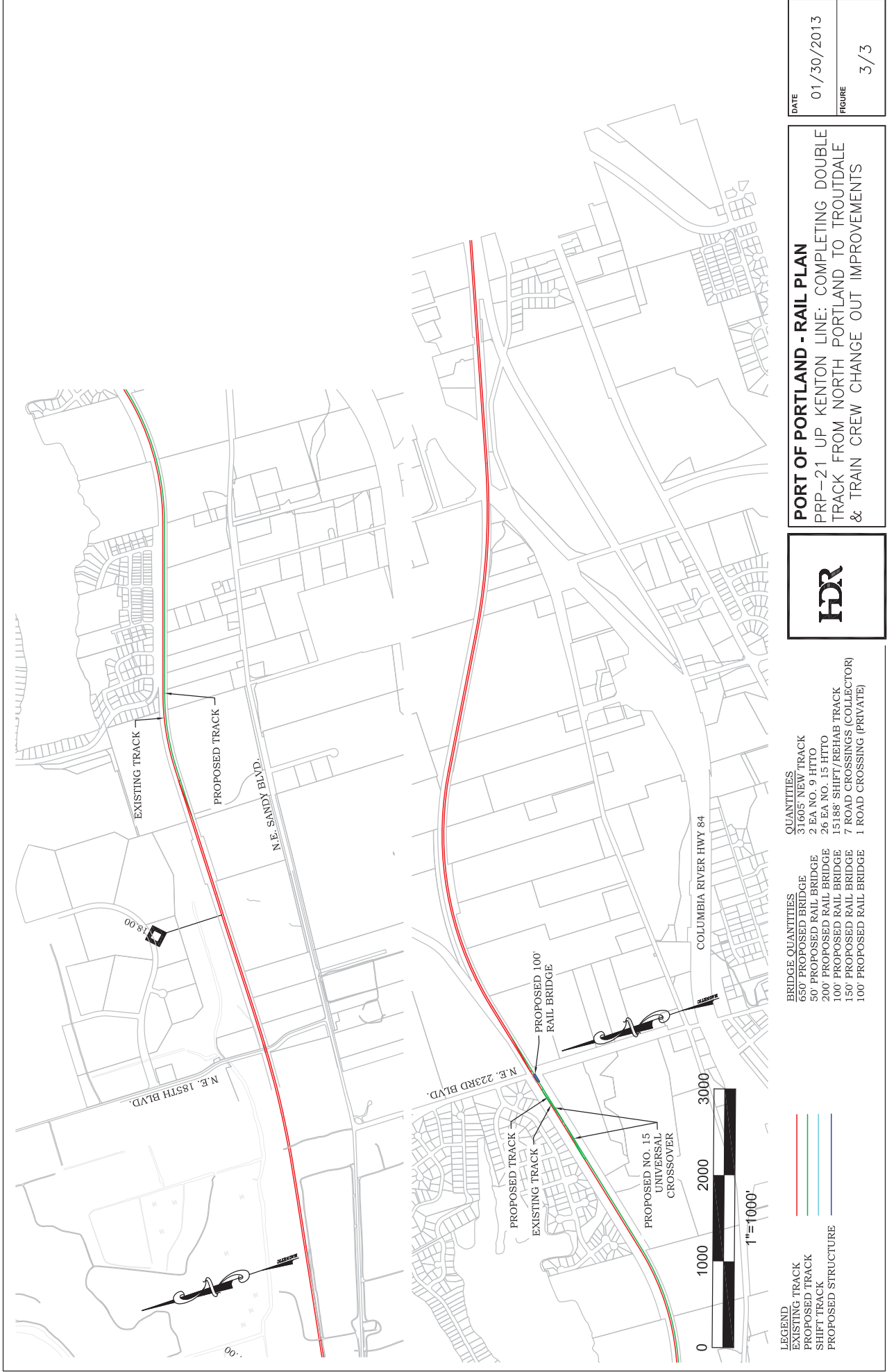
Project Reference: I-5 Rail Capacity Study, Portland/Vancouver I-5 Trade and Transportation Partnership (HDR, February 2003)

Port of Portland Rail Plan: Project Descriptions

PRP-21. UP Kenton Line: Completing Double Track from North Portland To Troutdale and Train Crew Change Out Improvements – Summary of Factors

Cost	\$139,166,000
Local Benefit	Allows trains destined to the Port of Portland facilities to be staged much closer to the Portland area, which greatly helps in getting these trains to the terminal when needed.
Regional Benefit	Creates a train staging area that will serve trains heading into and out of the Pacific Northwest.
Main Line Capacity	Completing the double tracking of UP's Kenton Main will greatly improve train flow on and off the BNSF main line.
Project Development Status	<p>Environmental Clearance: No progress to date.</p> <p>Right-of-Way: It is likely that the entire project is within UPRR right-of-way. However the potential need exists for small parcel acquisition and development of grade crossing separation plans requires cooperation with agencies and municipalities.</p> <p>Roadway Needs: Many at-grade highway/rail crossings in the area must be dealt with before this double track main line can be efficiently used, including construction of an overpass into industrial area near Nicoli Door.</p> <p>Preliminary Drawings: I-5 Trade Corridor Railroad Capacity Improvements Project Number 5 – HDR drawings (2 sheets)</p> <p>Previous Work: Union Pacific initiated the Double Tracking Program several years ago when it extended Champ Siding from N. Cully to N.11th Ave. Accordingly, Champ was designed so that double tracking could easily be added from NE 105th to N. Portland Jct. UP recently installed CTC and a siding at Hemlock and at Reynolds to help increase its ability to move freight trains.</p> <p>Final Design: Final design could be completed in 12 months</p> <p>Construction: Construction could be completed in 24 months</p>





PORT OF PORTLAND - RAIL PLAN
PRP-21 UP KENTON LINE: COMPLETING DOUBLE TRACK FROM NORTH PORTLAND TO TROUTDALE & TRAIN CREW CHANGE OUT IMPROVEMENTS

DATE	01/30/2013
FIGURE	3/3

Port of Portland Rail Plan: Project Descriptions

PRP 21 - PRELIMINARY CONSTRUCTION COST ESTIMATE - JAN 2013

	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	SUB TOTAL
1.0 General					
1.01	Right-of-Way Impacts/Property Acquisition		Acre		\$ -
1.02	Environmental Permitting		LS		\$ -
2.0 Civil & Track Work					
2.01	Embankment	149831.11	CY	\$ 25	\$ 3,745,778
2.02	New Track	31605	TF	\$ 175	\$ 5,530,875
2.03	Shift/Rehab track	15188	TF	\$ 20	\$ 303,760
2.04	Turnout #9, hand thrown	2	EA	\$ 70,000	\$ 140,000
2.05	Turnout #15, Power Operated	26	EA	\$ 100,000	\$ 2,600,000
3.0 Structural Work					
3.01	Bridge (long)	1200	LF	\$ 16,000	\$ 19,200,000
3.02	Bridge (short)	50	LF	\$ 8,000	\$ 400,000
3.03	Road Crossings (Collector)	6	EA	\$ 100,000	\$ 600,000
3.04	Road Crossings (Private)	1	EA	\$ 30,000	\$ 30,000
3.05	Road Grade Separations	7	EA	\$ 10,000,000	\$ 70,000,000
4.0 Signal Work					
4.01	Signaling	6	MI	\$750,000	\$ 4,500,000

Subtotal	\$	107,050,413
Contingency	30%	\$ 32,115,124
TOTAL	\$	139,165,537

ASSUMPTIONS

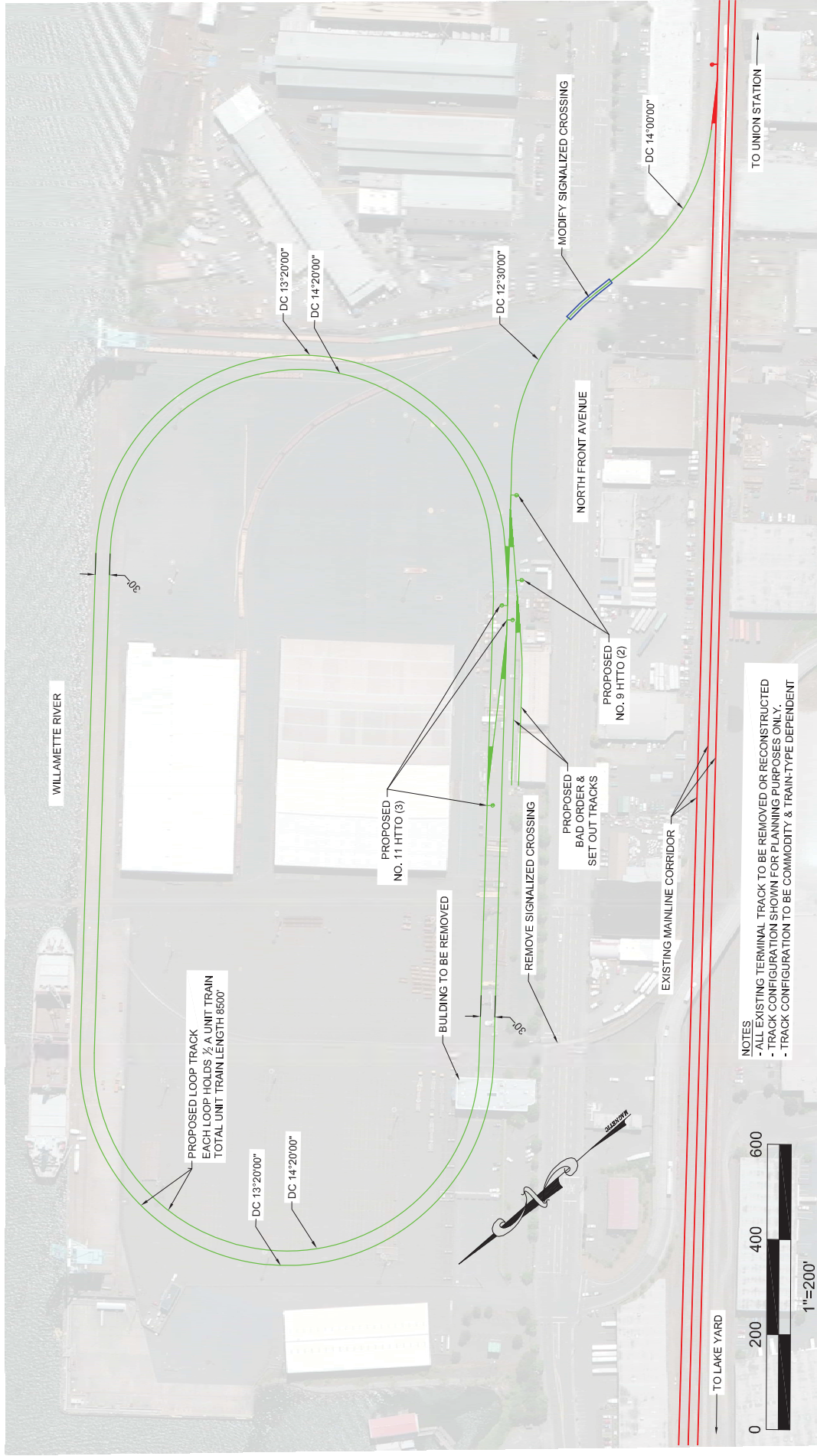
Estimates only indicate probable cost of construction
 Right-of-way or property impact costs are not included
 Environmental permitting is not included
 Engineering Design costs are not included
 Utility relocation costs are not included
 stormwater conveyance and treatment costs are not included
 Earthwork is an assumed 24' wide, 4' height and 2:1 slopes the track length

PRP-22. T-2 Track Reconfiguration & Siding – Summary of Factors

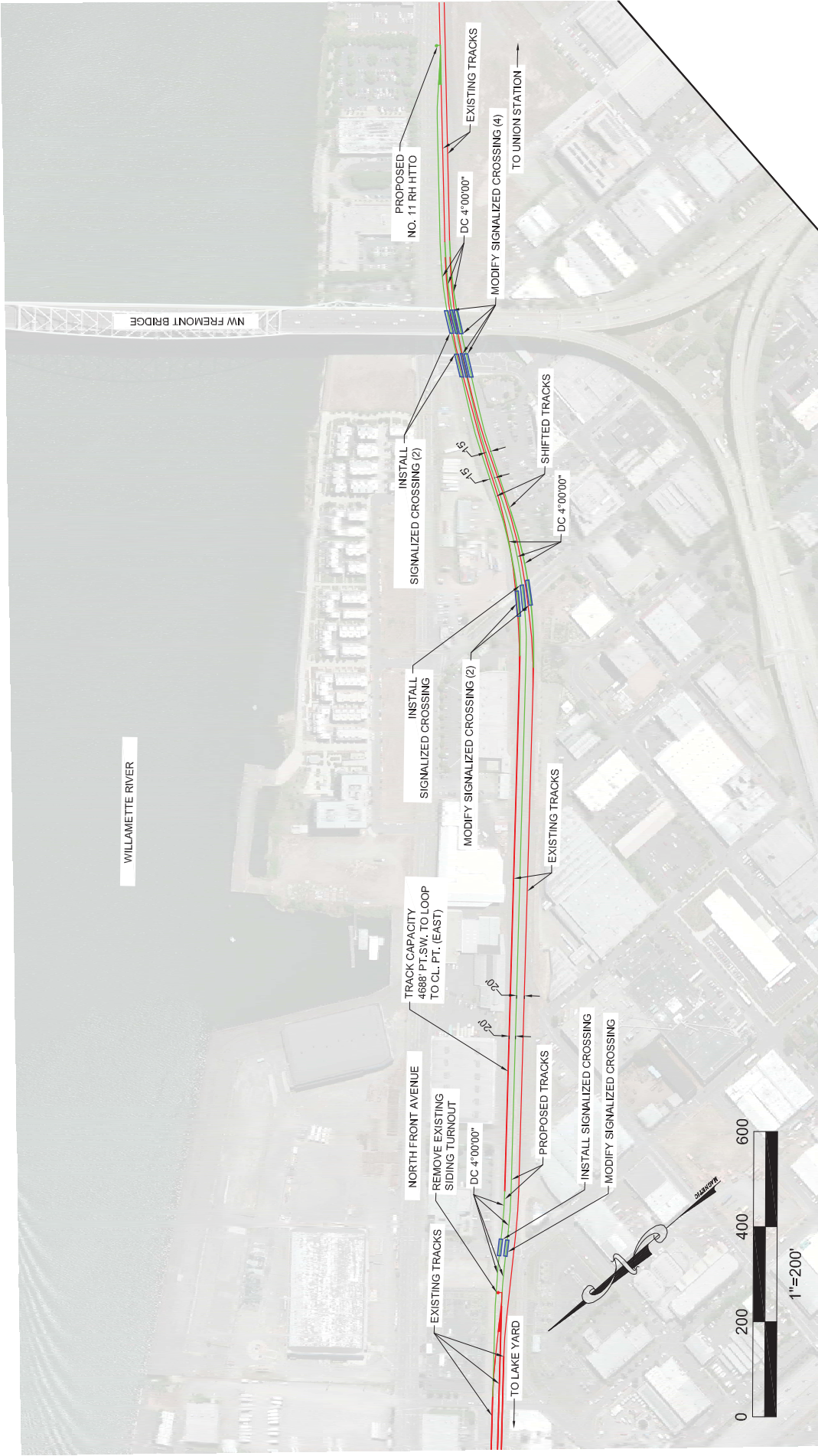
Project Description	<p>Terminal 2's track configuration can be reconfigured into a loop to serve new business opportunities that require a higher railcar volume and throughput, including unit train service. The loop would be comprised of two concentric loop tracks that together could hold a train potentially as much as 8,500 feet in length. The actual railcar capacity would be predicated on a specific business case and would be a function of train length, loading/unloading requirements, etc. The degree of terminal renovation would be dependent on the loop configuration required to hold the train. Other configurations are possible, depending on the actual business case. Some business cases may allow the Terminal to be used for bulk products requiring long blocks of rail cars while retaining the ability to conduct break-bulk operations. The loop configuration presented in the project graphic is the basis for the cost estimate.</p> <p>The reconfiguration would also require the extension of a siding on the east side of the main line. The extension would start near NW Nicolai Street and end near NW Thurman Street. The double-track main line has a particularly wide spacing in this segment and a third track could be constructed between the two.</p> <p>Since the segment of main line track along T-2 is co-owned by UP and BNSF through the Portland Terminal Railroad, both Class 1's would have access to the terminal.</p> <p>To serve the Terminal, the following steps are envisioned:</p> <ul style="list-style-type: none">• The extended siding would be used to land a train, break it apart, shove one half into a loop track and then shove the second half into the other loop track. Access would be from the south.• Once the two halves have been spotted in the Terminal, non-railroad labor would use a locomotive inside the loop to progress the train around.• Once loading/unloading is complete, the railroad would pull each half of the train back into the siding, assemble the train, perform tests, and depart. <p>Note: The loop track would require tighter curvature (up to 14⁰) than is standard for the Class 1 railroad's and would require coordination with the serving carriers. However, the curvature would be similar to that of the Columbia Grain semi-loop at Terminal 5, which accepts unit trains of 62' covered hoppers. Also note that the ability to serve break-bulk business along the dock could be retained, although it could not be operated simultaneously with a unit train.</p> <p>The terminal can be reconfigured in a variety of other ways to serve different business needs even though a loop configuration was chosen for this planning exercise.</p>
Cost	\$8,920,000
Local Benefit	The project would open the potential for T-2 to serve a variety of products that move in large blocks or unit trains on the railroad, including dry bulks and liquids. This would increase the number of vessel calls to T-2. Assuming that a bulk or liquid handling facility is built as well, the project would directly add jobs.
Regional Benefit	The project opens up a new Pacific Northwest marine terminal capacity to serve large-volume shipping that is open to both Class 1 carriers. The project improves the competitive position of the Port of Portland relative to other West Coast ports to attract new development.
Main Line Capacity	The impacts on main line capacity are minimal, as the project would construct sufficient side tracks to handle the train without interfering with the main line (other than to enter/leave the main line). Train speeds in the area are relatively low since it is in the terminal area.

PRP-22. T-2 Track Reconfiguration & Siding – Summary of Factors

Project Development Status	<p>No progress to date.</p> <p>Environmental Clearance: No progress to date.</p> <p>Right-of-Way: No additional right of way anticipated, although this should be confirmed by further study. Cooperation with the railroads to construct the siding extension is required.</p> <p>Final Design: 6 months.</p> <p>Construction: 12 months.</p>
Class I Competition Maintains or Increases	<p>Both Class 1 carriers have joint access via the Portland Terminal Railroad. The actual primary commodity that would pass through T-2 may tend to favor one railroad over the other depending on its origin.</p>



NOTE: ALL CONCEPTUAL DESIGN BASED OFF OF AERIAL IMAGERY



LEGEND
 EXISTING TRACK
 PROPOSED TRACK
 PROPOSED STRUCTURE

SIDING QUANTITIES
 4046' NEW TRACK
 1 EA NO. 11 HTTO
 3237' SHFTD TRACK
 4 EA NEW SIGNALIZED CROSSING
 7 EA MODIFY SIGNALIZED CROSSING

NOTE: ALL CONCEPTUAL DESIGN BASED OFF OF AERIAL IMAGERY



PORT OF PORTLAND - RAIL PLAN
 PRP-22 T-2 RE-CONFIGURATION & SIDING

DATE

03/04/2013

FIGURE

2/2

Port of Portland Rail Plan: Project Descriptions

PRP 22 - PRELIMINARY CONSTRUCTION COST ESTIMATE - JAN 2013

DESCRIPTION		QUANTITY	UNIT	UNIT PRICE	SUB TOTAL
1.0 General					
1.01	Right-of-Way Impacts/Property Acquisition	0	Acre		\$ -
1.02	Environmental Permitting		LS		\$ -
2.0 Civil & Track Work					
2.01	Remove Pavement	255550	SY	\$ 6	\$ 1,533,300
2.02	Shift Track	2770	TF	\$ 15	\$ 41,550
2.03	New Track	14712	TF	\$ 175	\$ 2,574,600
2.04	Turnout #9, hand thrown	2	EA	\$ 70,000	\$ 140,000
2.05	Turnout #11, hand thrown	4	EA	\$ 80,000	\$ 320,000
2.06	Remove Track	10200	TF	\$ 20	\$ 204,000
3.0 Structural Work					
3.01	Remove Buildings	1	LS	\$ 200,000	\$ 200,000
3.02	Reinforced Conc. Box Culvert Underpass	1	LS	\$ 750,000	\$ 750,000
4.0 Signal Work					
4.01	Modify Main Line Control Point	1	EA	\$ 300,000	\$ 300,000
4.02	Modify Signalized Crossing	5	EA	\$ 150,000	\$ 750,000
4.03	Remove Signalized Crossing	1	EA	\$ 50,000	\$ 50,000

	Subtotal	\$	6,863,450
Contingency	30%	\$	2,059,035
TOTAL		\$	8,922,485

ASSUMPTIONS

Estimates only indicate probable cost of construction
 Right-of-way or property impact costs are not included
 Environmental permitting is not included
 Engineering Design costs are not included
 Utility relocation costs are not included
 stormwater conveyance and treatment costs are not included
 Costs of processing, storage, and conveyance facilities for new commodity terminal not included.

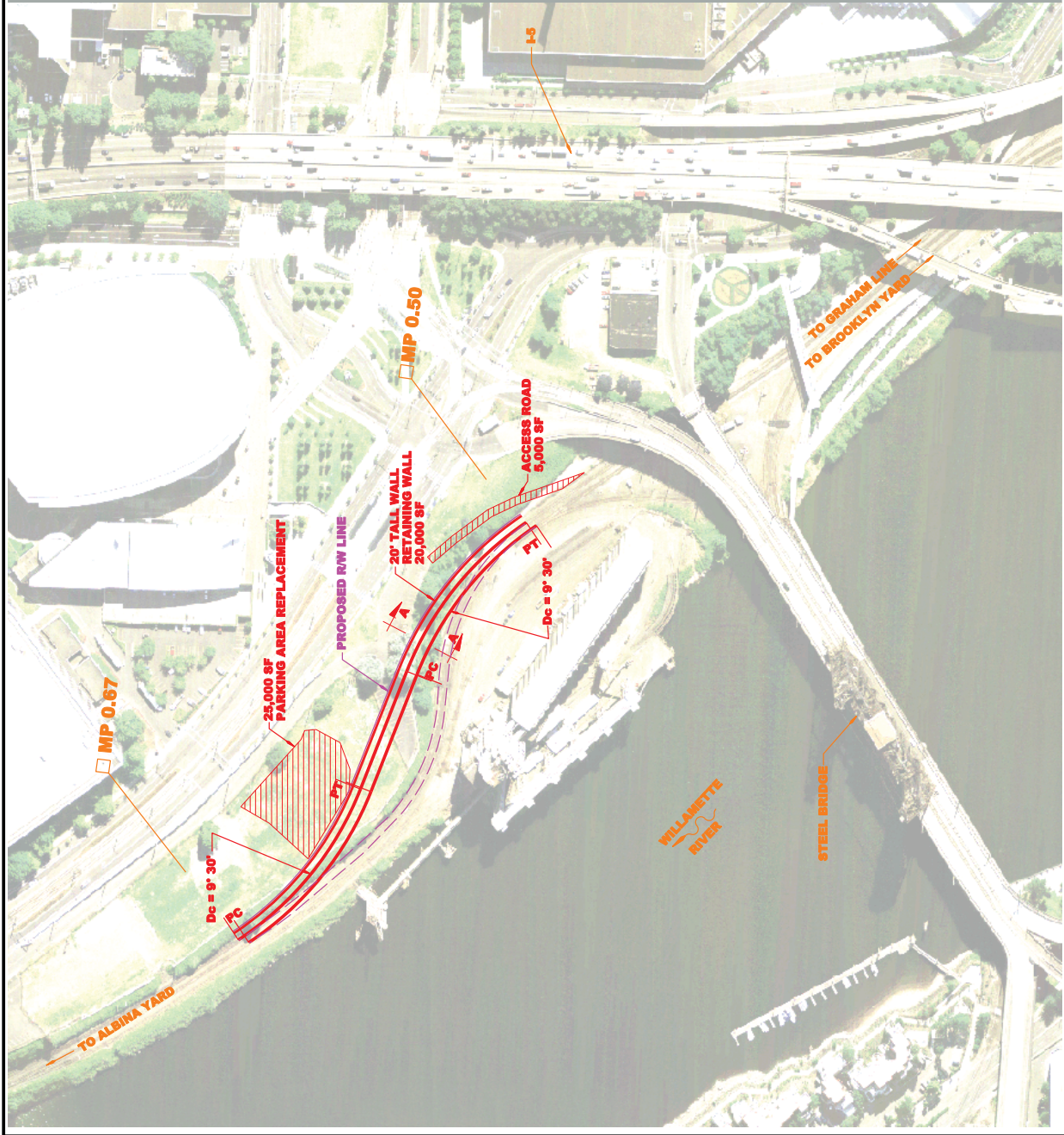
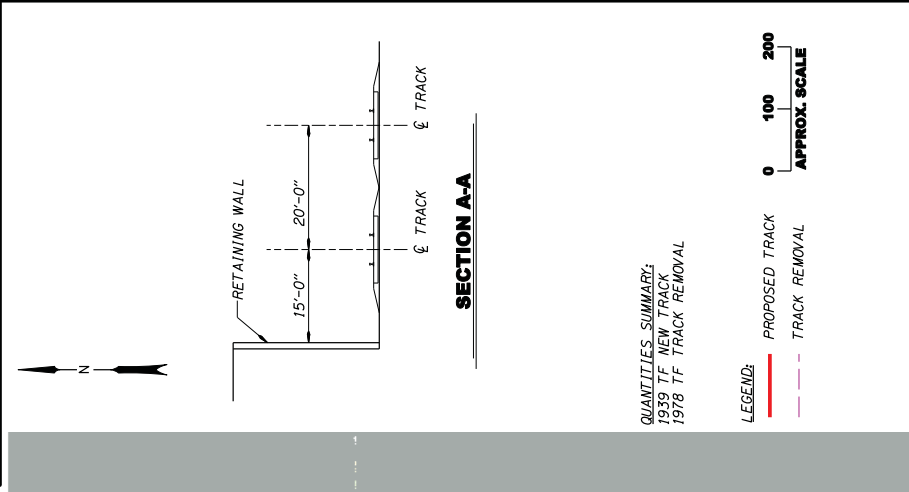
This page is intentionally blank.

PRP-23.UP Main Line: Track Realignment South of Albina (“6 MPH Curves”) – Summary of Factors

Project Description	<p>The project is also known as Project 7 of the I-5 Trade Corridor Railroad Capacity Improvements study. It is also known colloquially as the “6 MPH Curves”, “LDC Curves”, or “Thunderbird Curves”. Functionality of the double track main line between Albina and Willsburg Jct. was recently improved by the implementation of CTC from Willsburg Jct. to East Portland. However, track speed between Albina and East Portland is only 6 MPH due to relatively sharp opposing curvature through this stretch of track. Consequently, all trains operate at this slow speed through this area and additional crossovers are needed to efficiently move trains from Albina to Willsburg Jct.</p> <p>Project Reference: I-5 Rail Capacity Study, Portland/Vancouver I-5 Trade and Transportation Partnership (HDR, February 2003); Environmental Checklist (DEA, August 21, 2009)</p>
Cost	<p>\$23,726,000</p> <p>Original project cost estimate by others in 2009 were escalated by HDR to 2013 dollars. The detailed original cost estimate is not available.</p>
Local Benefit	<p>Increased track speed (from 6 to 20 MPH) will allow trains to clear roadway crossings quicker, reducing roadway traffic delays.</p>
Regional Benefit	<p>Trains moving between Willsburg and Albina may increase speed through East Portland if the curves are relaxed and the maximum authorized speed is increased. This would translate to blockages of less duration at numerous at-grade crossings on the inner east side of Portland. This will improve the circulation of the inner East Side, which is frequently interrupted by slow-moving trains.</p> <p>The impacts of increased capacity and reduced delay through Portland’s inner east side will also benefit the on-time performance of Amtrak.</p> <p>The public benefits of urban redevelopment of prime urban waterfront are also significant. A new planned development could bring substantial economic opportunity and add to the city’s job base.</p>
Main Line Capacity	<p>This project will increase track speed from 6 MPH to 20 MPH, more than doubling track capacity. Plus, additional crossovers at both ends will allow UP and Amtrak to take full advantage of the recently installed CTC system.</p>
Project Development Status	<p>ODOT-sponsored improvements were recently installed. These additional projects will be needed to realize the full potential of the corridor.</p> <p>This project could be considered for development as a phased public-private partnership, as there are significant public benefits to developing the waterfront.</p> <p>Environmental Clearance: Progress unknown.</p> <p>Right-of-Way: It will be necessary to acquire right-of-way to excavate into the hillside where the former Thunderbird Motel was located.</p> <p>Preliminary Drawings: I-5 Trade Corridor Railroad Capacity Improvements Project Number 7 – HDR drawings</p> <p>Final Design: Final design could be completed in 6 months</p> <p>Construction: Construction could be completed in 10 months</p>
Class I Competition Maintains or Increases	<p>The benefits of the project primarily accrue to UP. As train speeds and capacity increase, costs to operate trains through Portland decrease.</p> <p>UP and Amtrak will each benefit from this improvement.</p>

PROJECT 4
CURVES BTWN. EAST PORTLAND & ALBINA

Track speed between East Portland and Albina Yard is limited to 6 mph by severe curvature near East Portland. Slow moving freight trains using this route can cause congestion for passenger and other freight trains as they slowly creep out of the way. Realigning the track by cutting into the bluff will permit speed to increase to 20 mph. (I-5 Rail Capacity Study, 2003)



PRP-24.UP North Portland: Undoing the “X” (Option 1) – Summary of Factors

Project Description	<p>This project has been developed with two options, known as I-5 Trade Corridor Railroad Capacity Improvements, Projects Number 11A (Option No. 1) and 11 B (Option No. 2). During the I-5 Partnership Regional Dispatch Simulation Analysis, it was revealed that much of the rail network’s train delay could be attributed to southbound Union Pacific trains crossing over both BNSF main lines at slow speed as these trains move onto UPRR trackage. The slow speed issue is addressed by Project 3 of the I-5 Rail Capacity Study. However, the crossing of the BNSF main lines by UP trains remains a hindrance to local and regional efficiency. Project 11 was created, at ODOT’s request, to determine whether the “at-grade crossing of two railroads” maneuver at North Portland Junction could be eliminated. Much like a freeway ramp, the only practical method for completely eliminating a weave (or undoing the “X”) is to construct a grade separation. Two options were developed, both involve constructing a “ramp” that would allow southbound UPRR trains to depart the BNSF system without completely tying up both main lines for Amtrak passenger and other freight train movements. Only the lower-cost option is considered here.</p> <p>Note that trains entering and departing the wye at T-6 will still impact southbound UPRR using Option #1 where it ties into the BNSF main line.</p> <p>Project Reference: I-5 Rail Capacity Study, Portland/Vancouver I-5 Trade and Transportation Partnership (HDR, February 2003)</p>
Cost	<p>\$33,598,000</p> <p>Original project cost estimate by others in 2003 were escalated by HDR to 2013 dollars. The detailed original cost estimate is not available.</p>
Local Benefit	<p>Local/regional benefit: Both options allow southbound UPRR freights to depart BNSF trackage without completely blocking both main lines at North Portland Jct.</p>
Regional Benefit	<p>Could allow bi-directional freight train movement to and from UPRR tracks if constructed along with PRP-21 (double-tracking the Kenton line).</p>
Main Line Capacity	<p>The main line capacity is increased by doing away with most train movements that require blocking both tracks of the BNSF main line to enter/exit the main at North Portland Junction.</p>
Project Development Status	<p>The project was not vetted or discussed with either UPRR or BNSF.</p> <p>Environmental Clearance: None completed.</p> <p>Right-of-Way: Much of the land required for Option 1 is currently vacant but requires acquisition.</p> <p>Preliminary Drawings: I-5 Trade Corridor Railroad Capacity Improvements Project Number 11A</p> <p>Final Design: Final design could be completed in 8 months</p> <p>Construction: Construction could be completed in 12 months</p>
Class I Competition Maintains or Increases	<p>BNSF, UPRR and Amtrak will all benefit from this improvement by quicker movements on/off the main line and by elimination of the need by many train movements to block both tracks to turn on/off the BNSF main line.</p>

Purpose and Need:

During the I-5 Partnership Regional Dispatch Simulation Analysis it was identified that much of the Rail Network's train delay could be attributed to southbound Union Pacific trains crossing over both BNSF Mainlines at slow speed as these trains move onto UPRR trackage. The slow speed is an infrastructure issue and is being addressed in Project #3. However, the fact that both mainlines would still be blocked can only be addressed by "Undoing the X". Two Alternatives were explored. Both involve constructing a "ramp" that would allow southbound UPRR trains to depart the BNSF system without completely tying up both mainlines for Amtrak passenger and other freight train movements.

Project Status:

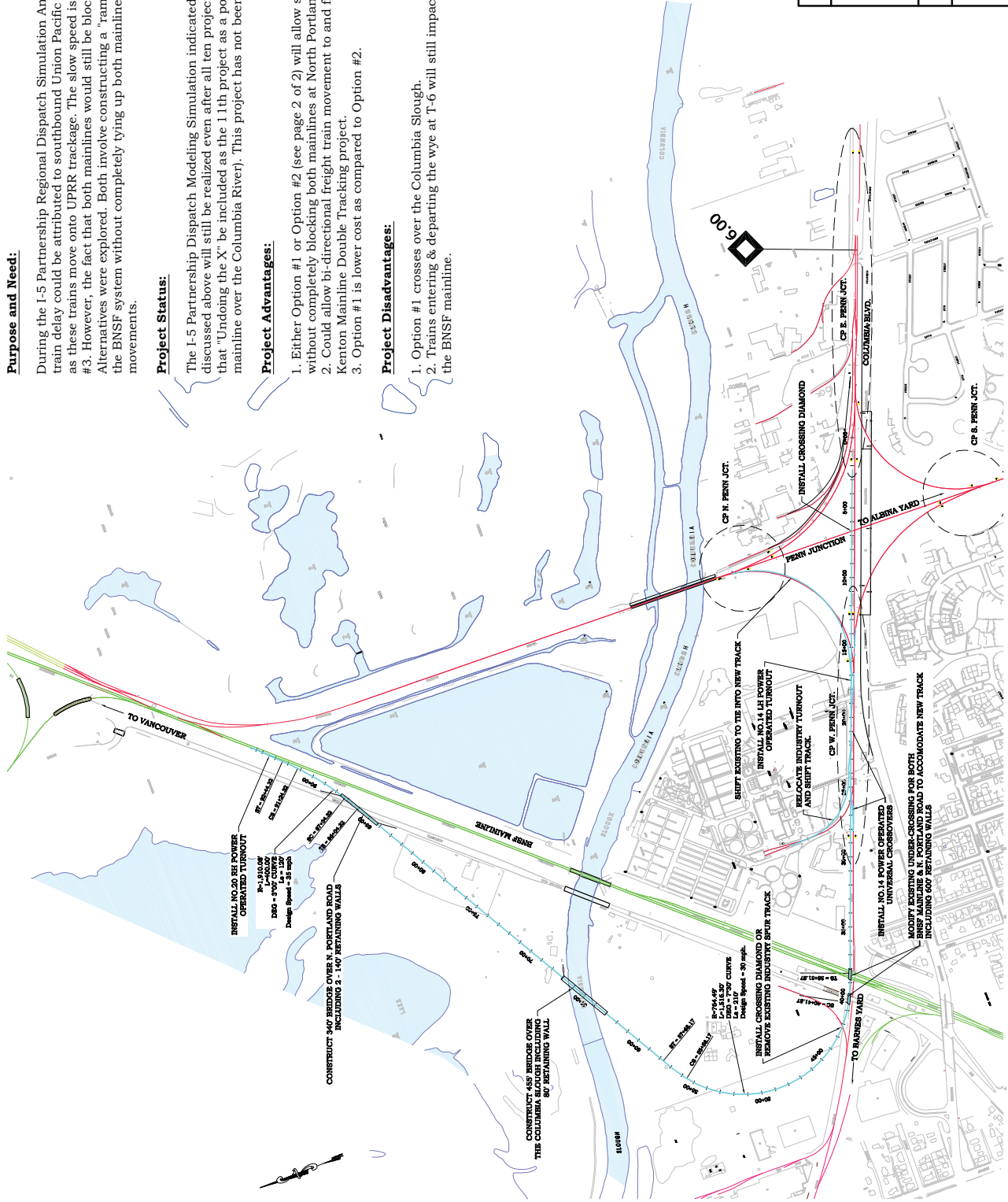
The I-5 Partnership Dispatch Modeling Simulation indicated that significant congestion due to the crossing movement discussed above will still be realized even after all ten projects are implemented. For this reason, ODOT has requested that "Undoing the X" be included as the 11th project as a potential "lower" cost solution (as opposed to adding a third mainline over the Columbia River). This project has not been "vetted" or discussed with either UPRR or BNSF.


Project Advantages:

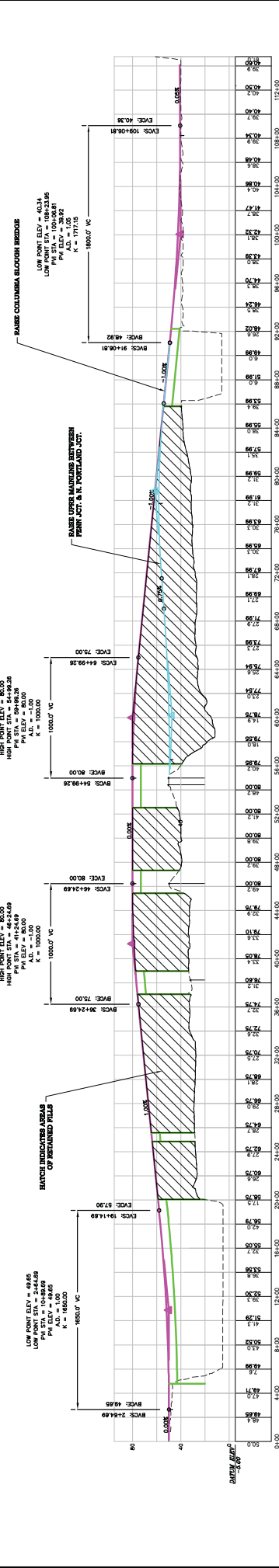
1. Either Option #1 or Option #2 (see page 2 of 2) will allow southbound UPRR freights to depart BNSF trackage without completely blocking both mainlines at North Portland Jct.
2. Could allow bi-directional freight train movement to and from UPRR tracks if constructed along with Project #5, the Kenton Mainline Double Tracking project.
3. Option #1 is lower cost as compared to Option #2.

Project Disadvantages:

1. Option #1 crosses over the Columbia Slough.
2. Trains entering & departing the wye at T-6 will still impact southbound UPRR using Option #1 where it ties into the BNSF mainline.




I-5 TRANSPORTATION & TRADE PARTNERSHIP	
I-5 TRADE CORRIDOR	
RAILROAD CAPACITY IMPROVEMENTS	
PROJECT NUMBER - 11A	
UNDOING THE X - OPTION NO.1	
PORTLAND, OREGON	
Design Team Leader - BILL BURGEL Designed By - ERIC WINTERS Drafted By - SCOTT HALE	
 HDR Engineering, Inc.	SHEET NO. 1 of 2 1001 SW 5TH AVENUE SUITE 1800 OR 97204 (503) 423-3700




15 TRANSPORTATION & TRADE PARTNERSHIP

- I-5 TRADE CORRIDOR
RAILROAD CAPACITY IMPROVEMENTS

PROJECT NUMBER - 11B

- | | |
|---|----------------------|
|  | 1000 CH. ST. ALBUQU. |
| | SHEET |



HDR Engineering, Inc.

1001 SW 5TH AVENUE
SUITE 1800
PORTLAND, OR 97204
(503) 423-3700

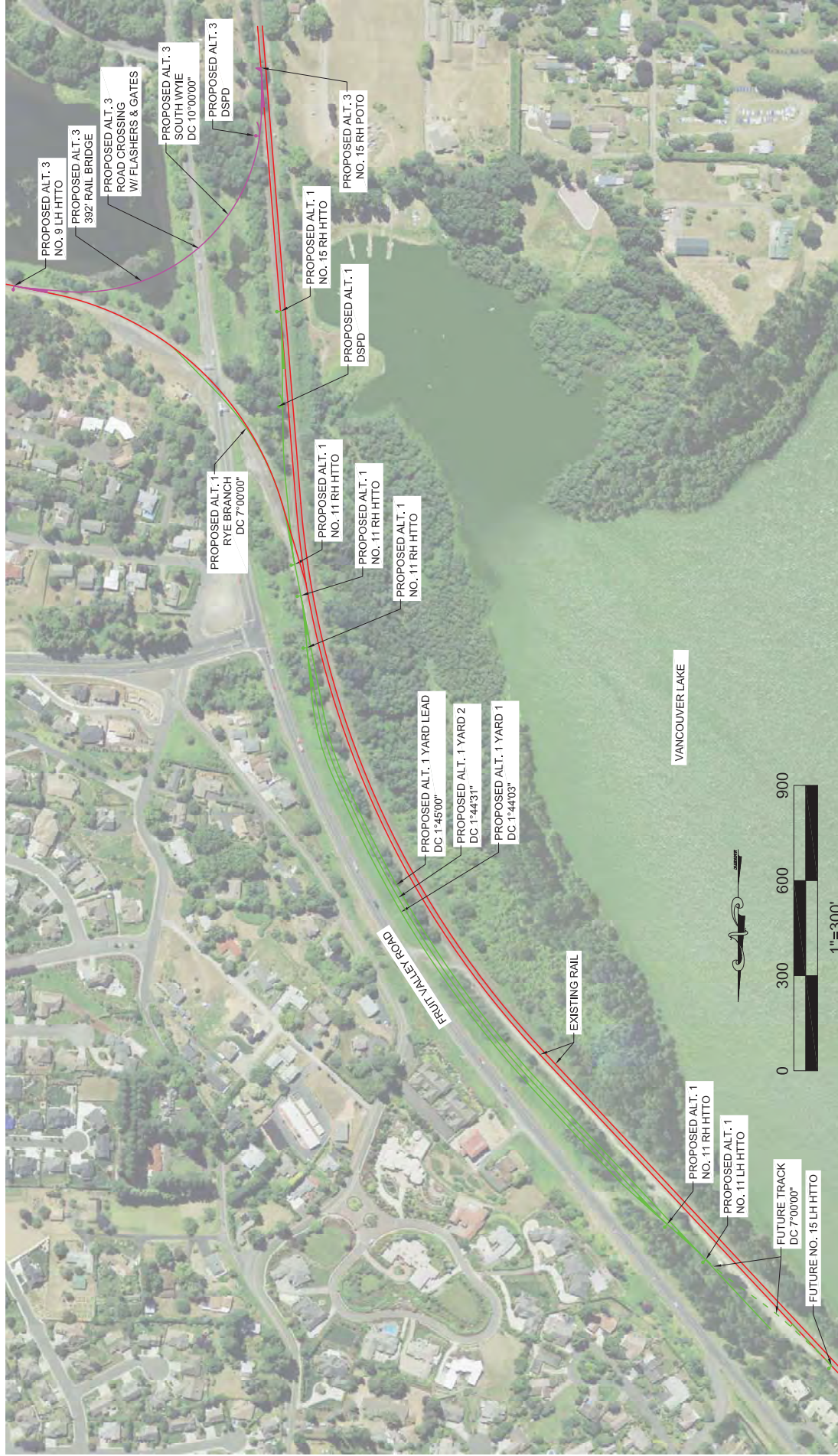
Drawn by = SCOTT HALL

SHEET NO. 2 of 2

This page is intentionally blank.

PRP-25.BNSF I-5 Corridor: Rye Junction Improvements – Summary of Factors

Project Description	<p>The BNSF interchanges railcars with the Portland-Vancouver Junction Railroad (PVJR) at Rye Junction immediately north of Vancouver Yard. Due to a lack of interchange tracks, the operation can tie up one main track for up to an hour while interchange switching occurs. This project would construct one of two alternatives previously studied to minimize use of the main line and increase the capacity of the interchange.</p> <p>The first alternative would construct a small interchange yard parallel to the BNSF main line north of the junction where BNSF trains can operate without blocking the main line. The second would reconstruct an old wye track to allow BNSF trains to turn up the shortline and interchange trains at a location along the shortline to be determined.</p>
Cost	<p>\$9,552,000</p> <p>Original project cost estimate by others in 2009 were escalated by HDR to 2013 dollars. The detailed original cost estimate is not available.</p>
Local Benefit	<p>The project does not directly impact operations around the Port terminals.</p>
Regional Benefit	<p>As the number of main line trains increases due to expanded passenger service, the possibility of coal trains, and a general rise in all other categories of freight trains, switching operations that tie up the main line become costlier due to the delay and congestion. Since the PVJR's annual car counts are on an uptrend annually (up from 60 in 2004 to 600 in 2012), the number of interchange operations per week will grow as well, further congesting the main.</p>
Main Line Capacity	<p>Main line capacity for BNSF, UP, and Amtrak trains is increased by completely relocating the switching movements off the main line. The main line would only be required for the BNSF interchanging train to arrive at new yard and then depart when the work is complete.</p>
Project Development Status	<p>In 2009, Clark County had a 30% design and cost estimate for both options performed. The effort also included development of the environmental permitting matrix for each. The Alternatives were put before the stakeholders. No funding source was identified at the time.</p> <p>Environmental Clearance: A 2009 study commissioned by the County assessed the permitting/review requirements, timelines, and approximate costs.</p> <p>Right-of-Way: It is probable that all work could be completed within the combined right of way of BNSF, PVJR, and Clark County right-of-way (Clark County is the owner of the shortline's underlying right-of-way).</p> <p>Final Design: Final design and permitting could be completed in 6 months</p> <p>Construction: Construction could be completed 9 months.</p>
Class I Competition Maintains or Increases	<p>No change in competitive balance. Both BNSF and UP would benefit from decreased congestion on the main line at Rye Junction.</p>



- LEGEND**
- EXISTING TRACK
 - PROPOSED TRACK ALT 1
 - PROPOSED TRACK ALT 3
 - FUTURE TRACK

PROPOSED ALT. 1 QUANTITIES

7579 NEW TRACK
1 EA NO. 15 HTTO
5 EA NO. 11 HTTO
1 EA DSPD

PROPOSED ALT. 3 QUANTITIES

1011 NEW TRACK
1 EA NO. 11 POTO
1 EA NO. 9 HTTO
1 EA DSPD
392' RAIL BRIDGE

FUTURE QUANTITIES

386 FUTURE TRACK
1 EA FUTURE NO. 15 HTTO

NOTE: ALL CONCEPTUAL DESIGN BASED OFF OF AERIAL IMAGERY



PORT OF PORTLAND - RAIL PLAN **PRP-25 BNSF I-5 CORRIDOR: RYE JUNCTION** **IMPROVEMENTS**

PRP-26.BNSF I-5 Corridor: WSDOT Projects between Longview and Kalama – Summary of Factors

Project Description	<p>The LOI in 2030 for this 3.52-mile double track segment is 86.5. The primary reason for the high LOI is the lack of main line capacity, which will limit the overall sustainable main line capacity north of Vancouver to about 68 trains per day. BNSF's own dynamic simulation of projected future freight and passenger operations on this segment has determined that it can operate sufficiently as a double track segment.</p> <p>This project would address this small segment (~3.7 miles), which is not covered in WSDOT projects defined in the Service Development Plan, 2011, Pacific Northwest Rail Corridor <i>Cascades</i> ® <i>High-Speed Rail Program</i>.</p> <p>Project Reference: Phase 1 Environmental Impact Statement Conceptual Engineering – Kelso to Martin's Bluff (WSDOT/HDR, as revised 7/26/02)</p>
Cost	<p>\$78,462,000</p> <p>Original project cost estimate by others in 2011 were escalated by HDR to 2013 dollars. The detailed original cost estimate is not available.</p>
Local Benefit	<p>The project would help prevent trains from stacking up in the Portland terminal area.</p>
Regional Benefit	<p>Main line accommodation of two additional round-trip Cascades trains per day, with no impact on freight operations.</p>
Main Line Capacity	<p>The project is intended to maintain main line capacity for freight trains despite additional Amtrak trains.</p>
Project Development Status	<p>Environmental Clearance: Work is on-going through the WSDOT high-speed rail program to permit two sections immediately north and south of this project. It is unknown as of yet of any of the effort covers this project.</p> <p>Right-of-Way: The project generally fits within the confines of the BNSF right-of-way, however some acquisition may be necessary.</p> <p>Final Design: Final design could be completed in 10 months</p> <p>Construction: Construction could be completed in 24 months</p>
Class I Competition Maintains or Increases	<p>Since the project is designed to offset the impact of increased Amtrak trains, there is no theoretical change in the competitive balance between the Class 1 carriers.</p>

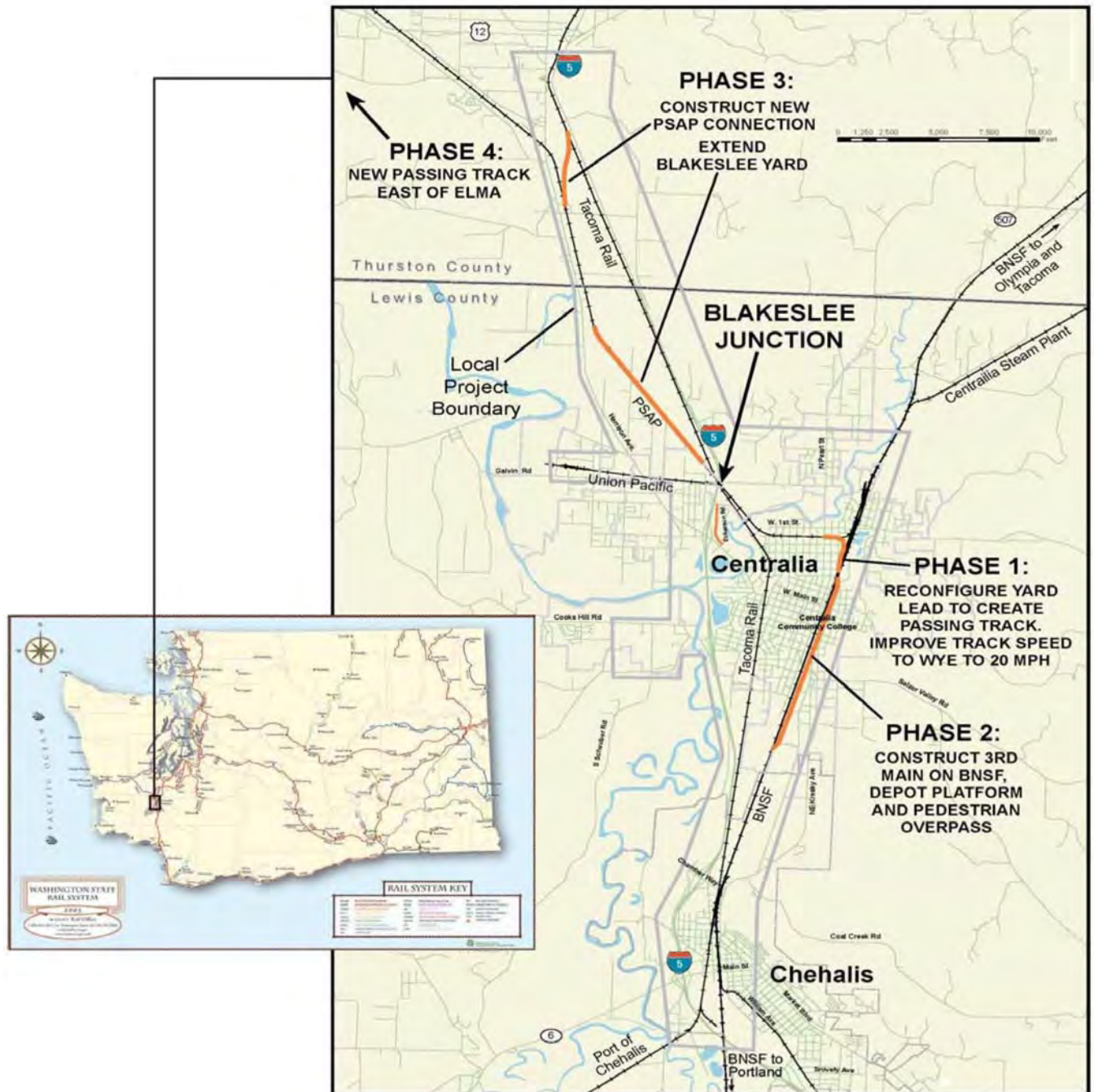


PRP-27.BNSF I-5 Corridor: BNSF/ PSAP Centralia Connection (Third Main, Depot and Pedestrian Overpass) – Summary of Factors

Project Description	<p>This project is the second phase of a five-phase project first discussed and designed to solve problems in the Centralia/Chehalis area (<i>Centralia/Chehalis Junction Rail Study</i>, WSDOT, February 2006). This phase can be built as a stand-alone project. The BNSF has two main line tracks through Centralia. The Puget Sound and Pacific (PSAP) connects off the BNSF main line one track to the west on a track with a restricted speed of 10 MPH. The Centralia Amtrak station, with a main line platform, is also located on the west side of Main line 1, approximately 850 feet south of the PSAP connection. As a result, trains that are arriving or departing PSAP at Centralia going 10 MPH must be closely coordinated with Amtrak schedules.</p> <p>To solve this problem, the project constructs a third main line track, builds a depot platform and a pedestrian overpass.</p> <p>Note that this project corresponds to only Phase 2 from the WSDOT work and on the project figure in this document.</p>
Cost	<p>\$15,250,000</p> <p>Original project cost estimate by others in 2006 were escalated by HDR to 2013 dollars. The detailed original cost estimate is not available.</p>
Local Benefit	<p>Local rail traffic destined for Grays Harbor will avoid 30-minute train delays for each train.</p>
Regional Benefit	<p>Amtrak trains avoid a five-minute delay at the Centralia Station stop.</p>
Main Line Capacity	<p>Eliminates main line delay associated with trains going or coming from PSAP and the five-minute delay per Amtrak train associated with the Centralia Station stop. Resulting LOI for this segment would be reduced from 86.5 to 55.9.</p>
Project Development Status	<p>Phase 2 (this project) is not funded.</p> <p>Environmental Clearance: No progress to date.</p> <p>Right-of-Way: No progress to date.</p> <p>Final Design: Final design could be completed in 4 months</p> <p>Construction: Construction could be completed in 6 months</p>
Class I Competition Maintains or Increases	<p>The project does not impact the current competitive balance between the Class 1 carriers.</p>



Consensus Plan to Reduce Road and Rail Congestion at Centralia/Chehalis



PRP-28.BNSF Fallbridge Line: Completing Double Tracking – Vancouver to Washougal – Summary of Factors

Project Description	<p>LOI in 2030 is over capacity, due to lack of main line capacity and insufficient sidings. This project extends the McLoughlin siding eastward to the west end of Washougal and adds two sets of #24 universal crossovers. This would involve the construction of approximately 8.3 miles of a second track from McLaughlin to Camas, and 3.2 miles of from Camas to Washougal for a total of 11.5 miles.</p> <p>This project is included for consideration with the caveat that BNSF is addressing capacity through extending sidings and operational changes in the Columbia Gorge and Washington State using its own funds.</p>
Cost	\$72,576,000
Local Benefit	The project helps stage and dispatch trains efficiently to prevent trains from stacking up in the Portland and Vancouver terminal areas while waiting for access to the main line.
Regional Benefit	The project increases the capacity of the east-west BNSF corridor linking Portland and Vancouver to points east, increasing the flow of goods past area Ports.
Main Line Capacity	Extension of the double-track main to Washougal allows efficient staging of numerous trains waiting to enter local ports or waiting to travel to points east.
Project Development Status	<p>Environmental Clearance: None completed.</p> <p>Right-of-Way: The project will generally fit within the confines of BNSF right of way.</p> <p>Final Design: Final design could be completed in 10 months</p> <p>Construction: Construction could be completed in 24 months</p>
Class I Competition Maintains or Increases	With increased capacity and train speeds, BNSF may experience a decrease in operating costs on its route through the Columbia Gorge, allowing it to compete more effectively with UP for east-west traffic out of the Pacific Northwest. This effect may be offset by completion of PRP -21, double-tracking the UP Kenton Line, a project which may have the same effects for UP.



