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North Portland Rail Analysis Summary of Existing Studies

Introduction

The Bureau of Planning and Sustainability has been engaged in the planning of West Hayden Island (WHI) to allow up to 300 acres of marine terminal development while ensuring at least 500 acres of natural resource preservation. One of the key features of this site is its direct access to the Burlington Northern / Santa Fe (BNSF) main line which travels north into Washington State and British Columbia, south through Oregon into California, and east through the Columbia Gorge into the state's agricultural hinterland and the Mountain West. Rail access into the WHI site would come directly off the BNSF line as it crosses the island, between the bridges that cross the Oregon Slough and the main channel of the Columbia River.

During the planning process, several stakeholders have raised concerns over the effect marine terminal development may have on the BNSF main line and the Columbia River rail bridges, which are perceived to be congested choke points. This concern includes expectations that rail traffic will increase with greater numbers of passenger and freight trains. The corridor has also been the subject of discussions related to high-speed passenger rail. Several commentators have focused on the capacity and age of the existing rail bridges.

Anticipating these concerns and in response to City Council direction two actions were taken. In 2011, the Port of Portland contracted out with Tangent Services to provide a short history and context of the Columbia River/Oregon Slough Rail Bridge, and an overview of several studies related to the bridge. In December, 2011, the City convened a technical working group that addressed rail infrastructure, railroad operations and rail planning activities. Together the bridge operation and history paper and technical work session identified operations, infrastructure, planning and regulation issues that are further explored in this paper.

While the Tangent report provides a good summary of the previous studies regarding the bridge, it is only one part of a larger issue of rail congestion and coordination in North Portland and how the BNSF and the Union Pacific (UP) lines intersect in North Portland. This paper attempts to expand on the Tangent report and technical discussion by reviewing studies and discussion points to determine other choke points related to the North Portland and Vancouver Washington rail area, and determine if additional policy initiatives should be raised. Several studies are reviewed and listed below.

Planning Context

West Hayden Island is located in unincorporated Multnomah County, and consists of over 800 acres of land west of the BNSF rail tracks. Its size accounts for half of the overall Hayden Island land mass. The island east of the rail tracks is within the City of Portland, and consists of a mix of residential development (including a large manufactured home community and several houseboat moorages), regional commercial development along Interstate 5 and some small scale industrial development. West Hayden Island includes large natural areas, but also contains over 100 acres used to receive dredge materials from the river, and includes area developed for utility uses such as powerline corridors, a Portland General Electric (PGE) substation, and the city's main sewer outfall, pump station and dechlorination facility.



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As part of the current legislative process BPS staff worked with the consultant, Worley Parsons to develop a concept plan for WHI. For illustrative purposes, the Concept Plan laid out the development of three marine terminals servicing auto imports, grain and other dry bulk exports. These terminals are all contained within a rail loop that accommodates unit trains. The grain and dry bulk facilities share a dock. The rail loop intersects with the BNSF tracks through a “wye” intersection just north of the PGE power sub-station.

Setup of Analysis and Review of Studies

In December, 2011, BPS staff held a session with members of Oregon Department and Portland Bureau of Transportation (ODOT & PBOT), the Port of Portland, Union Pacific (UP) and rail consultants to discuss the current state of the rail system in North Portland. Part of the discussion revolved around areas of study and potential actions that may be implemented in the future. ODOT is currently working on the Oregon State Rail Plan, which was last updated in 2001. Cambridge Systematics has been hired to do the work, and significant progress is expected in 2012. Some rail study projects have been successful in receiving grants from the American Recovery and Reinvestment Act (ARRA). Some attendees felt that the studies that focused on the area of the various rail junctions in North Portland were still relevant, but that different solutions were considered based on the perspective of the author.

Based on this session, several studies were considered for additional review to enhance the information that was provided in the Tangent report. Additional local or regional studies were reviewed for this paper. The list below states which studies were reviewed, including those in the original Tangent report:

- Oregon Rail Funding Task Force Final Recommendation (2011)
- Pacific Northwest Marine Cargo Forecast Update and Rail Capacity Assessment (2011)
- Oregon Rail Study (2010) *Update of Tangent Report*
- *Metro* Regional Freight Plan 2035 (2010)
- Clark County Freight Mobility Study (2010)
- Washington State 2010-2030 Freight Rail Plan (2009) *Update of Tangent Report*
- West Coast Corridor Coalition Trade and Transportation Study (2008) *Update of Tangent Report*
- Washington State Amtrak Cascades Mid-Range Plan (2008)
- Washington State Long-Range Plan for Amtrak Cascades (2006) *Update of Tangent Report*
- Statewide Rail Capacity and Needs Study & Addendum (2006) *Update of Tangent Report*
- City of Portland Freight Master Plan (2006)
- I-5 Rail Capacity Study (2003) *Update of Tangent Report*

A review of these studies and how they address congestion in North Portland is provided in the next section.