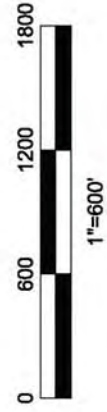
LEGEND
 EXISTING TRACK
 PROPOSED TRACK
 REMOVE TRACK
 REHAB TRACK
 PROPOSED STRUCTURE/

QUANTITIES
 59286' NEW TRACK
 3 EA NO. 11 HTTO
 1 EA NO. 15 HTTO
 1 EA NO. 20 HTTO
 24 EA NO. 24 HTTO
 844' REMOVED TRACK
 6655' REHABED TRACK
 320' CONCRETE TRESTLE
 512' PLATE GIRDER
 30 EA GRADE CROSSINGS

NOTE: ALL CONCEPTUAL DESIGN BASED OFF OF AERIAL IMAGERY



PORT OF PORTLAND - RAIL PLAN
 PRP-28 BNSF FALLBRIDGE LINE: COMPLETING
 DOUBLE TRACKING - VANCOUVER TO
 WASHOUGAL



- LEGEND**
- EXISTING TRACK
 - PROPOSED TRACK
 - REMOVE TRACK
 - REHAB TRACK
 - PROPOSED STRUCTURE/

QUANTITIES

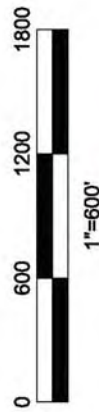
58265'	NEW TRACK
3 EA NO. 11	HTTO
1 EA NO. 15	HTTO
1 EA NO. 20	HTTO
24 EA NO. 24	HTTO
844'	REMOVED TRACK
6655'	REHABED TRACK
320'	CONCRETE TRESTLE
512'	PLATE GIRDER
30 EA	GRADE CROSSINGS

NOTE: ALL CONCEPTUAL DESIGN BASED OFF OF AERIAL IMAGERY



PORT OF PORTLAND - RAIL PLAN
 PRP-28 BNSF FALL BRIDGE LINE: COMPLETING
 DOUBLE TRACKING - VANCOUVER TO
 WASHOUGAL

DATE	01/23/2013
FIGURE	2/8



- LEGEND**
- EXISTING TRACK
 - PROPOSED TRACK
 - REMOVE TRACK
 - REHAB TRACK
 - PROPOSED STRUCTURE/

QUANTITIES

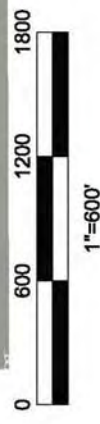
59286' NEW TRACK
3 EA NO. 11 HTTO
1 EA NO. 15 HTTO
1 EA NO. 20 HTTO
24 EA NO. 24 HTTO
844' REMOVED TRACK
6655' REHABED TRACK
320' CONCRETE TRESTLE
512' PLATE GIRDER
30 EA GRADE CROSSINGS

NOTE: ALL CONCEPTUAL DESIGN BASED OFF OF AERIAL IMAGERY



PORT OF PORTLAND - RAIL PLAN
 PRP-28 BNSF FALL BRIDGE LINE: COMPLETING
 DOUBLE TRACKING - VANCOUVER TO
 WASHOUGAL

DATE	01/23/2013
FIGURE	3/8



- LEGEND**
- EXISTING TRACK
 - PROPOSED TRACK
 - REMOVE TRACK
 - REHAB TRACK
 - PROPOSED STRUCTURE/

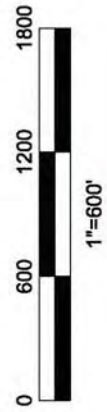
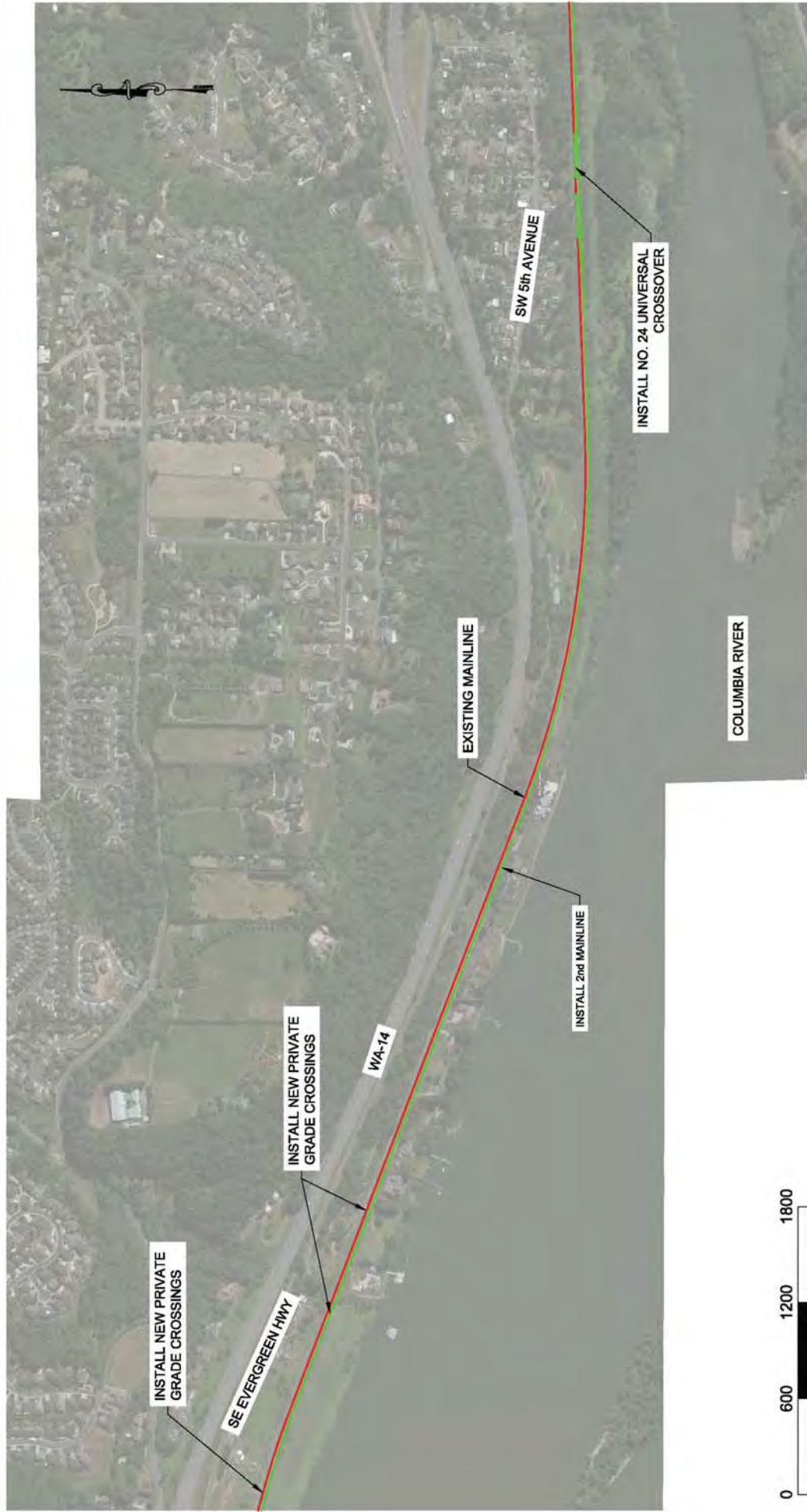
- QUANTITIES**
- 59265' NEW TRACK
 - 3 EA NO. 11 HTTO
 - 1 EA NO. 15 HTTO
 - 1 EA NO. 20 HTTO
 - 24 EA NO. 24 HTTO
 - 844' REMOVED TRACK
 - 6655' REHABED TRACK
 - 320' CONCRETE TRESTLE
 - 512' PLATE GIRDER
 - 30 EA GRADE CROSSINGS

NOTE: ALL CONCEPTUAL DESIGN BASED OFF OF AERIAL IMAGERY



PORT OF PORTLAND - RAIL PLAN
 PRP-28 BNSF FALL BRIDGE LINE: COMPLETING
 DOUBLE TRACKING - VANCOUVER TO
 WASHOUGAL

DATE	01/23/2013
FIGURE	4/8



- LEGEND**
- EXISTING TRACK
 - PROPOSED TRACK
 - REMOVE TRACK
 - REHAB TRACK
 - PROPOSED STRUCTURE/

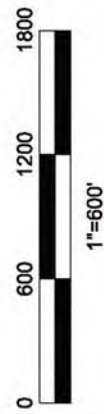
- QUANTITIES**
- 59286' NEW TRACK
 - 3 EA NO. 11 HTTO
 - 1 EA NO. 15 HTTO
 - 1 EA NO. 20 HTTO
 - 24 EA NO. 24 HTTO
 - 844' REMOVED TRACK
 - 6655' REHABED TRACK
 - 320' CONCRETE TRESTLE
 - 512' PLATE GIRDER
 - 30 EA GRADE CROSSINGS

NOTE: ALL CONCEPTUAL DESIGN BASED OFF OF AERIAL IMAGERY



PORT OF PORTLAND - RAIL PLAN
 PRP-28 BNSF FALL BRIDGE LINE: COMPLETING
 DOUBLE TRACKING - VANCOUVER TO
 WASHOUGAL

DATE	01/23/2013
FIGURE	5/8



LEGEND

EXISTING TRACK	Red line
PROPOSED TRACK	Green line
REMOVE TRACK	Blue line
REHAB TRACK	Orange line
PROPOSED STRUCTURE/	Yellow line

QUANTITIES

59286' NEW TRACK
3 EA NO. 11 HTTO
1 EA NO. 15 HTTO
1 EA NO. 20 HTTO
24 EA NO. 24 HTTO
844' REMOVED TRACK
6655' REHABED TRACK
320' CONCRETE TRESTLE
512' PLATE GIRDER
30 EA GRADE CROSSINGS

NOTE: ALL CONCEPTUAL DESIGN BASED OFF OF AERIAL IMAGERY



PORT OF PORTLAND - RAIL PLAN
PRP-28 BNSF FALL BRIDGE LINE: COMPLETING
DOUBLE TRACKING - VANCOUVER TO
WASHOUGAL

DATE	01/23/2013
FIGURE	6/8



- LEGEND**
- EXISTING TRACK
 - PROPOSED TRACK
 - REMOVE TRACK
 - REHAB TRACK
 - PROPOSED STRUCTURE/

QUANTITIES

59286' NEW TRACK
 3 EA NO. 11 HTTO
 1 EA NO. 15 HTTO
 1 EA NO. 20 HTTO
 24 EA NO. 24 HTTO
 844' REMOVED TRACK
 6655' REHABED TRACK
 320' CONCRETE TRESTLE
 512' PLATE GIRDER
 30 EA GRADE CROSSINGS

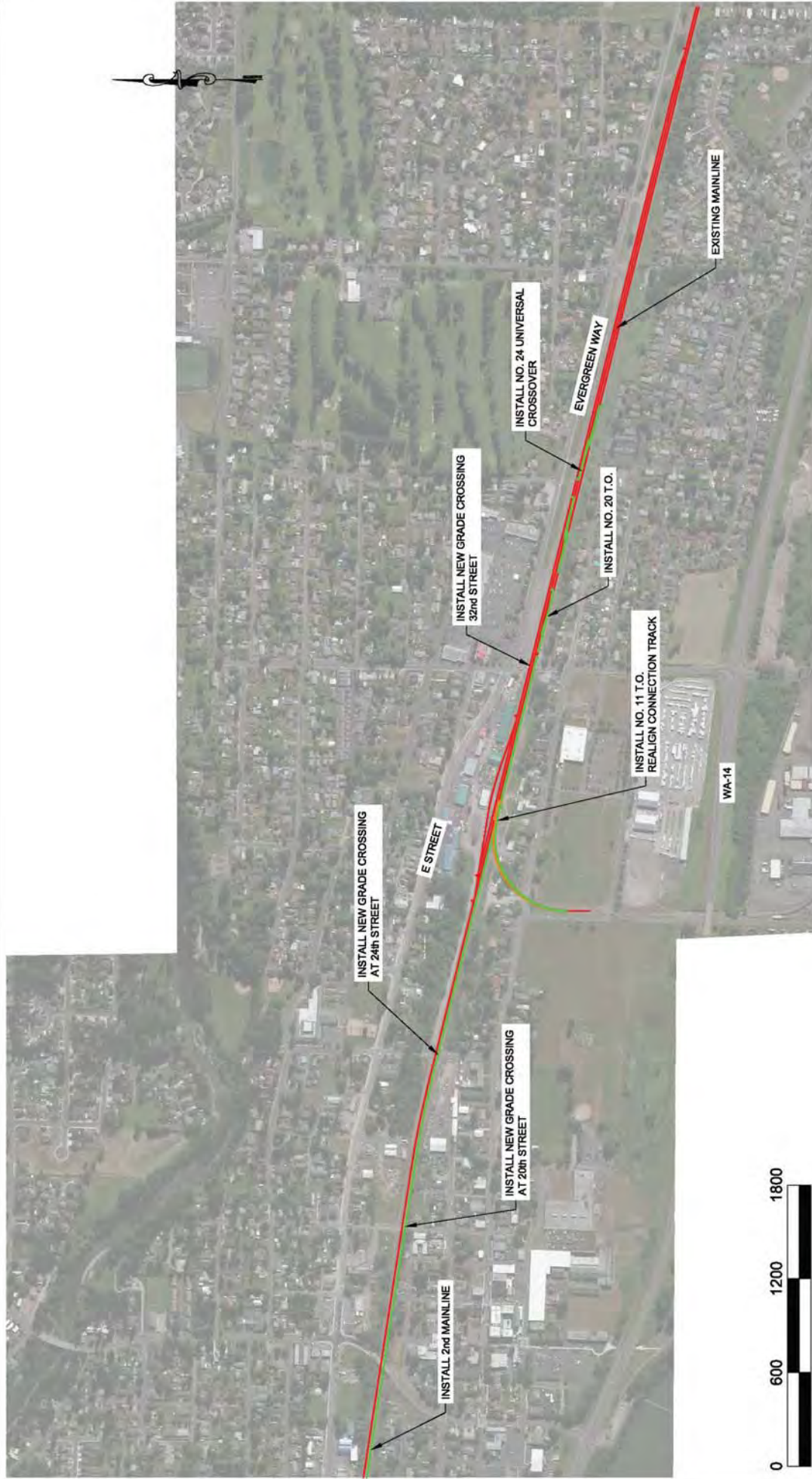
NOTE: ALL CONCEPTUAL DESIGN BASED OFF OF AERIAL IMAGERY



PORT OF PORTLAND - RAIL PLAN
 PRP-28 BNSF FALLBRIDGE LINE: COMPLETING
 DOUBLE TRACKING - VANCOUVER TO
 WASHOUGAL

DATE
 01/23/2013

FIGURE
 7/8



- LEGEND**
- EXISTING TRACK
 - PROPOSED TRACK
 - REMOVE TRACK
 - REHAB TRACK
 - PROPOSED STRUCTURE/

QUANTITIES

59286'	NEW TRACK
3 EA NO. 11	HTTO
1 EA NO. 15	HTTO
1 EA NO. 20	HTTO
24 EA NO. 24	HTTO
844'	REMOVED TRACK
6655'	REHABED TRACK
320'	CONCRETE TRESTLE
512'	PLATE GIRDER
30 EA	GRADE CROSSINGS

NOTE: ALL CONCEPTUAL DESIGN BASED OFF OF AERIAL IMAGERY



PORT OF PORTLAND - RAIL PLAN
 PRP-28 BNSF FALLBRIDGE LINE: COMPLETING
 DOUBLE TRACKING - VANCOUVER TO
 WASHOUGAL

DATE

01/23/2013

FIGURE

8/8

Port of Portland Rail Plan: Project Descriptions

PRP 28 - PRELIMINARY CONSTRUCTION COST ESTIMATE - JAN 2013

DESCRIPTION		QUANTITY	UNIT	UNIT PRICE	SUB TOTAL
1.0 General					
1.01	Right-of-Way Impacts/Property Acquisition		Acre		\$ -
1.02	Environmental Permitting		LS		\$ -
2.0 Civil & Track Work					
2.01	Embankment	280964.74	CY	\$ 25	\$ 7,024,119
2.02	New Track	59266	TF	\$ 175	\$ 10,371,550
2.03	Shift track	6655	TF	\$ 20	\$ 133,100
2.04	Remove track	844	TF	\$ 10	\$ 8,440
2.05	Turnout #11, hand thrown	3	EA	\$ 80,000	\$ 240,000
2.06	Turnout #15, hand thrown	1	EA	\$ 90,000	\$ 90,000
2.07	Turnout #20, power operated	1	EA	\$ 220,000	\$ 220,000
2.08	Turnout #24, power operated	24	EA	\$ 250,000	\$ 6,000,000
3.0 Structural Work					
3.01	Concrete Trestle	320	LF	\$ 8,000	\$ 2,560,000
3.02	Plate Girder Bridge	512	LF	\$ 30,000	\$ 15,360,000
3.03	Bridge (Short)	15	LF	\$ 8,000	\$ 120,000
3.04	Road Crossings (Collector)	10	EA	\$ 150,000	\$ 1,500,000
3.05	Road Crossings (Private)	20	EA	\$ 30,000	\$ 600,000
4.0 Signal Work					
4.01	Signaling	11	MI	750000	\$ 8,250,000

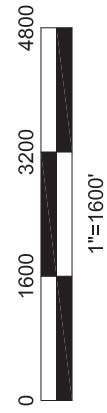
Subtotal		\$	52,477,209
Sales Tax	8.3%	\$	4,355,608
Contingency	30%	\$	15,743,163
TOTAL		\$	72,575,979

ASSUMPTIONS

Estimates only indicate probable cost of construction
 Right-of-way or property impact costs are not included
 Environmental permitting is not included
 Engineering Design costs are not included
 Utility relocation costs are not included
 stormwater conveyance and treatment costs are not included
 Earthwork is an assumed 24' wide, 4' height and 2:1 slopes the track length

PRP-29.BNSF I-5 Corridor: Port of Vancouver Main Line Connection at Felida – Summary of Factors

Project Description	<p>The purpose of this project is to improve future Port of Vancouver access to the BNSF main line.</p> <p>The project consists of 4.7 miles of track, and a bridge that would cross the 250-foot-wide Lake Creek on an oblique angle making this structure approximately 600 feet in length. Project concept assumes three in-water round piers that support a cap that is aligned with the four 150-foot deck girders. Drop roughly 30 feet from the BNSF main line to the ground surface adjacent to Vancouver Lake. This can be built up to provide a gentle ramp at approximately a 0.8% gradient. That ramp would require about ¾ mile of fill with an average fill height of 15 feet. Design speed should be 40-50 MPH coming off the BNSF main line, then slowing to 30 MPH near Vancouver Lake, finally slowing to yard speed as the Port of Vancouver is reached.</p> <p>Another small bridge plus two or maybe three at-grade highway/rail crossings will also be needed.</p>
Cost	\$34,161,000
Local Benefit	Improves future Port of Portland access to BNSF north-south main line.
Regional Benefit	BNSF could reduce the number of trains operating on the main line in the Vancouver terminal area by directly routing trains from the north into the port without passing through Vancouver Yard, thereby increasing train throughput on the main in Vancouver.
Main Line Capacity	The BNSF will be able to divert trains accessing the Port of Vancouver off the main line to the north of Vancouver, relieving terminal congestion at Vancouver Yard.
Project Development Status	<p>Project has been discussed with, but not approved by, BNSF.</p> <p>Environmental Clearance: None completed.</p> <p>Right-of-Way: It is assumed that all right-of-way has yet to be acquired; the project would require a new railroad right-of-way corridor.</p> <p>Final Design: Final design could be completed in 8 months</p> <p>Construction: Construction could be completed in 12 months</p>
Class I Competition Maintains or Increases	The competitive balance between UP and BNSF should remain unchanged since UP does not serve the Port of Vancouver. Since BNSF already serves all parts of the Port of Vancouver, the proposed link will not create a new market for rail service that UP would be excluded from.



LEGEND
EXISTING TRACK
PROPOSED TRACK

QUANTITIES
42419' NEW TRACK
6 EA NO. 15 HTTO
650' BRIDGE



PORT OF PORTLAND - RAIL PLAN
PRP-29 BNSF I-5 CORRIDOR: PORT OF
VANCOUVER MAIN LINE CONNECTION AT
FELIDA

DATE	01/23/2013
FIGURE	1/1

NOTE: ALL CONCEPTUAL DESIGN BASED OFF OF AERIAL IMAGERY

PRP 29 - PRELIMINARY CONSTRUCTION COST ESTIMATE - JAN 2013

DESCRIPTION		QUANTITY	UNIT	UNIT PRICE	SUB TOTAL
1.0 General					
1.01	Right-of-Way Impacts/Property Acquisition	77.9	Acre		\$ -
1.02	Environmental Permitting	1	LS		\$ -
2.0 Civil & Track Work					
2.01	Embankment	201097	CY	\$ 25	\$ 5,027,437
2.02	New Track	42419	TF	\$ 175	\$ 7,423,325
2.04	Turnout #15, hand thrown	6	EA	\$ 80,000	\$ 480,000
3.0 Structural Work					
3.01	Bridge	650	LF	\$ 16,000	\$ 10,400,000
3.03	Road Crossings (Collector)	5	EA	\$ 150,000	\$ 750,000
3.04	Road Crossings (Private)	4	EA	\$ 30,000	\$ 120,000
4.0 Signal Work					
4.01	Signaling	1	LS	\$500,000	\$ 500,000

Subtotal		\$	24,700,762
Sales Tax	8.3%	\$	2,050,163
Contingency	30%	\$	7,410,229
TOTAL		\$	34,161,154

ASSUMPTIONS

Estimates only indicate probable cost of construction
 Right-of-way or property impact costs are not included
 Environmental permitting is not included
 Engineering Design costs are not included
 Utility relocation costs are not included
 stormwater conveyance and treatment costs are not included
 Earthwork is an assumed 24' wide, 4' height and 2:1 slopes the track length

This page is intentionally blank.

Appendix B: Rail Inventory and Conditions in the Marine Terminals

Port of Portland Rail Plan

Port Rail Infrastructure Existing Conditions Report

March 4, 2013

Prepared for:

Port of Portland
7200 NE Airport Way
Portland, OR 97218

Prepared by:

HDR Engineering
1001 SW 5th Avenue
Suite 1800
Portland, OR 97204

[this page left blank]

Table of Contents

TABLE OF CONTENTS.....	I
ACRONYMS AND ABBREVIATIONS.....	II
1.0 INTRODUCTION.....	1
2.0 TERMINAL 2	2
3.0 SWAN ISLAND LEAD TRACK.....	8
4.0 TERMINAL 4	11
5.0 TERMINAL 5	16
6.0 TERMINAL 6	16
7.0 OTHER FACILITIES.....	17

Acronyms and Abbreviations

BNSF	BNSF Railway
Class 1	Class 1 Railroads (BNSF Railway and Union Pacific Railroad, in the plan area)
CCI	Construction Cost Index
COP	City of Portland
CTC	Centralized Traffic Control
CRC	Columbia River Crossing
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GIS	Geographic Information Systems
GPI	Greater Portland Inc.
HDR	HDR Engineering Inc.
HSIPR	Higher-Speed Intercity Passenger Rail
LOI	Line Occupancy Index
ODOT	Oregon Department of Transportation
PDX	Portland International Airport
PIC	Portland International Center
PNWR	Portland and Western Railroad
PPP	Public-Private Partnership
PTRC	Portland Terminal Railroad Company
PT	Peninsula Terminal Company
RPSG	Rail Plan Study Group
T-2	Terminal 2
T-4	Terminal 4
T-5	Terminal 5
T-6	Terminal 6
TRIP	Troutdale Reynolds Industrial Park
TWC	Track Warrant Control
UP/UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
WHI	West Hayden Island
WSDOT	Washington State Department of Transportation

1.0 INTRODUCTION

As part of the overall Rail Plan development, the Port requested HDR to study the existing rail infrastructure belonging to the Port, both within the terminals and off-terminal, and prepare a summary findings document. The report and the fieldwork conducted in support of it are not intended to be an exhaustive assessment of every foot of track, nor a complete inspection of track conditions. This is assumed to take place as part of a program of regular inspection and light maintenance. The findings and recommendations contained herein are intended to be strategic in nature. This document will assist Port management to:

- Understand the ability of its rail infrastructure to support modern rail service;
- Plan for extensive for extra-ordinary maintenance projects that may fall outside the limits of typical operating budgets;
- Assess the strategic value of assets versus the potential lifecycle costs;
- Identify the level of effort required to put idle rail infrastructure back into service;
- Identify specific locations where continued safe and reliable service to existing customers will require track work;
- Identify conditions that may place the general public at risk (primarily roadway crossings);

The HDR team made site one-day visits to the various Port terminals and other locations with Port-owned rail infrastructure. Where possible, staff walked track documenting findings with notes, limited measurements, and photographs. When present, the team spoke with management or workers at each site to obtain their knowledge of working conditions.

Each chapter of this report is dedicated to a particular terminal or rail infrastructure location. A discussion of the general layout of tracks is presented, followed by discussion of individual tracks or rail assets, and finally recommendations. The recommendations have also been consolidated into Appendix A to provide a singular location for reference.

The curves within Terminal 2 are fairly tight by modern railroad engineering standards. The curves of the balloon track are approximately 15° curves (~ 383' radius), whereas typical railroad curvature newly constructed is not allowed to exceed 10°30'. While the existing curves are tight, field observation revealed that 89' flatcars routinely move through the terminal relatively problem-free. If railcars continue their development trend of heavier/longer into the future, the tight curvature may present problems.

2.2 Track Condition

General Notes. The rails in the southerly half of the terminal tend to exhibit the worst conditions, whereas tracks along the berths and north portion of the terminal are generally fair. Areas of tie heaving, rail joints pounding down, loose joints, and poor surface/line/cross-level are typical in the southerly portion of the terminal. Any opportunity when the asphalt encasing the track is opened up should be used to replace all the exposed ties, service the rail joints, and replace rails. While the 90-lb rail can be maintained and used for the time being, consideration should be given to wholesale replacement with heavier rail, new ties, and concrete track panels, especially if a prolonged upsurge in rail traffic materializes.

Southerly Lead. The southerly lead curves off of the main line rail corridor, crosses NW Front Avenue, and enters the southwest corner of T-2 via a gate. The track appears to consist of 90-lb rail in poor condition. The ties are entirely buried in mud, rail joints are pounding down into the ties, and the rails have significant head wear owing to age, a tight curve, and many years of use. It is suspected that the wood crossties are all approaching poor condition. Through NW Front Avenue, the rails step up in size and the crossing surface consists of concrete panels. The crossing is in fair condition. Immediately east of NW Front Avenue, the rail steps down in size again (likely to 90-lb). The southerly lead passes through a series of turnouts for storage tracks and becomes the circular “balloon” track within the terminal.



Figure 2: Muddy condition of Southerly Lead

Storage Track Ladder. The southerly lead continues through three No. 9 turnouts that fan out to several stub-ended storage tracks. While the rails themselves are in fair condition, the turnouts are in poor condition owing to loose joints, poor tie condition, and joints pounding downwards. The rails have lost a smooth profile and are vertically mis-matched. While no

railcars moved over the turnouts at the time of the field visit, it is suspected that the rails of the turnouts heave up and down under the weight of the cars.



Figure 3: Left: Typical view of turnouts showing joint pounding, mis-aligned guard rail, etc.
Right: Looking up the switch ladder towards the berths.

Stub Storage Tracks. The stub storage tracks (3 along the southerly terminal boundary and 2 dockside between the warehouses) are composed of lightweight rail (again, likely 90-lb). The rails (mostly only the railheads were visible) are in fair condition and still have service life under low-to-moderate railcar volumes. Visual evidence of heaving around the crossties can be seen in all the tracks, with some areas worse than others. The notable locations were (1) the middle of the three southerly storage tracks and (2) the track that curves around to the warehouse docks. Where visible, this suggests that the ties are pumping up and down under the pavement and suggests that tie condition is approaching poor and spikes are losing their holding power. While compacted mud/rock and asphalt do have an ability to hold rails in place for a time, it is a condition that should be ameliorated.

Berth-side Tracks. The berth-side tracks are encased entirely in concrete and appear to be of heavier rail than 90-lb. The rails appear (again, only the heads are visible) to be in fair condition with additional service life left. Assuming that current rail traffic levels persist, no action is recommended other than routine maintenance and inspection to insure proper working of the switches and to detect problems that may arise.

Balloon Track (northerly half). The balloon track departs from the berth-side tracks, curves west, and departs T-2 near the terminal entry portal. Most of the track is encased in asphalt outside the rails and has 4' sections of concrete gage panels its entire length. A small portion is paved in concrete near the berth. The track is generally in fair condition with service life remaining. However, one area requires close monitoring and future maintenance due to three phenomena:

1. As the track departs from the berth and curves to the west, it passes over two expansion joints in the concrete and it intersects two crane rails. The rails at the westerly expansion joint are wearing heavily around the head and small sections of metal are breaking off the head. A portion of the rail heads are deforming and flattening down. This expansion joint may require repair or outright replacement in the near future.

2. As the track steps off the concrete pad of the berth and onto asphalt pavement, the first 40' of track dip downwards and show evidence of joint pounding. There may be a subgrade loss of support here. This segment of track should be opened up, ties replaced, lifted up on ballast, and re-gaged.



Figure 4: Rail expansion joint showing head flattening and chipping.

3. Crane-rail / tee-rail intersections. The balloon track crosses over two crane rails by means of a specially-manufactured “frog” that allows rail cars and cranes to pass over the joint. The profile of the railcar wheel flange through the frog is apparently not deep enough as visual inspection revealed that the railcar wheel flanges are incising into the body of the frog, up to $\frac{3}{4}$ ” at some locations. This was a common phenomena at all such locations in the terminal. One such frog is actually cracking out along the craneway axis. The situation is exacerbated by the fact that the railcars are wearing the running surface of the frogs down. As the surface wears down, the wheel flanges incise deeper into the frog casting. *Note* – this type of frog at the south end of the terminal was not inspected because active railcar movements were occurring at the time.



Figure 5: Left: Railcar wheel flange incising into crossing frog up to 3/4" deep.
Right: Chipping and cracking in crane rail at crossing frog.

Northerly Lead Track. The northerly lead track crosses NW Front Avenue via concrete panels. The track curves south to connect to Portland Terminal Railroad trackage. This track consists of 115-lb rail and is in fair condition.

2.3 Recommendations

Southerly Lead:

- Reconstruct the track from where it departs the main line corridor to the Naito Parkway crossings (~310') with heavier rail and 100% new ties;
- Raise the track with ballast up to 4" to lift it out of the mud.

Storage Track Ladder:

- Replace timber crossties and switch ties for the three turnouts (likely 100%);
- Recondition the turnouts by re-gaging track, tightening all fasteners, welding up imperfections in the rail running surfaces, and adjusting the line and surface of the rails to achieve smooth track;
- Tamp the turnouts to achieve good cross-level and smooth surface;
- Preferably, the turnouts should be replaced with new heavier rail (115-lb or better);
- Concrete panel crossing systems are manufactured for turnouts and are the best long-term solution, although they tend to be costly in comparison to normal crossing panels.

Stub Storage Tracks:

- Replace 100% of the crossties, service all rail joints, and surface/line/gage the track in the worst sections exhibiting tie pumping and pavement heaving;

- The middle stub track along the southerly terminal boundary;
 - The curved track leading to the warehouse dockside stub tracks;
 - Monitor other areas and replace ties as needed
- Where such work is done, lift the track up 1" to 2" with ballast and pave back gentle asphalt ramps in order to drain stormwater away from the rails.

Balloon Track (northerly half):

- Assess whether the crane-rail/tee-rail frogs can be repaired or need outright replacement to restore the wheel tread running surfaces to their proper elevation and arrest further incision into the frogs by the wheel flanges;
- Assess whether the aforementioned expansion joint can be repaired via welding or requires replacement;
- Re-build the 40' section of track per bullet #2 in Section 2.2.

3.0 SWAN ISLAND LEAD TRACK

3.1 General Layout

The Swan Island Lead is a single track nearly 2.2 miles in length running from Union Pacific Railroad's Albina Yard on the east to the Shipyard Commerce Center at the western tip of the Island. The Port's ownership of the track begins at a point near the intersection of North Port Center Way and North Channel Avenue and ends at the Shipyard Commerce Center. Track inside the Center is not owned by the Port. The Lead runs in a narrow corridor along North Channel Avenue, hemmed in tightly by the road, tree canopy, and adjacent buildings. There are several short spur tracks serving businesses along North Channel Avenue, however, none of the spur tracks are actively used except for the sole rail customer at Shipyard Commerce Center. All turnouts along the lead are No. 7's. The Lead crosses North Channel Avenue three times from side to side. Grade crossings are numerous. There are several public street crossings and a myriad of private driveway crossings.

3.2 Track Condition

The Swan Island Lead is comprised of 90-lb rail on wood crossties, with the exception of a section of 100-lb rail about 1,200' in length at the east end of the Island. Nearly 100% of the track is encased in dirt/rock or in pavement. The ballast is completely fouled with dirt and other deleterious elements. The track is lined with landscape trees placed along the street, forming a nearly continuous canopy that drops leaves directly onto the track each autumn. For the most part, only the railheads are visible. Thus, it is impossible to make a full assessment of tie or rail condition. There are, however, a number of other indicators that point to relative condition of the track. Generally, the easterly section of the Lead is in superior condition to the middle or westerly sections.



Figure 6: Typical view of the Swan Island Lead

While the track has been in fair condition up to the time of this writing, telltale indicators suggest that the track will begin to require more intensive maintenance in the next few years. The 90-lb rail, with some exceptions, still has service life and can continue to support the relatively low railcar traffic on the lead (provided railcar weights do not increase) for the foreseeable future. However, the systems that support the rails (ties, ballast, fasteners) are deteriorating. The indicators of deteriorating condition are:

1. Numerous rail joints spreading outward along the length of the Lead. This indicates that joint bars may be loose and that ties and spikes are losing their holding power. The spreading is causing wide gage at many joints, measured typically to be up to 5/8" wide

(measured with no load). When railcars pass by, these measurements would increase as the weight of the railcar pushes rails outwards.

2. Of the ties that are visible a high percentage are in marginal condition and becoming “soft.” Poor drainage holds moisture to the ties, which accelerates decay. Still, very few ties were actually observed to be broken, badly split, or completely mulched.
3. Localized areas where the rail does not maintain good alignment, cross-level, or surface. This indicates deteriorating ties below the surface of the dirt.
4. Pavement heaving in some areas where the track is embedded in asphalt around ties indicates that the ties are pumping and losing holding power.

3.3 At-Grade Street Crossings

There are numerous paved crossings of public streets, driveways, and paved aprons along the Swan Island Lead. Most are low volume crossings in fair condition. A few have been upgraded to heavier rail and concrete crossing panels. There are two crossings, however, that warrant discussion and will need repairs and/or upgrades in the relatively near future.

North Channel Avenue near North Anchor Street. Both the track and the roadway are curving through the crossing at a high skew angle. The length of track in the street is ~260'. Channel Avenue is a 3-lane one-way street that serves as the primary egress route from Swan Island to all other points in Portland. Vehicle speeds appear to range from 35 to 50 m.p.h. The rail appears to be 90-lb rail outfitted with guard rails to protect the flangeways (i.e., one sees 4 rails in the pavement). In wet conditions, the amount of steel in the surface of the crossing combined with the curvature of track and road cause may slick conditions for vehicles crossing the track. The asphalt pavement surrounding the rails is rough. Gaps and cracks in the asphalt are developing the full length of the crossing, especially near rail joints.

North Channel Avenue near North Dolphin Street. This crossing is similar in nature to the previous. Both roadway and track are curving through the crossing, which is at a high skew angle. The crossing is paved in asphalt and the 90-lb track is outfitted with guardrails to protect the flangeway. The crossing length is ~140'. The deterioration of the pavement and track at this crossing is advanced. Large gaps and voids have opened up in the asphalt around the rails. There is standing water visible at the base of the rails. The rail joints are pounding down and cracking out the pavement. The guardrails have become very loose and pound up and down significantly even under light passenger vehicle traffic. One joint in the guard rail has nearly completely failed, causing one of the guardrails to intrude into the flangeway space for railcar wheel flanges. There is the potential for an eastbound railcar wheel to “pick” the end of the displaced guardrail which could cause a derailment in the street.

3.4 Recommendations

Track. If low railcar volumes are anticipated to continue for the foreseeable future, then the track can be rehabilitated using the existing 90-lb rails. The following work is recommended:

- Tie replacement program of 2,500 ties (estimate);
- Remove matter covering rails and tops of ties;
- Remove asphalt driveway crossings that are permanently blocked off (at least two);
- Surface, line, and gage the Lead track;
- Remove turnouts for dis-used spurs (five total);
- Service all rail joints.

If the demand for rail service increases dramatically on Swan Island, then the rails should be upgraded.

Roadway Crossings.

- Replace the two North Channel Avenue crossings discussed herein with heavier rail and concrete crossing panels;
- Concrete “bath-tub” style panels may be warranted. This style of panel replaces the need for traditional timber crossties. Since the stormwater drainage in the area is poor, moist and saturated soil conditions will persist, significantly shortening the life of new crossties.



Figure 7: Mis-aligned and loose rail in crossing.

4.0 TERMINAL 4

4.1 General Layout

The rail infrastructure at Terminal 4 consists of several track groupings that all turn off of the Union Pacific Saint Johns Lead to the west. From north to south, the track groupings consist of:

- 700-series tracks at Pier 1 (Cereal Foods, the former Cargill site, International Raw Materials)
- 400-series tracks (Soda Ash Yard, McDermott Lead, Ansac, Kinder Morgan)
- Toyota import facility

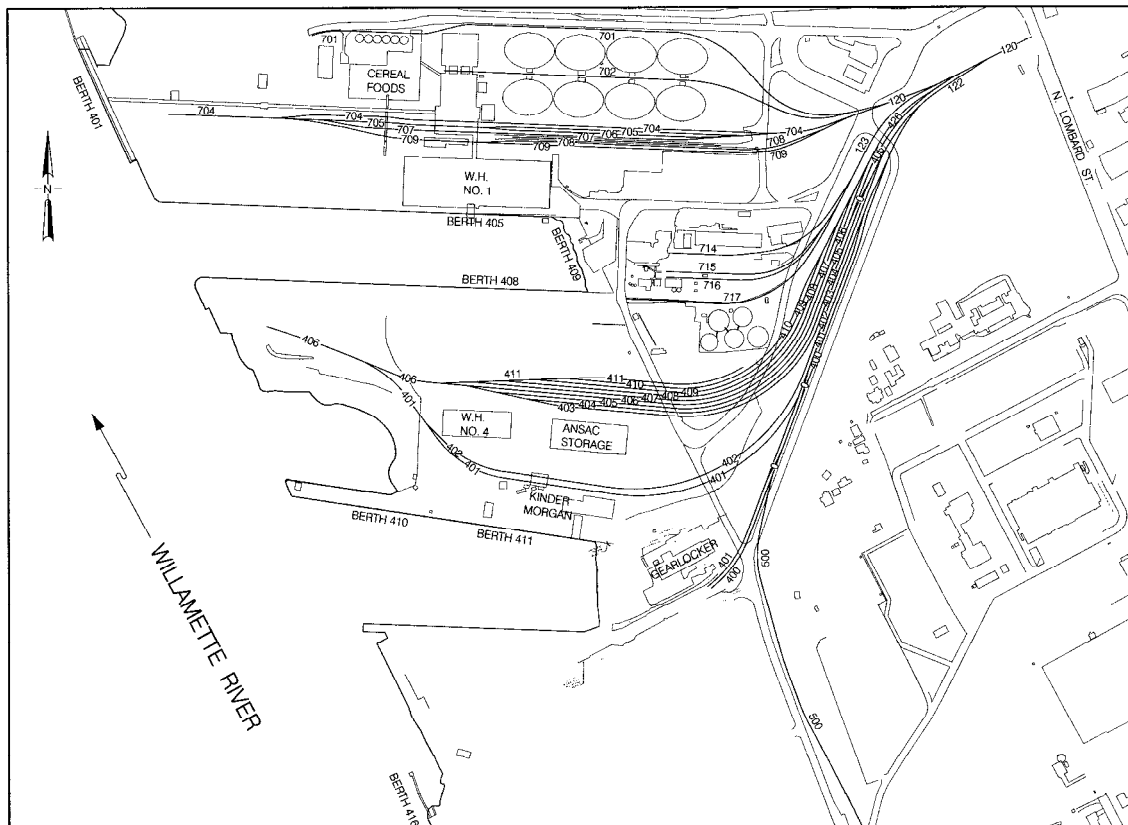


Figure 8: General layout of Terminal 4 (Toyota not shown)

The 400- and 700-series tracks are all served by Union Pacific from the north on a lead track that begins near the North Lombard Street overpass. The McDermott Lead parallels the Saint Johns Branch and eventually ties back into it further south near the Toyota main gate. The Toyota facility tracks are isolated from the other Port-owned tracks at T-4 and are served from the south by Union Pacific. Neither the internal Toyota tracks nor the Union Pacific Lead and sidings were reviewed.

4.2 Track Condition

Track 701 (Cereal Foods). The east end is in fair to good condition, comprised of 132-lb rail and turnouts. The last 500' or so at the west end are in fair to good condition, having recently

been reconstructed with 115-lb rail and many new ties. The middle section of Track 701, some 1,150' long, is in poor condition and repair work is warranted in the very near future. Generally, this section of track is approaching the point where derailments are likely to occur due to poor ties, poor rails, and poor ballast. The following phenomena were observed:

- Many of the 90-lb rails are heavily head-worn and have little service life left;
- Many of the 90-lb rails in the curve at the east end of the track are heavily curve-worn and do not have sufficient head to be flipped end-for-end to run on the other side;
- Several rail joints have no tie support, meaning that they are not held down by spikes and bounce under load (unsupported joints also typically spread outward under load, heightening the chance of derailment);
- At least one center-cracked joint bar was noted, which the FRA requires replacement of regardless of track classification;
- Numerous loose rail joint bolts;
- Frequently mis-matched rail ends at joints, both horizontally and vertically;
- One rail has a well developed vertical head split at least 2" long beginning at a rail joint;
- A mud/rock vehicle crossing near the vertical storage bins is pounding the rails and ties down into the mud;
- Several sections of the track are buried in mud;
- Many rotted, split, or broken ties were observed.

A leading contributor to the poor track condition is stormwater and sediment runoff from a paved roadway that sheds directly onto the track. This adds moisture to the track and fouls the ballast with sediment. Any attempt to improve track conditions should be accompanied by improvements to direct stormwater away from the track (i.e., a concrete curb, otherwise the ballast fouling and moisture issues will recur.

Track 702 (Cereal Foods). Track 702 has about 325' of 132-lb rail at the east end in fair to good condition. There is a short section of 90-lb rail. The remainder of the track is lightweight 75-lb rail in fair to poor condition. The rails are generally surface-bent (a permanent vertical bow in the rail), which makes achieving proper line and surface difficult. The rail joints are a mish-mash of bar styles, re-drilled rails, missing/loose bolts, torched bolt holes, etc. Approximately 20% of ties should be replaced. The track enters in to the Cereal Foods flour mill to a turnout that branches into two short stub tracks for loading. The switch points of the turnout do not appear to close properly when the handle is fully thrown. The signal flag of the switch stand is broken off. Overall Track 702 is in better condition than 701 despite the small rail. This is likely due to better ballast and tie conditions, as well as the fact that the majority of Cereal Foods' railcars seem to move on Track 701.

Tracks 704-709 (Cargill Yard). The 6-track yard was used to process grain trains through the unloading pits for the former Cargill facility. The yard is double-ended, meaning that locomotives can switch all tracks from either end. Near the west end of the yard, the 6 tracks condense down to 4 tracks, each of which passes through an enclosed unloading structure. Tracks within the structure are affixed directly to the concrete floor. Near the unloading pits are hydraulic car pullers used to progress strings of railcars back and forth over the pits. The car pullers presumably pulled strings of loaded cars from east to west through the dumper and then pushed the empty string east back onto the same track. Beyond the unloading area, the 4 tracks condense down to a single tail track that stub ends. The east lead track and several ladder switches are built of 132-lb rail. The remainder of the yard (the body, the unloading area, the west ladder and stub track) are 90-lb rail.

Tracks 704-707 have generally the same track conditions. These four tracks are currently lightly used as railcar storage for International Raw Materials. The 90-lb rail still has service life remaining, presuming the railcar volumes remain light. Generally, the yard tracks exhibit the following:

- Sporadic missing/loose rail joints;
- Occasional center-cracked joints bars;
- Occasional unsupported joints;
- Moderate railhead wear;
- Gapping between rails at joints is generally poor with joints having either no gap whatsoever or too much gap;
- A 25% tie replacement program is in order;
- Ballast is okay given the use of the yard;
- Turnouts – most turnouts are in need of a “tune-up” and most switch frogs have received heavy welding to repair defects, indicating that the frogs are nearing the end of their service lives;
- Two sets of improperly applied compromise joint bars (bars do not match the rails that were joined);

Tracks 708-09 are in similar condition to 704-709 except that (1) the tracks are out of service due to a missing switch frog at the east end and a missing switch point at the west end, and (2) tie conditions are far worse (a 75% tie replacement program is warranted).



Figure 9: Left: View of Tracks 708 & 709.
Right: Missing switch frog at west end of Tracks 708 & 709.

Tracks 714-717 (International Raw Materials). The lead to these tracks (Track 123) is made of heavy rail with turnouts in good condition. It was noted at the turnouts to Track 714 that one heel block assembly was very loose and in need of bolt tightening. That turnout should also be re-tamped to lift up the closure rails and the switchpoints. A low spot in the rail profile is causing undue flexing of the frog. The turnout to Tracks 715/716 exhibits tie plate cutting under the switch points, has a widening gage through the straight stock rail, and several ties that poorly support the rail. The turnout should be tamped, the wide gage corrected, and several 10' ties

should be replaced due to severe plate incising. Track 714 was encased in asphalt and not accessible. Tracks 715 and 716 are light rail (less than 90-lb, although mill marks were not legible). However, these two tracks were recently ballasted, raised, tamped, and had ties replaced. The tracks are serviceable in the interim but eventually the light rail should be replaced. Track 717 is generally in similar condition but has 200' segment that was not lifted up, is buried in mud, and remain moist most of the time. This track should receive similar treatment as 715 and 716.

Tracks 401-411 (Soda Ash Yard). The soda ash yard tracks were not accessed or generally evaluated because the yard was full of railcars and the yard was almost 100% reconstructed using heavier rails on concrete ties in the last few years. Hence, the track conditions are assumed to be good. It was noted that about 550' of Track 401 was left as 90-lb rail. The track is in fair condition.

Track 400 (McDermott Lead). The Lead is generally in fair condition. A light tie replacement program is advisable. Beginning at the north end, the rail is 90-lb on wood ties for the first ~900' up to the switch for the Gearlocker spur. The next ~400' of rail was improved to 136-lb rail on concrete ties and encompasses the North Terminal Road asphalt crossing. The rail returns to 90-lb for the next ~450' before increasing again to 136-lb before joining the Union Pacific Railroad Saint Johns Lead.

The following conditions were noted:

- One broken rail was spotted. An “ordinary break” through the entire rail was found in the easterly rail three joints north of the switchpoints of the Gearlocker spur turnout. Fortunately, the break occurred within a rail joint and is effectively braced and clamped by the first and second bolt holes of the joint. By virtue of the fact the break occurred within a rail joint, the break has been remedied per FRA regulation Part 213.113(a)(2)(“E”) for Class 1 track.
- In the newer section of 136-lb rail on concrete ties through the North Terminal Road crossing, 4 rails exhibit corrugated pitting on the top of the railhead. The pits are spaced regularly 2" to 3" apart, are the diameter of a silver dollar, and are up to 1/16" thick. The corrugated pits may be the result of sliding wheels or possibly mill defects.
- The turnout frog for the Gearlocker spur has wear on the running surfaces despite having been welded back up. This frog should be monitored and re-welded or replaced as conditions warrant.

4.3 Recommendations

Track 701:

- A complete rebuild of the 1,150' section of 90-lb rail is recommended in the near future including new rail, ties, and a 4" ballast lift;
- Install a 24' timber plank crossing to replace the mud crossing near the vertical storage bins.

Track 702:

- If the 702 track is not re-routed as part of PRP-02, then the light 75-lb rails should be replaced with heavier rail. This includes the segment of track that passes between the vertical storage bins and into the flour mill.

- The turnout within the flour mill should be replaced or at least adjusted for proper closure and have the target and mast replaced.

Tracks 704-707:

- A tie replacement program of 2,000 cross ties (estimated);
- Service all rail joints, replace broken or cracked bars;
- Re-condition turnouts including repairing or replacing heavily worn frogs;
- All tracks should be surfaced/lined/dressed;
- Test car pulling systems for operability;
- Replace incorrect compromise joint bar pairs on Track 704 just east of the unloading pits;

Tracks 708-709:

- Heavy tie replacement (75% +);
- Replace the missing frog in the 708/709 turnout at the east end of the yard;
- Replace missing switch points in the 708/709 turnout at the west end;
- Raise Track 708 4" to 6" with ballast to lift it up out of the wet subgrade;
- Same recommendations as Tracks 704-707.

Track 123 (lead to IRM):

- Service the turnouts as needed to tighten fasteners and joints, replaced deeply plate cut ties, tamp turnouts up to achieve smooth profile, and correct widening gage issues;

Track 717:

- Lift ~200' up on ballast, replace 50% of the ties, service the joints, and surface/line/dress the track;

Track 401:

- Monitor condition of 90-lb rails and reconstruct the 550' section as warranted in combination with a light tie replacement program (~50 crossties).

Track 400:

- Monitor the progression of the corrugated pits in the rails near the grade crossing and take action as warranted;
- Undertake a light tie replacement program (~150 ties);
- Replace broken 90-lb rail;
- Recondition (or replace) the running surface of the Gearlocker spur switch frog.

5.0 TERMINAL 5

Port-owned tracks at Terminal 5 primarily consist of the loading loop at the potash transfer facility operated by Canpotex. The potash terminal has three concentric loop tracks plus an array of switches on the east side of the loop to move trains through the dumper, between the loop tracks, and to facilitate ingress/egress from South Rivergate Yard. The terminal has been the subject of substantial track construction in recent years and the tracks and switches are in fair to good condition, comprised of 133# rail. No specific recommendations are made other than to continue a program of regular inspection and minor maintenance.



Figure 10: View of T-5 potash terminal loop tracks.

6.0 TERMINAL 6

Port-owned tracks at Terminal 6 consist of (1) the ~7,700' T-6 Lead Track that allows trains to move from the east end of the Terminal near Suttle Road direct to the intermodal container terminal, and (2) the tracks within the container terminal. The T-6 Lead was recently constructed on concrete ties with heavy rail. The track is in good condition and further discussion is not warranted. The container rail yard consists of 8 strip tracks varying from 2,000' to 3,000' in working length. The strip tracks are paved in asphalt in working areas and have concrete crossing panels for busy circulating roadways. All tracks in T-6 are modern 6-inch base rail. The Port tracks of Terminal 6 are generally in good condition and no further discussion is warranted. The recommended action is to continue a regular program of inspection and light maintenance.

7.0 OTHER FACILITIES

Reynolds Lead. The Port owns a ~1.3-mile lead track that connects the Union Pacific Railroad Kenton Line to the former Alcoa aluminum plant site in Troutdale, stopping short of the site at Sundial Road. There is one double-ended siding along the track. The Lead is dis-used and disconnected from the Kenton Line, Union Pacific having removed the track switch. Along the track and inside the Reynolds site is 150+ acres of developable industrial land offered by the Port, suggesting that there could be future need to reactivate the track. While some evidence of vegetation control is apparent, the track has become overgrown with blackberries and other vegetation. The track is laid with 100RE rail. This rail is considered to be on the lighter side for modern rail traffic, but is still serviceable for low to moderate amounts of rail traffic at lower speeds.

7.1 Recommendation

While there is no current plan to reactivate the track, to restore train service it is recommended that:

To return the Lead to use, the following would be required:

1. Re-install the track switch at the Union Pacific main line;
2. A mechanical and chemical vegetation control effort is needed;
3. A crosstie renewal program on the order of 1,500 ties is needed;
4. General “tune-up” of the track to tighten joints, service the track switches, adjust the surface and line of the rails;
5. Test the grade crossing signal at N. Marine Drive and fix any defects;
6. Extend the Lead track east across N. Sundial Road to the desired parcel.

Appendix A: Consolidated Recommendations

Terminal 2

Southerly Lead:

- Reconstruct the track from where it departs the main line corridor to the NW Front Avenue crossings (~310') with heavier rail and 100% new ties;
- Raise the track with ballast up to 4" to lift it out of the mud.

Storage Track Ladder:

- Replace timber crossties and switch ties for the three turnouts (likely 100%);
- Recondition the turnouts by re-gaging track, tightening all fasteners, welding up imperfections in the rail running surfaces, and adjusting the line and surface of the rails to achieve smooth track;
- Tamp the turnouts to achieve good cross-level and smooth surface;
- Preferably, the turnouts should be replaced with new heavier rail (115-lb or better);
- Concrete panel crossing systems are manufactured for turnouts and are the best long-term solution, although they tend to be costly in comparison to normal crossing panels.

Stub Storage Tracks:

- Replace 100% of the crossties, service all rail joints, and surface/line/gage the track in the worst sections exhibiting tie pumping and pavement heaving;
 - The middle stub track along the southerly terminal boundary;
 - The curved track leading to the warehouse dockside stub tracks;
 - Monitor other areas and replace ties as needed
- Where such work is done, lift the track up 1" to 2" with ballast and pave back gentle asphalt ramps in order to drain stormwater away from the rails.

Balloon Track (northerly half):

- Assess whether the crane-rail/tee-rail frogs can be repaired or need outright replacement to restore the wheel tread running surfaces to their proper elevation and arrest further incision into the frogs by the wheel flanges;
- Assess whether the aforementioned expansion joint can be repaired via welding or requires replacement;
- Re-build the 40' section of track per bullet #2 in Section 2.2.

Swan Island Lead

Track. If low railcar volumes are anticipated to continue for the foreseeable future, then the track can be rehabilitated using the existing 90-lb rails. The following work is recommended:

- Tie replacement program of 2,500 ties (estimate);
- Remove matter covering rails and tops of ties;
- Remove asphalt driveway crossings that are permanently blocked off (at least two);
- Surface, line, and gage the Lead track;
- Remove turnouts for dis-used spurs (five total);
- Service all rail joints.

If the demand for rail service increases dramatically on Swan Island, then the rails should be upgraded.

Roadway Crossings.

- Replace the two North Channel Avenue crossings discussed herein with heavier rail and concrete crossing panels;
- Concrete “bath-tub” style panels may be warranted. This style of panel replaces the need for traditional timber crossties. Since the stormwater drainage in the area is poor, moist and saturated soil conditions will persist, significantly shortening the life of new crossties.

Terminal 4

Track 701:

- A complete rebuild of the 1,150' section of 90-lb rail is recommended in the near future including new rail, ties, and a 4" ballast lift;
- Install a 24' timber plank crossing to replace the mud crossing near the vertical storage bins.

Track 702:

- If the 702 track is not re-routed as part of PRP-02, then the light 75-lb rails should be replaced with heavier rail. This includes the segment of track that passes between the vertical storage bins and into the flour mill.
- The turnout within the flour mill should be replaced or at least adjusted for proper closure and have the target and mast replaced.

Tracks 704-707:

- A tie replacement program of 2,000 cross ties (estimated);
- Service all rail joints, replace broken or cracked bars;
- Re-condition turnouts including repairing or replacing heavily worn frogs;
- All tracks should be surfaced/lined/dressed;
- Test car pulling systems for operability;
- Replace incorrect compromise joint bar pairs on Track 704 just east of the unloading pits;

Tracks 708-709:

- Heavy tie replacement (75% +);
- Replace the missing frog in the 708/709 turnout at the east end of the yard;
- Replace missing switch points in the 708/709 turnout at the west end;
- Raise Track 708 4" to 6" with ballast to lift it up out of the wet subgrade;
- Same recommendations as Tracks 704-707.

Track 123 (lead to IRM):

- Service the turnouts as needed to tighten fasteners and joints, replaced deeply plate cut ties, tamp turnouts up to achieve smooth profile, and correct widening gage issues;

Track 717:

- Lift ~200' up on ballast, replace 50% of the ties, service the joints, and surface/line/dress the track;

Track 401:

- Monitor condition of 90-lb rails and reconstruct the 550' section as warranted in combination with a light tie replacement program (~50 crossties).

Track 400:

- Monitor the progression of the corrugated pits in the rails near the grade crossing and take action as warranted;
- Undertake a light tie replacement program (~150 ties);
- Replace broken 90-lb rail;
- Recondition (or replace) the running surface of the Gearlocker spur switch frog.

Terminal 5

None.

Terminal 6

None.

Reynolds Lead:

While there is no intended use for the Lead track, it is recommended that the Port undertake an annual vegetation control effort to preserve the corridor and track bed for future uses. Alternatively, the Port could consider pulling up the track and using the rail, joint bars, and tie plates (depending on size and condition) for other projects such as re-building light-weight tracks at Port terminals.

Appendix C: Environmental Conditions Baseline Report

Port of Portland Rail Plan

Environmental Conditions Baseline Report

August, 2011

Prepared for:

Port of Portland
7200 NE Airport Way
Portland, OR 97218

Prepared by:

HDR Engineering
1001 SW 5th Avenue
Suite 1800
Portland, OR 97204

Table of Contents

1.0	EXECUTIVE SUMMARY	1
2.0	INTRODUCTION	4
3.0	PROJECT AREA	4
4.0	METHODS AND DATA SOURCES	4
5.0	ENVIRONMENTAL AND NATURAL RESOURCE CONSTRAINTS	4
5.1	Wetlands and Waters	5
5.2	Wildlife Compliance	6
5.2.1	Endangered Species Act	6
5.2.2	Essential Fish Habitat and the Magnuson-Stevens Fishery Conservation and Management Act	7
5.2.3	Marine Mammal Protection Act	7
5.2.4	Federal Bald and Golden Eagle Protection Act	7
5.2.5	Migratory Bird Treaty Act	8
5.2.6	Port of Portland Mitigation Sites	8
5.3	Contaminated Land	8
5.4	Stormwater	9
5.5	Floodplain Development	10
5.6	City of Portland Land Use and Zoning Overlays	11
5.6.1	Environmental Zone	11
5.6.2	Columbia South Shore Plan District	12
5.6.3	Smith and Bybee Lakes Natural Resources Management Plan	12
5.6.4	Natural Resources Management Plan for the Peninsula Drainage District No. 1	13
5.6.5	Willamette Greenway Zone	13
5.7	Noise	14
5.8	Air Quality	14
5.9	Conclusion and Summary	15

6.0 REFERENCES.....	18
---------------------	----

List of Figures (Appendix A)

Figure 1: Environmental Study Area	
Figure 2: Wetlands and Waters of the US.....	
Figure 3: Wetlands and Waters of the US.....	
Figure 4: Wetlands and Waters of the US.....	
Figure 5: FEMA Flood Zones	
Figure 6: FEMA Flood Zones	
Figure 7: FEMA Flood Zones	
Figure 8: City of Portland Environmental Zones.....	
Figure 9: City of Portland Environmental Zones.....	
Figure 10: City of Portland Environmental Zones.....	
Figure 11: Columbia South Shore Plan District.....	
Figure 12: Smith and Bybee Lakes Natural Resource Management Plan Area.....	
Figure 13: Natural Resources Management Plan for the Peninsula Drainage District No.1	
Figure 14: Willamette Greenway Zone.....	
Figure 15: Willamette Greenway Zone.....	

List of Appendices

Appendix A: Figures Referenced in the Report.....	
Appendix B: Columbia Southshore Well Field Wellhead Protection Area Description	

Acronyms and Abbreviations

BA	Biological Assessment
BDS	Bureau of Development Services
BES	Bureau of Environmental Services
BGEPA	Bald and Golden Eagle Protection Act
CMMP	Contaminated Media Management Plan
CWA	Clean Water Act
DEQ	Department of Environmental Quality
DSL	Department of State Lands
EIS	Environmental Impact Statement
EFH	Essential fish habitat
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GA	General Authorization
GIS	Geographic Information Systems
HCP	Habitat Conservation Plan
HDR	HDR Engineering Inc.
IHA	Incidental Harassment Authorization
LOMR	Letter of map revision
MBTA	Migratory Bird Treaty Act
MMPA	Marine Mammal Protection Act
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NWP	Nationwide Permit
OAR	Oregon Administrative Rule
ORBIC	Oregon Biodiversity Information Center
PDX	Portland International Airport
PIC	Portland International Center
T2	Terminal 2
T4	Terminal 4
T5	Terminal 5
TRIP	Troutdale Reynolds Industrial Park
UIC	Underground Injection Control

USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service

1.0 EXECUTIVE SUMMARY

The Port of Portland (Port) is in the process of updating its 20 year Rail Plan to identify facility improvements that will help the Port remain competitive. As an initial task, the Port has requested that HDR perform an environmental condition survey. This effort consisted of reviewing existing documentation to identify environmental conditions and constraints associated with existing Port owned rail facilities. Information was gathered from Port databases developed as part of previous Port projects as well as reviewing Metro and other publically available data sources. Because specific types and locations of projects to be addressed under the Rail Plan have not yet been defined, the environmental review addresses environmental resources and constraints in a general manner. Future phases of work will address resource impacts and specific permitting requirements in a more detailed manner once discrete projects or sets of projects are defined.

Table 1 provides a summary of key resources and permits, and presents a general recommendation to serve as a guide to development of conceptual projects for inclusion in the 20 year Rail Plan.

Table 1: Environmental Constraints and Permit Summary

Environmental Resource	Associated Permits/Approvals	HDR Planning Recommendation
Wetlands/Waters	USACE CWA Section 404 Oregon DSL Fill-Removal	While avoidance of impacts is always preferred, wetland and/or waters impacts are common types of impacts for infrastructure development projects. It is recommended that corridor projects address impacts in larger groups to take advantage of efficiencies in the permitting and mitigation process rather than seek to address smaller components individually. In cases where large projects can be addressed as a whole, a programmatic approach negotiated with permitting agencies may provide greater flexibility and reduced cost for permitting.
Endangered Species	ESA	Projects resulting in impacts to protected communities may result in increased consultation timelines and mitigation requirements and costs. Where impacts are unavoidable and are anticipated over a large area or would be common to a number of discrete projects, a negotiated programmatic approach to ESA and/or MSA compliance with the Services may provide greater flexibility and reduced cost for permitting.
Essential Fish Habitat	MSA	
Marine Mammals	MMPA	
Bald and Golden Eagle	BGEPA	
Contaminated Lands	OAR 340-122	Existing Port contaminated land studies and CMMPs document areas where contamination is known to occur on Port properties. Environmental Site Assessments of undocumented land will provide additional information related to contamination. Where possible, contaminated areas should be avoided; however the industrial nature of parcels may make this difficult. Special attention should be paid to opportunities for reusing contaminated media on-site where possible to reduce cost and difficulty of addressing off-site contaminated land disposal.

Stormwater	Local jurisdiction stormwater management regulations	Timelines for the review of stormwater system requirements and designs would be similar to other Development Services reviews and would be approximately 3 months.
Floodplain Impacts	44 CFR 60, Local floodplain management ordinances	Projects located in FEMA-mapped floodway would require No Rise certification and associated hydraulic analyses. Projects located out of the floodway, but in the floodplain would need to undergo review by the local jurisdiction. Developments within the floodway that are not able to satisfy the No Rise condition would require the submittal of a LOMR or conditional LOMR. This process can exceed 12 months in duration. Developments that cause a rise within the <u>floodway</u> should be avoided if possible because of significant permitting and analysis requirements and timelines to obtain permits and clearances for developments in these areas. Development within the <u>floodplain</u> may be allowed depending on the activity, affect, and proposed mitigation.
City of Portland Environmental Overlay Zones	City of Portland Code, Title 33, Chapter 430	<p>Projects in Environmental overlay zone p should be avoided where possible because The City of Portland has approved development permits for these areas only in rare circumstances. The Port would be required to perform rigorous alternatives analyses to show that there are no other feasible alternatives and would likely incur added costs in mitigation if projects are sited in overlay zone p.</p> <p>Project located in Environmental overlay zone c may require City of Portland Environmental Review, and may take up to 120 days. Projects in either environmental overlay zone would need to comply with the conditions in City of Portland Code Chapter 33.430 and would have associated costs to the Port for complying with overlay requirements that would not be required outside of these zones.</p>
City of Portland Greenway Overlay Zone	City of Portland Code, Title 33, Chapter 440	Projects in the Greenway overlay zone that are not river dependent may present challenges to successful permitting. The City of Portland would likely require the Port to perform rigorous alternatives analyses to show that there are no other feasible alternatives to siting a non-river dependant use in the Greenway. There are risks associated with project delays, permitting costs, and denial of permits that the Port should be aware of for non-river dependant rail projects in these Greenway areas.
Noise	NEPA	Noise has the potential to be a significant environmental constraint depending on the location and land uses adjacent to proposed projects.
Air Quality	NEPA Clean Air Act	Air quality conformity is an important issue for the Port and the rail network in the study area; however, unless

		projects substantially increase rail emissions within the Portland Air Quality Management Area, it is not likely that conformity issues would cause project delays.
--	--	---

2.0 INTRODUCTION

The Port is in the process of updating its 20 year Rail Plan to identify facility improvements that will help the Port remain competitive. HDR Engineering (HDR) is assisting the Port in outreach to a Rail Study Working Group, and in developing a conceptual approach to rail system improvements for the next 20 years. Specific improvements have not yet been identified by the Port or the Rail Study Working Group, but could include rail infrastructure construction or improvements such as new track, double track construction, and new rail bridges.

As an initial task, the Port has requested that HDR perform an environmental condition survey. This effort consisted of reviewing existing documentation to identify environmental conditions and constraints associated with existing Port owned rail facilities. Information was gathered from Port databases developed as part of previous Port projects as well as reviewing Metro and other publically available data sources. Because specific types and locations of projects to be addressed under the Rail Plan have not yet been defined, the environmental review addresses environmental resources and constraints in a general manner. Future phases of work will address resource impacts and specific permitting requirements in a more detailed manner once discrete projects or sets of projects are defined.

This report provides:

- a summary of environmental resources
- identification of site constraints on existing Port-owned land parcels
- a discussion of environmental considerations relevant to future rail facility development
- identification of additional studies required for environmental permitting.

3.0 PROJECT AREA

The Rail Plan study area includes the consideration of rail infrastructure from west to east between the Rivergate, Portland, area and Hinkle, Oregon (Hinkle is located near Hermiston, Oregon) and north to south from Seattle, Washington to Eugene, Oregon. However, the project study area for the environmental conditions survey was restricted to existing rail served Port-owned properties. For reference all Port properties are being shown, including the airport, as shown in Figure 1 in Appendix A.

4.0 METHODS AND DATA SOURCES

The analysis and discussion presented in this report is based on desktop Geographic Information System (GIS) analysis of existing data obtained from the Port, Metro, the City of Portland, the National Marine Fisheries Service (NMFS), and the United States Fish and Wildlife Service (USFWS). No field analysis or verification was conducted under this phase of work because no significant data gaps were identified; however, because the rail improvement activities that would be part of the Rail Plan have not yet been defined, future follow up field work under a subsequent phase of work may be required.

5.0 ENVIRONMENTAL AND NATURAL RESOURCE CONSTRAINTS

The following types of environmental and natural resource constraints were identified within the environmental study area:

- Wetland and Waters
- Wildlife
- Contaminated Land
- Stormwater
- Floodplain Development
- Land Use and Zoning
- Noise
- Air Quality

The following sections discuss the location of these environmental constraints, the applicable regulations that control or restrict development in the vicinity of these resources, and associated permitting risks and/or opportunities for permit streamlining during future planning or design efforts.

5.1 Wetlands and Waters

Permanent or temporary discharge of fill to waters of the U.S./State, which include wetlands, may require a Clean Water Act (CWA) permit from the U.S. Army Corps of Engineers (USACE) and an Oregon Fill-Removal permit from the Oregon Department of State Lands (DSL). The type of activity and level of impact would determine the level of permit review for specific projects. Certain activities with minimal impacts may qualify for Nationwide Permits (NWP), such as NWP 14, Linear Transportation Projects, from the USACE. In limited cases, a General Authorization (GA) from DSL may be applicable. However, it should be noted that portions of larger projects would not be eligible for NWP or GA coverage if the entire project is not covered. As a result, larger or more complex projects may require Individual Permits. Compensatory mitigation may need to be developed prior to completion of the permit application if resources are permanently affected.

If the Rail Plan includes projects that are geographically large in scope (such as multiple miles of track construction) where a number of potential wetland impacts are spread along a rail corridor, a programmatic approach to permitting and mitigating for wetland impacts is recommended to make the permitting process more efficient, providing that the projects addressed programmatically are of similar magnitude and would be implemented on similar timelines. Grouping projects together that have a single purpose and need for the purposes of permitting may reduce the overall timeline and offers opportunities for providing project-specific advance mitigation to reduce effort.

Figures 2 through 4 in Appendix A show areas where USFWS National Wetlands Inventory (NWI) and/or Port-identified and delineated wetlands overlap with existing Port-owned property.

Permit Timelines: Timelines would depend on the level of impact associated with the project and the type of permits required from USACE and DSL. The following gives an indication of timelines associated with CWA and Oregon Fill-Removal permitting:

- A USACE CWA Section 404 NWP typically requires a 45 to 90 day review of permit application after permit application is deemed complete. No public notice required. National Environmental Policy Act (NEPA) would be completed as part of the NWP process.
- USACE CWA Section 404 Individual Permit can take between 4 and 24 months to process after permit application is deemed complete. A 30 day public notice period is also required.
- If applicable, DSL Fill-Removal GAs typically require a 40 day review from the time the application is deemed complete. However, if a wetland delineation is required, DSL has

120 days to review and approve the delineation and this becomes the critical timeline for permitting.

- DSL Fill-Removal Individual Permit review has a legislative timeline of 120 days.

Additional Studies: Wetland determinations or delineations may be required to document impacts on a project-by-project basis and to provide a complete permit submittal package to the USACE and DSL.

5.2 Wildlife Compliance

5.2.1 Endangered Species Act

The Endangered Species Act (ESA) provides broad protection for species of fish, wildlife and plants that are listed as threatened or endangered in the U.S. or elsewhere. The ESA is administered by two federal agencies, the USFWS and the National Oceanic and Atmospheric Administration's (NOAA) NMFS. NOAA handles marine species, and the USFWS has responsibility over freshwater fish and all other species (including listed plant species).

The Rail Plan project area contains areas where ESA-listed species are known to, or are likely to occur, including the Columbia and Willamette rivers. ESA concerns from Rail Plan projects in the study area are most likely to arise in connection with effects to listed fish from structure and stormwater runoff and possibly listed plants. Stormwater runoff treatment will vary depending on the project and proximity to listed species and should be a consideration for Rail Plan projects. Stormwater is discussed further in Section 5.4.

Specific projects and connected actions would be required to comply with the ESA and may require the preparation of a Biological Assessment (BA) to demonstrate and document the level of anticipated impact on listed species (including construction disturbance), measures included to minimize any anticipated effects, and any mitigation to compensate for unavoidable effects as required by the USFWS and/or the NMFS.

In cases where there is a federal nexus (e.g. federal funding, or the need for federal permits) for specific Rail Plan projects, ESA compliance would be handled through a Section 7 consultation between the federal funding or permitting agency and the USFWS and/or NMFS. In cases where there is no federal nexus, the Port would need to apply for an incidental take permit under Section 10 of the ESA. A habitat conservation plan (HCP) would need to be prepared to accompany an application for an incidental take permit.

Permit Timelines: Timelines would depend on the level of impact associated with the project and the type of consultation (i.e. Section 7 or Section 10). The following gives an indication of timelines associated with ESA compliance:

- Information Section 7 Consultation – minimum of 30 days, but may be longer.
- Formation Section 7 Consultation – minimum of 135 days, but may take up to 180 days.
- Section 10 Consultation – depends on the complexity of issues involved but typically takes between 3 and 12 months to complete the process.

Additional Studies: Depending on the project, biological desktop (including Oregon Biodiversity Information Center [ORBIC] database searches) and field studies may be required to assess the occurrence of ESA-listed species in the vicinity of proposed Port rail improvements. A BA may be required to document species and impact information. Early coordination with the USFWS and NMFS is advised to avoid delays in permitting.

5.2.2 Essential Fish Habitat and the Magnuson-Stevens Fishery Conservation and Management Act

Essential fish habitat (EFH) is identified for species managed in Fishery Management Plans under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). EFH is the habitat necessary for managed fish to complete their life cycle. EFH designations exist throughout the study area and therefore projects on existing Port-owned property would need to assess their direct and indirect effects to EFH in the region. Any project-related impacts to EFH waters would require an analysis for EFH impacts, and would normally be included in a BA prepared for the project.

The MSA requires NMFS to work with other Federal agencies to conserve and enhance EFH. As a result, whenever Federal agencies authorize, fund, or carry out actions that may adversely impact EFH, they must consult with NMFS regarding the impact of their activities. NMFS provides EFH conservation recommendations for any action that would adversely affect EFH.

Permit Timelines: MSA compliance is typically included as part of ESA compliance documentation (see ESA timeline). In cases where no ESA consultation is required, but an EFH consultation is required, timelines would depend on project complexity, but may take up to 120 days.

Additional Studies: EFH studies would be completed as part of a project BA.

5.2.3 Marine Mammal Protection Act

Harbor seals, California sea lions, and Steller sea lions in the Columbia River are protected from harassment and harm by the Marine Mammal Protection Act (MMPA). If Rail Plan projects require certain noisy construction activities, such as the installation of piles, an incidental harassment authorization (IHA) may be required from the NMFS. An IHA application can take approximately six months to be approved.

Permit Timelines: See ESA timeline. MMPA compliance is typically included as part of ESA compliance documentation.

Additional Studies: MMPA studies would be completed as part of a project BA.

5.2.4 Federal Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA), originally passed in 1940, provides for the protection of the bald eagle and the golden eagle. The Act prohibits anyone without a permit issued by the USFWS from “taking” bald eagles, which includes killing, wounding, collecting, molesting, and/or disturbances that reduce nest productivity and/or cause nest abandonment. The impact of project-related construction and/or operation on bald and golden eagles depends on nest visibility, duration of disturbance, noise level, extent of area affected, and the tolerance and experience of specific nesting pairs.

Eagles may occur in the vicinity of Rail plan projects. For example, bald eagles are known to nest on West Hayden Island.

Permit Timelines: Compliance measures for the BGEPA are usually avoidance measures since no incidental take permit allowances currently exist under the BGEPA. Bald and golden

eagle take or disturbance should be avoided to the greatest practical extent to prevent project delays.

Additional Studies: BGEPA compliance is typically completed as part of other federal actions such as NEPA, CWA, and ESA compliance. An eagle nest occurrence database search through Dr. Frank B. Isaacs at Oregon State University's Fisheries and Wildlife Department would identify known eagles nest sites in the vicinity of specific Rail Plan project locations.

5.2.5 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) protects migratory birds, or the parts, nest, or eggs of such a bird except as authorized by the USFWS. Migratory birds, such as bald eagle and songbirds, could possibly nest on parcels identified for development under the Rail Plan. Impacts to bald eagles and related permit requirements are discussed above. Potential impacts to migratory songbirds that nest in trees or shrubs can be avoided if trees and shrubs are removed in the winter when these species are not nesting.

Permit Timelines: N/A. Compliance measures for the MBTA are usually included as part of the construction specifications and include timing certain activities outside of nesting and mating season, removing trees outside of the nesting season, or conducting individual tree nest clearances.

Additional Studies: MBTA compliance is typically completed as part of other federal actions such as NEPA, CWA, and ESA compliance.

5.2.6 Port of Portland Mitigation Sites

The Port has developed fifteen mitigation project sites over the years to respond to specific mitigation needs arising out of its development activities. These mitigation areas are generally located in the vicinity of Rivergate, Portland International Airport (PDX), Smith and Bybee Lakes, Government Island, and Hayden Island.

It is recommended that impacts to Port mitigation sites be avoided if possible because the Port would have to provide additional land area as mitigation in these cases. If impact is unavoidable, then an assessment of impacts to these mitigation sites would be made on a project-by-project basis and coordinated with the Port during project development.

5.3 Contaminated Land

Concerns related to contaminated land are one of primary environmental concerns for Rail Plan projects that would be developed. There are a number of known parcels that have contaminated media; however a database of contaminated sites is not yet available for GIS analysis.

The Port has indicated that notable areas of contamination include:

- Terminals 2 (T2) and 4 (T4) are adjacent to the Portland Harbor Superfund site.
- T4 is known to have existing areas of contaminated rail ballast. If rail ballast is disturbed at T4 as part of Rail Plan projects, there is a high likelihood of encountering contaminated material issues. The Port is currently investigating and characterizing contamination issues at T4 in order to develop a Contaminated Media Management Plan (CMMP) for the site.
- A portion of Terminal 5 (T5) has contaminated land issues and a CMMP has been developed to address contaminated media on T5.

- The Troutdale Reynolds Industrial Park (TRIP) has media management restrictions.

Risks associated with ground disturbing activities at T4 and T5 in particular would need to be assessed on a project-by-project basis. At T4, if projects are identified prior to the completion of the CMMP currently under development by the Port, an evaluation on how to manage materials generated during construction would be included.

A key consideration in Rail Plan project development on contaminated or potentially-contaminated parcels will be on-site management of fill generated during construction due to the high cost and difficulty of meeting off-site disposal standards.

Permit Timelines: Rail Plan projects would be required to comply with The Oregon Department of Environmental Quality's (DEQ) Oregon Administrative Rule (OAR) 340-122, *Hazardous Substance Remedial Action Rules*. This does not require a permit or approval in itself, but compliance avoids potential liability if contaminated soils or hazardous materials are located in the vicinity of, or at the project site.

Additional Studies: All ground disturbing activities should include an ASTM Environmental Site Assessment to identify the potential presence of any contaminated soils or potential sources of soil contamination. Environmental Site Assessments are typically conducted early in the project timeline to identify any issues that might constrain the layout or development of the project.

5.4 Stormwater

Development and redevelopment proposals in the City of Portland are subject to the requirements of the City's Stormwater Management Manual during the review and permit process. Parcels outside the City of Portland limits would be required to comply with the stormwater requirements of the local jurisdiction in which they are situated. For example, the TRIP property would need to comply with the City of Troutdale Development Code, Section 5.800, *Stormwater Management*. However, the City of Troutdale Code essentially adopts the City of Portland's Stormwater Manual by reference; therefore the discussion of stormwater requirements presented here is focused on the City of Portland's requirements. The thresholds for proposals that are subject to the requirements are:

- Properties that propose new offsite discharges or new connections to the public system are required to comply with stormwater requirements for pollutant generating impervious area draining to the discharge point.
- Projects that develop or redevelop over 500 square feet of impervious surface.

In general, proposals exceeding these thresholds must comply with the local agency's stormwater infiltration and discharge requirements, flow control requirements, and the pollution reduction requirements. Projects must also comply with the local agency's operations and maintenance requirements and source control requirements.

In the past, rail mainlines constructed on uncontaminated land using rail ballast have been considered pervious surfaces and have not required compliance; however, rail yards (i.e. storage areas) have typically required compliance with the standards. However, the Port (Breen, 2011) has indicated that even if Rail Plan projects do not trigger the need for stormwater treatment systems under the City's requirements, the Port may elect to treat stormwater because of the need to meet stormwater permit benchmarks on their facilities on a larger scale, or to address more regional stormwater goals. In addition, where possible, Rail Plan projects should not create subsurface infiltration systems that would be subject to Underground Injection

Control (UIC) regulations. Further, Rail Plan projects should consider opportunities to eliminate storm water discharges through natural infiltration where possible because of space constraints; however, on-site infiltration is often the preferred treatment option of the City of Portland.

In Portland, the Bureau of Development Services (BDS) administers the land use review process and permits for private improvements. Public works permits are required for public infrastructure improvements, which are generally located in the public right-of-way and are administered by the City's service bureaus, including Transportation, Environmental Services (BES), and Water.

Decisions regarding the degree of onsite infiltration and the discharge point (when complete onsite infiltration is not feasible) are based on the stormwater requirements. Certain circumstances (such as projects located in well head protection areas, contaminated land, and space constraints) may require greater levels of stormwater treatment. These circumstances would be evaluated on a site-by-site basis.

Port-owned and managed parcels at PDX, Portland International Center (PIC), Cascade Station, parcels north of Marine Drive in the vicinity of the Columbia River levee (from PDX to NE 158th Avenue) and a portion of TRIP overlap with the City's *Columbia Southshore Well Field Wellhead Protection Area*. GIS data indicating the exact boundary of this wellhead protection area was not available, however, Appendix B contains an excerpt from the City of Portland Stormwater Management Manual illustrating the area's boundary. To protect groundwater from spills of hazardous materials, additional requirements in this area focus on spill control measures and prevention of infiltration into the ground. In portions of the wellhead protection area, drainage facilities in the public right-of-way are required to be lined with a polyethylene geomembrane liner and have appropriate spill control measures.

New development and redevelopment projects may be exempt from flow control requirements if they discharge stormwater runoff directly into the Willamette River, Columbia River, or Columbia Slough through a private storm sewer, separated public storm sewer, or Multnomah Country Drainage District system with available capacity. BES or the drainage district must confirm all sites exempt from flow control requirements.

Permit Timelines: Timelines for the review of stormwater system requirements and designs would be similar to other Development Services reviews and would be approximately 3 months.

Additional Studies: Additional studies for stormwater design and compliance for specific projects may include infiltration testing, hydrologic analyses, and hydraulic analyses.

5.5 Floodplain Development

Projects in a Federal Emergency Management Agency (FEMA) floodplain must be reviewed to determine whether the project would increase flood heights. Projects located in FEMA-mapped floodway require No Rise certification, which may require a hydraulic analysis based on the standard step-backwater computer model used to develop the 100-year floodway shown on the Flood Insurance Rate Map or Flood Boundary and Floodway Map. Projects located out of the floodway, but within the floodplain, would need to undergo review by the local jurisdiction. Figures 5 through 7 show the location of Port-owned parcels and the FEMA 100-year and 500-year flood zones. Projects within the 100-year and 500-year flood zones may require additional analysis.

Developments within the floodway that are not able to satisfy the No Rise condition would require the submittal of a letter of map revision (LOMR) or conditional LOMR. This process seeks to re-establish the floodplain boundaries on the FEMA floodplain maps. This process requires the applicant to reconstruct the original hydraulic model to reflect the new proposed conditions and provide notifications to impacted property owners. Due to the public notification component and the required technical review and submittals to FEMA, this process can exceed 12 months in duration. As a result of the public review process, a conditional LOMR is typically sought during the design process.

Developments within the floodway that are able to satisfy the No Rise condition still requires a hydraulic and hydrologic analysis. However, FEMA submittals and public notification is not required.

Development that causes a rise within the floodway should be avoided if possible because of significant permitting and analysis requirements and timelines to obtain permits and clearances for developments in these areas. Development within the floodplain may be allowed depending on the activity, affect, and proposed mitigation.

Permit Timelines: Timelines for projects in mapped floodplains would vary from project-to-project depending on the location and complexity of the project, but may take in excess of 12 months for approvals if there is a rise in the floodway.

Additional Studies: Hydraulic analysis and preparation of No Rise certifications many be required for projects within floodplains.

5.6 City of Portland Land Use and Zoning Overlays

The City of Portland overlay zones consist of regulations that address specific requirements for development activities in particular areas in the City. Two environmental overlays that would affect Rail Plan projects around Port-owned parcels are the Environmental Zone (overlay c [conservation] or p [protection]) and the Greenway Zones (overlays g, i, n, q, or r).

5.6.1 Environmental Zone

Environmental Zones (overlays) are intended to protect resources and functional values that have been identified by the City as providing benefits to the public. The environmental regulations carry out Comprehensive Plan policies and objectives.

The Environmental Protection zone (p) provides the highest level of protection to the most important resources and functional values. Developments are typically approved in the environmental protection zone only in rare and unusual circumstances. The Environmental Conservation zone (c) conserves important resources and functional values in areas where the resources and functional values can be protected while allowing environmentally sensitive urban development.

City of Portland Code, Title 33, Chapter 430, Environmental Zones, includes standards that apply to new developments, and standards that apply to alterations to existing developments (including dedication or extension of rights-of-way and rail rights-of-way). In addition, there are standards that apply in transition areas. The transition area is generally defined as the first 25 feet inward from an environmental zone boundary, and is intended to provide a buffer for the significant resources and functional values within the resource area. All of the applicable Environmental Zone standards must be met within defined zones. Modification of any of these

standards requires approval through a City of Portland environmental review process. The environmental review process and required documentation is described in the City of Portland Code, sections 33.430.210 through 280.

Figures 8 through 10 shows the areas where existing Port-owned property overlaps with City of Portland Environmental Zones. Areas where development of rail infrastructure projects would be required to meet additional City of Portland Environmental Zone requirements include:

- Portions of the Rivergate Industrial District
- Portions of PDX (if applicable)
- Portions of the PIC (if applicable)
- Parcels north of Marine Drive in the vicinity of the Columbia River levee, from PDX to NE 158th Avenue

In addition to the requirements imposed by the overlay zones, there are additional requirements in certain areas by Plan Districts and Natural Resource Management Plans. Development on parcels within the study area would be required to comply with the provisions of the following Plan Districts and Natural Resource Management Plans:

- Columbia South Shore Plan District
- Smith and Bybee Lakes Natural Resources Management Plan
- Natural Resources Management Plan for the Peninsula Drainage District No. 1

Permit Timelines: Approval of projects within the Environmental Zone would undergo a City of Portland Environmental Review, and, depending on the project, may be reviewed and approved under the City's Type II or Type III land use review procedure. Timelines would take up to 120 days.

Additional Studies: Additional documentation required to prepare a submittal for Environmental Review would be prepared on a project-by-project basis.

5.6.2 Columbia South Shore Plan District

Figure 11 shows the area of the Columbia South Shore Plan District and overlapping Port parcels. Additional requirements relating to vegetation and replanting; clearing, grading, and erosion control; stormwater and water quality; underground utilities; construction and staging activities; and natural resource mitigation and maintenance would need to be satisfied within the Columbia South Shore Plan District.

Permit Timelines: Approval of projects within the Columbia South Shore Plan District would undergo a Columbia South Shore Environmental Review, and be reviewed and approved under the City's Type II land use review procedure. The timelines for such a review would be up to 120 days.

Additional Studies: Additional documentation required to prepare a submittal for Columbia South Shore Environmental Review would be prepared on a project-by-project basis.

5.6.3 Smith and Bybee Lakes Natural Resources Management Plan

Figure 12 shows the area covered by the Smith and Bybee Lakes Natural Resource Management Plan and overlapping Port parcels. Development in conformance with the Smith and Bybee Lakes plan would be reviewed by the City's Type II land use review procedure. Projects in this areas would need to demonstrate that they meet the goals and objectives of the

Plan, and that there would be no significant negative impacts on the resources covered in the Management Area. Conforming to the requirements for approval would make rail development projects in this area difficult.

Permit Timelines: Approval of projects within the Smith and Bybee Lakes Natural Resource Management Plan area would undergo a City of Portland Environmental Review, and be reviewed and approved under the City's Type II land use review procedure. The timelines for such a review would be up to 120 days.

Additional Studies: Additional documentation required to prepare a submittal Environmental Review would be prepared on a project-by-project basis.

5.6.4 Natural Resources Management Plan for the Peninsula Drainage District No. 1

Figure 13 shows the area covered by the Natural Resources Management Plan for the Peninsula Drainage District No. 1 and overlapping Port parcels. Development in conformance with the Peninsula Drainage District No. 1 plan would be reviewed according to the City's Type II land use review procedure. Projects in this areas would need to meet the development standards outlined in the Plan.

Permit Timelines: Approval of projects within the Natural Resources Management Plan for the Peninsula Drainage District No. 1 area would undergo a City of Portland Environmental Review, and be reviewed and approved under the City's Type II land use review procedure. The timelines for such a review would be up to 120 days.

Additional Studies: Additional documentation required to prepare a submittal Environmental Review would be prepared on a project-by-project basis.

5.6.5 Willamette Greenway Zone

The purpose of the five Greenway overlay zones is to implement the land use pattern identified in the Willamette Greenway Plan and the water quality requirements of Metro Code 3.07.340.B (Title 3).

The Greenway overlay regulations apply to all land and fills and structures in water within the Willamette Greenway Plan boundary designated on the Official Zoning Maps with River Natural, River Recreational, River General, River Industrial, or River Water Quality overlay zones except that the area within the interior of Ross and Hardtack Islands which is presently subject to the Ross Island Management Plan.

Figures 14 and 15 show the areas where existing Port-owned property overlaps with City of Portland Greenway Zones. Areas where development of rail infrastructure projects would be required to meet additional City of Portland Greenway Zone requirements include:

- Portions of the Rivergate Industrial District
- Portions of T2, T4 and T5
- Portions of Swan Island

In some cases, the Greenway overlay regulations require development setbacks ranging from 25 to 200 feet from the top of the bank, depending on the specific site condition and Greenway overlay. Specific project requirements and restrictions in the Greenway zones would be identified on a project-by-project basis. A Greenway Goal Exception is required to locate a

development or right-of-way that is not river-dependent or river-related within or riverward of the greenway setback.

Projects in the Greenway zones are required to undergo a Greenway Review to address issues of public access, flood protection, transportation connections, and potential impacts to recreational users, wildlife, and water quality. City of Portland Code, Title 33, Chapter 440 contains the City's Greenway regulations.

Permit Timelines: Approval of projects within the Greenway Zone would undergo a City of Portland Greenway Review, and, would be reviewed and approved under the City's Type II land use review procedure. Greenway Goal Exceptions are processed through the Type III procedure. Timelines would be up to 120 days.

Additional Studies: Additional documentation required to prepare a submittal for Greenway Review would be prepared on a project-by-project basis.

5.7 Noise

Noise is often an important consideration in new rail developments and may need to be assessed as part of NEPA requirements for federally funded or approved projects. The Federal Railroad Administration (FRA) relies upon the Federal Transit Administration (FTA) noise and vibration impact assessment procedures for assessing noise effects from freight rail projects.

The extent of environmental analysis and review would depend on the scope and complexity of the proposed project and the associated environmental impacts. FRA's environmental impact regulation classifies the most common projects according to the different levels of environmental analysis required, ranging from an environmental impact statement (EIS) to a categorical exclusion that requires little or no environmental documentation.

Noise impacts and the requirement for mitigation are most likely to occur in the vicinity of the most noise-sensitive land uses. The majority of existing Port-owned land is located in areas that is zoned for industrial uses and does not contain high levels of residential development. Notable areas that are adjacent to residential development include:

- Houseboats on the Columbia River in the vicinity of PDX
- St. Johns neighborhood adjacent to T4
- Subdivisions in the vicinity of the TRIP

Permit Timelines: Noise analyses would typically be undertaken during a NEPA document development, and approval would be part of a federal approval of NEPA documentation for permits or funding approval. Timelines would depend of the length of time to develop and obtain approval under NEPA and would vary depending on the project's complexity.

Additional Studies: A rail noise analysis may be required in certain cases.

5.8 Air Quality

Rail Plan projects that include a Federal nexus may have to demonstrate conformity with the Federal transportation conformity regulations. Conformity is required by Clean Air Act Section 176(c). This section requires that Federal agencies do not adopt, accept, approve or fund activities that are not consistent with State air quality goals.

Transportation conformity is required in areas designated nonattainment and maintenance by the U.S. Environmental Protection Agency (EPA) for the transportation-related criteria pollutants: ozone, particulate matter, nitrogen dioxide, and carbon monoxide. The Portland metropolitan area is a maintenance area for carbon monoxide. Transportation conformity applies to metropolitan transportation plan and transportation improvement program updates and amendments unless an amendment merely adds or deletes projects exempt from conformity (40 CFR 93.104(b) and (c)).

Permit Timelines: Air quality analyses for conformity purposes would typically be undertaken during a NEPA document development, and approval would be part of a federal approval of NEPA documentation for permits or funding approval. Timelines would depend of the length of time to develop and obtain approval under NEPA and would vary depending on the project's complexity.

Additional Studies: An air quality analysis may be required in certain cases.

5.9 Conclusion and Summary

The discussion of environmental resources, constraints and permitting requirements presented in this report has been kept general in nature due to the fact that specific types of projects have not yet been developed, and any rail infrastructure developments may occur over a wide geographic area. At this stage of the Rail Plan development it is not possible to provide specific recommendations on environmental issues and permits.

Table 2 below provides a summary of the resources and permits described above and presents a general recommendation to serve as a guide to development of conceptual projects for inclusion in the 20 year Rail Plan.

Table 2: Environmental Constraints and Permit Summary

Environmental Resource	Associated Permits/Approvals	HDR Planning Recommendation
Wetlands/Waters	USACE CWA Section 404 Oregon DSL Fill-Removal	While avoidance of impacts is always preferred, wetland and/or waters impacts are common types of impacts for infrastructure development projects. It is recommended that corridor projects address impacts in larger groups to take advantage of efficiencies in the permitting and mitigation process rather than seek to address smaller components individually. In cases where large projects can be addressed as a whole, a programmatic approach negotiated with permitting agencies may provide greater flexibility and reduced cost for permitting.
Endangered Species	ESA	Projects resulting in impacts to protected communities may result in increased consultation timelines and mitigation requirements and costs. Where impacts are unavoidable and are anticipated over a large area or would be common to a number of discrete projects, a negotiated programmatic approach to ESA and/or MSA compliance with the Services may provide greater flexibility and reduced cost for permitting.
Essential Fish Habitat	MSA	
Marine Mammals	MMPA	
Bald and Golden Eagle	BGEPA	

Contaminated Lands	OAR 340-122	Existing Port contaminated land studies and CMMPs document areas where contamination is known to occur on Port properties. Environmental Site Assessments of undocumented land will provide additional information related to contamination. Where possible, contaminated areas should be avoided; however the industrial nature of parcels may make this difficult. Special attention should be paid to opportunities for reusing contaminated media on-site where possible to reduce cost and difficulty of addressing off-site contaminated land disposal.
Stormwater	Local jurisdiction stormwater management regulations	Timelines for the review of stormwater system requirements and designs will be similar to other Development Services reviews and will be approximately 3 months.
Floodplain Impacts	44 CFR 60, Local floodplain management ordinances	Projects located in FEMA-mapped floodway will require No Rise certification and associated hydraulic analyses. Projects located out of the floodway, but in the floodplain will need to undergo review by the local jurisdiction. Developments within the floodway that are not able to satisfy the No Rise condition will require the submittal of a LOMR or conditional LOMR. This process can exceed 12 months in duration. Developments that cause a rise within the <u>floodway</u> should be avoided if possible because of significant permitting and analysis requirements and timelines to obtain permits and clearances for developments in these areas. Development within the <u>floodplain</u> may be allowed depending on the activity, affect, and proposed mitigation.
City of Portland Environmental Overlay Zones	City of Portland Code, Title 33, Chapter 430	<p>Projects in Environmental overlay zone p should be avoided where possible because The City of Portland has approved development permits for these areas only in rare circumstances. The Port will be required to perform rigorous alternatives analyses to show that there are no other feasible alternatives and will likely incur added costs in mitigation if projects are sited in overlay zone p.</p> <p>Project located in Environmental overlay zone c may require City of Portland Environmental Review, and may take up to 120 days. Projects in either environmental overlay zone would need to comply with the conditions in City of Portland Code Chapter 33.430 and would have associated costs to the Port for complying with overlay requirements that would not be required outside of these zones.</p>
City of Portland Greenway Overlay Zone	City of Portland Code, Title 33, Chapter 440	Projects in the Greenway overlay zone that are not river dependent may present challenges to successful permitting. The City of Portland will likely require the Port to perform rigorous alternatives analyses to show

		that there are no other feasible alternatives to siting a non-river dependant use in the Greenway. There are risks associated with project delays, permitting costs, and denial of permits that the Port should be aware of for non-river dependant rail projects in these Greenway areas.
Noise	NEPA	Noise has the potential to be a significant environmental constraint depending on the location and land uses adjacent to proposed projects.
Air Quality	NEPA Clean Air Act	Air quality conformity is an important issue for the Port and the rail network in the study area; however, unless projects substantially increase rail emissions within the Portland Air Quality Management Area, it is not likely that conformity issues would cause project delays.

6.0 REFERENCES

Breen, David. 2011.

Port of Portland Environmental Project Manager. 2011. *Personal Communication*.

City of Portland. 2008.

Stormwater Management Manual. Revision 4, August 2008.

City of Portland Code.

Title 33, Chapter 430, *Environmental Zones*.