Review of Previous Studies

Oregon Rail Funding Task Force Final Recommendation (2011)

This paper came out after the Tangent study commissioned by the Port of Portland. The study refers to the Oregon Rail Study (2010) referenced below in making a case for the need for state financing to improve infrastructure and build new facilities. Like the Oregon Rail Study, the focus is on the



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shortline railroads, but the paper acknowledges the congestion issues in the Portland region, and on the UP track east of Portland. No specific projects are proposed.

Pacific Northwest Marine Cargo Forecast Update and Rail Capacity Assessment. (2011)

This study was prepared by BST Associates for the Pacific Northwest Rail Coalition and a collection of other agencies. The assessment was completed to help the participating parties identify rail infrastructure improvements that may deserve funding in conjunction with on-going and future port operations in both states. The report provides an updated cargo forecast for the major shipping terminals of the Pacific Northwest and splits this forecast into the following geographic areas; the Puget Sound/Washington Coast region, the Lower Columbia Washington region and the Lower Columbia Oregon/Oregon Coast region. The study includes an assessment of rail capacity in these regions based upon the forecasts. Although the focus is on Washington rail systems, it includes some review of rail through the gorge on the Oregon side. Areas most relevant to the West Hayden Island development are the rail capacity in North Portland and Southwest Washington. The study assumes the completion of several rail improvements under construction in Vancouver, including the Vancouver Bypass and the new Port of Vancouver Access Route. In addition, the construction of a third main track through the Kalama/Longview area is anticipated to allow trains to more easily access these terminals without affecting main line speeds.

Within Portland, the report describes the Peninsula Junction to North Portland Junction as one of “a key series of improvements that are needed to improve both passenger and freight train capacity in the Portland area.” (This is the area often referred to as the “Portland Triangle”. See Metro study below for a description.) Quoting further:

Among other things, these projects would include reconfiguring the connection between the UP and BNSF at North Portland Junction and easing the curvature at Peninsula Junction. This would reduce congestion on the Columbia Gorge routes of both the BNSF and UP, as well as on the I-5 Corridor, and would allow for faster passenger train speeds.

The report states that these improvements would complement the work underway in Vancouver. Additional work and expansion along the BNSF line is also suggested to ease both passenger and freight traffic. No mention is made of the rail bridge.

The report also identifies operational strategies that are being utilized by the railroads that rationalize commodity flows. For example the BNSF is using directional flow to route full export bulk trains west through the Columbia River Gorge. Empty bulk trains from Portland and Vancouver would move eastbound through the gorge while empty bulk trains from Kalama north would travel east over Stampede Pass. As discussed in the technical work session, the railroads see other opportunities to address capacity challenges by altering operations.

Oregon Rail Study (2010)

This study was reviewed in the Tangent Services report. As stated in that report, there is a recognition of the need for a statewide approach to address congestion but the study focuses on the shortline railroads. Since the North Portland and Peninsula Junctions are part of UP and BNSF’s responsibility, the report does not include suggestions for improvement of these junctions or of the Columbia River bridge. There are general suggestions for strategies to create incentives for the major railroads to continue serving Oregon shippers. These include increasing railroad capacity, developing hub facilities for transloading and aggregating shipments, and purchasing rail cars for Oregon-specific uses. The capacity strategies are geared more to the shortlines, while the hub and transloading facilities are seen as a way to make it profitable for the Class 1 railroads to serve some of Oregon’s agricultural interests. Although the report does not include any specific recommendations related to Portland’s rail infrastructure, Appendix E of the report provides a Commodity Flow analysis that predicts that tonnage moving in and through Portland in 2035 will more than double the tonnage figures measured in 2002.