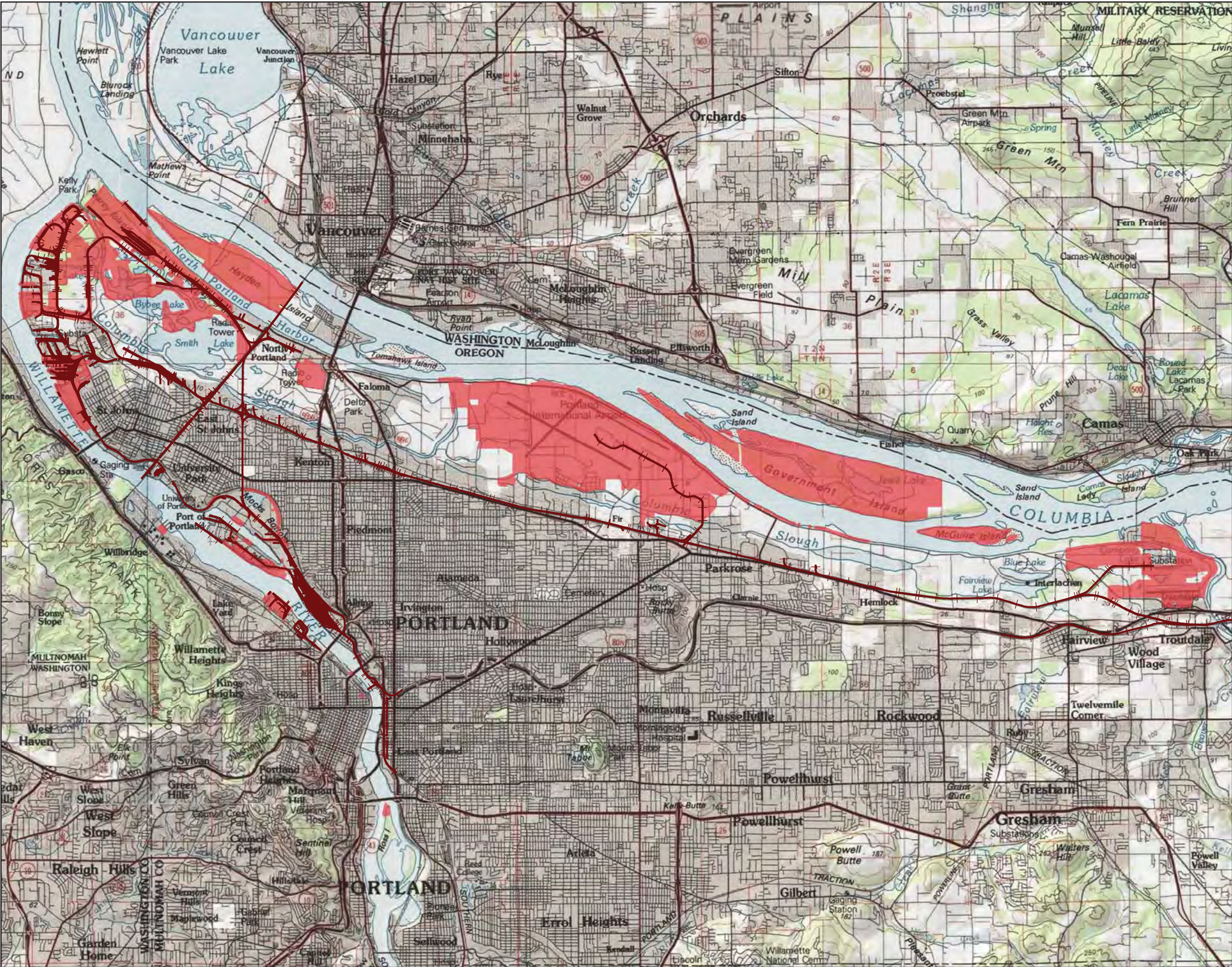
City of Portland Code.

Title 33, Chapter 440, *Greenway Overlay Zones*.

City of Troutdale Development Code.

Section 5.800, *Stormwater Management*.

Appendix A: Figures Referenced in the Report

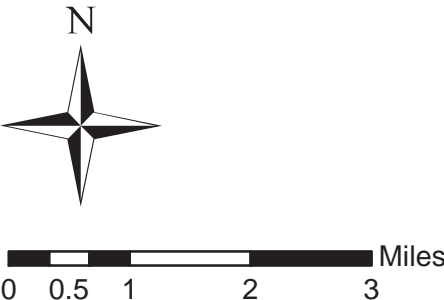


Port of Portland Rail Plan
Environmental Baseline Conditions

Figure 1
Environmental Study Area

LEGEND

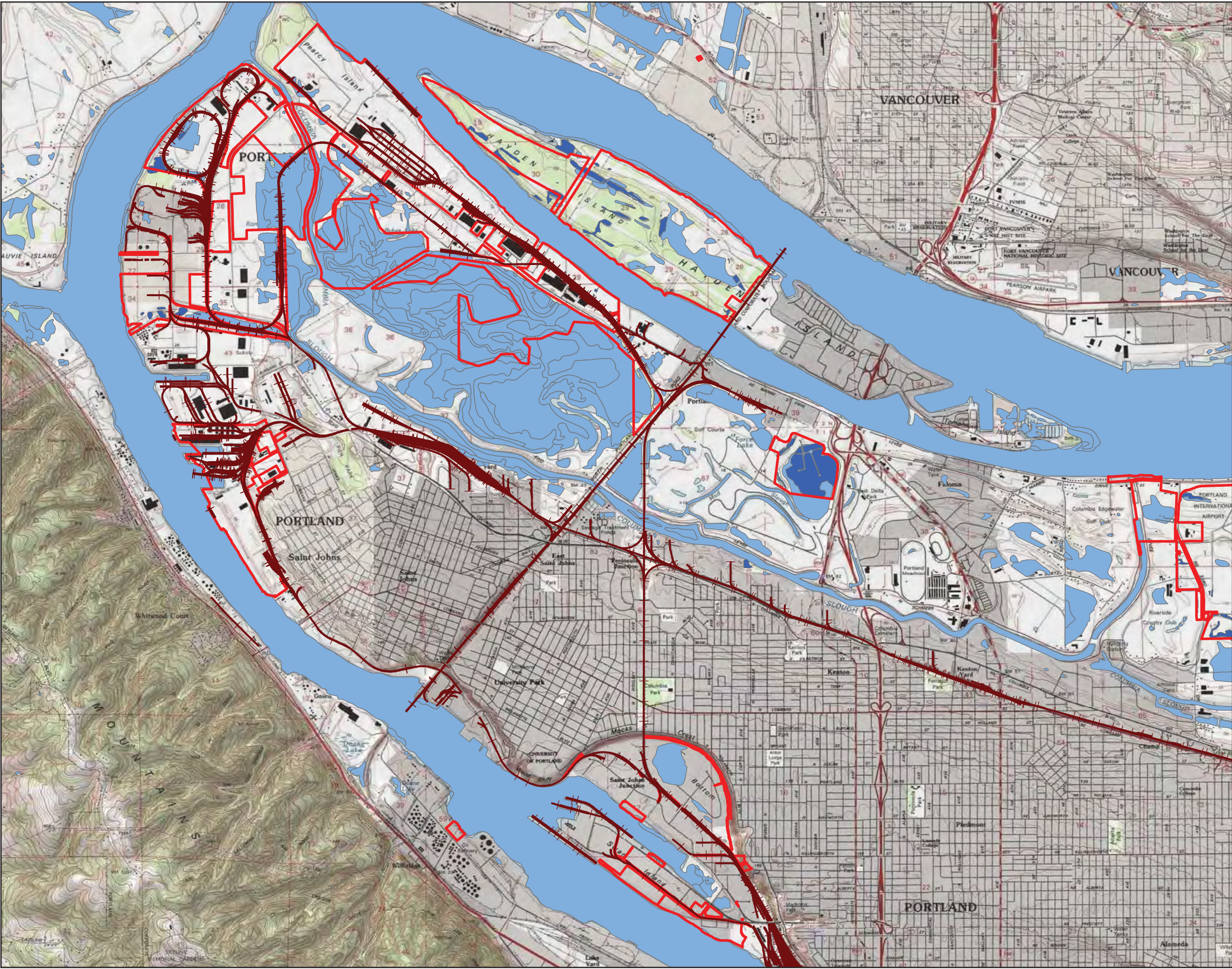
- Existing Port Railroad
- Port Properties

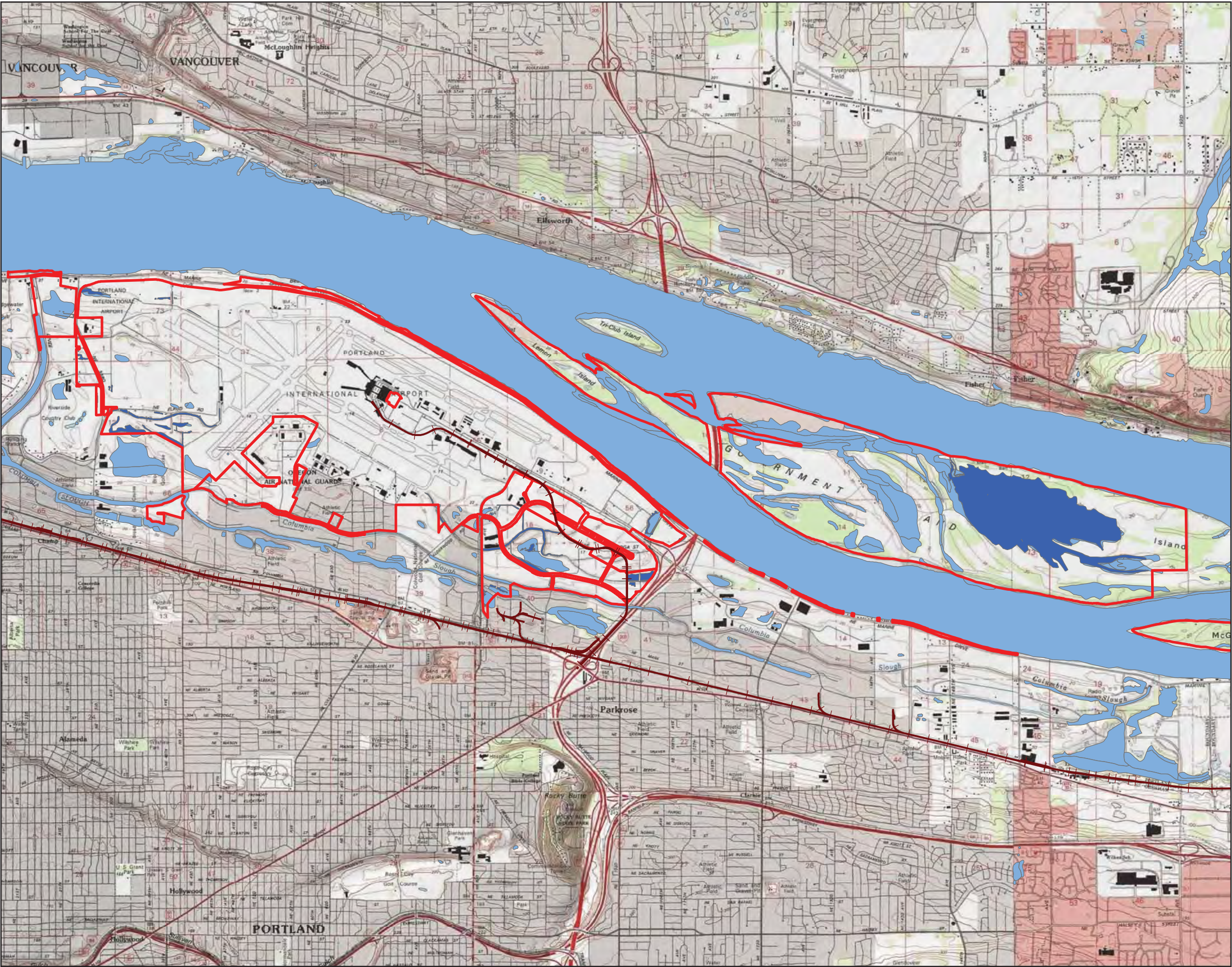


[illegible]

This map illustrates the proposed rail line (indicated by a red line) connecting the Portland International Airport to the city of Portland and beyond. The route starts at the airport, runs through the city, and extends towards the mountains. Key locations labeled on the map include Portland, Saint Johns, Columbia Slough, Portland International Airport, and Vancouver. The map also shows various parks, schools, and other landmarks in the area.

- [illegible]





Port of Portland Rail Plan
Environmental Baseline Conditions

Figure 3
Wetlands and Waters

LEGEND

- Existing Port Railroad
- Port Properties
- Port Delineated Wetlands
- NWI Wetlands



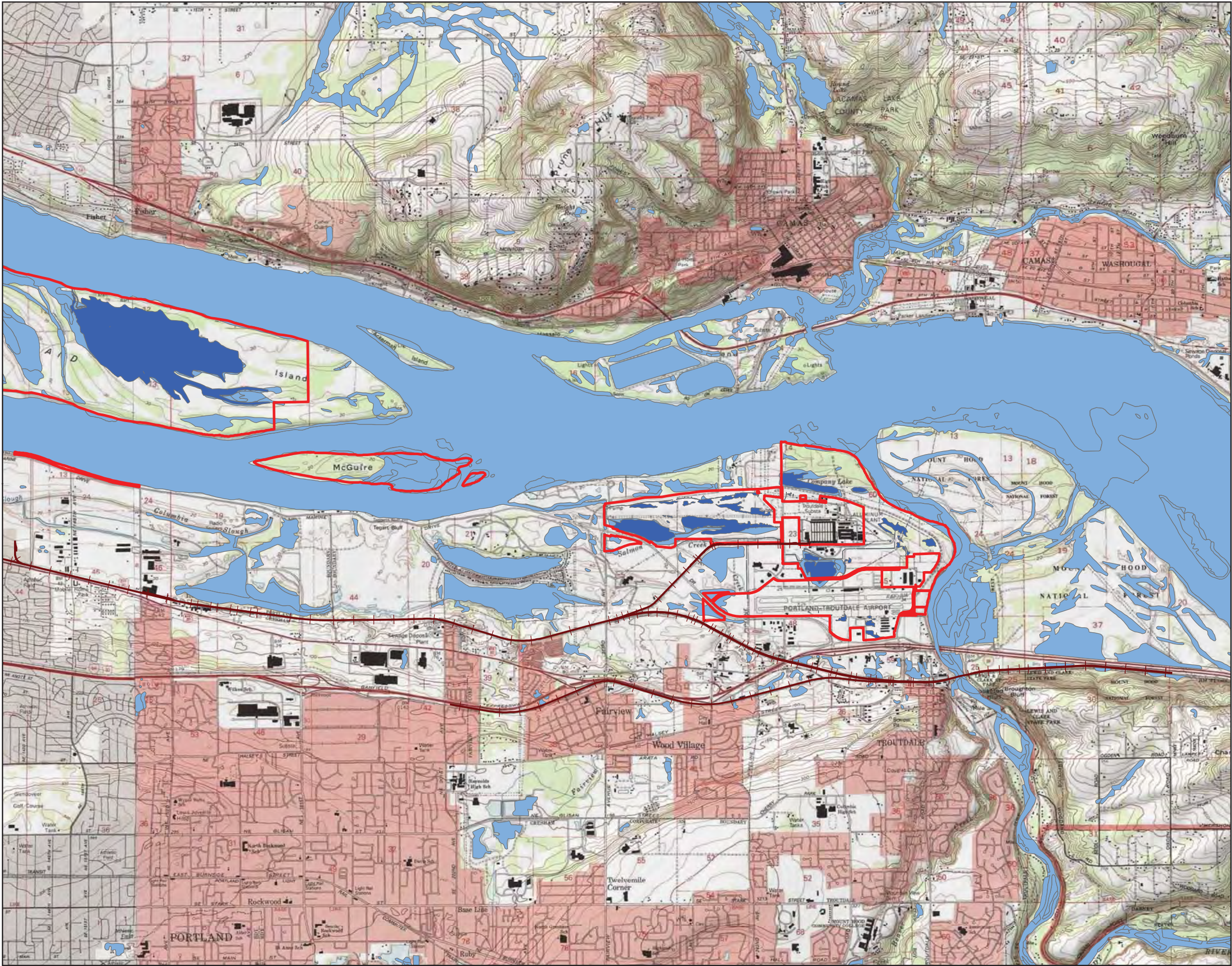
0 0.25 0.5 1 1.5 Miles

Port of Portland Rail Plan
Environmental Baseline Conditions

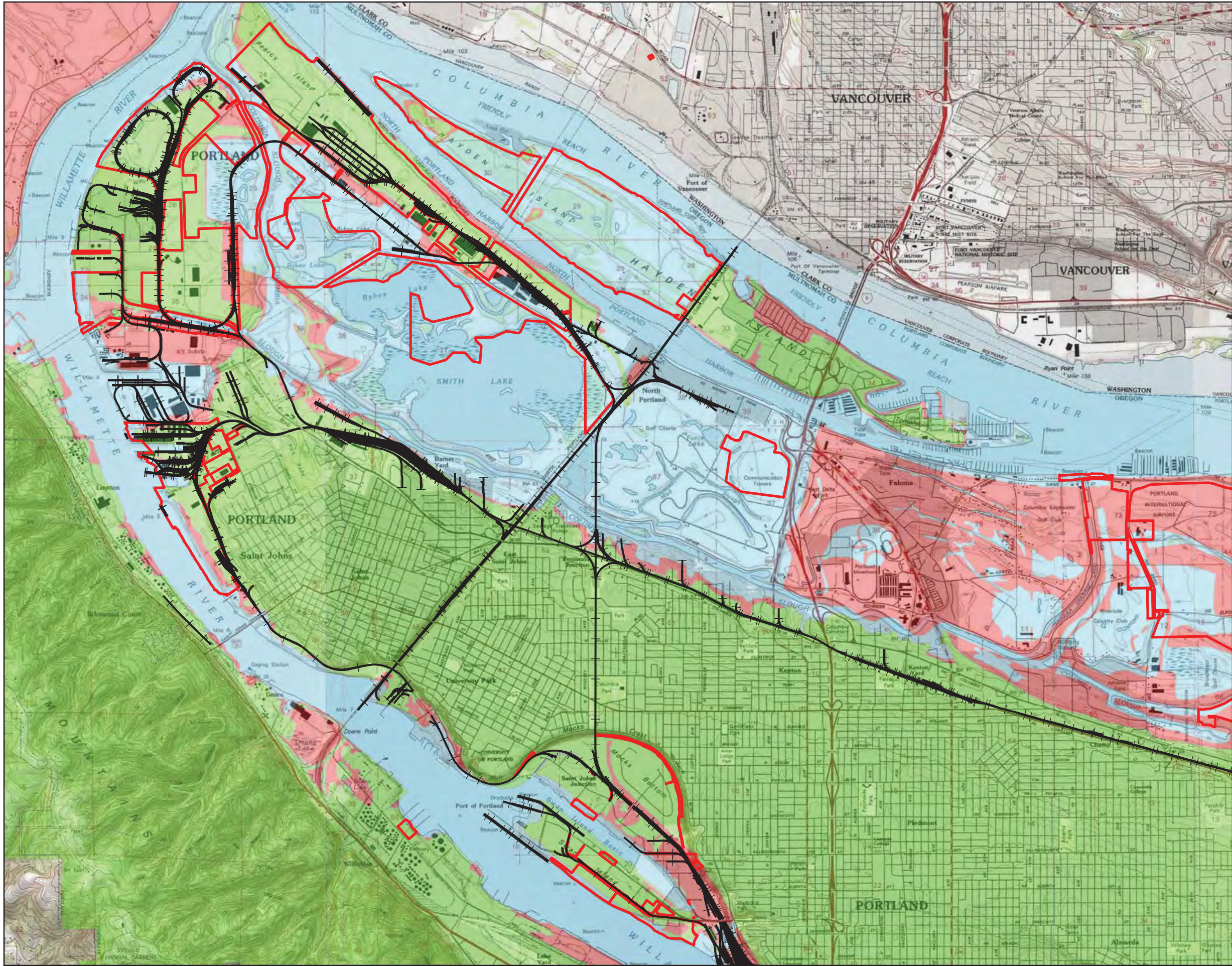
Figure 4
Wetlands and Waters

LEGEND

- Existing Port Railroad
- Port Properties
- Port Delineated Wetlands
- NWI Wetlands



0 0.25 0.5 1 1.5 Miles



Port of Portland Rail Plan
Environmental Baseline Conditions

Figure 5
FEMA Flood Zones

LEGEND

Existing Port Railroad

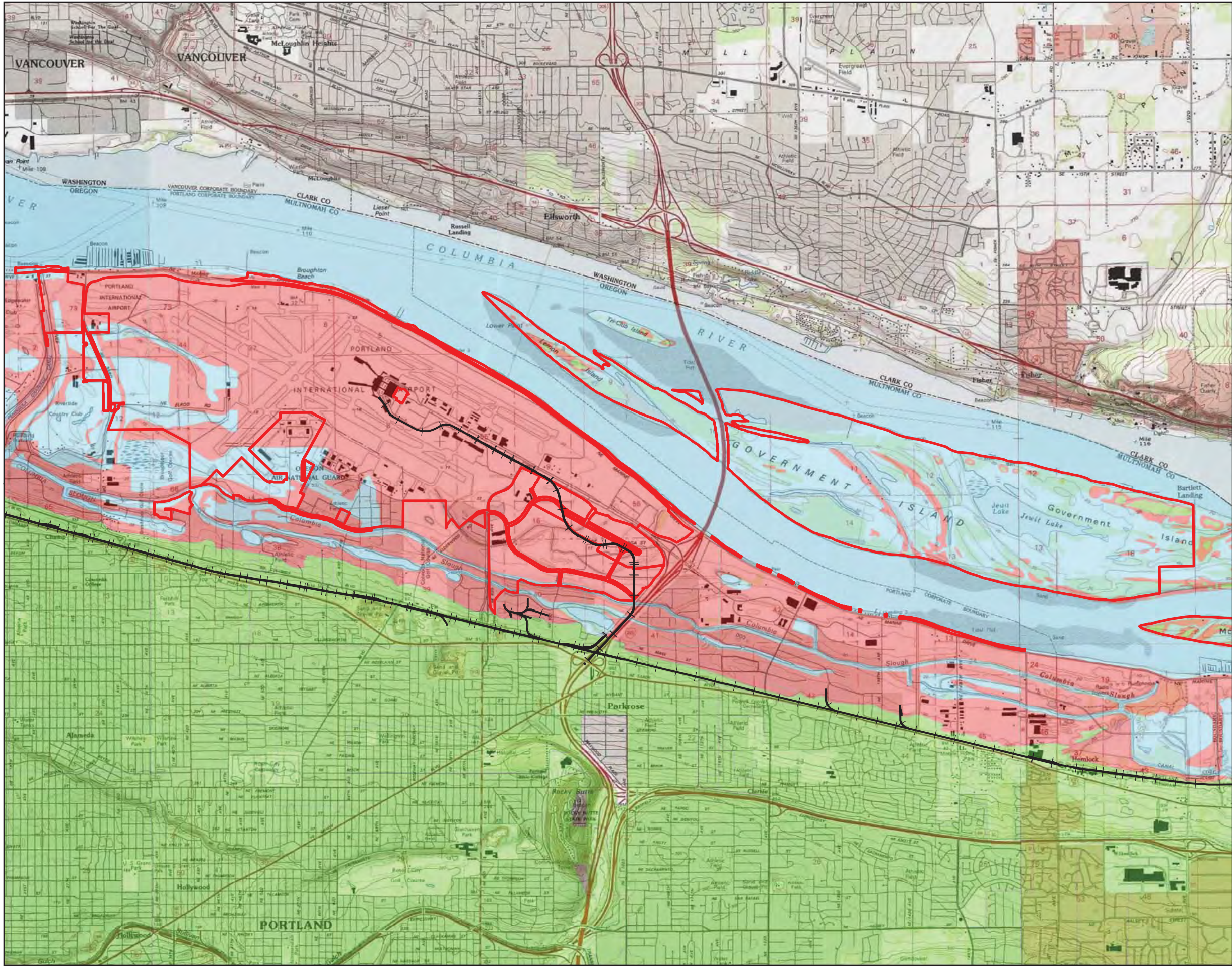
Port Properties

FEMA Flood Zones

100-yr Flood Zone

500-yr Flood Zone

Area Outside of Flood Zone



Port of Portland Rail Plan
Environmental Baseline Conditions

Figure 6
FEMA Flood Zones

LEGEND

Existing Port Railroad

Port Properties

FEMA Flood Zones

100-yr Flood Zone

500-yr Flood Zone

Area Outside of Flood Zone

Port of Portland Rail Plan
Environmental Baseline Conditions

Figure 7
FEMA Flood Zones

LEGEND

Existing Port Railroad

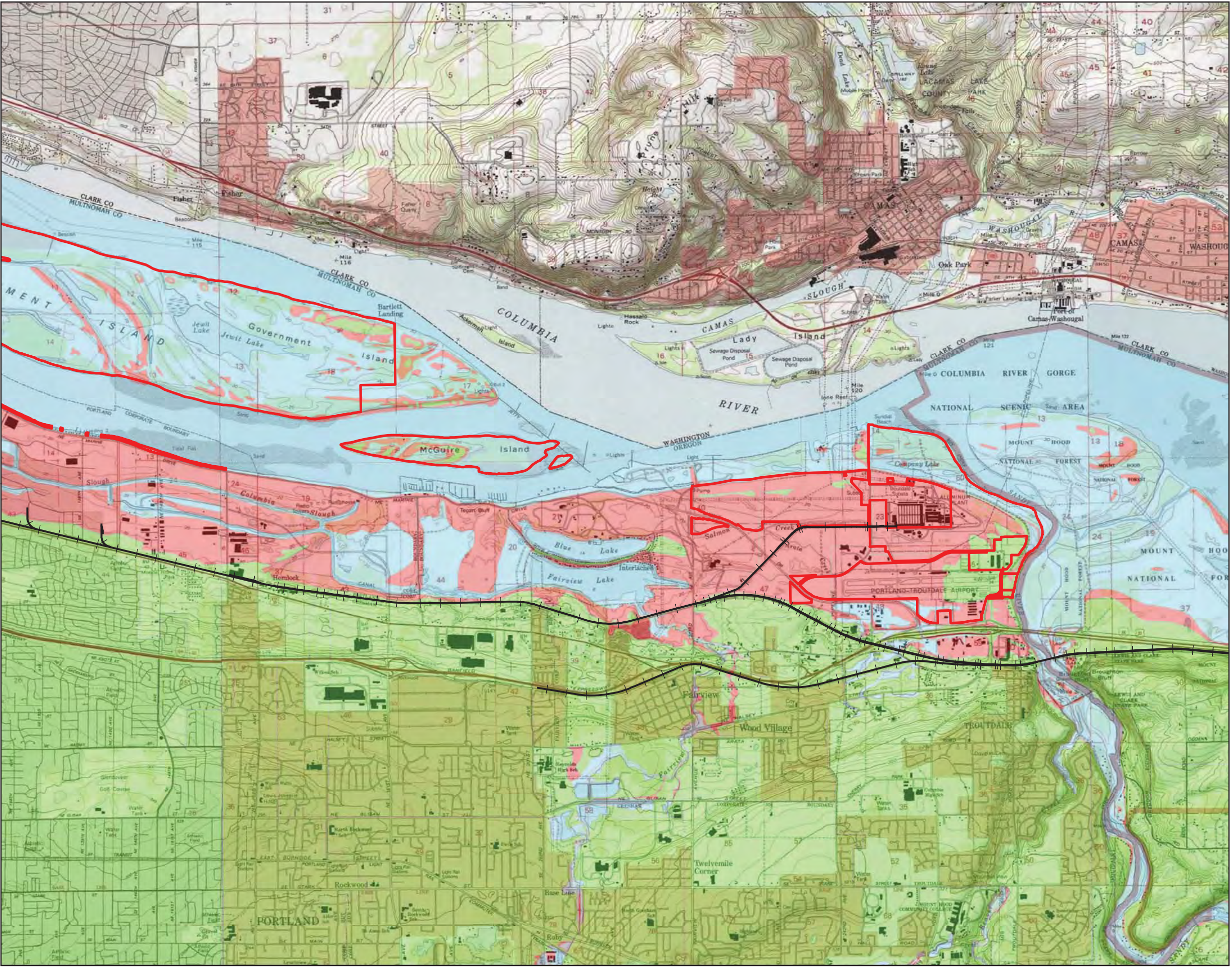
Port Properties

FEMA Flood Zones

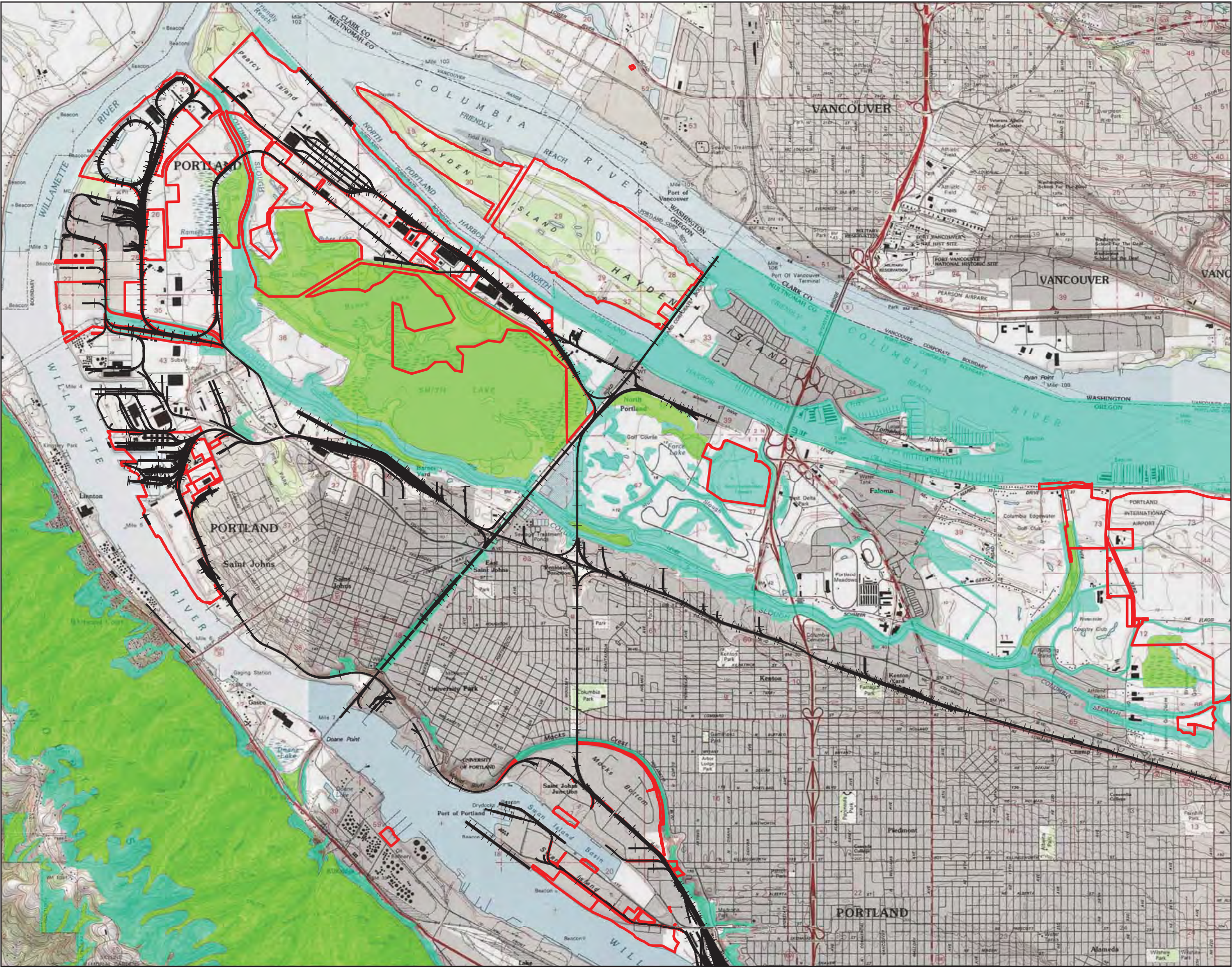
100-yr Flood Zone

500-yr Flood Zone

Area Outside of Flood Zone



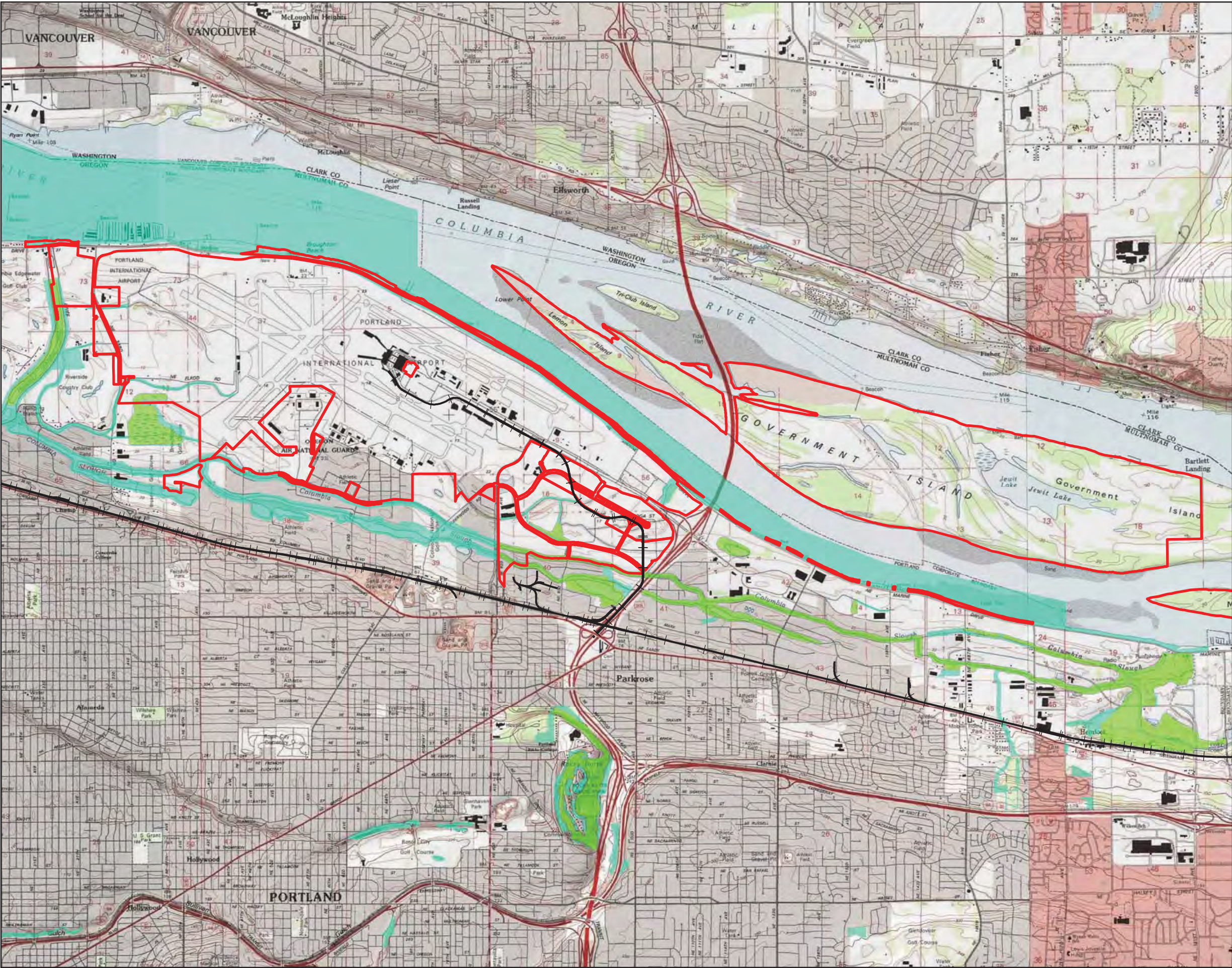
0 0.25 0.5 1 1.5 Miles



Port of Portland Rail Plan
Environmental Baseline Conditions

Figure 8
City of Portland
Environmental Zones

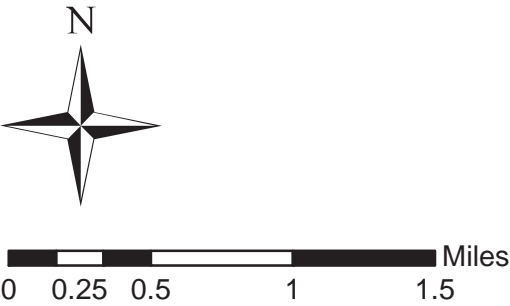
- LEGEND
- Existing Port Railroad
 - Port Properties
 - City Portland Environmental Zones
 - c (Conservation Zone)
 - p (Protection Zone)



Port of Portland Rail Plan
Environmental Baseline Conditions

Figure 9
City of Portland
Environmental Zones

- LEGEND
- Existing Port Railroad
 - Port Properties
 - City Portland Environmental Zones
 - c (Conservation Zone)
 - p (Protection Zone)



Port of Portland Rail Plan
Environmental Baseline Conditions

Figure 10
City of Portland
Environmental Zones

LEGEND

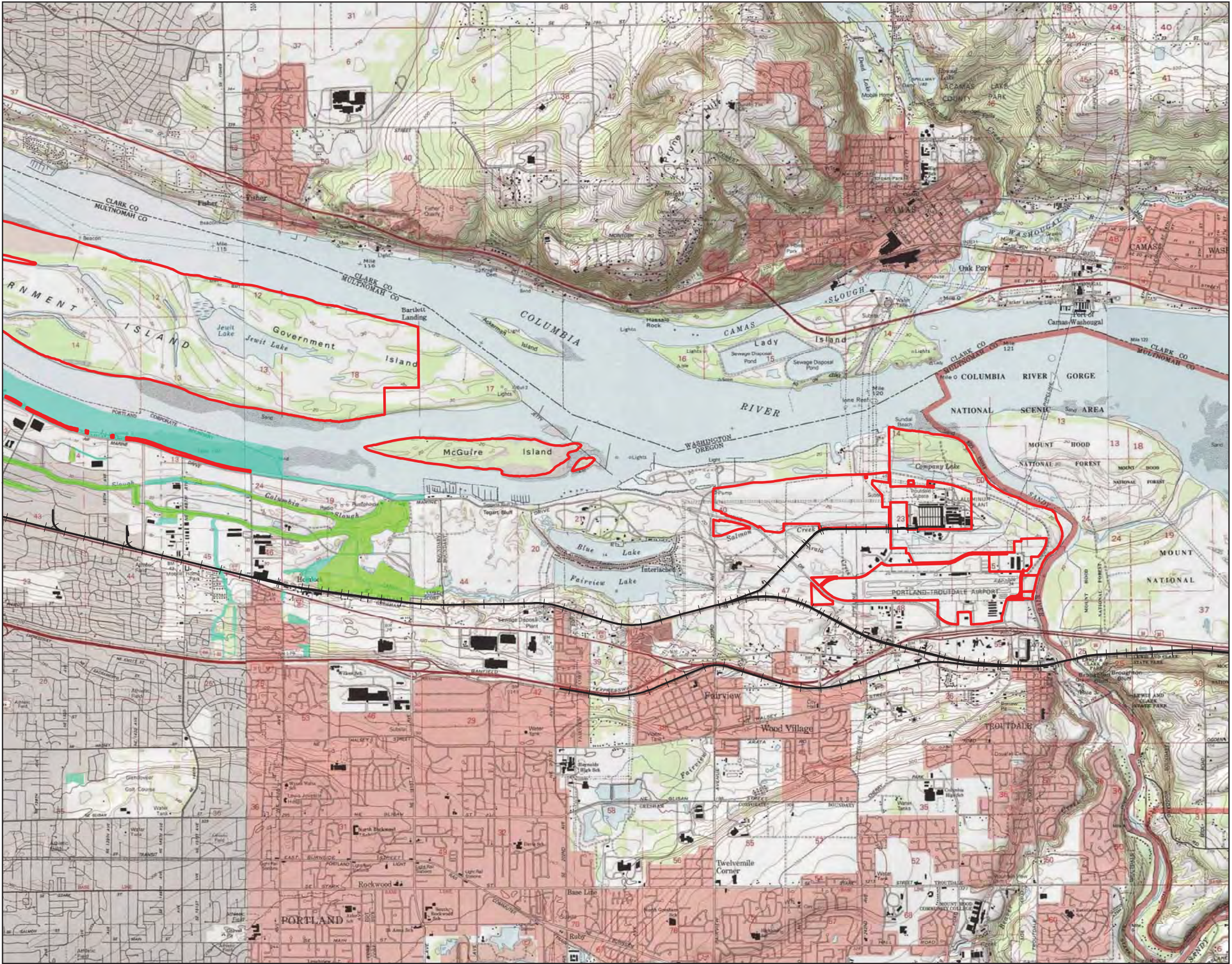
Existing Port Railroad

Port Properties

City Portland
Environmental Zones

c (Conservation Zone)

p (Protection Zone)



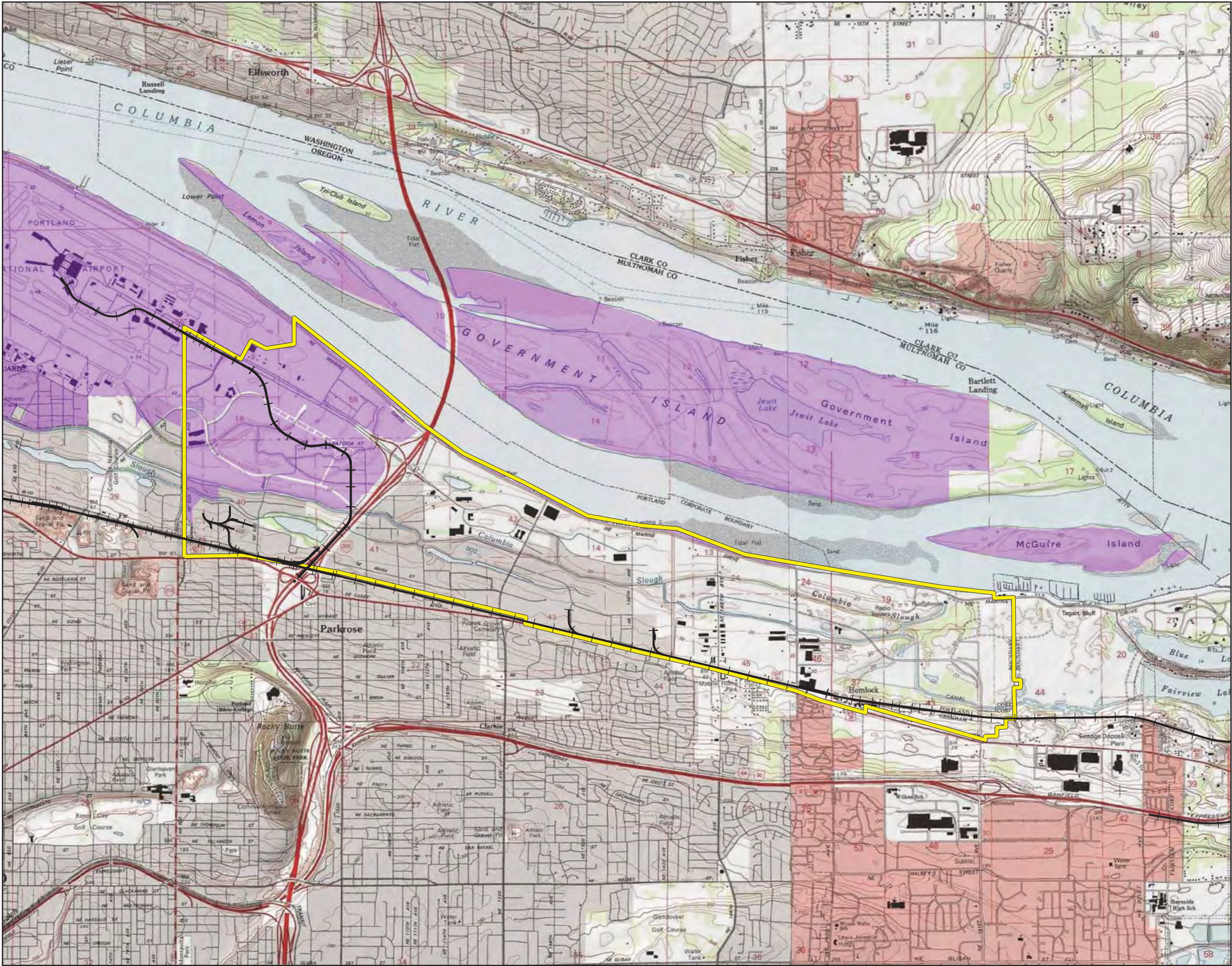
0 0.25 0.5 1 1.5 Miles

Port of Portland Rail Plan
Environmental Baseline Conditions

Figure 11
Columbia South
Shore Plan District

LEGEND

- Existing Port Railroad
- Port Properties
- Columbia South
Shore Plan District



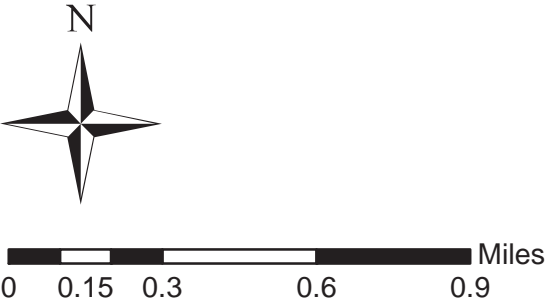
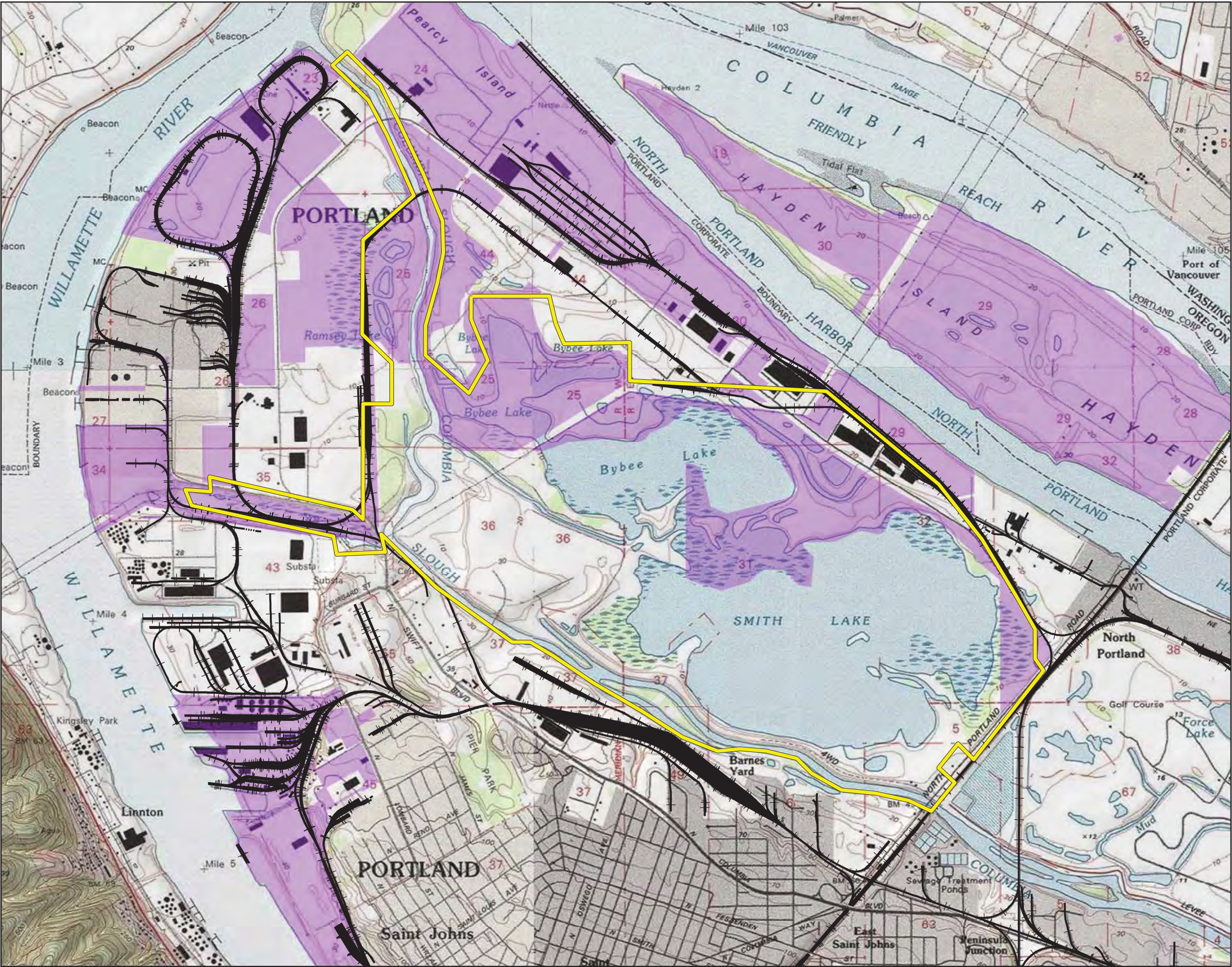
0 0.25 0.5 1 1.5 Miles

Port of Portland Rail Plan
Environmental Baseline Conditions

Figure 12
Smith and Bybee Lakes Natural
Resource Management Plan Area

LEGEND

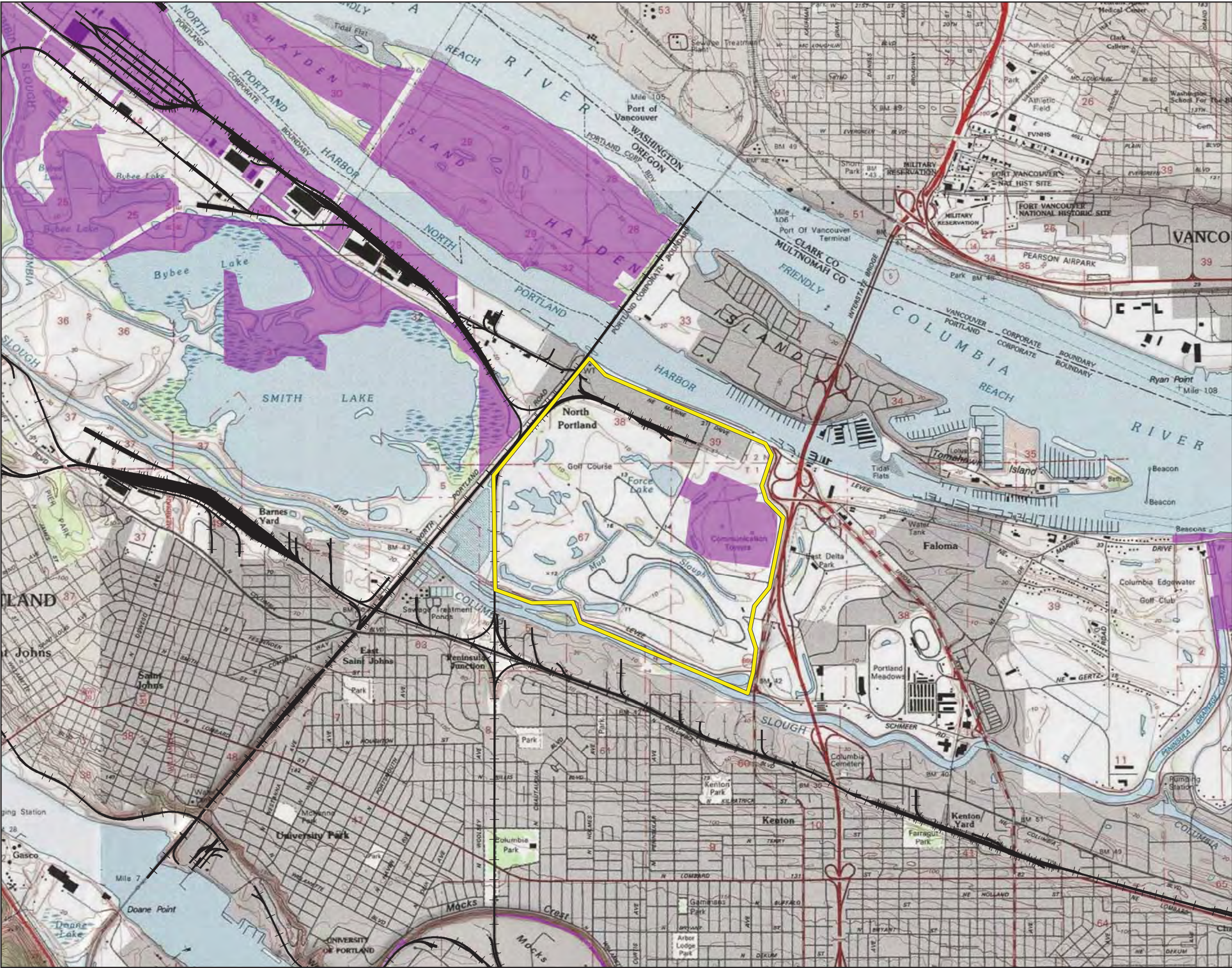
- Existing Port Railroad
- Port Properties
- Smith & Bybee
Lakes District



Port of Portland Rail Plan
Environmental Baseline Conditions

Figure 13
Natural Resources Management
Plan for the Peninsula Drainage
District No. 1

- LEGEND
- Existing Port Railroad
 - Port Properties
 - Peninsula Drainage District No. 1

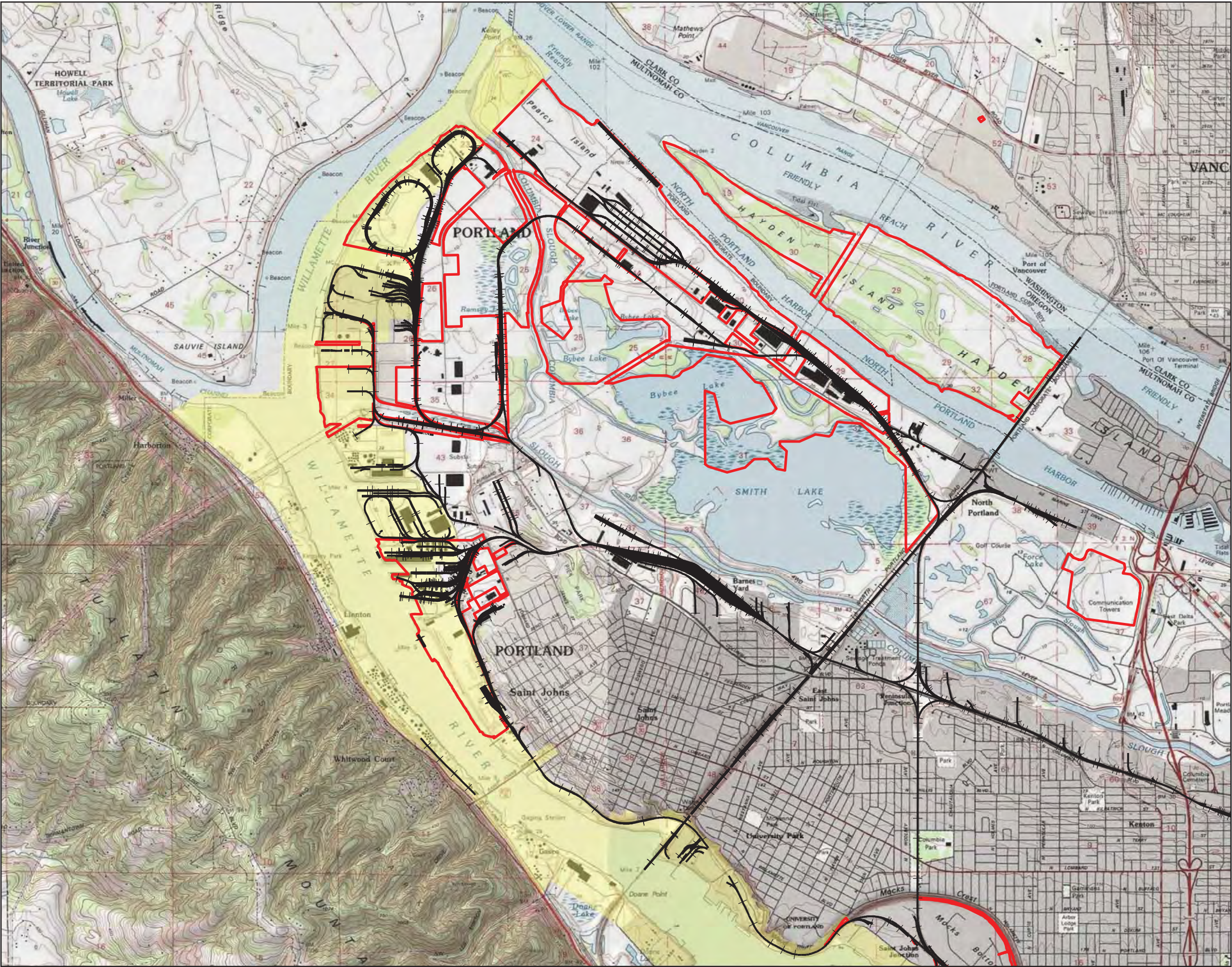


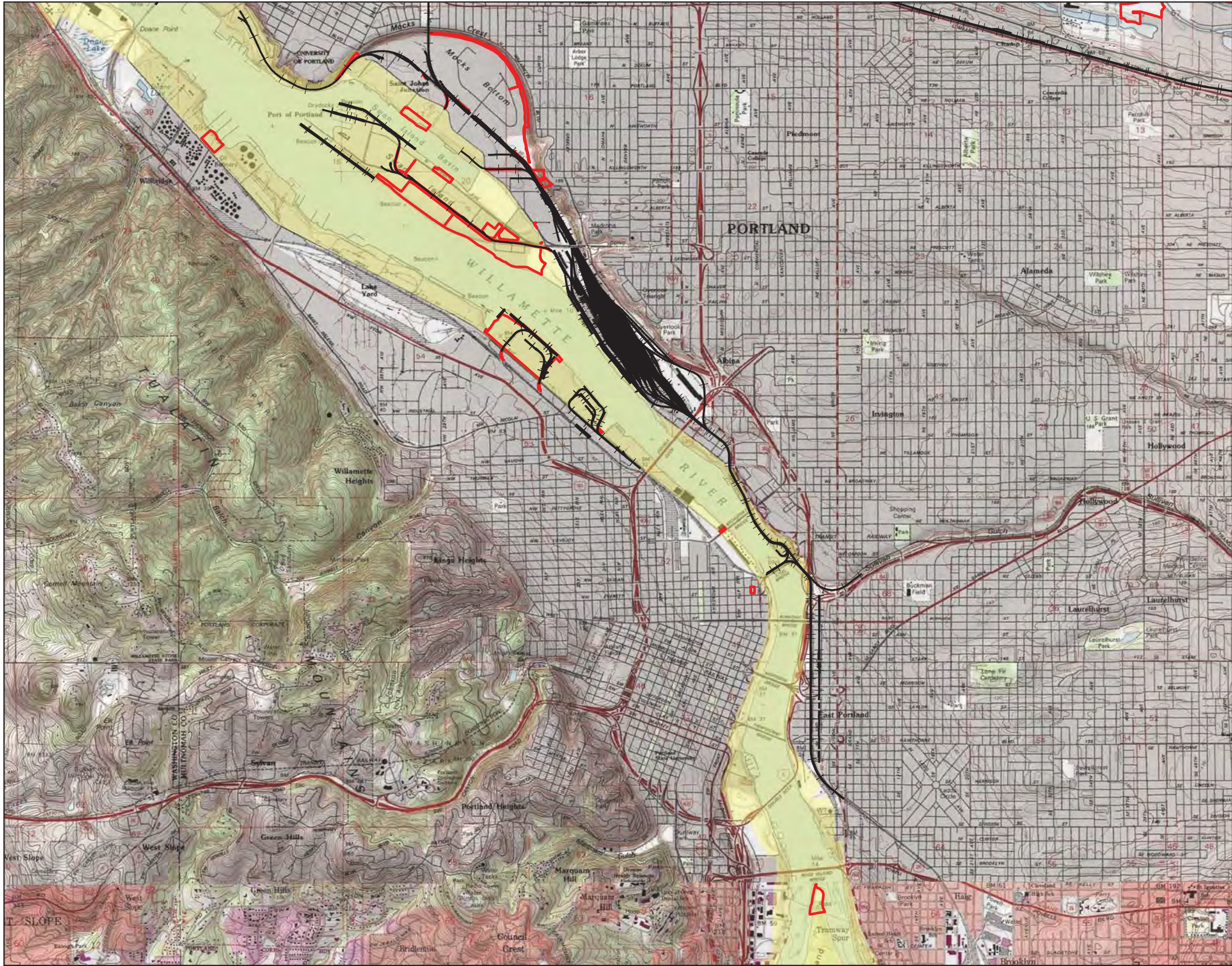
Port of Portland Rail Plan
Environmental Baseline Conditions

Figure 14
Willamette Greenway
Zone

LEGEND

- Existing Port Railroad
- Port Properties
- Greenway





Port of Portland Rail Plan
Environmental Baseline Conditions

Figure 15
Willamette Greenway
Zone

LEGEND

- Existing Port Railroad
- Port Properties
- Greenway



0 0.25 0.5 1 1.5 Miles

Appendix B:
Columbia Southshore Well Field
Wellhead Protection Area Description

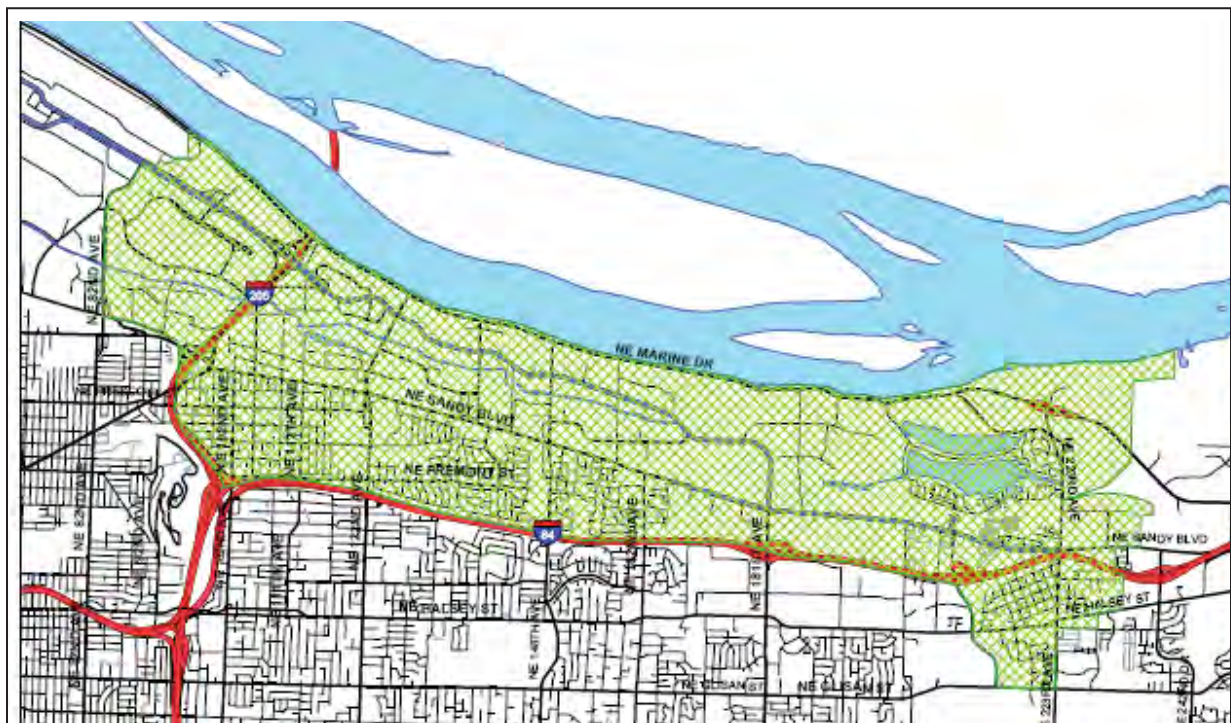
1.3.4 Columbia South Shore

Columbia South Shore Well Field Wellhead Protection Area

The Water Bureau's *Columbia South Shore Well Field Wellhead Protection Area Reference Manual* (June 25, 2003) regulates the storage, handling, use, and transportation of hazardous materials in the Columbia South Shore Well Field Wellhead Protection Area (see [Exhibit 1-7](#)). Requirements apply to indoor and outdoor storage areas; loading and unloading areas; fuel dispensing facilities; storage, maintenance, and repair of vehicles and equipment; and transportation routes on private property and in public rights-of-way.

To protect groundwater from spills of hazardous materials, the requirements focus on spill control measures and prevention of infiltration into the ground. In portions of the wellhead protection area, drainage facilities in the public right-of-way must be lined with a polyethylene geomembrane liner and have appropriate spill control measures. Material and installation requirements for the polyethylene geomembrane liners are stated in Sections 00350 and 02320 of the 2007 *City of Portland Standard Construction Specifications*. Planting trees or deep rooted shrubs over the top of required polyethylene geomembrane liners is prohibited in the wellhead protection area to protect the liners from root damage. Water Bureau review is required to determine which requirements apply. In some instances, infiltration may be allowed.

Exhibit 1-7: Columbia South Shore Well Field Wellhead Protection Area



Appendix D: Rail Operations Overview (Railroad Interviews)

Port of Portland Rail Plan

Rail Operations Overview

February 2013

Prepared for:

Port of Portland
7200 NE Airport Way
Portland, OR 97218

Prepared by:

HDR Engineering
1001 SW 5th Avenue
Suite 1800
Portland, OR 97204

Port of Portland – Class 1 Railroad System Service

The Port of Portland is served by two Class 1 railroads, BNSF Railway (BNSF) and Union Pacific Railroad (UP). BNSF connects the Port to the national rail network via its primary main line that follows the north bank of the Columbia River east from Portland into eastern Washington, thence through the Idaho Panhandle and Montana into the Midwest and Chicago. UP connects the Port via its primary main line that follows the south bank of the Columbia River to eastern Oregon, thence through Idaho's Snake River Valley and Wyoming into the Midwest and Chicago. In addition, both railroads connect the Port northward to Tacoma, Seattle and Canada via a jointly operated main line, and both railroads connect the Port southward to California via separate north-south main lines. The Port thus has direct, competitive rail service via primary main lines into the central U.S., as well as primary rail connections to the principal cities of the West Coast. This delivers to the Port rail connectivity that is equivalent in quality and importance to all of the major West Coast U.S. ports.

At a local level, BNSF enters the Port of Portland by crossing the Columbia River from its east-west main line on the north bank of the Columbia River at Vancouver, Washington. The Port is immediately adjacent to BNSF's north-south main line that extends from Portland Union Station through Vancouver, Washington, to Tacoma, Seattle, and Vancouver, B.C. This affords BNSF direct access to the Port's North Rivergate (T-6) facility and, via the Columbia Slough Bridge, the T-5 facility in South Rivergate.

UP enters the Port of Portland from its east-west mainline on the south bank of the Columbia River via one of two routes, the Kenton line or the Graham Line. These two lines, which diverge at Troutdale, Oregon, on the eastern edge of Portland, run parallel and enter the Port from the center and from the south, respectively. The Graham Line connects to UP's north-south main line near downtown Portland. UP enters its trackage rights on BNSF's north-south main line to Tacoma at a location near to BNSF's access to the Port. UP provides rail access to the Port of Portland's T-4 and T-5 areas.

Both railroads can deliver and receive unit trains directly to the Port. BNSF supports carload service via its local classification yard at Vancouver, Washington, and, with UP, through the jointly owned Lake Yard near Portland Union Station, and provides additional yard support at the "A" and "B" yards located along its Port access lead. UP supports carload service via its local classification yard at Albina, Oregon (on the north-south Seattle Subdivision) and bulk traffic handled primarily at Barnes Yard, located adjacent to the Port. BNSF further supports Port of Portland traffic via its regional hump yard at Pasco, Washington, and UP via its regional hump yard at Hinkle, Oregon. Other port support yards include South Rivergate, Rivergate "A" and "B", Kenton, and Ramsey, which provide near-dock support for carload and unit train customers. These local and regional yards enable both railroads to classify dedicated trains for Port of Portland customers, and to provide adequate car supply and good connectivity between the Port and national rail traffic lanes.

Rail access and switching at the Port's marine terminals is shared by the BNSF and UP as follows:

- At Rivergate, including T-5 and T-6, BNSF and UP share access equally. Both railroads can land unit trains into these terminals.
- BNSF is the managing carrier in North Rivergate, providing switching service to/from T-6 to UP and itself for less-than unit train operations, dispatching for unit trains, and track maintenance.
- UP is the managing carrier in South Rivergate, providing switching service to/from T-5 to BNSF and itself for less-than unit train operations, dispatching for unit trains, and track maintenance.
- UP is the managing carrier for T-4 and provides all train service there.

- BNSF is the managing carrier for the Columbia Slough rail bridge and the lead track connecting to South Rivergate.
- Both carriers have direct access to T-6 and T-5 for unit trains.
- Portland Terminal Railroad, a jointly owned subsidiary of UP and BNSF, provides switching at T-2.

BNSF System Overview

BNSF's Portland-area operations hub is located in Vancouver, Washington, where BNSF operates a medium sized flat-switched classification yard, and locomotive and car maintenance facilities. BNSF's Fallbridge and Seattle Subdivisions meet at Vancouver and accept and deliver traffic to Vancouver Yard. Both subdivisions are operated using Centralized Traffic Control (CTC), the highest-capacity method of operating trains in use. CTC employs wayside signals under the direction of a dispatcher for the highest possible capacity and efficiency. Both subdivisions are maintained to high-capacity standards. The Fallbridge Sub extends from Portland Union Station northward across the Columbia River Bridge to Vancouver as two main tracks, thence eastward to Pasco as a single main track. The two main track Seattle Subdivision connects Vancouver to Seattle. Principle commodities handled by BNSF to or through Portland and Vancouver include:

- Grain originating in the Northern Tier states destined for export at Portland, Vancouver, other lower Columbia River ports, Grays Harbor, Tacoma, and Seattle
- Coal originating in the Powder River Basin in Montana and Wyoming destined for export at Roberts Bank, B.C.
- Forest products originating in British Columbia, western Washington, and the Willamette Valley destined for markets throughout the U.S.
- Containerized imported goods originating at the Ports of Seattle and Tacoma destined for Chicago and the Ohio River Valley states, and mostly empty returning containers
- Import automobiles originating at the Ports of Portland and Vancouver
- Containerized municipal waste originating in the Seattle, Tacoma, and Olympia for landfills in eastern Oregon
- General merchandise

BNSF previously operated a secondary main line from Portland southward to Salem, Albany, and Eugene to provide local service. The main line is now operated by Portland & Western (PNWR) Railroad, a short line. Principal commodities shipped on P&W are forest products and agricultural products.

BNSF (and UP) also serves the lower Columbia River ports of Kalama and Longview, and the Puget Sound ports of Tacoma and Seattle. BNSF uses three main lines to serve these ports, and a fourth to connect to California:

- The Scenic Subdivision, via Stevens Pass, enters Seattle from the north and is the principal route to Seattle and Tacoma for premium intermodal service as it enables the fastest transit times between Puget Sound and the Midwest. All of the subdivision is operated by CTC.
- The Fallbridge Subdivision, via the Columbia River Gorge, is the principal route for BNSF premium intermodal service to Portland, and the principal route for BNSF unit trains and manifest trains as it offers the least adverse grades.
- The Stampede Subdivision, via Stampede Pass east of Auburn, Washington, is at present an overflow route for empty unit trains and some manifest trains; it connects with the Fallbridge Subdivision at Pasco and affords an alternate route to Puget Sound when the Fallbridge

Subdivision is at capacity. The Stampede Subdivision is only partially equipped with CTC; most of the subdivision is operated by Track Warrant Control (TWC), a train-control method with lower capacity and efficiency than CTC. The Stampede Subdivision cannot currently accommodate hi-cube double stack container traffic.

- The Oregon Trunk Subdivision diverges from the Fallbridge Subdivision near Wishram, Washington, approximately 100 miles east of Vancouver, Washington, and runs southward into California via Bend and Klamath Falls, Oregon. It provides a route for manifest and some intermodal traffic between the Pacific Northwest, California, and the Southwest. Most of the Oregon Trunk Subdivision is operated by TWC. The Oregon Trunk Subdivision was recently upgraded to accommodate hi-cube double stack container traffic.

In greater detail, the Fallbridge Subdivision is the most important BNSF main line for the Port of Portland, as it provides the shortest and lowest-grade connections between the Port and the central U.S. Relatively little BNSF traffic between the Port and the central U.S. enters the Port via any of BNSF's other routes. At present between 25 and 35 trains per day operate on the Fallbridge Subdivision, including one round trip Amtrak intercity train, compared to 20 to 25 trains per day on the Scenic Subdivision and 1 to 3 trains per day on the Stampede Subdivision. Most of the trains on the Fallbridge Subdivision are heavy-tonnage trains such as unit grain, unit coal, and manifest freight. The remainder consists of intermodal trains between BNSF's Portland intermodal yard at Lake Yard, and West Coast trains that move carload freight between Canada, the Puget Sound region, Vancouver and Portland, and California, via Wishram. This latter routing, sometimes referred to as BNSF's I-5 corridor, was created as a condition by the U.S. Surface Transportation Board as a result of the merger of UP and Southern Pacific Railroad in 1995, to assure competition for north-south rail freight on the West Coast.

The Fallbridge Subdivision is primarily a single-track main line railroad governed by CTC with sidings located every 5 to 10 miles so that trains can meet and pass other trains. A section of two main tracks begins at McLoughlin, just east of Vancouver, and extends across the Columbia River Bridge to the end of BNSF ownership near Portland's Union Station. The maximum operating speed for this subdivision is 79 MPH for passenger and 70 MPH for freight. The maximum number of trains per day that can be handled east of Vancouver is 30 to 35 trains. This total is exceeded occasionally, but additional track infrastructure would be needed to consistently to boost the trains per day total. Rigorous terrain, the parallel highway and environmental constraints along the Fallbridge Subdivision would make additional capacity very expensive.

Between McLoughlin and Union Station, the Fallbridge Subdivision is capacity constrained by heavy freight traffic, prioritized intercity passenger traffic, trains entering and exiting the Port and UP trains entering and leaving BNSF trackage at slow speeds, and the movable bridges across the Columbia and Willamette rivers. Capacity studies indicate that capacity between McLoughlin and Union Station is nearly completely utilized. The Columbia River Bridge has a substantial impact on the capacity as well as the fluidity of freight movements into the Port of Portland. When the swing-span bridge is open to allow marine traffic through, all train movements between Portland and Vancouver are halted. Due to navigation regulations giving river traffic priority over rail traffic, any measurable increase in Columbia River barge traffic would have significant effects on train capacity.

The Seattle Subdivision is the double-tracked main line running north from Vancouver (a short section of single main track near Tacoma passes through two tunnels at Point Defiance). Speeds are the same as for the Fallbridge Subdivision but with higher speeds for the operation of Talgo-type passenger equipment used by Washington State DOT for its *Cascades* service between Portland, Seattle, and Vancouver, B.C. Double-tracked railroads can generally handle upwards of 100 trains per day. However,

several factors limit capacity on the Seattle Subdivision to roughly 80 trains per day. These include a high differential in train speeds between passenger and freight trains, and numerous trains starting and stopping on the main line due to frequent set-outs and pick-ups to on-line industries (principally in the Kalama-Longview and Centralia areas).

The BNSF main line from Portland to Vancouver, BC, encompassing parts of the Fallbridge, Seattle, Scenic and Bellingham Subdivisions, is the primary component of the federally designated Pacific Northwest High Speed Rail Corridor. The state of Washington, in a program funded by the federal government, is commencing a major passenger-rail frequency and reliability improvement program that will allow it to increase its frequency of *Cascades* passenger trains between Portland and Seattle from four to six round trips daily by 2016 (in addition, Amtrak operates one round trip long-distance train per day on the Seattle Subdivision). Accompanying the WSDOT capital program are significant capacity improvements in the Vancouver terminal, in the Kelso-Longview area, and a bypass for passenger trains between Nisqually and Tacoma, to bypass the single-track section around Point Defiance.

BNSF owns and operates over its Rivergate Industrial Lead that connects to the BNSF main line with a north and south wye just south of the Columbia River Bridge. The Rivergate Lead connects the A & B yards, T-6, and Hyundai yards. At Ford Lead Junction, the Ford Industrial Lead crosses Marine Drive to provide rail service to the Ford auto facility as well as other rail-served industries. This lead was recently extended across the Slough to access South Rivergate. This connection allows BNSF to provide direct rail service to the T-5 area.

BNSF manages four yards in the Portland area. These include Vancouver Yard, Wilbridge Yard, Lake Yard, and “W” Yard.

- Vancouver Yard is used to temporarily hold cars, block and receive the Albany, Oregon train, locals (Camas and Ridgefield), and unit trains to and from United Grain (recent track changes enable road crews to deliver these trains directly to United Grain). BNSF recently changed its switch engine assignments at Vancouver Yard to work only 6 days a week with no work being performed on Sunday. This results in rail cars accumulating in the region until such time that BNSF has room in their yard. This change has the potential to greatly affect Port of Portland, UP and Portland & Western Railroad (PNWR) customers by accumulating railcars over the weekend congesting the yard and delaying deliveries. PNWR is operating 100 car unit trains to Port Westward on the Astoria Line. The trains originate on the BNSF and the PNWR crews get on the trains at Vancouver.
- Rivergate “A” & “B” Yards serve as temporary storage yards for auto racks and flat cars for the Port of Portland’s T-6 facility. Switched and serviced by BNSF, UP has rights to these yards but currently does not exercise them. BNSF originates vehicle trains out of the T-6 facility.
- Ramsey Yard is considered that area south of the Slough Bridge where a unit train staging was recently placed into service. Ramsey Yard consists of a main track and yard tracks where BNSF and UP can jointly stage loaded and empty unit trains. Currently, Ramsey Yard tracks are used by BNSF to set out bad order cars from departing Columbia Grain trains.
- East St. John’s Yard is a small storage yard adjacent to the BNSF main line primarily used to store empty flat cars for T-2. BNSF interchanges cars destined for Portland and Western Railroad at this yard.
- Wilbridge Yard is a small flat-switch classification yard located on the west of the Willamette River Bridge. The *Cascades* passenger corridor passes through the middle of this yard. Three switch crews work Wilbridge daily, handling cars for several adjacent industries including

Chevron, Kinder Morgan, Certain Teed and Conoco Phillips. BNSF interchanges cars from Portland and Western Railroad at this yard.

- Lake Yard is located just south of Willbridge Yard on property owned by the Portland Terminal Railroad (PTRR). This railroad is jointly owned by UP (60%) and by BNSF (40%), and is the interchange point for all manifest traffic between the two railroads. Within the yard, BNSF operates an intermodal facility. PTRR handles all flat switching, including the BNSF intermodal facility, in a series of 26 classification tracks. Several intermodal trains originate from or are destined for this yard daily. Manifest or intermodal train traffic to/from Lake Yard is humped at Pasco and moved via a daily Pasco-Lake manifest freight that averages 75-80 cars.

W” Yard is the interchange yard located on the Astoria Line north of the west end of the Willamette River Bridge. This yard is also used to interchange with the PNWR, a short line whose headquarters are located in Salem and train operations center is located in Albany.

- Transfer activity: Non-unit train traffic to/from Willbridge connects with the BNSF system via two daily transfer runs between Willbridge and Vancouver. One afternoon transfer also picks up and delivers at Lake for traffic to/from the Seattle Subdivision, and the other evening run also picks up and delivers at T-6 for non-unit train traffic.

Union Pacific System Overview

Union Pacific Railroad’s primary base of operations at Portland is split, with headquarters of the Portland Service Unit located at Brooklyn Yard but most of its terminal activities located at Albina Yard. UP’s Pacific Northwest franchise is the result of a merger of two railroads, UP and Southern Pacific Railroad (SP). SP entered Portland from the south and had an extensive network in western Oregon. UP entered Portland from the east, and turned north to reach Tacoma via trackage rights on BNSF, reaching Seattle on its own trackage between Tacoma and Seattle. The two railroads were merged in 1997, combining their networks. This history resulted in a track arrangement that does not always lend itself to efficient through train movements between the two. UP now operates trains through Portland, including direct Hinkle to Eugene and Hinkle to Roseville, CA manifest trains, and two to three Canada to Roseville manifests daily.

UP’s Portland area customers are served as follows:

- To and from the east, by the single-main track Portland Subdivision, which passes through the Columbia River Gorge to UP’s major regional hump yard at Hinkle, Oregon;
- To and from the south, by the single-main track Brooklyn Subdivision, that runs southward through the center of the Willamette Valley to Eugene, crosses over the Cascade Range to Klamath Falls, then south to UP’s principal Northern California hump yard at Roseville;
- To and from the north via BNSF’s two-main track Seattle Subdivision – UP operates on trackage rights over BNSF trackage until reaching Tacoma, at which point it re-enters its own single-track main line to Seattle.

All three lines are operated by CTC. Both the Portland Subdivision and Brooklyn Subdivision routes are currently handling 20-25 trains each day. No passenger trains operate on the UP through the Gorge; however, the Brooklyn Subdivision has two round-trip *Cascades* trains per day and one round-trip Amtrak long-distance train. Regional and local shipments that are routed onto the UP include the same commodities as are routed on the BNSF.

The Portland-area main track network for UP is composed of the following segments:

- The Portland Subdivision is primarily a single-track mainline railroad governed by CTC with sidings located every 5-10 miles so that trains can meet and pass other trains. The maximum operating speed for this subdivision is 70 MPH for freight. It is generally accepted by UP that the maximum number of trains that can be handled east of Troutdale is in the 30-35 trains per day range. This total is exceeded occasionally but infrastructure improvements (track and signal) will be needed in the Gorge if it becomes desirable to boost the trains per day total. This route is split at Troutdale into two main lines: the Kenton and Graham lines.
 - The Kenton Line follows Sandy Boulevard and Columbia Boulevard into North Portland and directly into Barnes Yard. Because there are minimal grades on this line, most westbound heavy-tonnage trains are routed onto the Kenton Line instead of the Graham Line. At Penn Junction, the Kenton Subdivision passes through a 6000' tunnel to reach Albina Yard.
 - The Graham Line extends from Troutdale to East Portland mostly paralleled by I-84, with no sidings to meet or pass trains. It ascends a significant grade from East Portland to Rocky Point. UP is currently planning to install a siding track near Parkrose.
- The Brooklyn Subdivision is a single-track CTC main line with sidings with a short section of two main tracks between East Portland and Willsburg Junction. A total of six passenger trains operate daily between Eugene and Portland.
- UP has trackage rights on the BNSF's Seattle Subdivision and therefore is subject to BNSF control. A small portion of the Seattle Subdivision is located between North Portland Junction and Penn Junction. Penn Junction forms the four-way diamond intersection of the Kenton Sub, with the Seattle Sub and the lead track to Barnes. All four routes are linked with wyes allowing any train to go in any direction at Penn Junction. BNSF has rights to proceed from North Portland Junction to Barnes and to Albina Yards, using this junction.

UP owns and operates its St. John's Industrial Lead that connects Albina Yard to Toyota, T-4 and Barnes Yard. Also, UP owns and operates the Industrial Lead from Barnes to South Rivergate providing rail service to the T-5 area, and has rights to operate over the Slough Bridge to provide access to T-6.

UP manages six yards in the Portland area: Albina Yard, Brooklyn Yard, Barnes Yard, South Rivergate, Ramsey Yard and the T-4 St. John's Industrial Yard.

- Albina Yard is a major classification yard located on the east side of the Willamette River under the Fremont Bridge. Switch engines work around the clock seven days a week to build transfers, block for local industry, build several trains daily and fill through trains..
- Brooklyn Yard is an intermodal yard located along McLoughlin Boulevard in SE Portland. All intermodal ramp work is done here.
- Barnes Yard is located west of Penn Junction and serves the heavy-industrial base in the T-4 and T-5 area. This yard temporarily holds soda ash loads and empties, empty auto racks, and cars due to be spotted or recently pulled from South Rivergate and Ramsey.
- South Rivergate Yard at T-5 is a 15-track yard that supports nearby industry. UP is the primary railroad in South Rivergate with BNSF delivering unit trains directly to their customers via Ramsey Yard.
- Ramsey Yard includes two main lead tracks connecting north and south Rivergate plus a recently opened four track storage yard. BNSF uses Ramsey Yard to place bad order empty cars from their T-6 Columbia Grain trains.

- T-4 St. John's Industrial Yard is a staging yard used primarily for soda ash storage for the nearby Kinder-Morgan Facility and car storage for Toyota. Portions of the yard are owned by UP and other portions are owned by the Port of Portland.
- Along the Kenton Main are three CTC sidings, Champ, Hemlock, and Reynolds, used to stage trains en route to Port of Portland destinations, plus a four track yard at Kenton.

Switching Operations in Portland

Both UP and BNSF interchange with each other as well as with the PTRR, the PNWR, and the Peninsula Terminal Railroad (located near North Portland Junction). Delivering railcars to and from the yards described above in above entails the use of yard transfers, which operate primarily between the major yards. Typically, yard transfers operate between Brooklyn and Albina, Brooklyn and Lake Yard, Albina and Lake Yard, and Lake Yard and Vancouver. All interchange between BNSF and UP occur at Lake Yard except for unit trains which interchange at Rivergate on the UP.

The greatest interference between main line operations and yard activity occurs at both ends of Vancouver Yard, the east end of Rivergate's A&B Yards, East St. John's Yard, both ends of Wilbridge Yard, both ends of Lake Yard (all on the BNSF system) and at both ends of UP's Brooklyn Yard. Yard activity is often compromised at these locations. Movement of UP trains on and off the BNSF main track at North Portland Junction is also impeded by operating restrictions over the Columbia River rail bridge and through the Peninsula Tunnel south of Peninsula Junction.

BNSF and UP operational constraints

Senior local management from both railroads has identified locations where current track, signal and operational characteristics are impeding a fluid, efficient terminal operation. Several have an impact on one railroad, but one was identified by both as a major operational constraint. What follows is a "wish list" of improvements the railroads feel would significantly improve their operational efficiency and flexibility.

BNSF and UP operational impacts:

- North and south ends of Lake Yard: Lake Yard is the primary interchange point between BNSF and UP. Currently, access to the yard from both north and south ends is controlled by hand-operated switches with timers. Crews must set the timers and wait several minutes for the timers to run before they can set the switches for the desired train movement. This ties up one of the two main tracks on the Fallbridge Subdivision between the Willamette River Bridge, Portland Union Station, and the primary connection with the UP at the Steel Bridge. In addition to UP and BNSF main line, intermodal and interchange traffic, 10 Amtrak trains per day traverse this line segment. Installation of dispatch-controlled power switches would allow BNSF dispatchers to line movements from their Ft. Worth dispatch center in a fraction of the time currently needed.

BNSF operational constraints:

- Crossovers on the BNSF Fallbridge Subdivision between Willbridge and Vancouver: The Fallbridge Sub is double track, bi-directional CTC along this line segment, providing significant

operational flexibility. The crossovers on this segment, however, are rated for only 10 mph train movement. The 10 daily Amtrak trains are a major user of this line. There are major financial performance incentives and penalties built into the BNSF-Amtrak operating agreement, meaning that BNSF cannot cross an Amtrak train from one main track to another without significantly delaying that Amtrak train and possibly losing the incentive bonus for that train. This basically means that freight traffic in both directions is restricted to only one main line track when Amtrak trains are operating on the Sub, severely restricting the ability of BNSF to route trains in the most efficient manner possible. This also impacts operation of UP trains running under BNSF trackage rights. The installation of higher speed crossovers on this track segment would greatly improve operational flexibility and capacity over this densely-trafficked corridor.

- BNSF unit trains to Columbia Grain on T-5 cannot arrive directly at Columbia Grain because of limited track capacity and rail connection. These trains cannot also arrive directly to South Rivergate Yard without blocking North Rivergate Boulevard for an unacceptable amount of time. BNSF 110-car unit trains for Columbia Grain are pulled across the North Rivergate Boulevard road crossing into South Rivergate Yard. When half of the train is through the crossing the train is stopped and the rear half of the train is left on the south side of the crossing. The front half of the train is pulled completely into South Rivergate Yard. The locomotives are unhooked and run back to the crossing to pull the rest of the train into South Rivergate Yard. When ready, UP spots the grain cars into Columbia Grain for unloading.
- BNSF access to new customers at T-4 and T-5 is limited as they do not have direct access and all switching must be provided by UP. As space is limited (both track storage and lead track), UP is unlikely to agree to serving new customers at T-4 or T-5 where BNSF would perform the line haul and UP the switching, as it would put at risk their ability to serve existing customers for little benefit.

UP operational constraints:

- North Rivergate Boulevard road crossing, south of South Rivergate Yard: Due to the short length of the tracks at Rivergate, inbound trains have to set over to another track and outbound trains have to double over to depart, resulting in the road being blocked for extended periods of time. If a train needs a significant amount of time to be built, air tested and depart, the crossing needs to be left open and a transfer air test is required, adding 3-4 hours to the train's departure time. Consideration should be given to changing the track layout, closing or moving the road or otherwise eliminating the grade crossing.
- UP unit trains to Columbia Grain on T-5 cannot arrive directly at Columbia Grain because of limited track capacity and rail connection. Neither can these trains arrive directly to South Rivergate Yard without blocking North Rivergate Boulevard for an unacceptable amount of time. UP 110-car unit trains for Columbia Grain are pulled across the North Rivergate Boulevard road crossing into South Rivergate Yard. When half of the train is through the crossing the train is stopped and the rear half of the train is left on the south side of the crossing. The front half of the train is pulled completely into South Rivergate Yard. The locomotives are unhooked and run

back to the crossing to pull the rest of the train into South Rivergate Yard. When ready, UP spots the grain cars into Columbia Grain for unloading.

- North Portland Junction crew change: UP needs to change crews at Champ for southbound trains. UP would like the crew change point closer to the junction to speed the crew change process and minimize the delays to both UP and BNSF with the current operation.
- Brooklyn Yard derails: Currently, the north and south switches connecting the yard to the Brooklyn Sub main are power switches, but there are manually operated derails. Installation of power derails would improve yard efficiency significantly and reduce potential delays to Amtrak, UP, BNSF and P&W trains.
- The Barnes Yard Bypass project which was funded by Connect Oregon was shortened in order to avoid purchasing of additional right-of-way for UP. This limits the utility of the bypass track primarily because it must be left open between 2 pm and 10 pm to serve General Motors.
- The 6 mph curves between Albina and East Portland limit the throughput of UP trains in the Portland area. Except for unit trains destined for Puget Sound and unit trains for Rivergate nearly every UP train destined for or pass through Portland must travel over this 6 mph section of track. By plan, UP separates trains by 90 minutes. This equates to 16 trains per day maximum. The UP has a capital project to provide a new southbound connection to the Brooklyn Subdivision from the Kenton Subdivision that will allow five trains per day to avoid this constrained section between Albina and East Portland.

Appendix E: Port of Portland Tenant Interviews

Confidential document on file with the Port of Portland.

Appendix F:
Main Line Capacity Analysis Technical Memorandum
and Portland Rail Forecast

To:	Phil Healy		
From:	Kurt Reichelt	Project:	Port of Portland Rail Plan
Copy:	File		
Date:	October 31, 2012	Job No:	165629
Re:	Task 4.3 Mainline Capacity Analysis		

Background

A Rail Operating Plan has been prepared to analyze the effects of forecast cargo volumes on BNSF Railway (BNSF) and Union Pacific Railroad (UP) trains on the existing mainline infrastructure. The plan has been developed based upon the criteria and methodology as outlined in this memo.

The number of trains that can operate on a corridor is dependent on many factors. Chief among these factors are the physical plant of the railroad (e.g., horizontal and vertical alignment, location of turnouts, interlockings and highway/rail at-grade grade crossings), speed differential between passenger and freight trains and the Method of Operation used. These factors are discussed below.

Physical Plant

Main Tracks

Maximum train speed on main tracks and controlled sidings is governed by curvature, signal spacing and aspects (the color of the signal), ascending and descending grades, and other conditions. Power-operated turnouts are used for all main track crossovers and ends of sidings within the study area. Other turnouts off the main line, such as for industry tracks, are manually operated and equipped with electric locks. Existing main tracks in the project area are maintained to the appropriate Federal Railroad Administration (FRA) track classification for the maximum timetable speed.

Train volumes on a given rail line are limited by factors such as the quantity of main tracks (e.g., 1, 2, or 3), configurations and distances between crossovers (tracks that allow trains to switch from one main track to another), the distance between sidings and the length of each siding, the speed at which trains can enter and leave sidings, average train speeds, signal block spacing, train lengths, and the ability of rail lines or yards at either end of a rail line to accept and release trains to the rail line.

Single Track: As trains will likely move in both directions, train volume on a single-track rail line is limited by the distance between sidings where trains moving in opposite directions can meet and pass. Another factor is the speed at which trains can enter and leave sidings. The maximum capacity of a rail line is usually determined by the two sidings that have the longest “running time” between them. The running time is the time required for an average train beginning from a standing stop at a siding, to; (1) leave the siding, (2) accelerate to its optimal speed, and (3) pass a standing train in the other siding. It is then possible for the second train to leave its siding and enter the single main track moving in the opposite direction. Typically, single track with controlled sidings

located approximately every five miles can handle roughly 35 trains per day. If the distance between sidings is reduced (or, in other words, each siding is lengthened), then the number of trains per day can be increased, approaching the 70 train per day volume usually handled on double-tracked rail lines.

Double-Track. In general terms, a double-track rail line can accommodate twice as much volume as a single-track rail line, and a triple-track rail line three times as much. Triple-track main lines are rare in the United States, and double-track rail lines are only employed on the most important and highest-volume routes. Crossovers between two or more main tracks provide flexibility for rail operations by enabling train dispatchers to move high-priority trains around low-priority trains, and enable trains to continue to move on one track when the other track is blocked. Blockage could be for a train experiencing mechanical problems or by maintenance activities. However, oftentimes there are priority trains moving in both directions and so the opportunity to use the opposing main track to bypass a slower train is rare. Often double-track railroads are operated directionally during peak rail traffic periods. All trains moving in one direction use one of the tracks, and all trains moving in the other direction use the other track. In that scenario, maximum train volume of each track is effectively set by the slowest train moving on the track.

Average train speeds. Train speeds on a rail line are limited by numerous factors, including curvature that limits trains to a maximum safe speed, gradients that consume the train's available horsepower to overcome gravity, the Method of Operation employed by the railroad and the speed limits prescribed by the FRA for that Method of Operation, the weight of the train (trailing tonnage) and the horsepower of the locomotives assigned to pull it. In most cases the average train speed is considerably less than the maximum authorized speed limit for a rail line because most trains must decelerate to enter sidings, leave the track at junctions, enter yards, or wait in sidings for other trains to pass.

Average train lengths. Train lengths are limited by technological, geographic, and physical/economic factors. Technological factors that limit train lengths are principally the strength of the couplings between rail cars, the strength of the rail car body itself, and the characteristics of the air braking system employed by North American railroads. Couplings and car bodies must transmit substantial acceleration and deceleration forces throughout the train without failure and must not transmit excessive forces on the track structure. The braking system is limited by its ability to transmit braking signals (created by a rapid reduction in air pressure in the brake pipe air line) safely and reliably throughout the train, and by cold weather, which degrades the ability to recharge the air brakes after they are applied. Both limits are in relationship to train length.

Geographic factors are principally reflected as gradients where railroads climb or descend hills, and curves both restrict the maximum length of trains.

Physical/economic factors are principally the lengths of sidings, double-track sections, yard tracks, and tracks in other locations where trains meet and pass or interact with other railroads, and the lengths of main track sections where trains stop to await a clear track ahead, and must fit between highway/rail grade crossings to avoid blocking the highway. These factors are physical as well as economic because railroads can and do operate trains at lengths too long to fit into any siding, yard track, or between highway/rail grade crossings. If train volumes are small on a rail line, the economic value to the railroad of operating long trains may be high; conversely, if train volumes are large, the economic value of long trains may be negative. In addition, waiting in a yard for enough rail cars to accumulate in order to operate a long train tends to penalize the shipper of the first cars to be assigned to a particular train as these cars must wait until the last cars arrive. Depending on volumes, this could add a day or two to the shipping times.

Method of Operation

Railroads use different Methods of Operation on different main track segments to satisfy different needs for safety, speed, train volume, ability to efficiently switch industries and side tracks and economic constraints. Typically, the number of trains per day likely to operate on a track segment governs the appropriate Method of Operation to be implemented. Methods of Operation and the train operating rules that underlie them are regulated by the FRA and cannot be modified without application to and approval from the FRA. Operations on each railroad are governed by the General Code of Operating Rules (GCOR), employee timetables, special instructions, air brake and train handling rules, and transportation safety rules.

Centralized Traffic Control: Currently, the Method of Operation for all main tracks in the project area is Centralized Traffic Control (CTC). BNSF and UP dispatchers control train operations on their respective tracks from remote dispatching centers (BNSF's in Fort Worth and Union Pacific's in Omaha). Under CTC rules, train movements are governed by signal aspect only with "instructions" for the proposed movement of trains relayed from the train dispatcher to the train crew by the color and position of the individual signal encountered as the train moves along the track. These signal indications inform the train crew whether or not their train will proceed along the main track or be routed into a siding or yard and what speed is appropriate for the intended movement. CTC is recommended for high volume lines (usually when the forecasted train volume exceeds 12-15 trains per day) as this method of operation provides the train dispatcher the greatest flexibility to handle the ever-changing requirements of dispatching trains efficiently.

Track Warrant Control. Under Track Warrant Control (TWC), trains may enter the main track and proceed only when authorized by the train dispatcher through the issuance of a Track Warrant, a preprinted form. The dispatcher determines the starting and ending limits for each train, and then issues the warrant to each train verbally, typically via radio. When each train has reached the end of its authorized limits, the train crew verbally releases the warrant so that the dispatcher can reissue authorization on that track to another train. Generally switches between tracks on a railroad governed by TWC are hand-operated by the train crew, typically requiring trains to stop to line a switch correctly before entering or leaving a side track. This factor, the requirement to stop to line switches, plus the increased workload on each train dispatcher who must constantly issue these warrants (see below) are major limitations on a rail line's ability to handle more than 12-15 trains per day.

TWC is a highly economical and flexible Method of Operation for rail lines with low to medium train volumes that enables higher maximum train speeds than Yard Limits. The FRA allows train speeds of up to 49 mph (freight trains) and 59 mph (passenger trains) on a rail line operated with TWC that has no signaling system, track conditions and other safety considerations permitting. Instituting TWC requires a very low investment cost in infrastructure. If an automatic block signal system is installed, then train velocities can be increased to a maximum of 60-70 mph for freight trains and 79 mph for passenger trains. TWC has an upper limit on train capacity that is in large part a function of a train dispatchers' workload, as the issuing, releasing, and management of the warrant system is time-consuming. Most railroads use electronic TWC dispatching systems that employ automatic conflict checks and will not allow a train dispatcher to issue warrants that create unsafe conditions.

Yard Limits. Under Yard Limits, trains may enter a main track and proceed at their own discretion. As other trains may also be operating within the same yard and to avoid conflicting movements, train movements are limited to "restricted speed," which is defined as "movement made at a speed that allows stopping within one half the range of vision short of trains, engines, men or equipment on or near the track, stop signals, or improperly lined switches or derails, and in no case exceeding

20 mph.” The one-half the range of vision speed limit minimizes the possibility that two trains approaching each other on the same track will collide.

Yard Limits provides for highly flexible rail operations that are economical and efficient in a small area with frequent switching activities. Instituting Yard Limits requires no significant investment in infrastructure. However, all trains moving on a rail line governed by yard limits are restricted to operate at a velocity not to exceed 20 mph, which greatly limits the volume of trains that can move in a day through a line segment so governed. For instance, if conditions are foggy, then trains operating under Yard limits usually slow to no more than walking speed greatly hampering overall operations.

Rail Operations

The proposed Rail Operating Plan includes both existing 2011 trains and forecast trains in 2020 and 2030. The train forecast is derived from *BST Portland Rail Forecast October 15, 2012* included in Appendix A. The train information analyzed is summarized in Table 1.

Table 1: Rail Operating Plan - 2011 Data

Segment ID	Segment Begin/End	Freight * (Trains/Day)	Z Trains * (Trains/Day)	Passenger * (Trains/Day)	Total Trains/Day
A	Centralia / Centralia South	40	8	10	58
A	Centralia South / Kelso North	40	14	10	64
A	Kelso North / Longview Jct. South	40	14	10	64
A	Longview Jct. South / Kalama North	40	14	10	64
A	Kalama North / MP 110	40	14	10	64
A	MP 110 / Vancouver	40	14	10	64
B	Vancouver / McLoughlin	38	6	2	46
B	McLoughlin / Avery	38	6	2	46
C	Vancouver / N. Portland Jct	25	6	12	43
D	Portland Union Station / N. Portland Jct	8	4	12	24
E	N. Portland Jct. / Peninsula Jct.	8	8	0	16
F	Peninsula Jct. / Albina	10	10	0	20
F	Albina / E. Portland	10	10	0	20
G	E. Portland / Portland Union Station	6	0	8	14
H	E. Portland / Troutdale	6	4	0	10
I	Peninsula Jct. / Kenton	18	6	0	24
I	Kenton / Troutdale	18	6	0	24
J	Troutdale / W. Sandy	24	10	0	34
J	W. Sandy / W. Crates	24	10	0	34
K	Willsburg Jct. / E. Portland	16	10	6	32
L	Willsburg Jct. / E. Clackamas	14	6	6	26
L	E. Clackamas / Eugene Station	14	6	6	26

* The average train lengths by train type are assumed to be Freight Trains 6,000 feet, Z Trains – 5,500 feet, and Passenger Trains – 900 feet

Table 2: Rail Operating Plan - 2020 Forecast

Segment ID	Segment Begin/End	Freight * (Trains/Day)	Z Trains * (Trains/Day)	Passenger * (Trains/Day)	Total Trains/Day
A	Centralia / Centralia South	49	12	14	75
A	Centralia South / Kelso North	49	18	14	81
A	Kelso North / Longview Jct. South	50	18	14	82
A	Longview Jct. South / Kalama North	55	18	14	87
A	Kalama North / MP 110	55	18	14	87
A	MP 110 / Vancouver	55	18	14	87
B	Vancouver / McLoughlin	52	9	2	63
B	McLoughlin / Avery	52	9	2	63
C	Vancouver / N. Portland Jct	31	10	16	57
D	Portland Union Station / N. Portland Jct	11	4	16	31
E	N. Portland Jct. / Peninsula Jct.	11	11	0	22
F	Peninsula Jct. / Albina	7**	12	0	24
F	Albina / E. Portland	7**	12	0	24
G	E. Portland / Portland Union Station	7	0	12	19
H	E. Portland / Troutdale	13**	4	0	12
I	Peninsula Jct. / Kenton	15**	7	0	27
I	Kenton / Troutdale	15**	7	0	27
J	Troutdale / W. Sandy	31	13	0	44
J	W. Sandy / W. Crates	31	13	0	44
K	Willsburg Jct. / E. Portland	18	13	10	41
L	Willsburg Jct. / E. Clackamas	16	8	10	34
L	E. Clackamas / Eugene Station	16	8	10	34

* The average train lengths by train type are assumed to be Freight Trains 7,000 feet, Z Trains – 5,500 feet, and Passenger Trains – 900 feet

** Assumes construction of East Portland connection and re-route of five freight trains per day from the Kenton to Graham Line.

Table 3: Rail Operating Plan - 2030 Forecast

Segment ID	Segment Begin/End	Freight * (Trains/Day)	Z Trains * (Trains/Day)	Passenger * (Trains/Day)	Total Trains/Day
A	Centralia / Centralia South	55	16	26	97
A	Centralia South / Kelso North	56	22	26	104
A	Kelso North / Longview Jct. South	56	22	26	104
A	Longview Jct. South / Kalama North	63	22	26	111
A	Kalama North / MP 110	63	22	26	111
A	MP 110 / Vancouver	63	22	26	111
B	Vancouver / McLoughlin	61	12	2	75
B	McLoughlin / Avery	61	12	2	75
C	Vancouver / N. Portland Jct	36	16	28	80
D	Portland Union Station / N. Portland Jct	14	4	28	46
E	N. Portland Jct. / Peninsula Jct.	12	15	0	27
F	Peninsula Jct. / Albina	8**	15	0	28
F	Albina / E. Portland	8**	15	0	28
G	E. Portland / Portland Union Station	7	0	14	21
H	E. Portland / Troutdale	14**	6	0	15
I	Peninsula Jct. / Kenton	16**	10	0	31
I	Kenton / Troutdale	16**	10	0	31
J	Troutdale / W. Sandy	35	17	0	52
J	W. Sandy / W. Crates	35	17	0	52
K	Willsburg Jct. / E. Portland	18	19	12	49
L	Willsburg Jct. / E. Clackamas	16	11	12	39
L	E. Clackamas / Eugene Station	16	11	12	39

* The average train lengths by train type are assumed to be Freight Trains 7,500 feet, Z Trains – 5,500 feet, and Passenger Trains – 900 feet
Passenger Trains – 900 feet

** Assumes construction of East Portland connection and re-route of five freight trains per day from the Kenton to Graham Line.