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Metro Regional Freight Plan 2035 (2010)

The Metro Regional Freight Plan (RFP) is a complimentary piece to their Regional Transportation Plan (RTP). The RFP engaged a large number of stakeholders with the goal to ensure that freight movement and its different modes are addressed at a regional level. The report considers multiple aspects of freight movement including rail, marine and pipeline. The main portion of the report addresses ways to improve regional policy and develop a freight strategy and funding analysis. Issues addressing rail freight include the congestion issues in the "Portland Triangle" which is the area in North Portland where the BNP and UP lines converge (North Portland and Peninsula Junctions) and several spurs lead off to industrial development and port facilities. Issues stated in the report include inadequate siding lengths, rail bridges with inadequate capacity and lowered sufficiency ratings, at-grade rail crossings, overall capacity thresholds, and a potential shortfall for increase demands at existing rail yards. Implementation includes supporting the list of freight priority projects in the RTP. The list, in Appendix B, is broken out into high, medium-high, medium-low, and low priorities. Regional rail/North Portland/WHI projects contained in the list (with estimated dollar amounts) include:

High Regional Priority

- Improve I-5/Columbia River bridge (note this likely related to Oregon's share of the CRC) - Two listings \$600M total
- Install High Speed crossovers at North Portland Jct. (potentially including better connection to T-6 yards) \$15M
- Expand Controlled siding at East St. Johns \$10M

Medium-High Regional Priority

- T-6 Internal Overcrossing - Roadway overcrossing between Marine Dr. and T-6 \$3.6M
- Ramsey Rail Yard - 6 yard tracks and one lead track \$13.9M (note this has been completed by Port)
- Kenton Rail Line Upgrade - 2nd main line from N Portland Jct to Troutdale \$25.4M
- Various other yard, switching and siding improvements in Metro area.

Medium-Low Regional Priority

- West Hayden Crossing (WHI 4-land access from Marine Dr) \$99.3M
- Barnes Yard to Bonneville Yard Trackage - Addl. trackage between yards \$11M (note this is under construction)
- South Rivergate Rail yard Expansion Ph 1 \$8.8M (note this is under construction)
- St. Johns Lead Expansion - Addl. tracks within ROW \$3M (note this has been completed)
- Terminal 6 A+B Yard \$2.9M
- West Hayden Island Rail Access \$3.0M
- West Hayden Island Rail Yard \$9.5M

Low Regional Priority

- No Projects listed

Clark County Freight Mobility Study (2010)

This report was prepared for the Southwest Washington Regional Transportation Council. Although its focus is on truck freight routes, *Strategy 5* is to "Support rail improvements" and the report lists both the Vancouver Bypass rail project and the West Vancouver Freight access project as important catalysts to improve rail chokepoints. The second project is anticipated to be completed by 2017 and could reduce delays at the Vancouver "wye" in 2025 by 40% compared to 2005 congestion. Other recommendations include exploring future grade separated crossings and additional sidings to improve speed on the main line.



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Washington State 2010-2030 Freight Rail Plan (2009)

As reported in the Tangent Study, the 2010-2030 Freight Rail Plan identifies a bottleneck in the Portland/Vancouver area without referring to any specific piece of infrastructure (i.e. doesn't mention Vancouver Yard, Rail Bridge or North Portland Junction). The report acknowledges the congestion of the I-5 Corridor and that several segments experience capacity limitations during peak volume flows. The report includes a needs assessment that identifies 109 short- and long-term capital improvement projects and other initiatives, totaling \$2.0 billion. The report reviewed a series of freight forecasts and the authors used a series of surveys and analysis to help prioritize the list. Port access is also considered to be an issue with the state. This section stresses the importance of the I-5 rail corridor for the success of the deepwater ports, and identifies five areas where mainline capacity needs and connectivity issues intersect, including Vancouver (WA), and the Kalama to Longview segment.

The report mentions that BNSF has no public plans to increase capacity over the I-5 North-South Corridor route. It is noted that the BNSF line accommodates Amtrak trains between Vancouver WA and Vancouver BC and Union Pacific (UP) trains between Vancouver WA and Tacoma WA. The report states that the intersection of the north/south and east/west routes as well as the yard infrastructure, port needs, and passenger service create critical delays in the Portland/Vancouver area in rail simulation studies. The report states that BNSF considers that public and private interests should share funding of additional sidings along the corridor, since the main benefit of the sidings is to allow passenger trains to pass up slower freight trains, and accommodate a greater volume of passenger rail service. Despite claims by BNSF that capacity may be adequate, the report states that the addition of passenger rail cars and the potential growth for freight will result in the capacity being exceeded by 2018. Their recommendation is to continue efforts to develop a dedicated high-speed passenger rail track on this corridor between Seattle and Vancouver WA. It is assumed that this corridor would need to be extended into Portland to avoid service delays between Portland and Vancouver, WA.

Appendix 8 of the report lists projects needed to meet the statewide rail system growth. Vancouver WA projects relate to the West Vancouver freight access project which is currently being constructed. Statewide need along the I-5 corridor consists of the extension of rail sidings. No mention is made of the Columbia River and Oregon Slough bridges, although this could be partially dependent on the expectation related to high-speed rail, mentioned above.