The average train speeds for each segment varied by train type and operating railroad timetable speed restrictions. The average train speeds are included in the LOI analysis results.

Line Occupancy Index Analysis

Line Occupancy Indexes (LOIs) are an empirical analysis tool that compares a rail line's nominal (or "standard") train capacity as a function of its number of main tracks, method of operation, and maximum track speeds with the actual number of trains that will occupy the rail line. The maximum available occupancy per day is adjusted based on type of train movement authority and non-through train movements which consume track capacity. Train movement authority adjustments for CTC and TWC are 0.8 and 0.6 respectively. Non-through train movements (such as locals, on-line switching and so forth) are based on input from local operating staff regarding how much time is spent performing switching and yard transfers. LOI typically breaks the rail line into segments having similar features such as train volumes, Methods of Operation, and double-track versus single-track sections. A rail line or line segment with an LOI of 50 implies the line is handling 50 percent of its maximum practical train capacity. Highway transportation officials use a similar categorization of capacity defined as Level of Service (LOS). LOI values (and the comparable LOS designation) can be described as follows:

- ◆ Values between 0 and 39 (LOS = A & B) indicate that the rail line segment has adequate capacity for additional train traffic and to perform track, structure, and signal maintenance.

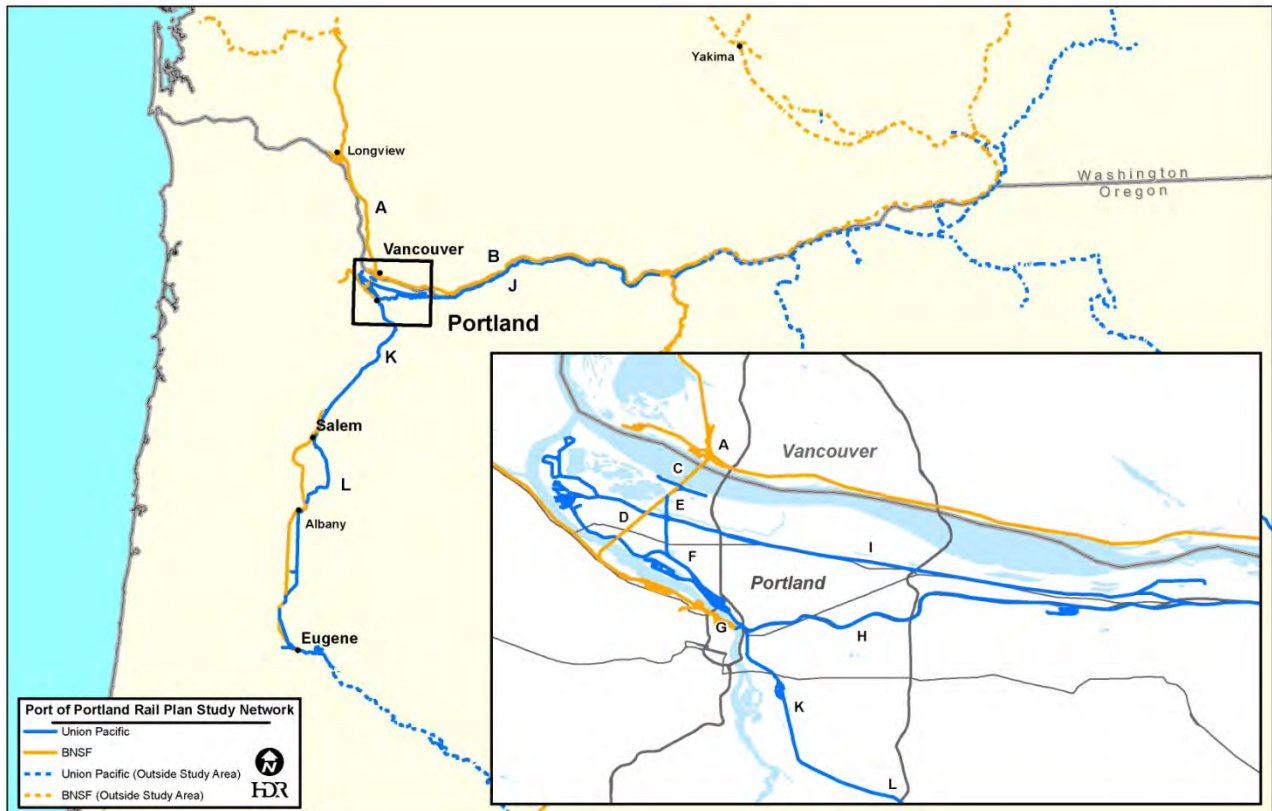
- ◆ Values between 40 and 69 (LOS = C & D) indicate that the rail line segment is reaching an upper threshold for adding more train traffic, and maintenance activities will need to be carefully scheduled to avoid excessive interruption to train traffic.
- ◆ Values between 70 and 100 (LOS = E & F) indicate that the rail line segment has exceeded its practical capacity and maintenance activities will likely result in interruption and delays to train traffic, rerouting of train traffic to other lines, temporary reductions in rail service levels offered to shippers, or all three.

While rail lines with LOIs greater than 70 are operated successfully, they are generally considered impractical by the rail industry. They allow insufficient time for track maintenance and have insufficient spare capacity to make up for unforeseen rail service interruptions and fluctuations in rail traffic. Rail line capacity that is not used one day is lost forever, and if the trains that were to operate that day appear the next day, along with the next day's trains, a rail line with a high LOI may not have the ability to recapture the lost capacity for a considerable period of time. In addition, trains that cannot be accepted on a rail line with a high LOI must wait somewhere, using up additional capacity and effectively increasing the LOI on adjoining rail lines for a considerable distance.

Using the Rail Operating Plan (which includes existing trains), HDR performed an independent Line Occupancy Index (LOI) for the project rail network. The Line Segment Map is shown in Figure 1 on the next page.

The LOI analysis focused primarily on train speed and length, track speed, number of main tracks, number of sidings, and other related factors that may affect capacity, such as the amount of switching work to be performed while occupying the main line. External factors such as the number of bridge lifts, Amtrak stops, and industry switching on mainline are also included.

Figure 1: Line Segment Map



LOI Calculations

The LOI calculations are included in the attached appendix.

LOI Results

Existing - Existing infrastructure and 2011 Trains

The results of the LOI analysis for existing 2011 trains summarized in Table 4 and detailed in Appendix A.

Table 4: Line Occupancy Index Table - 2011

Segment ID	Begin Station	End Station	Miles	# of Tracks	# of Sidings	Avg. Occupancy (%)
A	Centralia	Centralia South	2.90	2	0	43.9
A	Centralia South	Kelso North	38.66	2	0	43.9
A	Kelso North	Longview Jct. South	4.79	2	0	55.2
A	Longview Jct. South	Kalama North	3.52	2	0	44.3
A	Kalama North	MP 110	4.28	2	0	52.4
A	MP 110	Vancouver	26.55	2	0	39.8
B	Vancouver	McLoughlin	4.90	2	0	30.4
B	McLoughlin	Avery	87.60	1	7	45.9
C	Vancouver	N. Portland Jct	1.80	2	0	30.8
D	Portland Union Station	N. Portland Jct	8.10	2	0	39.2
E	N. Portland Jct.	Peninsula Jct.	0.95	1	0	21.9
F	Peninsula Jct.	Albina	3.06	1	0	53.4
F	Albina	E. Portland	1.62	2	0	63.9
G	E. Portland	Portland Union Station	0.39	1	0	30.7
H	E. Portland	Troutdale	14.62	1	0	32.0
I	Peninsula Jct.	Kenton	3.20	1	0	51.5
I	Kenton	Troutdale	13.16	1	4	21.9
J	Troutdale	W. Sandy	0.71	1	0	27.6
J	W. Sandy	W. Crates	65.69	1	6	41.2
K	Willsburg Jct.	E. Portland	5.06	2	0	45.4
L	Willsburg Jct.	E. Clackamas	4.11	1	0	56.1
L	E. Clackamas	Eugene Station	113.53	1	12	39.4

Future

Funded mainline infrastructure and 2020 and 2030 Trains

The mainline infrastructure analyzed assumes the completion of the following known projects:

- WSDOT / BNSF Higher Speed Intercity Passenger Rail(HSIPR) – Vancouver Bypass
- WSDOT / BNSF HSIPR – Vancouver New Middle Lead
- WSDOT / BNSF HSIPR - Kelso to Martin's Bluff – Toteff Siding
- WSDOT / BNSF HSIPR - Kelso to Martin's Bluff – New Siding
- WSDOT / BNSF HSIPR - Kelso to Martin's Bluff – Kelso to Longview Jct.
- ODOT / BNSF HSIPR – Willbridge Crossovers
- UP – Graham Line Mid-Point Siding, 10,000 feet long
- UP – E. Portland Connection between Graham Line and Brooklyn Subdivision.
- UP – Second mainline construction 4.1 miles between Willsburg Jct. and Clackamas

The train forecast is derived from *BST Portland Rail Forecast October 15, 2012* included in Appendix A. The BST forecast of train counts was adjusted to reflect the assumed rerouting of five trains per day from the Kenton to Graham Line upon completion of the East Portland Connection which will provide a southbound connection to the Brooklyn Subdivision from the Graham Line. The 2020 and 2030 train counts are summarized in Figure 2.

Figure 2: Portland Rail Forecast 2020, 2030

	Segment	2020 Train Count					Segment	2030 Train Count				
		Passenger	Z Trains	Freight	Total			Passenger	Z Trains	Freight	Total	
Nisqually / Centralia (BNSF)	A1	14	12	49	75		A1	26	16	55	97	
Centralia / Kelso South (BNSF)	A2	14	18	49	81		A2	26	22	56	104	
Kelso South / Longview Junction (BNSF)	A3	14	18	50	82		A3	26	22	56	104	
Longview Junction / Vancouver (BNSF)	A4	14	18	55	87		A4	26	22	63	111	
Vancouver / Wishram (BNSF)	B	2	9	52	63		B	2	12	61	75	
Vancouver / North Portland Junction (BNSF)	C	16	10	31	57		C	28	16	36	80	
North Portland Junction / Portland Union Station (BNSF)	D	16	4	11	31		D	28	4	14	46	
North Portland Junction / Peninsula Jct (BNSF)	E	0	11	11	22		E	0	15	12	27	
Peninsula Jct. / E. Portland (UP)	F	0	12	7	19		F	0	15	8	23	
E. Portland / Portland Union Station (UP)	G	12	0	7	19		G	14	0	7	21	
E. Portland / Troutdale (UP)	H	0	4	13	17		H	0	6	14	20	
Peninsula Jct. / Troutdale (UP)	I	0	7	15	22		I	0	10	16	26	
Troutdale / Biggs (UP)	J	0	13	31	44		J	0	17	35	52	
E. Portland / Willsburg Jct (UP)	K	10	13	18	41		K	12	19	18	49	
Willsburg Jct / Eugene Station (UP)	L	10	8	16	34		L	12	11	16	39	
Total					694						874	

LOI Results -2020

The results of the LOI analysis for existing 2020 trains summarized in Table 5 and detailed in Appendix A.

Table 5: Line Occupancy Index Table - 2020

Segment ID	Begin Station	End Station	Miles	# of Tracks	# of Sidings	Avg. Occupancy (%)
A	Centralia	Centralia South	2.90	2	0	52.8
A	Centralia South	Kelso North	38.66	2	0	56.0
A	Kelso North	Longview Jct. South	4.79	3	0	47.3
A	Longview Jct. South	Kalama North	3.52	2	0	61.0
A	Kalama North	MP 110	4.28	3	0	46.0
A	MP 110	Vancouver	26.55	2	0	54.8
B	Vancouver	McLoughlin	4.90	2	0	42.1
B	McLoughlin	Avery	87.60	1	7	63.0
C	Vancouver	N. Portland Jct	1.80	2	0	42.9
D	Portland Union Station	N. Portland Jct	8.10	2	0	50.6
E	N. Portland Jct.	Peninsula Jct.	0.95	1	0	30.9
F	Peninsula Jct.	Albina	3.06	1	0	53.6
F	Albina	E. Portland	1.62	2	0	63.3
G	E. Portland	Portland Union Station	0.39	1	0	44.9
H	E. Portland	Troutdale	14.62	1	1	55.8
I	Peninsula Jct.	Kenton	3.20	1	0	44.9
I	Kenton	Troutdale	13.16	1	4	18.7
J	Troutdale	W. Sandy	0.71	1	0	32.8
J	W. Sandy	W. Crates	65.69	1	6	50.5
K	Willsburg Jct.	E. Portland	5.06	2	0	62.3
L	Willsburg Jct.	E. Clackamas	4.11	2	0	38.9
L	E. Clackamas	Eugene Station	113.53	1	12	44.3

LOI Results -2030

The results of the LOI analysis for existing 2030 trains summarized in Table 6 and detailed in Appendix A.

Table 6: Line Occupancy Index Table - 2030

Segment ID	Begin Station	End Station	Miles	# of Tracks	# of Sidings	Avg. Occupancy (%)
A	Centralia	Centralia South	2.90	2	0	80.1
A	Centralia South	Kelso North	38.66	2	0	73.3
A	Kelso North	Longview Jct. South	4.79	3	0	66.0
A	Longview Jct. South	Kalama North	3.52	2	0	86.5
A	Kalama North	MP 110	4.28	3	0	64.3
A	MP 110	Vancouver	26.55	2	0	68.8
B	Vancouver	McLoughlin	4.90	2	0	51.0
B	McLoughlin	Avery	87.60	1	7	74.9
C	Vancouver	N. Portland Jct	1.80	2	0	68.8
D	Portland Union Station	N. Portland Jct	8.10	2	0	39.1
E	N. Portland Jct.	Peninsula Jct.	0.95	1	0	40.0
F	Peninsula Jct.	Albina	3.06	1	0	69.4
F	Albina	E. Portland	1.62	2	0	78.8
G	E. Portland	Portland Union Station	0.39	1	0	51.5
H	E. Portland	Troutdale	14.62	1	1	66.4
I	Peninsula Jct.	Kenton	3.20	1	0	55.2
I	Kenton	Troutdale	13.16	1	4	22.4
J	Troutdale	W. Sandy	0.71	1	0	41.4
J	W. Sandy	W. Crates	65.69	1	6	59.7
K	Willsburg Jct.	E. Portland	5.06	2	0	63.0
L	Willsburg Jct.	E. Clackamas	4.11	2	0	45.8
L	E. Clackamas	Eugene Station	113.53	1	12	51.8

LOI Conclusions

Year 2020

Based on the LOI analysis, no segments appear to exceed practical capacity. The identified improvements which are assumed to be completed by 2020 will address the segments which were approaching practical capacity by adding infrastructure, reducing system delays, re-routing trains, or combinations of all three.

Year 2030

Based on the LOI analysis, five segments appear to exceed practical capacity based on the forecast train volumes unless additional capacity is increased by adding infrastructure, reducing system delays, re-routing trains, or combinations of all three. The five segments are:

- Centralia to Centralia South
- Centralia South to Kelso North
- Longview Jct. South to Kalama North

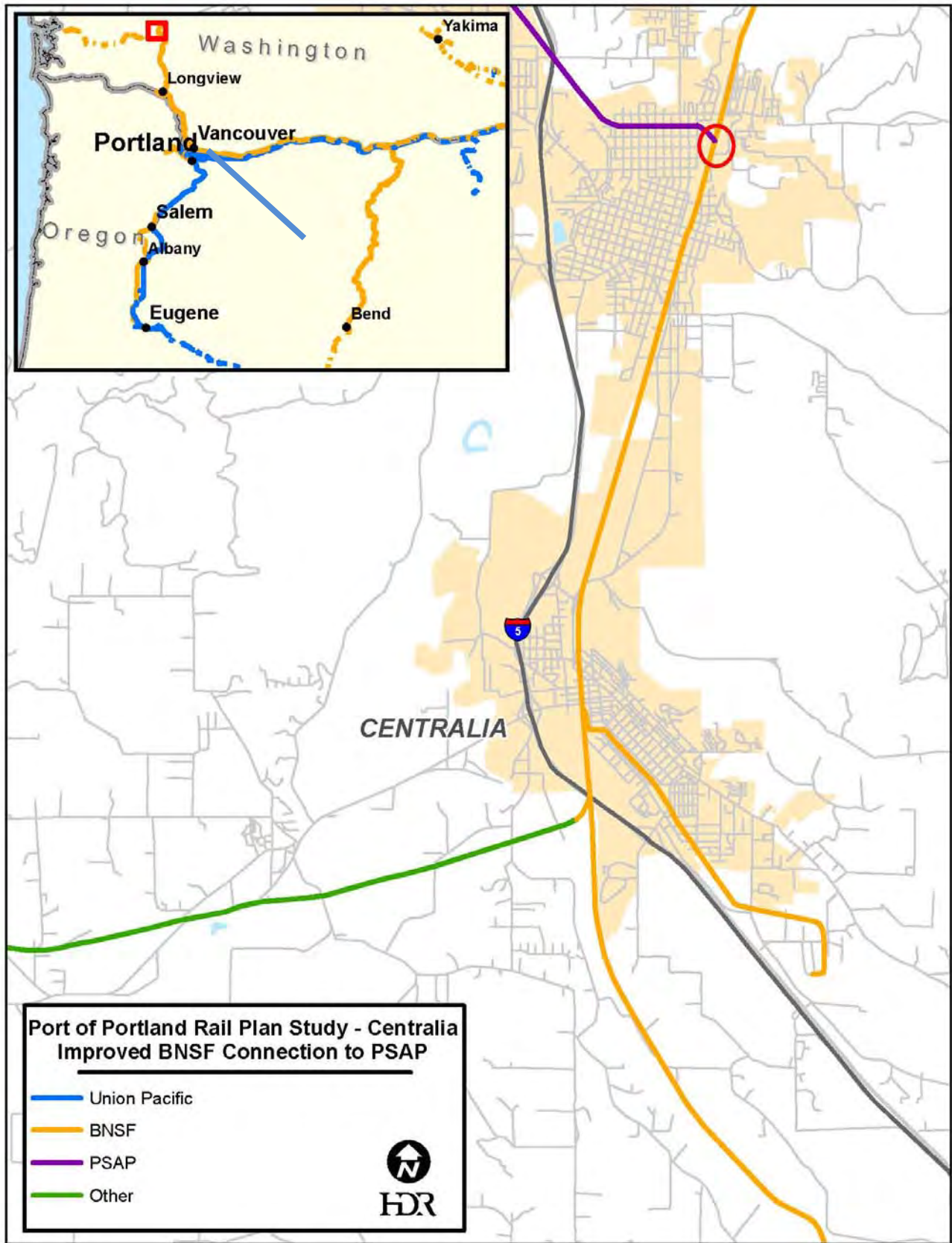
- McLoughlin to Avery
- Albina to East Portland

Following is a more detailed analysis of the situation at each location and potential solutions.

Centralia to Centralia South

The LOI in 2030 for this 2.9 mile single track segment is 86.5. The primary reasons for the high LOI are:

- 30-minute delays for each train entering and leaving the BNSF main line at Centralia Jct. to connect with the Puget Sound and Pacific Railroad (PSAP) at Centralia destined for Grays Harbor
- 5-minute delays for each Amtrak train stop at the mainline station



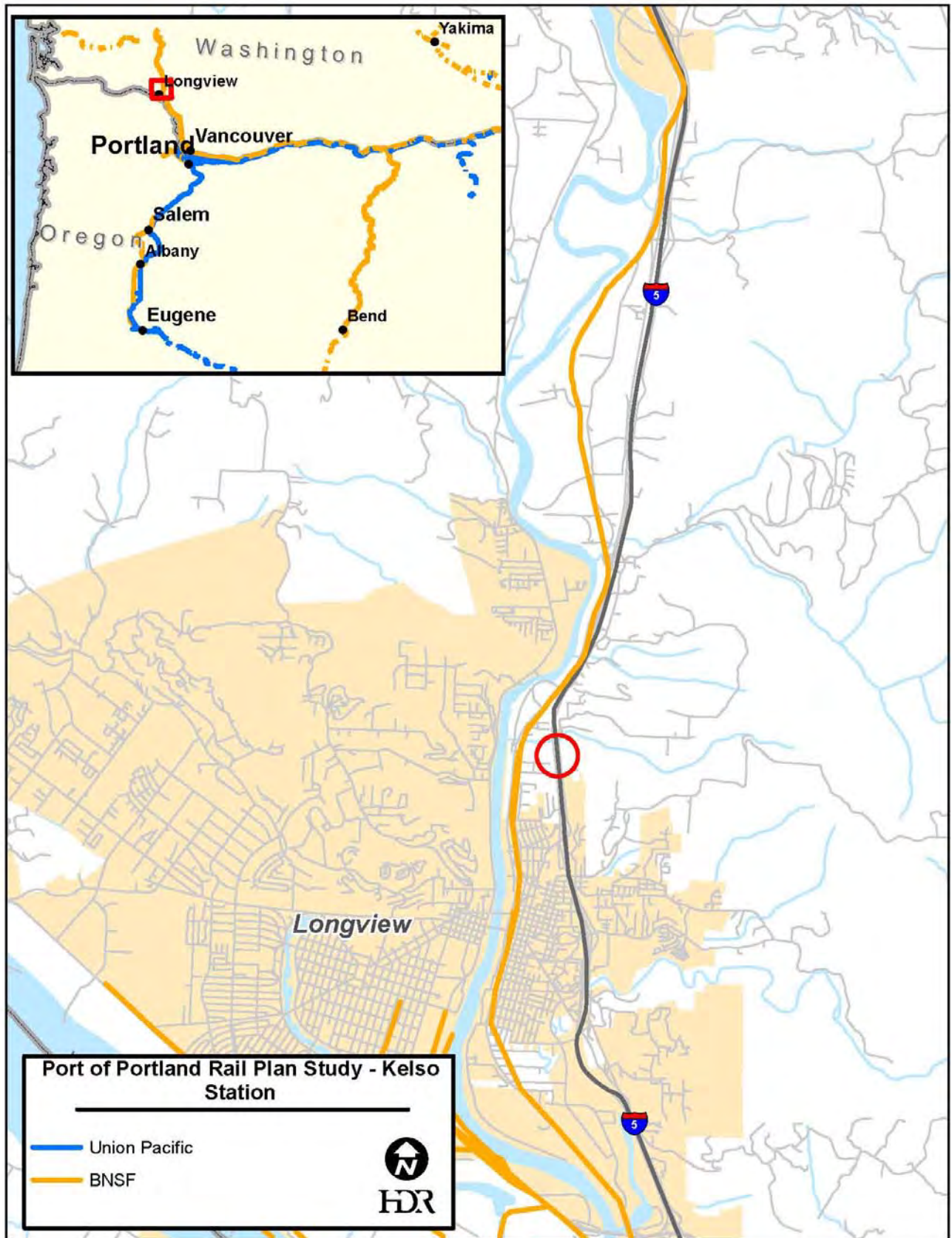
These problems were identified in study by WSDOT called the *Centralia/Chehalis Junction Rail Study, February 2006*. The primary reason for study was to reduce at-grade crossing blockages of Reynolds Avenue on the PSAP approximately 2 miles from the PSAP connection to BNSF in Centralia. BNSF has two mainline tracks through Centralia. The PSAP connects to BNSF Mainline 1 track from the west at Centralia Jct at a restricted speed of 10 mph. The Centralia Amtrak station, with a main line platform, is also located on the west side of Mainline 1 approximately 850 feet south of the PSAP connection. As a result, trains that are arriving or departing PSAP at Centralia going 10 mph must be closely coordinated with Amtrak train schedules. The study team recommended, with a consensus by key stakeholders, a four phase project which would address the problems identified by the study. The second phase, which could be a stand alone project, constructs a third mainline track, builds a depot platform and a pedestrian overpass. In 2006, the estimated cost for this phase of the project was \$12.4M.

This project would eliminate the mainline delay associated with trains going or coming from PSAP and the five-minute delay per Amtrak train associated with the Centralia Station stop. The resulting LOI for this segment would be reduced from 86.5 to 55.9.

Centralia South to Kelso North

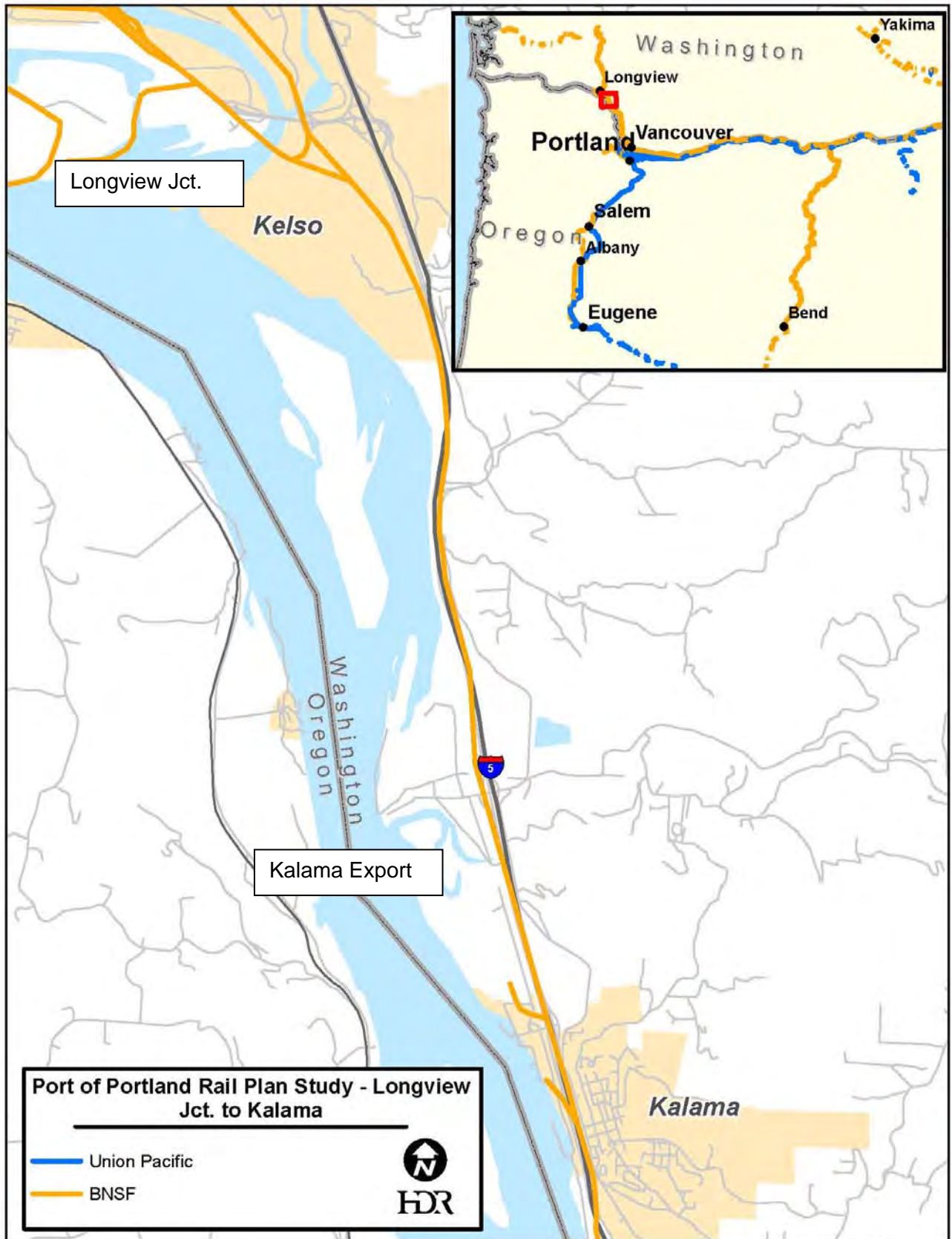
The LOI in 2030 for this 38.66 miles double track segment is 73.3. The primary reason for the high LOI is the five-minute delay for each Amtrak train stop at the Kelso main line station. BNSF has two main tracks through Kelso at the location of the station, with Amtrak platform only on the northbound track, meaning all southbound trains must cross over to the north main to entrain and detrain passengers. Approximately 100 feet south of the Kelso station platform, located east of Mainline 2, the third mainline track begins. (The siding track will be upgraded to mainline standards as part of HSIPR Kelso to Martins Bluff Kelso to Longview Jct. project)

Two options exist for addressing this capacity constraint. One option is to move the No. 24 turnout off Main 1 to the third mainline track north of the Kelso station. This would eliminate the five-minute delay associated with Amtrak trains occupying the mainline, reducing the LOI for this segment from 73.3 to 70.0. The second option, which is part of the WSDOT Amtrak Cascades Long Range Plan, is to build a center platform with pedestrian overpass. As option two is already planned, no project will be submitted for further consideration.



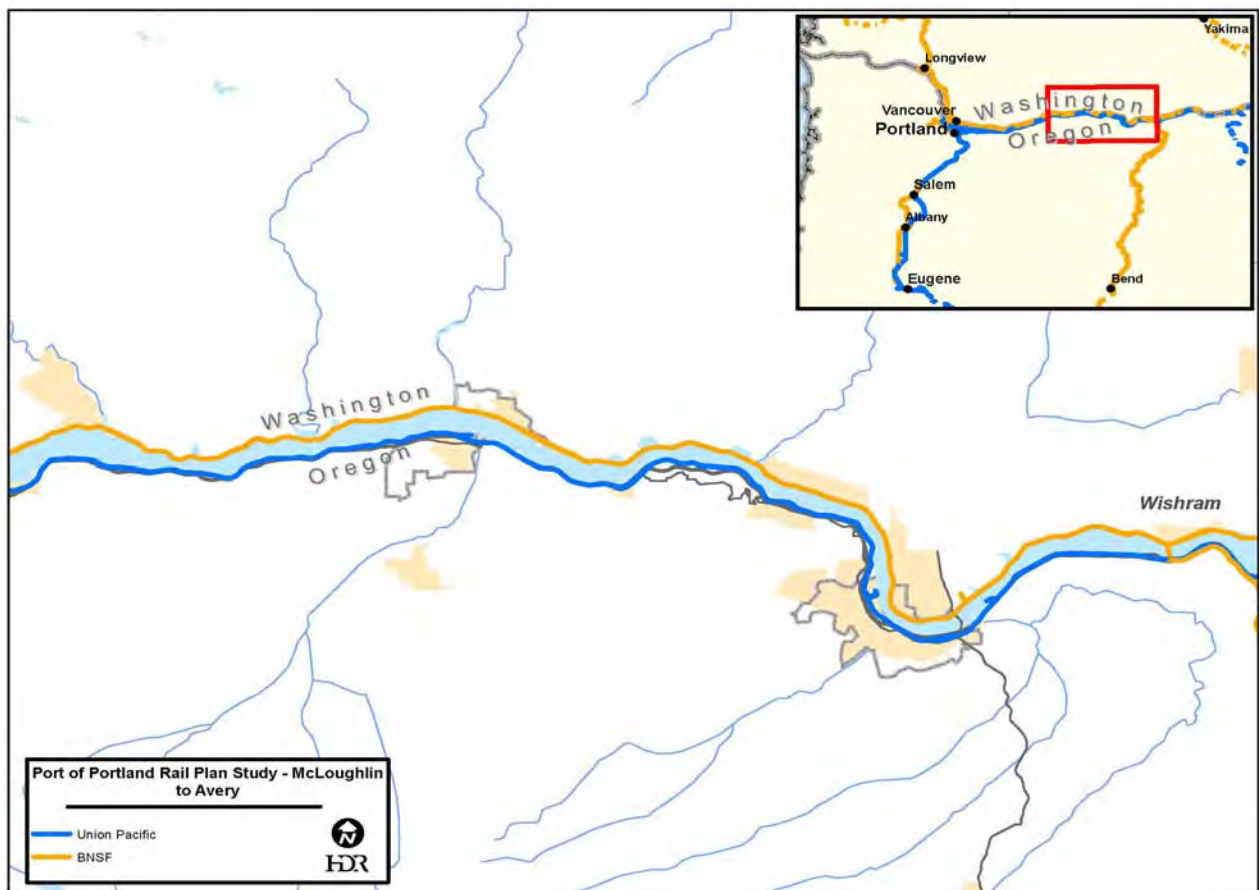
Longview Jct. South to Kalama North

The LOI in 2030 for this 3.52 mile double track segment is 86.5. The primary reason for the high LOI is the lack of main line capacity available, with only two mainline tracks. This 3.52 mile segment will limit the overall sustainable mainline capacity north of Vancouver to about 68 trains per day. BNSF, however, has performed their own dynamic simulation of projected future freight and passenger operations on this segment and has determined that this section of main line can remain double tracked. Therefore, the BNSF analysis is given credence over the LOI and no improvement project will be considered as part of this analysis.



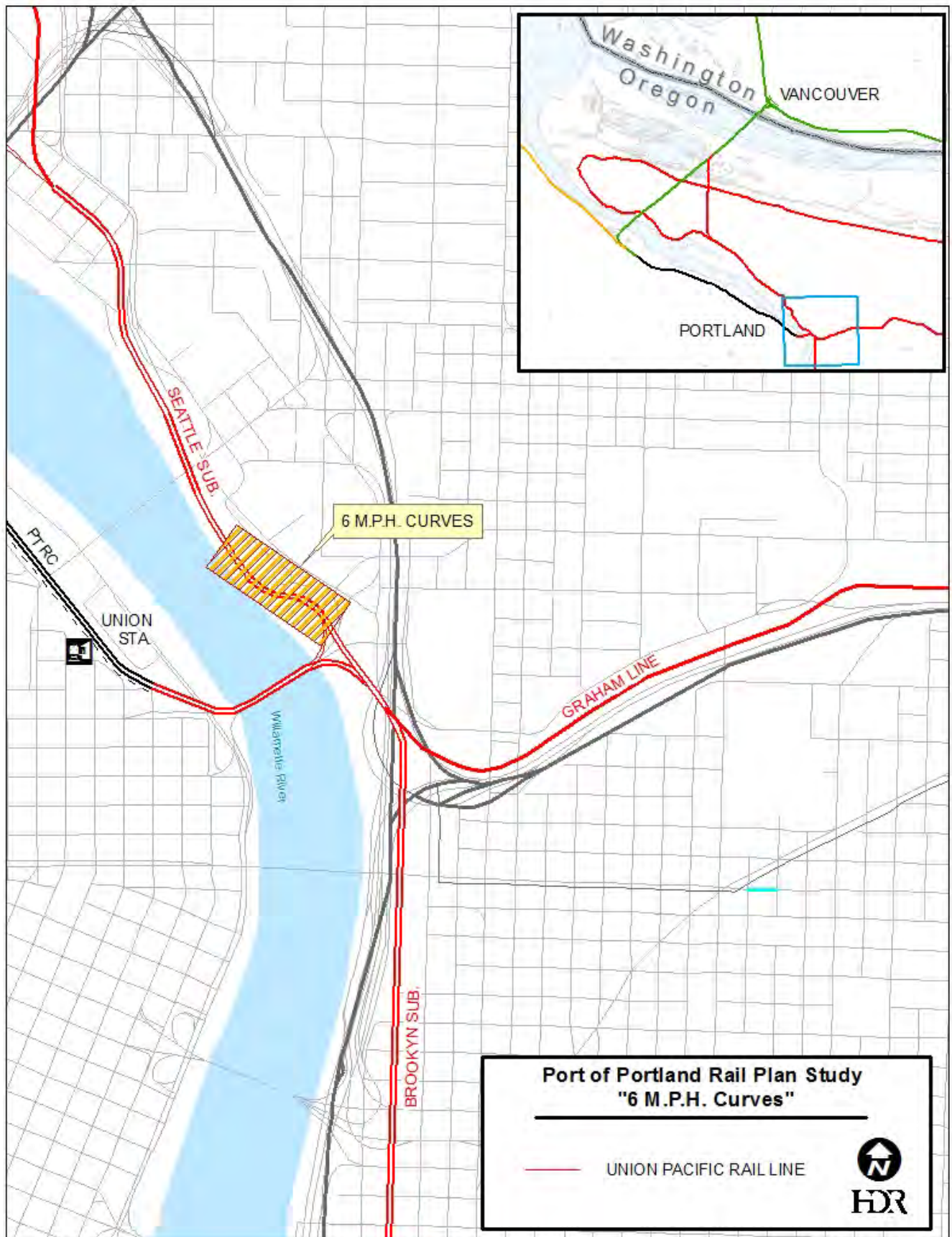
McLoughlin to Avery

The LOI in 2030 for this 87.6 mile segment of single track with seven sidings east of Vancouver, WA along the Columbia River Gorge is 74.9. The primary reason for the high LOI is the lack of mainline capacity provided, with only one main track and sidings located every 12.5 miles apart. The *Pacific Northwest Marine Cargo Forecast Update and Rail Capacity Assessment Final Report, December 2011* identified similar findings, stating that the full capacity of the line would be reached in 2025. The report goes on to state that BNSF will address the capacity constraint through a combination of siding extensions and revised operating protocols. When interviewed recently, BNSF confirmed this conclusion but stated they had not yet identified the location of siding extensions which they would include in their capital investment program.



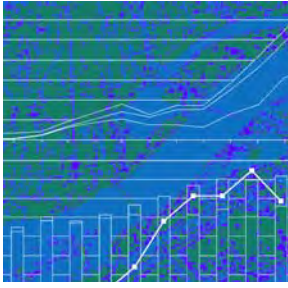
Albina to E. Portland

As identified in the I-5 Trade Corridor Rail Capacity Improvements study. It is also known colloquially as the “6 MPH Curves”, “LDC Curves”, or “Thunderbird Curves”. Functionality of the double track main line between Albina and Willsburg Jct. was recently improved by the implementation of CTC from Willsburg Jct. to East Portland. However, track speed between Albina and East Portland is only 6 MPH due to relatively sharp opposing curvature through this stretch of track. Consequently, all trains operate at this slow speed through this area and additional crossovers are needed to efficiently move trains from Albina to Willsburg Jct. If the track is realigned and the track speed increased to 20 mph it is estimated the LOI would be improved to 24.3.



Recommendations

The projects identified in this technical memorandum will be further developed in Task 4.4 Build-Out Alternatives to Meet Study Area Rail Needs.



Portland Rail Forecast

Final Report

PREPARED FOR

PREPARED BY

BST Associates
PO Box 82388
Kenmore, WA 98028-0388
(425) 486-7722
bstassoc@seanet.com

October 15, 2012

BST Associates
Market Research & Strategic Planning

Table of Contents

Executive Summary	2
Cargo Forecasts	2
Overview of Rail Line Segments.....	2
Rail Forecast Details.....	4
Passenger	4
Z-Train	4
Freight.....	5
Rail Forecast by Line Segment.....	6

List of Tables

Table 1: Key Mainline Segments.....	3
Table 2: Number of Trains by Line Segment – Mid-Range Forecast.....	7
Table 3: Number of Trains by Line Segment – High Forecast.....	8

Executive Summary

BST Associates was retained by the Port of Portland to produce forecasts of rail traffic in the Portland region. Because a substantial share of rail traffic in the region is related to port activities, the first step in this analysis was to produce updated forecasts of port volumes, based on recent analyses. Based on the projected cargo volumes and the origin/destination of the cargo, forecasts were developed for the average daily number of trains expected to operate on key mainline segments.

Cargo Forecasts

A substantial share of the cargo handled by ports in the Pacific Northwest is transported to or from the ports by rail, and much of this rail traffic is routed through the Portland region. The major port-related cargo types that are transported by rail include international containers, import and export automobiles, and export dry bulk commodities (including grain and oilseeds, potash, soda ash, coal, and others), as well as various other commodities. Growth rates for these cargoes were based on those developed for recent studies, including the *West Hayden Island Marine Cargo Forecasts & Capacity Assessment*¹ and *Pacific Northwest Marine Cargo Forecast Update and Rail Capacity Assessment*². These forecast rates were updated based on recent information about potential new cargo volumes.

In addition to the port-related traffic, domestic cargo generates growing volumes of rail traffic. Key domestic cargo types include containers, automobiles, forest products, chemicals and petroleum products, and frozen commodities, among others. For this forecast, the growth rates for domestic traffic were the same as those developed for the *Pacific Northwest Marine Cargo Forecast and Rail Capacity Assessment*, and which were applied to updated baseline numbers supplied by the railroads.

Passenger trains also use the Portland area rail system, with most of the traffic moving north-south. Forecasts of growth in passenger traffic used in this analysis were based on plans developed by the States of Washington and Oregon along with Amtrak.

Overview of Rail Line Segments

As noted above, much of the port-related rail traffic in the Pacific Northwest is routed through the Portland region by the Union Pacific Railroad (UP) and BNSF Railway (BNSF).

Most of the bulk traffic and a large share of intermodal traffic moves through the Columbia River Gorge, with UP traffic moving along the Oregon side of the Columbia River between Biggs and Portland and the BNSF traffic moving along the Washington side of the river between Vancouver and Pasco. At Portland, UP traffic moving to or from Washington ports crosses the Columbia River on the BNSF-owned Columbia River Bridge, while BNSF traffic serving the Port of Portland and other customers in Oregon also uses the bridge.

¹ *West Hayden Island Marine Cargo Forecasts & Capacity Assessment*, April 2010, BST Associates for the City of Portland

² *Pacific Northwest Marine Cargo Forecast Update and Rail Capacity Assessment*, December 2010, BST Associates & Mainline Management, for the Pacific Northwest Rail Coalition (Ports of Portland, Vancouver, Kalama, Longview, Grays Harbor, Tacoma, Seattle, and Everett)

In addition to the east-west rail traffic moving through the Gorge, a variety of trains move north-south through the Portland area, including passenger trains, domestic intermodal trains serving the I-5 corridor, and various types of freight trains serving the Willamette Valley, Oregon Coast, and other points.

The rail cargo forecasts presented in this report were allocated to key mainline rail segments. These segments include the UP and BNSF corridors through the Columbia River Gorge, the UP system south of Portland, and the BNSF system north of Portland, as well as the lines running between the major rail junctions in the Portland area. The segments used in this analysis are listed in Table 1.

Table 1: Key Mainline Segments

Line Segment	End Point 1	End Point 2	Railroad
A1	Nisqually	Centralia	BNSF
A2	Centralia	Kelso South	BNSF
A3	Kelso South	Longview Junction	BNSF
A4	Longview Junction	Vancouver	BNSF
B	Vancouver	Wishram	BNSF
C	Vancouver	North Portland Junction	BNSF
D	North Portland Junction	Portland Union Station	BNSF
E	North Portland Junction	Peninsula Junction	BNSF
F	Peninsula Junction	East Portland	UP
G	East Portland	Portland Union Station	UP
H	East Portland	Troutdale	UP
I	Peninsula Junction	Troutdale	UP
J	Troutdale	Biggs	UP
K	East Portland	Willsburg Junction	UP
L	Willsburg Junction	Eugene Station	UP

Source: HDR, Inc.

Rail Forecast Details

The forecasts of rail traffic were grouped into three general train types, and then allocated to key mainline rail segments. The train types that were used included:

- Passenger,
- Z train, and
- Freight

Passenger trains include the long-distance Amtrak trains as well as the inter-city regional rail service that operates between Eugene, Oregon and Vancouver, British Columbia. It does not include the light rail, commuter rail, or streetcars operated by Tri-Met in the Portland area.

The Z train designation is used to describe high-priority freight trains, including those carrying containers, trailers, and automobiles.

The freight category includes all other train types, such as manifest freight (multiple car types and commodities), dry bulk unit trains (i.e. grains, metal ores, minerals, fertilizers, coal, and others), liquid bulk trains (i.e. crude oil, petroleum products, chemicals and like products).

Passenger

Forecasts of growth in passenger traffic used in this analysis were based on plans developed by the States of Washington and Oregon along with Amtrak. There are currently 10 trains per day between Seattle and Portland, six between Portland and Eugene, and two between Chicago and Portland via the BNSF Columbia Gorge line. State rail plans call for the number of Seattle-Portland passenger trains to increase to 14 in 2020 and 26 in 2030. Between Portland and Eugene the number of passenger trains is projected to grow to 10 in 2020 and 12 in 2030. The number of passenger trains in the Columbia Gorge is not projected to change.

Z-Train

International Containers

Growth rates for international containers were taken from the *Pacific Northwest Marine Cargo Forecast Update and Rail Capacity Assessment*, which was completed in December 2011. These rates were then modified based on input from railroad representatives. Average annual growth rates for rail movements of international containers between 2011 and 2030 were estimated to be:

- 2.5 percent annual growth under the mid-range growth forecast, and
- 5.1 percent annual growth under the high growth forecast.

Most of the international containerized traffic is handled by the Ports of Tacoma and Seattle, with Portland handling a smaller share.

Domestic Intermodal

Domestic intermodal traffic has seen steady gains in recent years, a trend that is expected to continue. Projected growth rates for domestic intermodal were:

- 2.5 percent annual growth under the moderate growth forecast, and
- 3.5 percent annual growth under the high growth forecast.

Automobiles

Automobiles move both to and from the Pacific Northwest by rail. Pacific Northwest ports have a long history of handling imports of fully-assembled automobiles, with a large share of the trade moving through Portland and Vancouver. In addition to imports, U.S.-made vehicles are exported through some ports in the region. The shipment of vehicles from North American assembly plants to the Pacific Northwest for selling in the local market also generates rail traffic. Projected growth rates for automobiles were:

- 2.5 percent annual growth under the moderate growth forecast, and
- 4.4 percent annual growth under the high growth forecast.

Freight

Grains & Oilseeds

The Pacific Northwest is home to ten export elevators that load grain, oilseeds, and related products onto ships for export. Two of these are located on Puget Sound (one each in Seattle and Tacoma), one on Grays Harbor, and seven on the Lower Columbia River (one in Longview, two in Kalama, one in Vancouver, and three in Portland).

Grain from Eastern Washington, Oregon and Idaho moves by either rail or barge, while that from the Great Plains and Midwest moves by rail. Terminals on the Lower Columbia River receive grain by both rail and barge, while those on Puget Sound and Grays Harbor receive only by rail.

All of the grain export terminals in the Pacific Northwest are served by both the UP and BNSF railroads, and all of grain shipped by rail moves through the Columbia River Gorge. Union Pacific moves both full and empty grain trains through the Gorge, while BNSF sends a portion of the empty cars back via Stampede Pass instead of the Gorge.

Projected growth rates from 2011 through 2030 include:

- 1.0 percent per year under the moderate forecast, and
- 3.1 percent per year under the high forecast.

Coal

Coal is currently shipped by rail to two major power plants in the Pacific Northwest, and is also moved through the region by rail for export through the Roberts Bank terminal in British Columbia. The power plant in Boardman, Oregon is scheduled to be closed by 2020 and the plant in Centralia, Washington is scheduled to stop using coal by 2025. However, the decline in coal volumes shipped by rail to these two plants could be more than offset by increases in exports, particularly through new export terminals.

There are currently six proposals for new coal export terminals in the Pacific Northwest, including three in Oregon and three in Washington. The Oregon facilities include one in Coos Bay and two in Saint Helens. The Washington facilities include one in Longview, one in Grays Harbor, and one at Cherry Point. In total these facilities could have the capacity to handle more than 140 million metric tons of coal per year, most of which would arrive by rail.

The moderate forecast assumes that half of this potential volume is realized, while under the high forecast all six projects are built and operating at capacity by the end of the study period.

Other Dry Bulks

Ports on the Lower Columbia River handle a wide variety of bulk cargoes, including soda ash, bentonite clay, copper concentrates, and potash, among others. Portland exports substantial volumes of potash from Canada and soda ash from Wyoming, all of which move by rail. The Port of Vancouver may also begin exporting potash in the near future, and other ports are also studying proposals for handling potash. Another dry bulk moved by rail is petroleum coke that moves from refineries in northern Puget Sound to the Port of Longview for export. In addition, smaller volumes of a variety of other minerals and chemicals that move through ports in the region are moved inland by rail.

Other

- Merchandise trains are projected to grow at 2 percent annually.
- Domestic intermodal trains are projected to grow at 3.5 percent annually.
- Rail shipments of crude petroleum from North Dakota to Puget Sound refineries are currently very small, but may grow substantially.

Rail Forecast by Line Segment

The rail cargo forecasts were summarized by major category, and then allocated to key mainline rail segments. These segments include the UP and BNSF corridors through the Columbia River Gorge, the UP system south of Portland, and the BNSF system north of Portland, as well as the lines running between the major rail junctions in the Portland area. The segments used in this analysis are listed in Table 2-1 and are illustrated in Figure 2-1.

Table 2: Number of Trains by Line Segment – Mid-Range Forecast

Segment	2011				2020				2030				Avg. Annual Growth			
	Passenger	Z Trains	Freight	Total	Passenger	Z Trains	Freight	Total	Passenger	Z Trains	Freight	Total	Passenger	Z Trains	Freight	Total
Nisqually/Centralia (BNSF)	10	8	40	58	14	12	49	75	26	16	55	97	5.2%	3.7%	1.7%	2.7%
Centralia/Kelso South (BNSF)	10	14	40	64	14	18	49	81	26	22	56	104	5.2%	2.4%	1.8%	2.6%
Kelso South/Longview Junction (BNSF)	10	14	40	64	14	18	50	82	26	22	56	104	5.2%	2.4%	1.8%	2.6%
Longview Junction /Vancouver (BNSF)	10	14	40	64	14	18	55	87	26	22	63	111	5.2%	2.4%	2.4%	2.9%
Vancouver / Wishram (BNSF)	2	6	38	46	2	9	52	63	2	12	61	75	0.0%	3.7%	2.5%	2.6%
Vancouver / North Portland Jct. (BNSF)	12	6	25	43	16	10	31	57	28	16	36	80	4.6%	5.3%	1.9%	3.3%
North Portland Jct. / Portland Union Station (BNSF)	12	4	8	24	16	4	11	31	28	4	14	46	4.6%	0.0%	3.0%	3.5%
North Portland Jct. / Peninsula Jct. (BNSF)	0	8	8	16	0	11	11	22	0	15	12	27	n/a	3.4%	2.2%	2.8%
Peninsula Jct. / E. Portland (UP)	0	10	10	20	0	12	12	24	0	15	13	28	n/a	2.2%	1.4%	1.8%
E. Portland / Portland Union Station (UP)	8	0	6	14	12	0	7	19	14	0	7	21	3.0%	n/a	0.8%	2.2%
E. Portland / Troutdale (UP)	0	4	6	10	0	4	8	12	0	6	9	15	n/a	2.2%	2.2%	2.2%
Penninsula Jct. / Troutdale (UP)	0	6	18	24	0	7	20	27	0	10	21	31	n/a	2.7%	0.8%	1.4%
Troutdale / Biggs (UP)	0	10	24	34	0	13	31	44	0	17	35	52	n/a	2.8%	2.0%	2.3%
E. Portland / Willsburg Jct. (UP)	6	10	16	32	10	13	18	41	12	19	18	49	3.7%	3.4%	0.6%	2.3%
Willsburg Jct / Eugene Station (UP)	6	6	14	26	10	8	16	34	12	11	16	39	3.7%	3.2%	0.7%	2.2%

Source: HDR baseline, BST Associates projections

Table 3: Number of Trains by Line Segment – High Forecast

Segment	<u>2011</u>				<u>2020</u>				<u>2030</u>				<u>Avg. Annual Growth</u>			
	Passenger	Z Trains	Freight	Total	Passenger	Z Trains	Freight	Total	Passenger	Z Trains	Freight	Total	Passenger	Z Trains	Freight	Total
Nisqually/Centralia (BNSF)	10	8	40	58	14	14	49	77	26	25	55	106	5.2%	6.2%	1.7%	3.2%
Centralia/Kelso South (BNSF)	10	14	40	64	14	20	49	83	26	31	56	113	5.2%	4.3%	1.8%	3.0%
Kelso South/Longview Junction (BNSF)	10	14	40	64	14	20	50	84	26	31	56	113	5.2%	4.3%	1.8%	3.0%
Longview Junction /Vancouver (BNSF)	10	14	40	64	14	20	55	89	26	31	63	120	5.2%	4.3%	2.4%	3.4%
Vancouver / Wishram (BNSF)	2	6	38	46	2	10	52	64	2	17	61	80	0.0%	5.6%	2.5%	3.0%
Vancouver / North Portland Jct. (BNSF)	12	6	25	43	16	13	31	60	28	24	36	88	4.6%	7.6%	1.9%	3.8%
North Portland Jct. / Portland Union Station (BNSF)	12	4	8	24	16	4	11	31	28	4	14	46	4.6%	0.0%	3.0%	3.5%
North Portland Jct. / Peninsula Jct. (BNSF)	0	8	8	16	0	13	11	24	0	22	12	34	n/a	5.5%	2.2%	4.0%
Peninsula Jct. / E. Portland (UP)	0	10	10	20	0	13	12	25	0	18	13	31	n/a	3.1%	1.4%	2.3%
E. Portland / Portland Union Station (UP)	8	0	6	14	12	0	7	19	14	0	7	21	3.0%	n/a	0.8%	2.2%
E. Portland / Troutdale (UP)	0	4	6	10	0	6	8	14	0	9	9	18	n/a	4.4%	2.2%	3.1%
Penninsula Jct. / Troutdale (UP)	0	6	18	24	0	9	20	29	0	15	21	36	n/a	4.9%	0.8%	2.2%
Troutdale / Biggs (UP)	0	10	24	34	0	15	31	46	0	23	35	58	n/a	4.5%	2.0%	2.9%
E. Portland / Willsburg Jct. (UP)	6	10	16	32	10	14	18	42	12	20	18	50	3.7%	3.7%	0.6%	2.4%
Willsburg Jct / Eugene Station (UP)	6	6	14	26	10	8	16	34	12	12	16	40	3.7%	3.7%	0.7%	2.3%

Source: HDR baseline, BST Associates projections

Appendix G: Portland Rail Port Technologies

To:	Phil Healy		
From:	Kurt Reichelt	Project:	Port of Portland Rail Plan
Copy:	File		
Date:	December 19, 2012	Job No:	165629
Re:	Portland Rail Port Technologies		

BACKGROUND

HDR was asked to complete a technical memorandum regarding rail and port access including future and technological innovations related to rail transportation access for sectors affecting the Port facilities. The technical memorandum identifies and describes the candidate technologies and their applicability to the Port's rail system. In addition, it addresses the technologies that appear to be feasible for implementing within the boundaries of this system.

Ports are one segment of the transportation network associated with international and domestic trade. They are multi-modal exchange points which allow for the rapid transfer of high volume unitized or loose commodities between surface and maritime modes of transportation. The key to inter-connectivity and access revolves around each of the following system components:

- ◆ Speed and efficiency of transfer
- ◆ Access between modes with limited restrictions
- ◆ Capacity at interface points
- ◆ Limited restrictions regarding weight and dimensional size
- ◆ Application of tracking and scheduling technology
- ◆ Cost

Each of these areas needs to be addressed in the planning and implementation of an effective logistics control system, including access between port and rail systems.

PORT OF PORTLAND

The Port of Portland is organized into a government jurisdiction since 1973 impacting three counties. The Port has four marine terminals, six business parks and three airports. Over 17 million tons of cargo move through Portland each year. Twelve million tons of this cargo moves through the Port of Portland-owned facilities. The Port's major exports are wheat, soda ash, potash, and hay. Major imports include automobiles, steel, machinery, mineral bulks and other varied products. Annual imports and exports at the Port of Portland total about \$15.4 billion USD. The Port estimates that over one thousand logistics and marine related businesses use the Port's marine facilities.

The Port exports the largest amount of wheat in the United States and is the third largest wheat port in the world. It is the 5th largest port for overall tonnage in the United States, 3rd largest automobile

import port, the largest mineral bulk port on the US West Coast and the 17th largest U. S. port handling cargo containers. The Port is serviced by six major container ocean carriers including:

- ◆ COSCO
- ◆ Hapag-Lloyd
- ◆ Hamburg Sud
- ◆ K-Line
- ◆ Westward Shipping Lines
- ◆ Yang Ming

The Port of Portland's Marine Terminals are located along the Willamette River and the Columbia River. Terminals are served by rail through the Union Pacific and BNSF railroads, connecting interstates with feeder and direct access roadways, and marine transportation connections particularly river barges. The marine terminals located in Portland include:

- ◆ Terminal Number 2- Willamette River
 - 52. 5 acres (212,450 m²)
 - Break Bulk and Bulk cargos
 - Three berths
 - Rail served by Portland Terminal Railroad
 - 4 warehouses: 81,000 sqft; 90,450 sqft; 90,000 sqft; 39,000 sqft
 - 2 open storage areas: total 27. 5 acres
- ◆ Terminal Number 4- Willamette River
 - 261. 5 acres (1.1 km²)
 - Auto, Liquid and Mineral cargos
 - One berth
 - Rail served by UP
 - 30,000 Metric Ton storage capacity
- ◆ Terminal Number 5- Willamette River
 - 159 acres (643,450 m²)
 - Grain and Mineral cargos
 - One berth
 - Warehouse/manufacturing

- ◆ Terminal Number 6-Columbia River
 - 419 acres (2.0 km²)
 - Container, Auto, Steel and Break Bulk cargos
 - One berth
 - Rail yard access and operation

SYSTEM COMPONENTS

Speed and Efficiency of Transfer

The efficiency and effectiveness of intermodal transfer systems is fully dependent on the process by which cargo is transferred between ship and rail. The application of transfer processes is generally associated with the type of handling equipment. The equipment has a direct impact on the cost and time frame associated with cargo movement. Delivered outbound cargo has to meet regulatory and pre-shipment requirements while inbound cargo has to be cleared (if international), processed and stored for pickup. In all cases, it is important to note that terminal and rail yards serve as inventory points for cargo transfer. Accurate accounting systems must be employed to insure cargo is tracked as it enters and leaves facilities and any damage noted. Speed of transfer is increased as the number of individual handling circumstances is reduced. Each type of cargo has its own unique requirements.

Container cargo or similar unitized cargo can be handled by package and is significantly more efficient if multi-modal options are reduced. For example, a facility designed to transfer containers to and from ships directly onto rail cars with the same equipment is more efficient and less costly than transferring to and from a yard area and then transferring in a second move to the transportation mode.

Neo-Bulk cargo generally requires an intermediate storage point because of the need for inventory and volume measurement. Cargos such as automobiles or lumber are generally moved to and from an inventory point before being transferred to the transportation mode.

Bulk cargo, liquid or dry, is generally moved to a storage point for volume measurement and then modal transfer. Bulk dry cargo is piled and liquid is stored in tanks when inbound. The piles or tanks also serve as distribution points. Although loading and unloading technology has improved significantly, the intermediate handling is still required.

Bulk cargos are normally less time-sensitive in regard to delivery and yield lower profit margins to the handlers. Technologies associated with dry bulk, liquid bulk and liquidized gas cargos have not substantially changed in several decades. Efficiencies have been gained, however, in the sharing of facilities for the handling of different cargos at marine terminals. Berths with piers designed to handle containers, pipeline manifolds, bulk handling equipment and other commodities are becoming more common because of the increasing cost of berth dredging and facility construction. If volumes and diversity of cargo handling dictate, this concept is plausible to reduce time and cost of transfer of cargo between rail and vessels.

Limiting Restrictions on Access between Modes

The ship-to-rail transfer process usually takes place in various types of facilities and can apply to all types of cargo, differentiated only if they are unitized or carried in bulk. These involve special port-related marine facilities with associated rail yards. These yards are commonly classified according to their relative location in regard to the marine terminal as:

- ◆ On-Dock
- ◆ In Terminal- Near-Dock
- ◆ Near Terminal
- ◆ Outside the port district

There are various methods of inter-modal exchange between vessels and rail systems. The fundamental methodology is infrastructure-based and relies on the functionality associated with property utilization. This is determined based upon the characteristics of the intermodal exchange area. Considerations include:

- ◆ Availability of property
- ◆ Types of cargo handled and cost effectiveness of direct interchange
- ◆ Projected vessel size
- ◆ Projected unit train size
- ◆ Necessity for intermediate storage

On-Dock Rail: On-dock rail can be either efficient or an encumbrance, depending on the type of cargo handled. The ability to manage on-dock rail is dependant upon the amount of property on and near the water allowing for the construction of intermodal yards configured to handle unit trains. To be effective it must meet the objective of combining the handling of cargo between modes with the optimization of rail services. One challenge involves the difficulties related to switching long trains to/from marine terminal docks. This interrupts traffic within the terminal adding to cost and time.

An on-dock rail system minimizes transfer handling and is operationally the most efficient, since it eliminates additional moves and landside storage space requirements. Likewise, it provides for the fastest ship-to-rail process. It is practical only in the case of line-controlled, dedicated unit-trains where there is sufficient on-dock trackage for a full train (5,000 to 8,000+ linear ft). This is most effective in the handling of unitized or containerized cargo.

Bulk and neo-bulk cargoes may not lend themselves to the efficiencies seen with containerized cargoes. In most cases the handling of these types of cargoes can be facilitated by off-dock cargo handling, depending on the frequency of large shipments. Referred to as a drop system, many container yards with intermodal capabilities connecting to rail are configured in this manner. This system however adds to cost for the additional move and internal dray. On-dock rail at marine facilities requires valuable waterfront land that could otherwise be used for other operations.

In Terminal-Near Dock: Moving rail off docks can increase the flexibility and can increase the capacity of a marine terminal. This is true especially in the case of the larger storage configurations that require large on-terminal space. However, some of the loss of space to accommodate the on-dock rail system is offset by the shortening of the dwell time for the cargo, which increases the utilization of the terminal. The main disadvantage of near-dock yards over on-dock yards is the avoidance or shortening of drayage for cargo transfer to storage locations. This disadvantage can

lengthen the overall transfer time but can also provide for the assembling of vessel load volumes related to outbound moves. These facilities also allow for the development of controlled Customs areas for inbound clearance of international cargo.

Near Terminal: This configuration is similar to in terminal-near dock facilities, except that the location of the yard is outside the marine terminal and Customs area. These facilities have rail yards that are larger than on-dock facilities. A yard facility located outside a marine terminal allows for the serving of several or potentially all the marine terminals in the port area. The main advantage of the near terminal location is that if the yard is within a designated port district, the drayage from the marine terminals can be performed by terminal yard hustlers. Use of terminal equipment can be better coordinated and may provide savings in relation to cost and time. Paperwork and some equipment inspections can be reduced substantially. This can be accomplished if the traffic to the near-dock rail yard is processed through special gates to avoid mixing with the general port traffic.

Outside the Port District: This refers to a rail yard located close to, but outside the port area. Usually situated within an area with less than a five mile radius, they are an alternative to near terminal facilities. The drayage in this configuration is mostly on public roads and requires using outside trucks and a regular gate process. This includes the checking of cargo documents, the condition of boxes and chassis in the case of containers and preparing an Equipment Interchange Report or a truck dispatch. Although these facilities may lend themselves to greater size, capacity and more centralized servicing of market areas, the cost to the shipper using vessel/rail system transportation is generally higher because the cargo transfer is dray dependant.

Capacity at Interface Points

When port districts were first developed there was adequate land available for large capacity storage and development of open areas for cargo staging, management, inventory and interchange. As older port districts evolved, the removal of existing and antiquated infrastructure provided new and additional space for these activities. In many port areas, gentrification around port districts has limited further expansion. Port capacity was reduced as volume increased and ports handled additional types of cargo. Newer and larger ships have in turn put additional pressure on port capacity. Many ports now find themselves constrained in their ability to handle larger vessels with much higher volumes because of physical limitations shoreside and in harbors.

The increase in capacity for constrained sites is related to three essential elements:

- ◆ Physical limitations
- ◆ Dwell time
- ◆ Lack of site flexibility

Where physical limitations cannot be addressed, faster processing of cargo with minimized need for storage can increase the capacity of a given site significantly. Storage requires more land than the actual interchange points in most cases. If the storage area can be reduced by lowering its occupancy level and length of stay, capacity based on annual through-put will increase.

A second approach is site flexibility. This involves two major approaches. The first is vertical utilization which includes raising the height of cargo storage to minimize storage footprints. This includes stacking of containers vs. wheeled operations related to both marine and rail terminals and the development of higher, silo based storage methods for appropriate cargos. In addition, the elimination of encumbrances such as buildings or other obsolete facilities that allow for the

development of large tracts of open property that can be used for a number of different types of cargo handling activities.

In addition, carefully planned infrastructure that optimizes vehicle flow through efficient traffic patterns limits terminal bottlenecks. Terminal surfaces with pavement built to higher capacity static landing weights coupled with level topography will improve traffic movement and decrease maintenance downtime on terminal properties.

Limiting Restrictions Regarding Weight and Dimensional Size

The size and weight of specialized cargo carried on ships and barges can often times exceed the dimensional capacity of rail rights-of-way. Overseas production of wind farm components, for example, or specialized project cargoes such as power plants, are often shipped in component sizes that exceed rail capability. Rail rights-of-way must have adequate clearance which is often compromised by roadway bridge height that crosses over the track. In addition, the dimensions between bridge supports may be narrow. There are also limitations in regard to the curvature of track and the weight bearing capacity of the rail. Because of rail limitations, project cargoes are often times moved over the road at much higher costs to the shipper. While the shipments may be infrequent, port selection for handling these components always take into account landside limitations. The vast majority of rail rights-of-way are designed for rolling stock of standard dimension and maximum weight. However the demand on this mode of transportation will continue to increase, requiring modifications that are cost effective and appropriate. This same situation was encountered when double-stacked container trains came into broad use.

Application of Tracking and Scheduling Technology

The most significant advances in new technologies related to cargo handling are in computer tracking and equipment scheduling. These new systems have a direct impact on storage periods, dwell times and component moves. New technologies have allowed for rapid transfer of cargo to and from vessels and have shaved thousands of hours off operations in the course of a year. The resulting cost savings is attributed to the improving efficiency of cargo handling and has effectively increased capacity within the limitations of existing infrastructure. Several key improvements include:

- ◆ Computerized tagging and tracking of containers and rail cars
- ◆ Manifest review and advanced Customs clearance
- ◆ Cross-border movement efficiencies
- ◆ Volume measurement efficiencies
- ◆ Equipment scheduling
- ◆ Vessel and motive power performance efficiencies

Although there was initially a very strong emphasis on the “just in time” delivery capability of transportation systems, a stronger emphasis has recently emerged on tracking and delivery certainty. Shippers have demonstrated a willingness to be more flexible in regard to rigid schedules and have seen lower costs related to cargo moves. The ability to track even the smallest cargo component has become a paramount consideration in the logistics chain.

As new technologies emerge, there is a fundamental interest in both the commercial sector and the US Department of Homeland Security to ensure that there is a quantifiable and uninterrupted chain

of custody related to all types of cargo flow, particularly containers. The government relies very heavily on advanced processing of crew and cargo manifests as well as electronic systems specifically designed to track and identify potential commodities that may impact national security. The commercial sector is focused in a similar fashion to ensure cargo is not lost, tampered with or stolen. The initial application of these technologies to meet government standards has improved operational efficiency in the commercial sector. This has reduced insurance costs and is expanding the network which will be used by shippers and consignees to track cargo movement and plan for deliveries.

Ports are now developing electronic webs that allow all port customers to access current information regarding cargo, rail, truck and vessel movements for their specific purposes often sponsored by the ports themselves. These expanding networks allow all users of the transportation services to have access designed to meet their particular needs and interests.

Cost

Cost is the paramount factor in all considerations in regard to transportation of cargo, planning for system improvements and investments in future technologies. Cost is a key factor in the competitive advantage of ports and related transportation facilities. Planning for infrastructure and operational improvements still places emphasis on modal development as opposed to the more significant approach of technological system development. Component elements make up the aggregate cost impact to the shipper. The shipper's fundamental interest focuses on the efficiency and pricing of cargo flow not through individual port or rail facilities but overall from origin to destination. This often includes those areas well outside of the control of port or rail carrier interests. Each component needs to be assessed in regard to its cost and efficiency as part of the overall logistics pattern.

FUTURE TECHNOLOGY APPLICATIONS

Advanced technology remains the fastest growing method of improving system efficiency and reducing costs. The next generation of applied technologies will not only include improved scanning for Homeland Security purposes but also a more precise technology for holistic origin to destination tracking of shipments. The integration of devices such as optical scanners, camera systems, automatic vehicle and railcar identification, portal monitors, personnel access and control and numerous other capabilities is expected to be integrated into a single transportation operating system comprised of numerous existing and planned components. Built on the model of terminal operating systems now in place in numerous ports, these systems are planned to integrate all service provider information into a common operating platform.

The major concern emerging in regard to this concept is the potential compromise of these systems by malevolent interests. Cyber security is currently a major focus of the US Department of Homeland Security which is working with various industry groups to define and identify vulnerabilities in existing and expanded technology based systems. Although there is significant potential for compromise of advanced technologically based transportation and cargo control systems, there is also a significant benefit for reducing costs and improving efficiencies because of these technologies. The most significant step for the port and transportation interests in the Port of Portland is the possible integration of all technology into a single operating platform with a broadband "mesh" coverage system allowing all components to feed into the platform.

Mesh technology is based on utilization of a wireless based system. Currently, transportation facilities use one of two predominant systems. The first is WiFi which operates in the 802 MHz frequency band and utilizes readily available equipment for connection to the system. It is designed

to allow for wireless connectivity to a Local Area Network which is commonly used for access to the internet, e-mail and similar applications.

The second type is MEA which is a purpose built industrial level system that was originally developed for the US Department of Defense for field communications. The system is based on enabling each segment to act as a router to and from every other device. The system's efficiencies are improved because the signals are less impacted by external conditions. Each device passes the signal to the next device, making it less susceptible to interference and barriers. MEA operates in the 2GHz band and is designed to handle large multi-path signals and RF interference without significant attenuation or signal degradation.

WiFi and MEA can both be used in wireless mesh networks because they are complementary technologies. Only the applications are different and they can be used independently or integrated into a common system. The key to the effectiveness of their use is the connectivity between all of the users within the system from the dock to the rail network. Several vendors have developed various methodologies to integrate numerous components already installed and in use. The replacement of existing systems is not required as often as it was when new technologies were first employed.

SUMMARY

The future applications in regard to the logistics path will involve a continued focus on the efficiency of port and rail facilities related to each of the areas highlighted as well as application of advanced and emerging technologies. No one factor in itself is all encompassing but combined efficiencies of all areas will be critical. There is no single solution in regard to the appropriate utilization of infrastructure given the wide range of cargo handled by the port and its associated facilities. The need for greater capacity can be offset by the reduction in dwell time, dwell time, in turn, can be impacted by more efficient scheduling of equipment and the reduction in time for multi-modal interchange. These elements can be further improved through the expansion of advanced technologies related to tracking and monitoring of cargo movements and the positioning of equipment. This will also include improved connectivity between service providers as well as improved access of system information to port and rail system customers.

Appendix H: Evaluation Framework

1.0 Project Evaluation Framework

1.1 Screening Criteria

1.1.1 Introduction

The Port of Portland is in the process of updating its Rail Plan to identify facility improvements that will help the Port remain competitive. HDR Engineering (HDR) is assisting the Port in outreach to a Rail Study Working Group and in developing a conceptual approach to rail system improvements for the next 20 years. To assist in the selection of projects that should be championed by the Port and its stakeholders, the list of candidate projects must be evaluated and prioritized. Project prioritization is a process whereby capital improvement projects or other capital expenditures may be evaluated and ranked against a set of screening criteria.

The candidate projects were derived from:

- A main line capacity analysis of the current and 20 year forecast rail cargo volumes;
- Opportunities and constraints identified by stakeholders. As such some mainline projects were not identified as over capacity in the main line capacity analysis.

Note that while some projects address localized issues, others are designed to address larger systemic needs in the rail network that serves Portland and maintains the Port's land-side transportation network advantage in rail. Projects were developed or compiled from numerous sources, including professional judgment of the consultant team and consultation with rail, port, shipper and public agency stakeholders.

The consultant team worked with the Rail Plan Working Group made up of Port of Portland and project stakeholders (including the railroads, Port tenants, and customers) to develop screening criteria to serve as the basis for measuring the benefits and assessing the overall value of proposed improvements. This section describes how the project team developed a dynamic and strategically oriented screening tool to foster the overall success of the selected investments that become part of the Port's Rail Plan.

In evaluating the candidate projects, it is important to remember that the purpose of the Rail Plan is to provide the Port with a slate of recommended achievable projects both on and off Port property that provides the most benefit to the Port and region.

In terms of their primary function, the reviewed and recommended projects fall into four groups:

- 1.) **Port Access.** Projects that improve rail access to the Port of Portland – improved ability to arrive, store, and depart trains nearer the Port facilities;
- 2.) **Main Line Capacity.** Projects that improve main line capacity – main line speed increase, additional track capacity, more fluid connections between railroads;
- 3.) **Port Capability.** Projects that improve Port capability – improve track conditions or configurations which limit rail service, add new Port rail served facility, or improve efficiency; and

- 4.) **Impact Mitigation.** Projects that mitigate impacts to the public caused by increased or new rail movements, primarily through reducing public roadway/railroad conflicts and increasing safety.

1.1.2 Performance Measure Definitions

Approach

The screening criteria were developed with the Port's principles and values—notably, it's ongoing commitment to a vibrant regional economy as well as the environmental health and quality of the Portland area—in mind, so that any request for Port capital expenditures or political support would be in alignment with the Port's short-term and long-range goals. Incorporation of the Port's concerns, along with those of other critical stakeholders, particularly the Port's tenants and customers, the railroads (BNSF Railway, Union Pacific Railroad [UP], Peninsula Terminal Railroad, Portland and Western Railroad, and the Portland Terminal Railroad Company) and the communities that might be affected by proposed improvements and whose support or acceptance is often critical to implementation, resulted in performance metrics that can be grouped into the following six broad categories:

- Rail System
- Port Operations
- Environmental Feasibility
- Institutional, Political and Public Feasibility
- Economic Development
- Project Implementation Timetable

These categories reflect the Port's need for rail and port operational efficiency, as well as environmental sustainability of identified candidates. By including criteria related to public support, funding, and compatibility with local and regional multimodal freight plans, and freight and passenger rail plans, the project ensures that top-rated projects are perceived to be of benefit to both users and neighbors.

Criteria and Project Rating Matrix

Specific performance measures or metrics to be used in screening potential projects were articulated for each of these six categories, as shown in the Criteria and Project Rating Matrix, Table 1, below.

Table 1: Port of Portland: Criteria and Project Rating Matrix

Rate each potential project against the factors listed below, using a scale from 1-5. 1 = poor performance 2 = fair 3 = good 4 = above average 5 = excellent						
	Project 1	Project 2	Project 3	Project 4	Project 5	Project 6
RAIL SYSTEM METRICS						
Improves Regional Rail System Capacity/Operations						
Likely to Reduce Passenger/Freight Conflicts						
Improves Railroad Main Line Capacity – Directly						
Improves Railroad Main Line Capacity – Indirectly						
Likely to Maintain or Increase Class 1 Competition						
Improves Safety						
Lowers Rail Operating Costs						
PORT OPERATIONS METRICS						
Improves Port Operations						
Enhances National/Global Competitiveness of Ports						
Improves Rail Connection to BNSF or UP to/from Port of Portland						
ENVIRONMENTAL FEASIBILITY METRICS						
Can Receive Environmental Approval						
INSTITUTIONAL, POLITICAL, AND PUBLIC FEASIBILITY METRICS						
Committed Funding						
Funding Eligibility						
Has Public and Political Support						
Compatible with Railroad Plans*						
ECONOMIC METRICS						
Consistent with Regional Export Strategy						
Supports export growth						
New development						
Has or could gain public and political support for whole or partial public funding						
PROJECT IMPLEMENTATION TIMETABLE						
Rated according to time frame when project is needed.						
TOTAL SCORE						

* Railroads = BNSF and UP

1.2 Additional Evaluation Considerations

During stakeholder discussions, several recurring themes emerged regarding capital improvements programs, which provided guidance for the specific elements of each performance measure.

In developing both the general categories, and in defining specific performance measures or metrics, it was important to keep in mind a key goal of the screening process—namely, ensuring that an existing bottleneck is not simply moved to become someone else’s problem. This goal meant that, for example, performance measures assessing *regional network performance* (albeit at a non-quantified sketch level) was preferable to a corridor or segment performance measure.

Another important goal was to identify projects that were feasible within the existing funding, political, and regulatory environment. Naturally, of special relevance to the Port of Portland was the ability of proposed improvements to positively impact Port operations. Several components of performance in this area were developed to respond to that primary study goal.

The resulting rating and ranking criteria focus primarily on the rail system performance, benefits to Port of Portland operations, and physical and political feasibility, but are designed to incorporate consideration of environmentally sustainable infrastructure as an important element of community acceptance and best practice.

1.2.1 Performance Metrics for Evaluation Criteria

Specific performance metrics developed to rate projects for this study, in each respective category, are as follows:

Rail System Metrics

Improves Regional Rail System Capacity/Operations

- Likely to reduce delay and unreliable trip times at the regional level
- Likely to reduce inefficient train movements
- Likely to maintain or increase Class 1 competition

Likely to reduce passenger/freight conflicts

- Reduces conflicts
- Does not create or exacerbate downstream bottlenecks

Improves Railroad Main Line Capacity – Directly

- Direct increase in capacity (new or improved tracks, sidings, connections, etc.) resulting in probable increase in throughput of railcar volume in affected segments
- Direct increase in reliability of operations resulting in reduced trip times and lower operating costs

Improves Railroad Main line Capacity – Indirectly

- Improves main line capacity through off-main line infrastructure or operational changes resulting in probable increase in throughput of railcar volume in affected segments (new or improved yard or intermodal facility that removes or reduces main line bottlenecks)

Improves Safety

- Reduces conflicts between rail and road

Appendix I: Detail of Project Rating and Ranking – Technical Memorandum

-

To: Phil Healy, Port of Portland	
From: Kurt Reichelt	Project: Port of Portland Rail Plan
Copy:	
Date: February 26, 2013	Job No: 165629
Re: Port of Portland Rail Plan – Detail of Project Rating and Ranking	

1.0 Summary of Main Line and Port Issues and Existing Conditions

The Port of Portland (Port) Rail Plan identifies candidate projects that balance the capabilities of the main line and Port, provide necessary main line access to the Port, and provide necessary capacity and safety improvements associated with anticipated increased rail traffic.

1.1 Port Access

The ability for the Port to quickly and efficiently service inbound trains from the BNSF and UPRR main lines near the terminals is needed in order to efficiently serve Port shippers and free up main line sidings for main line trains passing through Portland. Identified projects include those which provide new or improved access to existing and proposed terminals.

1.2 Main Line Capacity

Main line capacity project priorities and implementation plans are supported by the main line capacity analysis and interviews with railroad stakeholders about rail service needs. As shown below, the BNSF and UPRR are addressing their near term, fifteen year planning horizon main line capacity constraints with projects included in capital spending programs. The programs are funded both internally and in the case of some BNSF projects, with High Speed Intercity Passenger Rail projects.

- WSDOT / BNSF High Speed Intercity Passenger Rail (HSIPR) – Vancouver Bypass
- WSDOT / BNSF HSIPR – Vancouver New Middle Lead
- WSDOT / BNSF HSIPR – Kelso to Martin's Bluff – Toteff Siding
- WSDOT / BNSF HSIPR – Kelso to Martin's Bluff – New Siding
- WSDOT / BNSF HSIPR – Kelso to Martin's Bluff – Kelso to Longview Jct.
- ODOT / BNSF HSIPR – Willbridge Crossovers
- UP – Graham Line Mid-Point Siding, 10,000 feet long
- UP – E. Portland Connection between Graham Line and Brooklyn Subdivision.
- UP – Second main line construction 4.1 miles between Willsburg Jct. and Clackamas

In addition, the Port of Vancouver's West Vancouver Freight Access project eliminates the conflict between BNSF and UP trains traveling north-south on the BNSF main line with trains coming in and out of the Port of Vancouver. This project also increases the speed of trains on and off the BNSF main line east of Vancouver. Both result in increased main line capacity which directly benefits the Port of Portland.

1.3 Port Capability

Much of the Port of Portland's rail operations are limited by its lack of space to arrive and depart unit trains directly. The only terminal at the Port with that capability is Portland Bulk Terminal at T-5. All other unit trains must arrive at a nearby yard and shuttled in pieces to the terminal. An example is access to and from Columbia Grain from BNSF or UPRR must be delivered to South Rivergate Yard in two pieces before being spotted to Columbia Grain by UPRR. The plan identified projects which improve the Port's capabilities to arrive and depart unit trains, support existing Port tenants, and offer rail service to new Port tenants.

1.4 Mitigation

Improvements to Port and main line rail operational capacity will result in the ability to handle more train traffic. The improved main line capacity conditions may result in the need for additional improvements to address unintended impacts of increased train throughput such as grade crossing separations to eliminate the interaction between road and rail traffic. Also, the impact to sensitive noise receptors by more trains traveling through at-grade crossings should be considered for mitigation.

2.0 Candidate Projects

2.1 Grouping

The candidate projects identified in the rail planning process were grouped by type and when needed. The four groups are:

In terms of their primary function, the reviewed and recommended projects fall into four groups:

- 1.) **Port Access.** Projects that improve rail access to the Port of Portland – improved ability to arrive, store, and depart trains adjacent to the Port's facilities;
- 2.) **Main Line Capacity.** Projects that improve main line capacity – main line speed increases, additional track capacity, and more fluid connections between railroads;
- 3.) **Port Rail Operations.** Projects that improve the Port's capability to serve more train traffic—improve track conditions or configurations which currently limit the efficiency of rail service, add new Port rail capacity, improve efficiency, or reduce internal road/rail conflicts; and
- 4.) **Impact Mitigation.** Projects that mitigate impacts to the public caused by increased or new rail movements, primarily through reducing public roadway/railroad conflicts and increasing safety at crossings.

2.2 Evaluation of Candidate Projects

Implementation Time Frame: The candidate projects were grouped based on short-term and longer term needs. Improvements that meet short term needs (such as eliminating a current bottleneck that creates delay throughout the system) are recommended to occur within the next five years, while others are not anticipated to be needed to either provide added capacity, serve new tenants, or otherwise make rail service more efficient, for between 5 to 20+ years. As shown in Table 1 ten projects are recommended for construction within the next five years, eleven projects are recommended to be in place within 10 to 15 years, and eleven other projects are recommended in the next 15 to 20+ years.

2.3 Project Performance and Priority Rankings

As described in the Project Evaluation Framework Technical Memorandum dated March 1, 2013, the candidate projects were evaluated for their benefits in improving track congestion, operations, and access for Port tenants and carriers. The framework includes a set of detailed evaluation criteria and a project rating matrix that scores projects on a scale of 1 to 5, with a score of 1 meaning “poor performance” in improving rail operations and needs, and a score of 5 meaning “excellent” performance in improving rail operations and needs. Table 1 summarizes the results of this evaluation.

Table 1: Port of Portland Rail Plan – Project Implementation							
Port of Portland Rail Plan Project Implementation (Grouped by Project Function)*							
		Implementation Time Frame (Years)					
Project No.	Project Name	0 to 5	5 to 10	10 to 15	15 to 20	> 20	Performance Ranking
IMPROVES RAIL ACCESS TO THE PORT OF PORTLAND							
PRP-10	South Rivergate Rail Access: Second Slough Bridge					X	2
PRP-11	UP: Barnes Yard to T-4 Direct Connection	X					1
PRP-13	Ramsey Yard Utilization	X					3
PRP-15	Bonneville Yard Build-Out	X					4
IMPROVES MAIN LINE CAPACITY							
PRP-3	Peninsula Terminal Railroad: BNSF/PT Rail Connection at Suttle Road			X			11
PRP-8	BNSF/UP/Portland Terminal Railroad – Main Line Lake Yard Access Improvement	X					12
PRP-20	UP: North Portland Crossover Improvements	X					10
PRP-19	BNSF: Increased Speed Over the Willamette and Columbia River Bridges			X			3
PRP-21	UP Kenton Line: Completing Double Track from North Portland to Troutdale and Train Crew Change-Out Improvements					X	1
PRP-23	UP Main Line: Track Realignment South of Albina (“6 MPH Curves”)	X					8
PRP-24	UP North Portland: Undoing the “X” (Option 1)			X			2
PRP-25	BNSF I-5 Corridor: Rye Junction Improvements			X			7
PRP-26	BNSF I-5 Corridor: WSDOT Projects between Longview and Kalama				X		5
PRP-27	BNSF I-5 Corridor: BNSF/PSAP Centralia Connection (3 rd Main, Depot, and Pedestrian Overpass)				X		6
PRP-28	BNSF Fallbridge Line: Completing Double Tracking - Vancouver to Washougal					X	4
PRP-29	BNSF I-5 Corridor: Port of Vancouver Main Line Connection at Felida					X	9
IMPROVES PORT RAIL OPERATIONS							
PRP-1	Port of Portland Rail Terminal Maintenance and Repair Projects	X					5
PRP-2	T-4 Pier 1 Rail Yard Improvements	X					7
PRP-5	Port of Portland Pave Unpaved Area at T-6 Intermodal Yard	X					6
PRP-16	T-4 Soda Ash Storage Tracks	X					4
PRP-17	West Hayden Island Main Line Access					X	2
PRP-18	West Hayden Island Unit Train Loops					X	3
PRP-22	T-2 Track Reconfiguration and Siding Extension	X					1
MITIGATION PROJECTS							
PRP-4	Port of Portland Marine Drive Grade Separation			X			4
PRP-6	Port of Portland T-6 Access Improvement			X			1
PRP-7	Port of Portland T-6 Berth 607 Grade Separation			X			6
PRP-9	Columbia Boulevard Grade Separation Project (Raise Columbia Blvd. over UPRR at Penn Jct.)			X			5
PRP-12	North Rivergate Boulevard Grade Separation	X					2
PRP-14	Cathedral Park Quiet Zone and Track Improvements			X			3

*See Project Evaluation Framework Technical Memorandum dated March 1, 2013, for a detailed description of the phasing recommendations.

3.0 Conclusions

3.1 Port Access to Port of Portland

The top three priority projects that improve the ability for the Port's facilities to quickly and efficiently service inbound trains from the BNSF and UPRR main lines near the terminals are:

- 1.) **PRP-11.** UP Barnes Yard to T-4 direct connection is a priority because it will help to accommodate a new tenant(s) as well as increase use of T-4 facilities.
- 2.) **PRP-13.** Ramsey Yard utilization project provides a track to store a T-5 unit train intact. The project also eliminates a conflict between BNSF and UPRR trains arriving or departing T-5.
- 3.) **PRP-15.** Bonneville Yard build-out includes two additional storage tracks and double tracking from the Bonneville Yard to the end of the Barnes Yard bypass. The benefits of the Barnes Yard bypass project would be realized with the completion of this project, such as the ability to accommodate simultaneous moves from Barnes Yard to both South Rivergate (T-5) and Ramsey Yards. Unit trains destined for South Rivergate (T-5) could be staged on the Barnes Yard bypass track without affecting Barnes Yard switching or servicing of General Motors.

3.2 Main Line Capacity

The top three priority projects which improve main line capacity are:

- 1.) **PRP-20.** UP North Portland crossover improvements increases the speeds of UP trains to enter or depart the heavily congested (freight and passenger) BNSF north-south main line.
- 2.) **PRP-23.** UP main line realignment south of Albina ("6 mph curves") increases the speed of trains on the UP main line. This project would positively affect the majority of the UP trains to, from, and through Portland.
- 3.) **PRP-8.** BNSF/UP/Portland Terminal Railroad – Main line access improvement improves the efficiency and speed for the BNSF and UP to arrive and depart trains resulting in additional BNSF north-south main line capacity. This project benefits BNSF, UP, P&W, PTRC, and Amtrak.

3.3 Port Rail Operations

The top three priority projects which improve Port rail operations are:

- 1.) **PRP-22.** T-2 track can be reconfigured and BNSF siding extended to serve new business opportunities that require a higher railcar volume and throughput, including unit train service. The loop would be comprised of two concentric loop tracks that together could hold a train potentially as much as 8,500 feet in length. The reconfiguration would also require the extension of a siding on the east side of the main line. The extension would start near NW Nicolai Street and end near NW Thurman Street. Both Class 1 carriers have access to T-2 through their jointly owned subsidiary, Portland Terminal Railroad.
- 2.) **PRP-16.** T-4 Soda Ash storage tracks increases the ability to store empty and loaded rail cars for bulk commodity customers at T-4. This is an existing tenant-driven project as T-4 storage tracks are at capacity to support existing T-4 tenants. Given the lack of nearby UP storage, new or expanded service would need to include storage and unloading/loading tracks. The storage track to loading/unloading track ratio would be 2 to 1.
- 3.) **PRP-1.** PRP-1 is composed of sub-projects A-H. The projects are focused on heavy maintenance activities as opposed to building new capital infrastructure. The purpose of each is to ensure that Port rail facilities continue to serve existing rail traffic reliably and broaden the range of products that can be moved on the existing infrastructure. These goals

would be achieved primarily by activities such as replacing deteriorating track, upgrading the FRA class of track, ameliorating public safety at road crossings, eliminating clearance restrictions, relieving tight curvature, etc. Sub-projects were developed for T-2, T-4, and Swan Island. The sub-projects are:

- a. T-4 Track 701 (Cereal Foods) Rehabilitation
- b. T-4 Track 702 (Cereal Foods) Rehabilitation
- c. T-4 Track 401 (Soda Ash) Rehabilitation
- d. T-4 Tracks 704-709 (Cargill) Rehabilitation
- e. Swan Island Lead Track Rehabilitation
- f. Swan Island Lead Track: Channel Avenue Crossing Improvements
- g. T-4 Track 500 (McDermott Lead) Rehabilitation
- h. T-2 Track Rehabilitation

3.4 Mitigation

The top three priority projects which are a result of current or near term increases in rail traffic are:

- 1.) **PRP-12.** North Rivergate Boulevard grade separation to mitigate for increased blockage of the North Rivergate Boulevard/UP at-grade crossing with increased rail and road traffic generated by the recent expansion and use of T-5 tenants including ADM, Columbia Grain, Portland Bulk Terminal (Canpotex), and Evraz. This project would improve railroad efficiency and the speed of arriving or departing trains, thus allowing for new Port business.
- 2.) **PRP-9.** Columbia Boulevard grade separation to mitigate for increased blockage of the Columbia Boulevard crossing of UPRR at Peninsula Junction. Constructing an overpass over these legs of the UPRR will greatly free up both rail freight as well as truck freight in this vital area.
- 3.) **PRP-4.** Marine Drive grade separation over the BNSF lead track to Ramsey Yard and T-6 to mitigate for increased blockage of the Marine Drive /BNSF at-grade crossing. The increased rail and road traffic is generated by the recent expansion at T-5 by tenants such as Columbia Grain and increased business at BNSF Rivergate Automotive Facility.

The other mitigation projects would be triggered by Port Rail Operations and Port Access projects and should be considered together. For example, the Second Slough Bridge project (PRP-10), which provides improved BNSF access into South Rivergate, significantly impact T-6 vehicle traffic. This would drive the need for vehicular access improvement projects at T-6 such as Port of Portland T-6 Access Improvement (PRP-6) and Port of Portland T-6 Berth 607 Grade Separation (PRP-7).

Appendix J: Project Cost Escalation Factors

To: Phillip Healy, Port of Portland	
From: Corey McManus, PE, HDR Engineering, Inc.	Project: Port of Portland Rail Plan
Date: January 30, 2013	Job No: 165629
Re: Prior Project Cost Escalation	

Purpose

The purpose of this memo is to explain the methodology used for the Port of Portland Rail Plan in escalating prospective project cost estimates developed for other planning studies prior to 2012. Projects that were estimated in 2012 were not escalated, as their estimates are recent enough to be considered valid. The assumptions, unit costs, or quantities of the previous planning study project costs were not evaluated.

Methodology

The chosen rate is based on an analysis of historical data for Washington State Department of Transportation's (WSDOT) Construction Cost Index (CCI). The CCI is calculated based on seven representative bid items that factor into an overall construction cost percentage change per year. For consistency and simplicity, a single inflation rate was applied to all projects.

Reference Data

WSDOT Cost Escalation	
Year	CCI % Change
2000	6.67%
2001	-0.55%
2002	2.14%
2003	1.28%
2004	3.07%
2005	18.91%
2006	20.53%
2007	5.78%
2008	9.53%
2009	-3.12%
2010	3.62%
2011	3.11%
2012	3.69%

Conclusion

The rate of 3.0% was selected based on average cost increases observed in the WSDOT analysis while: (1) removing years that appear to be outliers, and (2) rounding up to the nearest whole integer. The years 2005, 2006, and 2008 were considered to be outliers. Excluding these years, the average percentage increase in costs was 2.57%. Rounding up to the nearest whole integer yields a value of 3.0%.

The 3.0% annual rate was applied using a geometric growth equation:

$$X_t = X_0(1+r)^t$$

X_0 = cost at time 0 X_t = cost year t

t = the growth period in years

r = the annual growth rate as a decimal

For a case where the initial value is \$100, the growth rate is %3 and the time period is 5 years, the result is as follows:

$$\$100(1+.03)^5 = \$115.9$$

Appendix K: Project List Permit Review

General Notes

Additional Studies

The assessment of each of the projects is based on publicly available information and conceptual level project descriptions. As a result, the conclusions should be considered preliminary. As engineering level project descriptions are developed and project areas are refined, detailed site level studies will be required to fully evaluate the environmental effects of the proposed actions.

Timeline and Schedule

Due to the conceptual nature of the project descriptions and resulting uncertainties in the permit application process, timeline and schedule are difficult to determine at this time. The following provides general information on timelines for the permits described in this section.

Federal Clean Water Act Permits

The timeframe for approval of federal permit applications is dependent on the complexity of the impacts on aquatic resources, endangered species, archaeological or tribal concerns, and at the processes associated with each of the regulatory agencies. Clean Water Act (CWA) Section 404 permits are issued by the US Army Corps of Engineers (USACE).

- Projects with no impacts to wetland may require only notice to the district engineer (completed in an approximately 10 day timeframe).
- Nationwide permits are usually processed within 3 to 6 months, though it can take up to 12 months if Endangered Species Act (ESA) consultation is required.
- Individual permits can require from 9 to 24 months depending on the complexity of the project.
- Projects that require an environmental impact statement (far less than one percent) average about 3 years to process. It is unlikely this will be a requirement for the projects evaluated.

Federal Endangered Species Act

Timeframes for Endangered Species Action Consultation with US Fish and Wildlife (USFWS) and National Marine Fisheries Service (NMFS) also varies with project complexity.

- Consultation with these agencies would not be required for projects with no federal nexus (e.g. no federal funding or federal permit required).
- For projects with a No Effects determination, coordination may not be required.
- For projects with a determination of Not Likely to Adversely Affect or Likely to Adversely Affect, the timeframe varies depending on effects to listed species. Regional NMFS offices have been on average issuing biological opinions in 205 days.

State Permits

Permit approval timelines for state permits in Washington and Oregon also varies with project complexity. In Washington State, Section 401 Clean Water Certification and wetland permits (Washington Department of Ecology) and Hydraulic Permit Approval (HPA), approved by Washington Port of Portland Rail Plan

Department of Fish and Wildlife, is typically completed as part of the Joint Aquatic Resources Permit Application, and would follow the federal Clean Water Act process.

Washington State also has a State Environmental Policy Act (SEPA) process to document effects to various resources. The SEPA Checklist is generally required for projects exceeding 500 cubic yards of fill and/or affecting sensitive resources, such as wetlands, riparian buffers, and streams. The SEPA process typically takes 2-4 months to complete.

Local Permits

For smaller projects with readily discernible effects, permit approval may be obtained in as little as 1-2 months. Very large, complex or controversial projects can require substantially longer. Examples of complex project effects would include those with substantial rezoning or impacts to many private properties, or projects with effects that extend over a large area.

Timelines will be shown for those projects where there are substantial permit timeframes.

Project Evaluations

PRP-1

Project 1 is designed to be strictly a spot maintenance program, and will consist of repairing or rehabilitating tracks in place; the surrounding area will not be disturbed by these activities.

Wetland and habitats (ESA)

Spot maintenance activities are expected to be completed without disturbance to the surrounding areas. As a result, these activities are expected to have no affect on wetlands or other habitats. No Endangered Species Act (ESA) consultation is expected.

Flood

These activities will not result in changes in floodplain areas. As a result, no effects are anticipated to floodplains.

Stormwater

No disturbance of areas outside the existing rail bed is expected, and no new impervious surfaces will be created. As a result, this project is expected to have no effect on stormwater quality or quantity.

Local Permits and Other

Since this project is not expected to disturb areas outside existing tracks. These activities are considered exempted minor railroad maintenance activities. As a result, it is assumed that no local, state, or federal permits are required.

Noise

Since this project consists of spot maintenance activities on existing rail lines, it is assumed that there will be no changes from current noise levels.

Air

Since this project consists of spot maintenance activities on existing rail lines, it is assumed that there will be no changes in air quality resulting from the project.

Archeological

Since this project consists of spot maintenance activities on existing rail lines and no additional areas will be disturbed, it is assumed that there will be no risk to archeological resources.

PRP-2

Project PRP 2 consists of relocation of a spur track and removal of the existing tracks at an existing facility on the Willamette River. A 25-foot greenway will be maintained between the access road and the Willamette River.

Wetland and habitats (ESA)

Emergent wetland located on the Willamette River approximately 500 feet south of project area north along an embankment of the Willamette. There are no expected impacts to wetlands from the project, and no permit would be required.

If complete infiltration of stormwater is not feasible on site or if in-water work is necessary to accomplish the demolition work, this project may not meet the threshold for No Effect to listed aquatic species or habitats, and consultation may be required under ESA. Additional stormwater studies may be required to determine potential for complete infiltration.

Flood

PRP-2 is located approximately 500 feet from the Willamette River. No effects are anticipated to the floodplain of the Willamette River.

Stormwater

New paved areas would likely require additional stormwater facilities. New treatment facilities for these areas would be equal or better than current water quality conditions. No detention facilities are anticipated due to the proximity to the Willamette River.

Local Permits and Other

PRP-2 is within the Willamette Greenway Plan area. Development in this area must meet the greenway review requirements of the Willamette Greenway Plan.

Noise

Removal and relocation of the existing rail lines will result in a temporary, short term increase in noise. The track relocation is not expected to result in increased traffic and the resulting noise, however if additional traffic results, then additional studies will be necessary to determine the extent of potential impacts.

Air

PRP-2 is within the Portland air quality maintenance area for carbon monoxide. Removal of the existing rail lines is not expected to result in significant changes in air quality onsite. However, any changes in rail traffic patterns may result in changes to air quality.

Archeological

Grading near the Willamette River will be required, but in existing developed area. This may result in exposure of archeological resources. Additional studies would likely be required.

Schedule and Timeline

Permits for this project would likely be acquired in 6 months or less.

PRP-3

PRP-3 consists of construction of approximately 3,900 feet of new rail extension between North Marine Drive and North Portland Road. The work is primarily confined to the existing footprint of N Suttle Road, and would require use of a small area of N Suttle Road's public street right-of-way at its dead-end terminus. PRP-3 would also include construction of approximately 2,400 feet of interchange track west of North Marine Drive, and construction of a wall at North Marine Drive. These activities would occur primarily within the existing rail right of way.

Wetland and habitats (ESA)

Emergent National Wetland Inventory (NWI) wetland mapped approximately 75 feet to the south, but this wetland has been filled and developed. A larger forested NWI wetland (250 feet to the south) has also been partially filled. The remaining portion of this wetland is identified in the Local Wetland Inventory (LWI), and is located approximately 550 feet to the south. Another very large (approximately 400 acre) multi-class wetland associated with the Columbia Slough is also located approximately 400 feet south of the project. No wetlands encroach into the work area and no permit would be required.

The Columbia River is located approximately 900 feet to the northeast. No work would occur in the river and no permit would be required.

If complete infiltration of stormwater is not feasible for PRP-3, the project may not meet the threshold National Marine Fisheries Services (NMFS) criteria for No Effect to listed aquatic species or habitats, and consultation may be required under ESA. Additional stormwater studies may be required to determine potential for complete infiltration.

Flood

The entire area is mapped as 100 year floodplain for the Columbia River. If there is no significant change in grade, the project may be accomplished without mitigation.

Stormwater

Creation of new stormwater facilities would be required to accommodate new impervious surface. While these facilities would be expected to address stormwater quality and quantity, additional studies may be needed to determine whether complete infiltration of stormwater can be accommodated, and any potential implication for endangered species.

Local Permits and Other

The proposed improvements in PRP-3 extend beyond previously paved areas, and would be subject to the City of Portland environmental zoning regulations. Additional permits may be required for vacating or re-purposing public rights-of-way.

Noise

PRP-3 creates a new line located between 0 and 1,300 feet to the north of the existing lines. This project will create short-term, temporary increase in noise due to the construction. Long term, the project may result in an increase in train noise for the businesses along NE Suttle Road. Additional studies would be required to determine potential changes in noise levels at sensitive receptor sites.

Air

PRP-3 is within the Portland air quality maintenance area for carbon monoxide. Additional studies may be required to determine the effects of the project on air quality.

Archeological

Grading near the Columbia River will be required, but in an existing developed area. This may result in exposure of archeological resources. Additional studies would likely be required.

Schedule and Timeline

Permits for this project could likely be acquired in 6 to 9 months or less if a No Effects to ESA species determination is made.

PRP-4

The proposed PRP 4 project would create a grade separation at Marine Drive, carrying Marine Drive over the existing railroad tracks.

Wetland and habitats (ESA)

The affected area appears to be heavily developed. NWI maps do not show any wetlands or waterways within the proposed project limits. As a result, no wetland permits are expected.

If stormwater treatment methods allow for full infiltration there would be No Affect to listed aquatic species. Fully treating the stormwater resulting from the design storm without full infiltration will result in a Not Likely to Adversely Affect for ESA listed aquatic species.

Flood

There are no mapped floodplains in the project area.

Stormwater

Stormwater facilities should be anticipated for the new roadway alignment. The improvements are expected to result in an improvement in water quality by treating stormwater. No detention facilities are anticipated due to the proximity to the Columbia Slough.

Local permit and other

The proposed project would be constructed adjacent and north of the City of Portland Environmental Protection Zone for the Smith and Bybee Lake Natural Resource Area. The Environmental Protection zone provides the highest level of protection to the most important resources. Any proposed development within this zone will require a public hearing prior to issuing a Type III Conditional Use Permit.

Noise

Improvements are in an existing developed industrial area adjacent to a residential area. Paving activities are expected to result in temporary, short term increases in noise during construction. Given the anticipated vertical alignment shift a noise evaluation would be required to determine if sensitive noise receptors are adversely impacted.

Air

The project would not be expected to have adverse air quality impacts.

Archeological

The proposed project would likely impact areas outside the existing footprint of the roadway. Additional archaeological evaluations would be anticipated.

Schedule and Timeline

Permits for this project could likely be acquired in 6 months or less.

PRP-5

PRP-5 will pave approximately 20.8 acres of currently unpaved areas on port property. The unpaved areas consist of access and staging, and the existing access is an unpaved access road. Surface treatment of unpaved areas is used to control fugitive dust around the intermodal strip tracks.

Wetland and habitats (ESA)

The affected area is existing developed rail siding and an unpaved portion of North Marine Drive. No wetlands or streams are identified within the project area. Emergent and scrub-shrub wetland are present on the south side of North Marine Drive (100+ feet away).

If stormwater treatment methods allow for full infiltration there would be No Affect to listed aquatic species. Fully treating the stormwater resulting from the design storm without full infiltration will result in a Not Likely to Adversely Affect for ESA listed aquatic species. Additional studies would be necessary to determine whether infiltration is feasible at this location.

Flood

A small portion of 100 year floodplain is present on the south side of North Marine Drive. Although this is shown as 100 feet from the project area, the mapped floodplain has an existing building and likely has been filled to above the flood elevation.

Stormwater

New paved areas would require additional stormwater facilities. Stormwater facilities included as part of the project may increase the footprint area, but are unlikely to affect nearby resources. The improvements are expected to result in an improvement in water quality by removing a source of dust and treating stormwater. No detention facilities are anticipated due to the proximity to the Oregon Slough.

Local permit and other

The project is not within the City of Portland Environmental Protection or Environmental Conservation zone. Other city regulations, such as Title 10 Erosion Control must still be met.

Noise

The proposed improvements are within in an existing developed industrial area. Paving activities are expected to result in temporary, short term increases in noise during construction. There are no expected permanent increases in noise from this activity.

Air

Paving this existing access is expected to reduce fugitive dust and remove the application of dust reducing chemicals, improving air quality. It is assumed that traffic levels would remain similar, and that further changes in air quality would not result from the project.

Archeological

The area is an existing developed area. No archeological resources are expected to be disturbed or encountered.

PRP-6

PRP-6 would construct a new access along North Marine Drive from terminal road to North Bybee Lake Road, approximately 4,600 feet in length. A new road bridge over the BNSF tracks would also be part of this project. Significant grading and paving activities would be required in existing developed areas.

Wetland and habitats (ESA)

The affected area is along an unpaved portion of North Marine Drive. No wetlands or streams are identified within the project area. Emergent and scrub-shrub wetland are present on the south side of North Marine Drive (100+ feet away). As a result, no wetland permits are expected to be required for this project.

If stormwater treatment methods allow for full infiltration there would be No Affect to listed aquatic species. Fully treating the stormwater resulting from the design storm without full infiltration will result in a Not Likely to Adversely Affect determination for ESA listed aquatic species. Additional studies would be necessary to determine whether infiltration is feasible at this location.

Flood

A small portion of 100 year floodplain is present on the south side of North Marine Drive. Although this is shown as 100 feet from the project area, the mapped floodplain has an existing building within it, and likely has been filled to elevations above the flood elevation. Proposed construction is expected to avoid this area, and would not require permits.

Stormwater

The new paved areas and bridge would likely require additional stormwater facilities. These new treatment facilities would be expected to provide water quality treatment equal or better than current water quality conditions. No detention facilities are anticipated due to the proximity to the Oregon Slough. Additional studies would be required to determine whether complete infiltration can be accommodated for this project.

Local permit and other

The project is not within the City of Portland Environmental Protection or Environmental Conservation zone. Other city regulations, such as Title 10 Erosion Control must still be met.

Noise

Improvements are in an existing developed industrial area. Paving activities are expected to result in temporary, short term increases in noise during construction. Creation of new roadway may result in increases in traffic which may increase traffic related noise, but are not expected to result in substantial increases above existing due to the industrial nature of the existing development.

Air

PRP-6 is located within the Portland air quality maintenance area for carbon dioxide. Access improvements may result in changes in rail or motor vehicle traffic, which may have effects on air quality. Additional studies may be required to determine the effects of the project on air quality.

Archeological

The area is an existing developed area. No archeological resources are expected to be disturbed or removed.

PRP-7

Access improvements to Berth 607 at Terminal 6, including a new bridge with fill slope or retaining wall. Substantial grading work and excavation would be required.

Wetland and habitats (ESA)

The Columbia River extends to within 250 feet of the north end of the project, but does not extend into the project area. No wetland permit would be required for the project.

If stormwater treatment methods allow for full infiltration there would be No Affect to listed aquatic species. Fully treating the stormwater resulting from the design storm without full infiltration will result in a Not Likely to Adversely Affect determination for ESA listed aquatic species, requiring consultation under ESA. Additional studies would be necessary to determine whether infiltration is feasible at this location.

Flood

A portion of the 100 year floodplain for the Columbia River is located approximately 250 feet to the northeast. This floodplain does not encroach into the project area and no permit would be required.

Stormwater

Construction of a new bridge will require new stormwater facilities. New treatment facilities for these areas would be equal or better than current water quality conditions. No detention facilities are anticipated due to the proximity to the Oregon Slough. Additional studies will be required to determine whether complete infiltration can be accomplished in the project area.

Local permit and other

The project is not within the City of Portland Environmental Protection or Environmental Conservation zone. Other city regulations, such as Title 10 Erosion Control must still be met.

Noise

Improvements are in an existing developed industrial area. Construction and paving activities are expected to result in temporary, short term increases in noise during construction. Creation of new roadway may result in increases in traffic related noise. Additional studies will be required to determine the potential effects of this project on sensitive receptor sites.

Air

PRP-7 is located within the Portland air quality maintenance area for carbon dioxide. Since additional traffic may result in a potential change in air quality, additional studies would be required to determine the effects of the project on air quality.

Archeological

The area is an existing developed area. However, the substantial nature of the improvements and the location near the Columbia River may result in exposure of archeological resources. Additional studies would likely be required.

PRP-8

PRP-8 consists installing power-operated switches in the BNSF main line at two locations (north and south ends of Lake Yard), starting west of North Kittridge Road and extending northeast to NW Front Avenue. No ground excavation is anticipated outside the track prism. No buildings will be impacted.

Wetland and habitats (ESA)

The Willamette River is located approximately 600 feet to the northeast, but does not encroach into the project area. A tributary to the Willamette River is mapped on the east side of North Kittridge Road; however this stream appears to be conveyed beneath the project area in a culvert, since no channel is evident in the aerial photograph. No wetlands are identified in the project area, and no wetland permits would be required for this project.

No areas outside of the rail areas are disturbed and no new stormwater facilities are required, the project will likely not require ESA consultation.

Flood

Floodplains for the Willamette River are approximately 600 feet to the northeast and would not be affected by the project.

Stormwater

No expected changes to stormwater treatment.

Local Permits and Other

The project is not within the City of Portland Environmental Protection or Environmental Conservation zone. If work is limited to the existing rail it would constitute maintenance of an existing facility.

Noise

If no changes result to roadway or rail traffic, then there would be no expected noise effects from the switch replacement.

Air

The project is within the Portland air quality maintenance area for carbon monoxide. If no changes to railroad or vehicular traffic result from the switching changes, there would be no expected effects to air quality. Changes in traffic could potentially result in changes in air quality that would require additional studies.

Archeological

If there is no ground disturbance, then there would be no expected effects. However, ground disturbing activities would require additional studies.

PRP-9

The proposed project would create a grade separation at Columbia Boulevard, taking Columbia Boulevard over the tracks.

Wetland and habitats (ESA)

The affected area appears to be heavily developed. NWI maps do not show any wetlands or waterways within the proposed project limits.

If stormwater treatment methods allow for full infiltration, there would be No Effect to listed aquatic species. Fully treating the stormwater resulting from the design storm without full infiltration will result in a Not Likely to Adversely Affect for ESA listed aquatic species.

Flood

There are no mapped floodplains in the project area, and no permit would be required.

Stormwater

Stormwater facilities should be anticipated for the new roadway alignment. The improvements are expected to result in an improvement in water quality by treating stormwater. No detention facilities are anticipated due to the proximity to the Columbia Slough.

Local permit and other

The area north of Columbia Boulevard is within a City of Portland Environmental Conservation Zone. The proposed project could qualify as an exemption within this zone, as there are no waterways within 50 feet of the proposed development; however, a Type II permit would be required.

Noise

Improvements are in an existing developed industrial area. Paving activities are expected to result in temporary, short term increases in noise during construction. Given the anticipated vertical alignment shift a noise evaluation would be required to determine if sensitive noise receptors are adversely impacted.

Air

The project would not be expected to have adverse air quality impacts.

Archeological

PRP-9 will likely impact areas outside the existing footprint of the roadway. Archaeological evaluations would be anticipated.

PRP-10

PRP-10 includes construction of a new alignment and rail bridge and begins near North Simmons Road, crosses Columbia Slough, parallels NE Kelley Point Park Road and ends at North Marine Drive. Approximately 1,200 feet of additional track will be located in the existing rail rights-of-way near Terminal 5, and four new switches will be added in this location. Construction of PRP-10 requires substantial grading, with the potential for in-water work, and would affect existing wetlands, and a portion of the project is within Kelley Point Park, a City of Portland Parks.

Wetland and habitats (ESA)

Forested NWI wetland located on the east side of the slough. The proposed crossing is approximately 900 feet long. Assuming a 25 foot right-of-way this is approximately 0.5 acres and would likely require an individual permit under Section 404 of the Clean Water Act. However, this area appears to be already developed and no wetland is mapped on the Local (City of Portland) wetland inventory.

PRP-10 crosses Columbia Slough (a tributary to the Willamette River), has potential effects to ESA (salmonids), which could be minimized through avoidance of in-water work, however the proposed crossing is approximately 600 feet long. As a result, the proposed actions would likely require in-water work (resulting in an ESA effect determination of Likely to Adversely Affect). Best management practices would contain construction activities and minimize potential impacts to fish.

A new crossing of waterways containing migratory fish will trigger the Oregon Department of Fish and Wildlife (ODFW) Fish Passage rules and required consultation with ODFW for approval.

Flood

The project crosses the 100 year floodplain of the Columbia Slough. Permits may be required for this work, and floodplain mitigation may be required.

Stormwater

New stormwater facilities likely required due to a new at-grade crossing. No detention facilities are anticipated due to the proximity to the Columbia Slough.

Local Permits and Other

The proposed project would be constructed in a City of Portland Environmental Conservation Zone associated with the Smith & Bybee Lakes Natural Resource Area. The Environmental Conservation zone conserves important resources and functional values in areas where the resources and functional values can be protected while allowing environmentally sensitive urban development. The proposed development may require a Type II Conditional Use permit.

Projects that affect park or recreation lands may be subject to the Land and Water Conservation Fund Section 6(F) and Section 4(f) of the federal Department of Transportation Act (49 USC 303).

Noise

The proposed project includes new structures within an existing industrial access area. The project will likely increase noise for sensitive receptors in the immediate vicinity along Simmons, NE Kelley Point Park Road and North Marine Drive. Additional studies will be required to determine the extent of these effects.

Air

The project is within the Portland air quality maintenance area for carbon monoxide. Changes to railroad or vehicular traffic resulting from this new alignment are likely to result potential changes to air quality. Changes in traffic could potentially result in changes in air quality that would require additional studies.

Archeological

Substantial grading near the Willamette and Columbia Slough will be required, and Kelley Point Park is a historic site. This may result in exposure of archeological resources. Additional studies would likely be required.

Schedule and Timeline

Permits for this project include ESA consultation with in-water work and individual Corps permit. These permits would likely require 9 to 24 months.

Studies may be required for compliance with Section 4(f) of USDOTA or LWCA 6(f). These studies vary in complexity, but can result in substantial delays, presumably up to 24 months or longer.

PRP-11

PRP-11 includes construction of a third running track alongside two existing tracks between UP Barnes Yard and Terminal 4. The project extends eastward past North Columbia Boulevard and passes under the North Lombard Street bridge (it was assumed that there would be no bridge work). Work takes place within existing railroad and street rights-of-way.

Wetland and habitats (ESA)

No wetlands or streams were identified in the project area. The nearest wetland is approximately 375 feet north in Chimney Park. The Columbia River and Willamette River are both over 1,000 feet from the termini of the project. No wetland permit would be required for the project.

Construction of stormwater facilities that cannot accommodate complete infiltration of stormwater may result in changes to water quality that could affect ESA listed species. Additional studies would be required to determine potential for infiltration, and ESA consultation may be required.

Flood

No floodplains were identified in the project area. The nearest floodplain is the 100 year floodplain to the Willamette River, approximately 800 feet to the west. No floodplain permits would be required.

Stormwater

Proposed bridge improvements would likely require new or improved stormwater facilities and would not result in changes in stormwater quantity or quality. No detention facilities are anticipated due to the proximity to the Columbia Slough.

Local Permits and Other

The project is not within the City of Portland Environmental Protection or Environmental Conservation zone. Other city regulations, such as Title 10 Erosion Control must still be met.

Noise

Construction of the new loop tracks will result in short-term construction related increases in noise levels. The two new rail loops are likely to result in long term increases in trail traffic, which may result in increases in noise and sensitive receptor sites. Additional studies will be required to determine the extent of these changes.

Air

PRP-11 is located within the Portland air quality maintenance area for carbon monoxide. Changes in rail traffic are likely to result in the potential effects to air quality. Additional studies would be required to determine the extent of the changes.

Archeological

Grading near the Willamette and Columbia Rivers will be required. This may result in exposure of archeological resources. Additional studies would likely be required.

PRP-12

PRP-12 includes construction of a grade separation at North Rivergate Boulevard, approximately 875 feet in length.

Wetland and habitats (ESA)

A small tributary to Columbia Slough located approximately 135 feet to the south of the project, and mapped NWI and LWI wetlands are located along the stream. These wetlands are bisected by the existing rail line, and a culvert appears to carry stream flows beneath the rail line. A small wetland is also identified by the NWI approximately 50 feet north of North Rivergate Drive; this wetland has been converted to office/industrial use. Since no wetlands are located in the immediate project vicinity, no wetland permit would be required. ESA consultation may be required for stormwater impacts.

Flood

The 100 year floodplain for the identified stream appears to extend to the toe of the road prism for North Rivergate Drive. Work that extends beyond the base of the road prism (as shown in the revised right-of-way) would likely require a floodplain development permit.

Stormwater

New impervious surface resulting from PRP 12 would require stormwater treatment. As a result, PRP 12 is not expected to result in an increase in stormwater quality or a decrease in quality. No detention facilities are anticipated due to the proximity to the Columbia Slough.

Local Permits and Other

The area immediately south of North Rivergate Boulevard is zoned by the City of Portland as Environmental Conservation. Impacts outside the prism of the transportation network would require a Type II Conditional Use permit.

Noise

PRP-12 will result in a short-term temporary increase in noise due to construction activities. Construction of the grade separation would not result in any long term increases in noise levels.

Air

PRP-12 is not expected to result in result in changes to air quality in the project area.

Archeological

Grading near the tributary to Columbia Slough will be required. This may result in exposure of archeological resources, requiring additional studies.

Schedule and Timeline

Based on the assumption of a no effects determination for ESA species, permits for this project could likely be acquired in 6 months or less.

PRP-13

PRP-13 includes approximately 3,500' of new track construction on the west side of the rail yard on the Ramsey Line, and minor track revisions and installation of two switches near North Time Oil Road.

Wetland and habitats (ESA)

This project includes areas mapped by the NWI as forested wetland (approximately 4,600 lineal feet) to the west of the existing rail line. However, these areas appear to have been filled and have been converted to industrial uses. Approximately 130 acres of wetlands are mapped in the LWI to the east of the project, along Ramsey Lake and Columbia Slough. These areas remain undeveloped. Wetland permits may be required under Section 404 of the CWA if these wetlands are affected by eastward expansion of the project.

Two small tributaries to the Columbia Slough are located to the north of North Time Oil Road, near the track revision and signal installation area. At the west end of the project, these tributaries are more than 200 feet from the rail grade. On the east end of the project, the northern tributary approached within 40 feet, and the southern tributary is within 75 feet. Wetlands associated with these tributaries are mapped in both the NWI and LWI and appear to extend to the foot of the existing rail prism. Installation of the signals and some of the rail revision work appears to extend into the existing wetlands. A Section 404 CWA permit will be required from USACE for this work.

Columbia Slough is located approximately 130 feet to the north of the northern terminus of the project. If the project is constructed in the existing rail prism, streams and ESA fish and habitat will not be affected. However, entering the wetland near North Time Oil Road or failure to provide complete infiltration of stormwater may require consultation under ESA.

Flood

Most of the project is within the 100 year floodplain associated with Ramsey Lake and Columbia Slough. The project will likely require a floodplain development permit and may require floodplain mitigation.

Stormwater

PRP-13 is within the existing developed rail areas and is not expected to result in changes to stormwater quality or quantity. If stormwater for the project cannot be completely infiltrated, additional studies may be required.

Local Permits and Other

The area immediately east of the project area is zoned by the City of Portland as Environmental Protection and Conservation. Impacts outside the prism of the transportation network would require a Type II Conditional Use permit; however, the proposed project does not appear to impact parcels including the environmental overlays.

Noise

PRP-13 will result in short-term temporary increases in noise due to construction activities. Since PRP-13 is on an existing rail line, if the project does not result to changes in traffic patterns, it would not be expected result in a permanent increase in noise for the area.

Air

PRP-13 is located within the Portland air quality maintenance area for carbon monoxide. If no changes to railroad or vehicular traffic result from the project, there would be no expected effects to air quality. Changes in traffic could potentially result in changes in air quality that would require additional studies.

Archeological

Grading near the Willamette and Columbia Rivers will be required. This may result in exposure of archeological resources. Additional studies would likely be required.

Schedule and Timeline

Based on an assumption of minimal or no wetland fill, permits for this project could likely be acquired in 6 months or less.

PRP-14

Track removal and realignment in existing rail prism, approximately 1,400 feet in length. Minor improvements include vehicle crossing “quad gates” at North Pittsburg Avenue and North Burlington Avenue. The project includes removal of asphalt surfacing and some concrete demolition and removal. The final phase of the project may impact one commercial building.

Wetland and habitats (ESA)

The Willamette is located to the south of the project, approximately 2,540 feet south near North Burlington Road and 700 feet south at the western end of the project. The project is not expected to affect streams or ESA species or habitats. No consultation would be required for ESA.

No NWI or LWI wetlands were identified near the project area. No wetland permits would be required for this project.

Flood

The 100 year floodplain for the Willamette River approaches within 20 feet of the project near St John’s Bridge. The remainder of the project area is outside of floodplains. If the proposed project can be completed within the existing rail area and without additional floodplain fill no floodplain development permits would be required.

Stormwater

New impervious surface resulting from PRP 14 would require stormwater treatment. As a result, PRP-14 is not expected to result in an increase in stormwater quality or a decrease in water quality. No detention facilities are anticipated due to the proximity to the Willamette River.

Local Permits and Other

The project crosses property designated as Open Space with River Recreational, Water Quality Resource Area, and Scenic Resource overlay zones. Industrial service and railroad yards are not allowed uses within an Open Space. Local grading permits would be required for the demolition of the existing structure and other construction activities. Taking of private property would be required at the existing building site, which may be

Noise

PRP-14 will result in a short-term temporary increase in noise due to construction activities, notably the building demolition. Relocation of the existing rails within the rail prism would not result in any long term increases in noise levels. The addition of the vehicle gates at North Pittsburg Avenue and North Burlington Avenue will result in reduced train horn noise.

Air

PRP-14 is not expected to result in changes to air quality in the project area. PRP-13 is located within the Portland air quality maintenance area for carbon monoxide. If no changes to railroad or vehicular traffic result from the project, there would be no expected effects to air quality.

Archeological

Grading near the tributary to Willamette River will be required. This may result in exposure of archeological resources, requiring additional studies.

PRP-15

PRP-15 consists of two new yard tracks within the footprint of an existing rail yard between North Rivergate Boulevard and North Time Oil Road, approximately 3,100 feet in length. The project also includes removal of approximately 450 feet of existing rail along Columbia Slough, and construction of approximately 1,800 feet of new track and a new switch along Columbia Slough within existing rail rights-of-way and a strip of new right-of-way that would be acquired from private landowners on the south side of the track.

Wetland and habitats (ESA)

Two small tributaries to Columbia Slough are located to the north and south of the project. At the west end of the project, these tributaries are more than 200 feet from the rail grade. On the east end of the project, the northern tributary approached within 40 feet, and the southern tributary is within 75 feet. Wetlands associated with these tributaries are mapped in both the NWI and LWI and appear to extend to the foot of the existing rail prism. Riverine wetlands associated with Columbia Slough are approximately 50 feet to the east of the project area. Since the proposed relocation would be located between existing tracks and the new track is within the existing rail prism where no wetlands are mapped, PRP-15 can be completed with no effect to wetlands or streams (and no required permits), and no consultation would be required under ESA.

Flood

The 100 year floodplain for the identified streams covers the entire project area. A floodplain development permit would be required. If the proposed project can be completed within the existing rails and without additional floodplain fill (demonstrating zero rise), then PRP-15 would not require floodplain mitigation.

Stormwater

No new impervious surface would result from PRP-15. As a result, this project is not expected to result in an increase in stormwater quality or a decrease in quantity.

Local Permits and Other

The project is within a City of Portland Environmental Conservation Zone of the Smith & Bybee Lakes Natural Resource Area. Impacts that increase the coverage of the transportation network would require a Type II Conditional Use permit.

A strip approximately 1,600 feet by up to 20' wide of new right-of-way would have to be acquired from private land owners for the project.

Noise

PRP-15 will result in a short-term temporary increase in noise due to construction activities. Relocation of the existing rails within the rail prism (with not changes in rail traffic patterns) would not result in any long term increases in noise levels. However, the installation of new rail track along Columbia Slough may result in increased rail traffic, and a potential for increased noise at sensitive receptor sites.

Air

PRP-15 is located within the Portland air quality maintenance area for carbon monoxide. Any changes to railroad traffic resulting from the project have the potential to affect air quality, and would be require additional studies.

Archeological

Grading near the tributary to Columbia Slough will be required. This may result in exposure of archeological resources, requiring additional studies.

Schedule and Timeline

Acquisition of property from multiple private property owners can be a lengthy process. This process could require 12 or more months.

PRP-16

PRP-16 would construct additional inbound and outbound rail tracks in the Berth 410 and 411 Rail Yard. The project may include a rail scale, and other improvements to existing rails. Work is expected to be confined to the existing developed areas.

Wetland and habitats (ESA)

A small emergent wetland is located approximately 400 feet to the north along an embayment of the Willamette River. There are no expected impacts to wetlands from the work onsite, and no wetland permits would be required.

No expected impacts water bodies or stormwater, and therefore no expected impacts to ESA species are expected from the project. As a result, no consultation would be required under ESA.

Flood

The project extends to within 50 feet of the floodplain of the Willamette River. There are no expected impacts to floodplains, and no floodplain development permits would be required.

Stormwater

The project is within an existing developed rail facility. If no additional impervious areas are created, then there would be no expected effects to stormwater quality or quantity.

Local Permits and Other

The project not is within the City of Portland Environmental Protection or Conservation zone. Other city regulations, such as Title 10 Erosion Control must still be met.

Noise

Short term increases in noise levels would result from the construction activities. Increases in rail traffic at the site could result in additional noise at sensitive receptor sites. Additional studies would be required to determine the extent of these effects.

Air

PRP-16 is located within the Portland air quality maintenance area for carbon monoxide. Changes in traffic resulting from the additional rail lines could result in changes in air quality that would require additional studies.

Archeological

Grading near the Willamette River will be required, but within existing developed area. This may result in exposure of archeological resources. Additional studies would likely be required.

PRP-17

PRP-17 includes construction of tracks on west Hayden Island to facilitate access to the proposed marine terminal from the BNSF main line.

Wetland and habitats (ESA)

The project crosses the Columbia River; however, no project elements are proposed in the Columbia River. NWI maps indicate the presence of a wetland immediately north and west of the proposed project, but this feature does not appear to extend into the project area. One small wetland is mapped in the Local Wetland Inventory to the west of the project. Less than 0.5 acre of this wetland would be filled to accommodate the new rail access. A wetland permit would be required under Section 404 of the CWA.

If stormwater treatment methods allow for full infiltration there would be No Affect to listed aquatic species. Fully treating the stormwater resulting from the design storm without full infiltration will result in a Not Likely to Adversely Affect for ESA listed aquatic species.

Flood

The proposed project is within the Columbia River floodplain. The project will be required to demonstrate it will not result in a rise of the base flow of the Columbia River.

Stormwater

Construction of new impervious area will require new stormwater facilities. No detention facilities are anticipated due to the proximity to the Columbia River.

Local permit and other

The West Hayden Island development has generated much public interest. Any associated project will likely generate public interest and comment that will make local permits more difficult to secure. The proposed project would be constructed in a City of Portland Environmental Protection Zone for the Middle Columbia Natural Resource Area. The Environmental Protection zone provides the highest level of protection to the most important resources. The proposed development within this zone will require a Public hearing prior to issuing a Type III Conditional Use permit.

Noise

Improvements are in an existing developed industrial and commercial area. The proposed project may result in increases in noise for sensitive noise receptors. Additional studies would be needed to determine the extent of the effects on sensitive receptors.

Air

PRP-17 is located within the Portland air quality maintenance area for carbon monoxide. The proposed facilities may result in an increase in air quality due to additional idle times and slower movements to access the new facility. An analysis should be completed to determine if there is an affect.

Archeological

The existing area has been highly disturbed. However, the substantial nature of the improvements and the location near the Columbia River may result in exposure of archeological resources. Additional studies would likely be required.

Schedule and Timeline

Permits for this project could likely be acquired in 6 months or less.

PRP-18

Project proposes to create a new marine terminal on West Hayden Island with train loops.

Wetland and habitats (ESA)

The Columbia River surrounds the proposed development. The project would construct two marine docks in the Columbia River. The interior of the site includes approximately 10 wetlands mapped in the Local Wetland Inventory. The project would also have impacts to wetlands (approximately 10 acres) and other shallow water habitat. Given the amount of impacts and the public interest, the project would be permitted under an Individual permit (subject to Section 404 of the CWA).

PRP 18 includes direct effects to ESA salmonid species and habitats resulting from the installation of piles in the Columbia River. The removal and modification of habitat from these activities would also result in indirect effects on these species and their habitats. As a result, PRP-18 will require formal ESA consultation.

Flood

PRP-18 is almost entirely within the floodplain of the Columbia River. The project will require a floodplain development permit, and would be required to demonstrate it will not result in a rise of the base flood elevation of the Columbia River.

Stormwater

Stormwater quantity and quality treatment should be anticipated by the project, as impervious area will be developed. No detention facilities are anticipated due to the proximity to the Columbia River.

Local permit and other

PRP-18 is within the City of Portland environmental zone. The West Hayden Island development has generated much public interest. Any associated project will likely generate public interest and comment that will make local permits more difficult to secure. PRP-18 should anticipate an extensive process with City of Portland to complete the Type III process, including a public hearing.

Noise

Increased noise impacts to adjacent residential areas would be anticipated from the increased road, vessel, and rail traffic. These effects may result in an increase in noise for sensitive receptor sites. Additional analysis would be required to determine the level of effect.

Air

PRP-18 is located within the Portland air quality maintenance area for carbon monoxide. Changes in traffic are likely to result for the project, and air quality would be expected to degrade with the development of the new marine terminal and support infrastructure.

Archeological

No expected effects to artifacts, as the majority of the development will occur on grounds previously disturbed by dredge spoil handling. The project should anticipate tribal interest in the development.

Schedule and Timeline

Permits for this project are likely to be complex due to the potential impacts to ESA species and wetlands. Assuming that an EIS is not required, permit approval may require 9 to 24 months to complete.

PRP-19

The work involves improving the approaches to these bridges to allow an increased operating speed. PRP-19 also includes the Willamette River Draw Span. The precise improvements have yet to be determined, but for this evaluation it is assumed that work areas will be limited to the existing facility, and any substructure work will occur from the existing facility footprint.

Wetland and habitats (ESA)

The bridges included in the proposed project crosses the Columbia River National Wetland Inventory maps do not include any other wetland features within the project area.

The Columbia River contains numerous ESA listed species. If work is contained and does not result in the creation of additional impervious surface or modification of stormwater conveyance, a No Affect for ESA is likely, and formal consultation would not be required.

Flood

The project crosses the 100 year floodplain of the Columbia River and would require a floodplain development permit. The project will likely be required to demonstrate no rise for work that may increase the structural profile.

Stormwater

New stormwater facilities will not be required if the work is limited to existing rail maintenance.

Local permit and other

The proposed project would be constructed in a City of Portland Environmental Conservation Zone. The Environmental Conservation zone conserves important resources and functional values in areas where the resources and functional values can be protected while allowing environmentally sensitive urban development. The proposed development may require a Type II Conditional Use permit.

Noise

Additional studies may be required to determine the effects of the project on sensitive receptor sites.

Air

PRP-19 is located within the Portland air quality maintenance area for carbon monoxide. The project is not expected to result in a change in air quality, and may improve air quality by eliminating the need for train speed reduction.

Archeological

Additional studies would likely be required to determine effects to archaeological or historical resource.

PRP-20

Reconfigure the Union Pacific connection at North Portland Junction installing a No. 20 universal crossover and easing curvature. Ease curvature of the tracks connecting North Portland Junction to the Kenton Line and install an interface between BNSF Railway (BNSF) and UP to insure continuous movement of trains entering and exiting BNSF at North Portland Junction.

Wetland and habitats (ESA)

A large emergent wetland is located immediately west and east of the proposed project along the embankment of the existing railroad. If the toe of slope is maintained impacts would not be anticipated. Minor expansions would likely result in wetland fills that would require a permit under Section 404 of the CWA.

There do not appear to be ESA listed aquatic species in the immediate vicinity, and no consultation would be required.

Flood

The project would not be developed in a floodplain, and no floodplain development permit would be required.

Stormwater

The additional impervious area created by the new track and pull outs should anticipate treatment prior to discharging to waters of the state.

Local permit and other

There do not appear to be any unique local agency permitting requirements for the proposed action.

Noise

The minor shift in alignment is not expected to not have an impact to sensitive noise receptors.

Air

No expected changes to air quality due to the existing rail facilities.

Archeological

Grading near the Willamette River will be required. Additional studies would likely be required.

PRP-21

PRP-21 provides continuous double track where only single track currently exists. Proposed improvements include several new bridges over local roads and crossovers at strategic locations. The project would also construct a new bridge for a 2nd UP track over the Columbia Slough on the west end of the alignment, near North Portland Road.

Wetland and habitats (ESA)

NWI maps for the project vicinity indicate the presence of a pond between North 63rd Avenue and North 66th Avenue, but this appears to be outside the limits of the No 24 Universal Crossovers. There is also an apparent unmapped wetland south of the tracks east of NE 158th Boulevard and a large wetland complex shown between NE 165th Avenue and NE 197th Avenue north of the tracks. If the project is constructed on the existing railroad ballast, these areas will also be outside the potential impact area of the project. There are several smaller wetlands within 100 feet and two stream crossings as the tracks approach Troutdale; if additional railroad base expansion is not required, then these areas can likely be avoided. If wetlands are located near the project area can be avoided, PRP-21 is expected not expected to require a permit under CWA. However, additional studies will be required to determine the exact location of wetlands, and more detailed design will need to be completed to completely assess the potential impacts.

PRP 21 will cross Columbia Slough (a tributary to the Columbia River) and four unnamed tributaries to the slough. These streams are all likely to provide potential habitat for listed salmonids species. The proposed Columbia Slough crossing is approximately 650 feet long, would likely require in-water work (such as removal an installation of piles), which would result in an ESA effect determination of Likely to Adversely Affect. Two of the smaller stream crossing may also require in-water or overwater work to cross the streams. No new facilities are proposed for the remaining two streams where the work consists of improvements to existing tracks. The removal and modification of habitat from these activities would also result in indirect effects on these species and their habitats. Best management practices would be required to contain construction activities and minimize potential impacts to fish at all stream crossings, however, formal consultation under ESA would be required for the project. A fish passage plan would also be required by ODFW.

Flood

The project is not proposed in a 100 year floodplain, and no floodplain development would be required.

Stormwater

Areas of additional impervious surface should anticipate water quality and quantity treatment. No detention facilities are anticipated due to the proximity to the Columbia Slough.

Local permit and other

Given the proposed crossing of several local streets, additional coordination would be required.

Noise

There are several areas along the alignment where additional tracks are proposed adjacent to near by residential communities. Although not anticipated, the alignment shifts in this area would be evaluated resulting in impacts to sensitive receptors.

Air

PRP-21 is located within the Portland air quality maintenance area for carbon monoxide. The proposed project should improve rail mobility in this corridor, and may result in adverse effects to air quality.

Archeological

Areas anticipated to be disturbed should be evaluated for potential resources. Given the previous disturbance, it is unlikely resources would be discovered.

Schedule and Timeline

Permits for this project are likely to be complex due to the potential impacts to ESA species. Assuming that an EIS is not required, permit approval may require 9 to 24 months to complete.

PRP-22

The proposed project is located in Port of Portland Terminal 2 on the Willamette River. This site is on the north side of Northwest Front Street near Northwest 26th Avenue. PRP 22 consists of improvements to the existing port facilities, including a double loop track on the interior of the site, new use of an existing dockside track along the Willamette River to facilitate loading and unloading of ships, a reconfigured rail access from Northwest Sherlock Avenue, and a new siding on the south side of the rail along Northwest Sherlock Avenue, extending from approximately 150 feet west of Northwest 21st Avenue to about 200 feet southeast of Northwest 17th Avenue.

Wetland and habitats (ESA)

NWI maps show an area of riverine wetland on the Terminal 2 site, however this area has been filled. No local wetland inventory wetlands are mapped on the site or in the new siding area. Construction of the project is expected to include only the developed areas and will not include in-water work in the Willamette River.

The Willamette River is located immediately to the north, of the site, and provides habitat for ESA listed salmonid species.

Flood

The project is not within the mapped 100 year floodplain for the Willamette River.

Stormwater

The site is already developed with paved impervious surface. It is assumed that any proposed stormwater treatment facilities would provide similar treatment to the existing, and would not result in impact to ESA species..

Local permit and other

PRP-22 is part of the Willamette River Greenway, however the area is already zoned as industrial and developed. Local grading permits would be required.

Noise

Demolition and construction activities would result in short-term, temporary increase in noise for sensitive receptors. The new siding areas and the new loop tracks may support additional rail traffic in the area, which could result in an increase in noise for sensitive receptors. Additional studies would be necessary to confirm the exact effects.

Air

PRP-22 is located within the Portland air quality maintenance area for carbon monoxide. If there is an increase in traffic from the improved facilities, additional studies should be performed to assess potential changes in air quality.

Archeological

PRP-22 will include ground disturbance where new tracks are installed, but the work is expected to take place within recently developed areas. As a result, impacts to archeological resources are not expected.

If substantial excavation is to be performed, additional studies should be performed for historic or archeological resources.

PRP-23

PRP 23 will increase track speed (from 6 to 20 MPH) between Albina and East Portland. Additional crossovers at both ends will allow Union Pacific and Amtrak to take full advantage of the recently installed CTC system.

Wetland and habitats (ESA)

The proposed project is immediately adjacent to the Willamette River (within 45 feet). There are no other water ways or wetlands within the proposed project boundaries.

Full stormwater treatment and isolation of work activities from the Willamette River should allow for an ESA No Effect determination for aquatic species. Although suitable habitat does not appear to be present, additional analysis would be required confirming that the project would not affect listed plants.

Flood

The project is adjacent to a City of Portland designated special flood hazard and 100 year floodplain. It does not appear the proposed project would encroach into this area.

Stormwater

New stormwater facilities would likely utilize Portland's Consolidated Sewer Overflow (CSO) 'big pipe' to meet the water quality treatment requirements. No detention facilities are anticipated due to the proximity to the Willamette River.

Local permit and other

The proposed project is part of the Willamette River Greenway. Other city regulations, such as Title 10 Erosion Control must also be met.

Noise

The alignment will shift with the correcting of the curve. There do not appear to be sensitive noise receptors within 0.1 miles of the alignment shift. No additional noise analysis is likely required.

Air

PRP-23 is located within the Portland air quality maintenance area for carbon monoxide. If no changes to railroad or vehicular traffic result from the project, there would be no expected effects to air quality.

Archeological

Although the proposed project area has been previously disturbed additional studies would likely be required for historic and archaeological resources.

Schedule and Timeline

Permits for this project could likely be acquired in 6 months or less if no effect to ESA listed species can be determined.

PRP-24; Option 1

Eliminate train crossing of Union Pacific and BNSF lines by “Undoing the X”. This would eliminate significant congestions due to the crossing movement. This option would construct new track over Portland Blvd and the Columbia Slough and approach Penn Jct. from the west.

Wetland and habitats (ESA)

Forested/shrub and emergent NWI wetland located immediately to the west of Option 1. A freshwater pond is shown within the existing alignment, however the feature does not appear to on current aerials and the area is completely developed.

The project crosses the Columbia Slough, a tributary to the Willamette River. The proposed crossing is approximately 455 feet long, would likely require in-water work, with the potential effects to ESA (salmonids). Best management practices would be required to contain construction activities and minimize potential impacts to fish, however, consultation under ESA would likely be required for the project. A fish passage plan would be required by ODFW.

Flood

The project crosses the Columbia Slough; however there is no designated floodplain depicted on the FEMA maps.

Stormwater

New stormwater facilities will likely be required to avoid impacts to listed aquatic species and jurisdictional waters. No detention facilities are anticipated due to the proximity to the Columbia Slough.

Local permit and other

The proposed project would be constructed in a City of Portland Environmental Protection Zone for the Smith and Bybee Lake Natural Resource Area. The Environmental Protection zone provides the highest level of protection to the most important resources. The proposed development within this zone will require a public hearing prior to issuing a Type III Conditional Use permit.

Noise

The new alignment south of the slough would increase rail traffic and the associated noise in the vicinity of the rail. The closest sensitive noise receptor appears to be 650 feet from the alignment (North bank St), and given the current use of other tracks in the vicinity would not likely be adversely impacted. Additional review would be required to verify.

Air

PRP-24 is located within the Portland air quality maintenance area for carbon monoxide. The project should reduce emissions by reducing congestions currently experienced by the crossing movement.

Archeological

Substantial grading will be required. Additional studies would likely be required.

Schedule and Timeline

Permits for this project include ESA consultation with in-water work and a Nationwide USACE permit. These permits would likely require 6 to 9 months.

PRP-24 ; Option 2

Option 2 would eliminate train crossing of Union Pacific and BNSF lines by “Undoing the X”. This would eliminate significant congestions due to the crossing movement. Option 2 would also construct a new track to the east of the existing track, approaching Penn Junction from the east.

Wetland and habitats (ESA)

Riverine and pond NWI wetland located on the east side of the proposed alignment. Expansion of the toe of slope could have impacts exceeding one acre. The project also includes a proposed crossing of the Columbia River on the south side of Hayden Island. Given the length of the proposed crossing, in water work would be anticipated. The project would require an individual permit from USACE under Section 404 of the CWA.

The proposed project crosses Columbia Slough (a tributary to the Willamette River) on an existing bridge. With appropriate Best Management Practices (BMPs), the project could avoid effects to ESA listed species at this crossing. The crossing of the Columbia River would like result in an Adverse Effect to listed aquatic species or their habitats.

Flood

The project crosses the 100 year floodplain of the Columbia River, and would need to demonstrate no rise or provide mitigation.

Local permit and other

The proposed project would be constructed in a City of Portland Environmental Conservation Zone. The Environmental Conservation zone conserves important resources and functional values in areas where the resources and functional values can be protected while allowing environmentally sensitive urban development. The proposed development within this zone may require a Type II Conditional Use permit.

Stormwater

New stormwater facilities would be required for the new impervious surface generated. No detention facilities are anticipated due to the proximity to the Columbia Slough.

Noise

PRP-24 has the potential to increase train volume and the resulting noise levels. Additional studies would be required to determine the extent of these effects. Additional vibratory impacts resulting from the track relocation should be evaluated.

Air

PRP-24 is located within the Portland air quality maintenance area for carbon monoxide. Likely changes to railroad traffic result from the project, providing potential effects to air quality.

Archeological

Substantial grading near the Willamette and Columbia Slough will be required. This may result in exposure of archeological resources. Additional studies would be required.

Schedule and Timeline

Permits for this project include ESA consultation with in-water work and an Individual USACE permit. These permits would likely require 9 to 24 months.

PRP-25

Alternative 1

Construct a small interchange yard parallel to the BNSF mainline. The work area is between the existing rails along Vancouver Lake and NW Lakeshore Avenue is approximately 3,000 feet long. Likely requires grading within the existing rail corridor and vegetation removal.

Alternative 3

This alternative include the wye track, a new bridge over Burnt Bridge Creek, a new at-grade crossing of Fruit Valley Road, an earthen fill structure between Fruit Valley Road and the BNSF main track, and a new signalized connection.

Wetland and habitats (ESA)

A large wetland associated with the shorelines of Vancouver Lake is located to the west of the project. This wetland appears on both NWI and LWI maps and is approximately 150 feet from the northern end of the project, but closely approach the foot of the rail ballast at the southern end of the project. HDR has also identified additional wetland in the interior area between the existing rails. While construction of Alternative 1 could be accomplished without affecting the NWI/LWI wetlands, the interior wetland would be affected, and the total area may exceed 1.7 acres, requiring an individual permit under Section 404 of the CWA. Alternative 3 would also cross wetlands and would require a new bridge over Burnt Bridge Creek. The approximate affected area is just over 0.5 acre (and would also require an individual permit).

Burnt Bridge Creek flows under the southern end of the alignment in a culvert, and Vancouver Lake is located to the west of the project.

Alternative 1 would not require in-water work, and would likely result in a No Effect determination for listed salmonids. Alternative 3 would likely require in water Burnt Bridge Creek, resulting in an ESA likely to adversely affect determination for listed salmonids and habitats.

Flood

Portions of both PRP-25 Alternatives are within the 100 year floodplain for Burnt Bridge Creek and Vancouver Lake. Alternative 1 can likely be accomplished with minimal effect on the floodplain since the affected portion of the project is largely realignment. Alternative 3 results in greater effects within the floodplain than other project options, including the construction of a new bridge. As a result, this alternative would likely require floodplain mitigation.

Stormwater

Alternative 1 is not expected to require additional stormwater facilities. Alternative 3 includes an at-grade crossing that may require new stormwater facilities.

Local Permits

Lake Vancouver is a Shoreline of Statewide Significance. Fairly extensive permitting efforts for work in the shoreline would be required. Washington SEPA compliance would be required. Work in wetland streams and their riparian corridors would likely require a critical areas permit

Noise

Improvements are in an existing rail corridor area. Construction and paving activities are expected to result in temporary, short term increases in noise during construction. Revisions to the existing rail facilities are not expected to result in substantial increases in noise.

Air

PRP-25 is located within the Vancouver air quality maintenance area for carbon monoxide. If no changes to railroad or vehicular traffic result from the project, there would be no expected effects to air quality. Changes in traffic could potentially result in changes in air quality that would require additional studies. PRP-25 is not expected to result in changes in air quality.

Archeological

Grading near Burnt Bridge Creek and Vancouver Lake will be required. This may result in exposure of archeological resources. Additional studies would likely be required.

Schedule and Timeline

Permits for this project include ESA consultation with in-water work and an individual USACE permit. These permits would likely require 9 to 24 months.

PRP-26

PRP-26 is composed of WSDOT projects along Kelso Martins Bluff High Speed Rail project corridor, including building a third track alongside the double main, extending from just north of the Kalama River Bridge northward to Longview Junction.

Wetland and habitats (ESA)

Extensive NWI wetlands are located to the west of the project; these likely extend to the toe of the fill prism for the majority of the alignment. NWI wetlands are also located along the east side of the alignment for much of the southern portion of the project, likely extending to the foot of the existing rail. Expansion in this area is highly constrained and would result in impacts to wetlands. Due to the length of the project, these impacts would likely be of sufficient area (greater than 0.5 acre) to require an individual USACE permit under Section 404 of the CWA.

The two new bridges will need to be constructed for the project, one over the Kalama River and one over Owl Creek. Other smaller streams may be present, that are not visible on existing mapping due to the relatively coarse scale. Since this project is located in close proximity to the Columbia River, there are likely to be numerous unmapped small streams. Stream crossings would likely require culvert extensions and corresponding in-water work (Likely to Adversely Affect listed salmonids/habitats) which would require ESA consultation. A crossing of the Kalama River, (if included) would have similar ESA consultation requirements. Any in-water work in the State of Washington would require a Hydraulic Permit Approval from Washington Department of Fish and Wildlife (WDFW).

Flood

No flood areas are mapped crossing the project, however, a side channel to the Columbia River is located immediately to the west, and its flood zone likely extends to the foot of the railway. The Kalama River is also located at the southern end of the project. Work within the existing alignment that does not require filling would likely meet the no rise criteria, but new expansion would likely require mitigation.

Stormwater

New impervious surface would likely require stormwater treatment facilities. No detention facilities are anticipated due to the proximity to the Columbia River, but due to the length of the project it is possible that stormwater will be discharged to smaller streams. If this is the case, detention may be required.

Local Permits and Other

The Columbia River and its side channels would be classified as Waters of Statewide Significance. The lower extents of Kalama River may also be within this zone. These areas would require shoreline permits and critical area permits. Additional studies and permits (such as geotechnical studies, landslide hazard areas, etc.) may also be required. SEPA compliance would also be required.

Noise

Improvements are in an existing rail corridor area. Construction and paving activities are expected to result in temporary, short term increases in noise during construction. Construction of a third track along the existing lines would likely support additional rail traffic, which could result increases in noise at sensitive receptor sites.

Air

PRP-26 is located within the Vancouver air quality maintenance area for carbon monoxide. Changes to railroad or vehicular traffic result from the project have the potential to affect air quality. Additional studies would be required to determine the extent of any effects.

Archeological

Grading near the Columbia River may be required. This may result in exposure of archeological resources. Additional studies would likely be required.

Schedule and Timeline

If wetland impacts can be avoided, the project may obtain permits in 6 months or less. However, if ESA consultation and Individual USACE permit are required, the permits may require 9 to 24 months.

PRP-27

Construction of a new track line approximately 100 feet east of the existing line. A pedestrian overpass and depot platform would be included.

Wetland and habitats (ESA)

NWI maps do not show wetlands east of the existing line in the project area. The nearest mapped wetland is a forested system associated with the Salzer Creek floodplain, and is located south of East Floral Street on the west side of the existing line, approximately 130 feet away from the project. No wetland permit would be required.

Flood

The southern end of the project meets the floodplains of Salzer Creek. The project would need to meet the zero rise criteria for this work (which is tapering back into the existing line).

Stormwater

New facilities for PRP-27 are likely to require additional stormwater quality treatment facilities. No detention facilities are anticipated due to the proximity to the Columbia River, but due to the location of the project it is possible that stormwater will be discharged to smaller streams. If this is the case, detention may be required.

Local Permits and other

PRP-27 may include areas within the local shoreline jurisdiction, which would require additional studies and permits. Critical area permits and SEPA compliance would be required. PRP-27 would likely require substantial acquisition of right-of-way from numerous private parties.

Noise

Construction and paving activities are expected to result in temporary, short term increases in noise during construction. Creation of a new line will likely result in increases in noise for nearby residences and businesses.

Air

PRP-27 is not expected to result in changes in air quality.

Archeological

Grading near the Chehalis River and Salzer Creek floodplains may be required. This may result in exposure of archeological resources. Additional studies would likely be required.

Schedule and Timeline

Although no ESA consultation or complex wetland permits are required, SEPA compliance will likely be required and the project is likely to be controversial. Permits for this could require as long as 9 to 24 months.

PRP-28

PRP-28 includes construction of approximately 11.5 miles of new siding.

Wetland and habitats (ESA)

Six small wetlands are identified in the local wetland inventory near PRP-28, east of Interstate 205. One small forested wetland is identified along an unidentified stream near SE 164th Avenue, and three wetlands are shown near the Washougal River. These wetland are all sufficiently close as to likely extend to the existing rail prism. The total wetland area affected is approximately 1.6 acres, and would require an individual permit.

Crossings for the Washougal River and an unnamed tributary to the Columbia River would require in-water work, likely resulting in an ESA determination of Likely to Adversely Affect Salmonid species/habitats.

Flood

The project crosses the floodplain of the Washougal River. Zero rise requirements would need to be met.

Stormwater

Additional stormwater quality treatment facilities may be required. No detention facilities are anticipated due to the proximity to the Columbia River, but due to the location of the project it is possible that stormwater will be discharged to smaller streams. If this is the case, detention may be required.

Local Permits

The Columbia River and side channels would be classified as Waters of Statewide Significance. The lower extents of Washougal River are also within this zone. A shoreline permit and local critical areas permits would be required. Additional studies and permits (e.g. geotechnical studies) may also be required. An HPA would also be required from WDFW for in-water work. SEPA compliance would be required.

Noise

Construction and paving activities are expected to result in temporary, short term increases in noise during construction. Creation of a new line in this existing rail corridor may result in increases in noise to sensitive receptor sites.

Air

PRP-28 is located within the Vancouver air quality maintenance area for carbon monoxide. Increases in rail use due to the new siding may result in changes it air quality. Additional studies may be required.

Archeological

Grading near the Columbia River and Washougal River would be required. This may result in exposure of archeological resources. Additional studies would likely be required.

Schedule and Timeline

Permits for this project include ESA consultation with in-water work and an Individual USACE permit. These permits would likely require 9 to 24 months.

PRP-29

PRP-29 includes construction of 4.7 miles of new track. New bridges would be required at Lake Creek and at Buckmire Slough. The new Lake Creek bridge will require in-water piers, and the project also includes construction of an extensive ramp to support the new rail line.

Wetland and habitats (ESA)

PRP-29 is located in the bottomlands associated the Columbia River and Vancouver Lake. Numerous wetlands are associated with these bottomlands, however only two appear to be sufficiently close to require filling. The expected total fill in these areas would likely be less than 0.5 acre and would be covered under a Nationwide permit (Section 404 CWA).

Lake Creek and Buckmire Slough are located in the project area. In-water work will likely be required in these streams, resulting in a Likely to Adversely Affect listed salmonids species and habitats determination. This determination requires formal consultation under ESA.

Flood

Although this area is composed of bottomlands associated with the Columbia River Buckmire Slough and Vancouver Lake, no 100 year floodplains are mapped in the area. This is likely due to historic diking activities. As a result, PRP-29 would not affect floodplains.

Stormwater

Additional stormwater quality treatment facilities may be required. No detention facilities are anticipated due to the proximity to the Columbia River, but due to the location of the project it is possible that stormwater will be discharged to smaller streams. If this is the case, detention may be required.

Local Permits

Lake Vancouver is a Shoreline of Statewide Significance, and a local shoreline permit would be required for this work. The project also includes work in wetland and riparian corridors that would require a local critical areas permit and supporting studies. In-water work would also require an HPA from WDFW. Significant right-of-way may need to be acquired, which could be contentious. SEPA compliance would also be required.

Noise

Construction and paving activities are expected to result in temporary, short term increases in noise during construction. Creation of a new line in this existing rail corridor may result in increases in noise to sensitive receptor sites.

Air

PRP-29 is located within the Vancouver air quality maintenance area for carbon monoxide. Increases in rail use due to the new siding may result in changes it air quality. Additional studies may be required.

Archeological

Extensive grading and filling near the Columbia River, associated streams, and Vancouver Lake will be required. This may result in exposure of archeological resources. Additional studies would likely be required.

Schedule and Timeline

Permits for this project include ESA consultation with in-water work and a Nationwide USACE permit. These permits would likely require 6 to 9 months.