West Coast Corridor Coalition Trade and Transportation Study (2008)

This study was completed by Cambridge Systematics for the West Coast Corridor Coalition, which represents the states of Alaska, Washington, Oregon and California. The study analyzes the entire west coast freight system including sea and airports, truck and rail freight, border crossings, etc. Although the report covers a variety of geographic areas and freight modes, it covers some specific issues with the Portland and Vancouver region, as mentioned in the Tangent report.

The report includes a case study on the Columbia River Crossings, reviewing both the highway bridge and the rail bridge. Since the Columbia Gorge is both a highway and a rail gateway to the Midwest, the study finds these bridges to be a significant link to the regional transportation system. Continued congestion at the crossing could "have significant regional and national impacts", although the emphasis is on the highway bridge.

The report defines several chokepoints by type and listed areas under each type:

- Rail Capacity Chokepoints: Vancouver-Kalama-Longview are listed as congested areas, Columbia Gorge and Portland to Eugene are also shown to lack capacity. Nothing is indicated for the Portland metro area.
- Track Clearance and Alignment Chokepoints: Portland's Triangle is listed due to "geographical constraints including rivers and hills".



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- Yard Capacity Chokepoints: The BNSF Vancouver Yard is listed due to freight/passenger conflicts and general congestion.
- Passenger/Freight Commingling Areas: The I-5 Corridor between Eugene and Seattle is listed as an area of heavy passenger traffic.

Several projects, including port improvements such as the West Vancouver freight access project and the Vancouver Bypass, as well as some improvements at Port of Portland ports are identified to help with the chokepoints. The report includes a focus on the movement of containers, and anticipates demand for highway and rail shipping to exceed infrastructure supply, even with the improvements. The report also states that insufficient funding exists at the state level to address system chokepoints. Since the report covers such a wide geographic area and all freight modes, its conclusions are regional and general in scale, mostly related to coordinating between the different states, regions and MPO's. No large scale projects are proposed, other than those already in the pipeline listed above.

Washington State Long-Range Plan for Amtrak Cascades (2006)

Washington State Amtrak Cascades Mid-Range Plan (2008)

The long-range study which was reviewed by Tangent Services calls for 13 round trip passenger trains per day between Seattle and Portland by 2023. The Mid-Range Plan from 2008 calls for up to eight round trip trains by 2018, depending on available funding. The current level of service is five round trips per day.

The Long-Range plan includes a list of large scale projects to provide capacity and better on-time performance of the Amtrak Cascades service. Several of the projects are in the Portland/Vancouver area. These include converting the existing Columbia River rail bridge from a swing span to a lift span, and the construction of a new Columbia River rail bridge. The cost is estimated at \$575 million. However, the report recognized that speeds on the existing bridge are limited more by the neighboring rail junctions on either side of the bridge. Both the Portland-Spokane route junction in Vancouver, and the junction between the Port of Portland and BNSF have 10 mph speed restrictions. Since these junctions are adjacent to the Columbia River, trains must proceed slowly over the bridge if they are accessing these tracks. Construction of a new bridge without addressing the speed restricted areas on either side would not markedly improve the efficiency of the bridge. The report also summarizes the improvements planned (at the time) for the Vancouver Rail Project. This includes bypasses of the railyard, additional turnouts and direct access for freight coming from the east. Much of this work is currently being completed.

The Mid-Range Plan includes several projects that could potentially be completed within the 2010-2017 time frame. Included in the lower cost options are the Vancouver yard bypass mentioned above. Included in some of the more aggressive funding schemes are new sidings and main tracks in various areas between Vancouver and Longview, as well as an overall track upgrade that could allow faster speeds.

Statewide Rail Capacity and Needs Study & Addendum (2006)

The Tangent study mentions (and a review confirms) that while this study does mention the Portland/Vancouver area as a corridor of congestion, the focus of the study is on public policy rather than on specific projects to improve congestion.

City of Portland Freight Master Plan (2006)

This study was completed by the City's Bureau of Transportation. It is a focused guide for managing freight activities and is intended to integrate into the city's Transportation System Plan (TSP). This document both lays out policies to encourage integration of freight into planning as well as prioritizes specific types of freight improvements. Improvements are categorized into "Funded" projects, while "Non funded" projects are ranked in order of priority as "Tier 1", "Tier 2", and "Tier 3" projects. While





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no funded projects related to area rail/WHI issues are listed as funded, the following projects are prioritized into different 'tiers':

Tier 1

- Vancouver BNSF Rail Bridge over the Columbia
- West Hayden Island/Rivergate; Rail Access
- Several yard and loop improvements

Tier 2

- BNSF line @ Columbia Bridge; Track Improvements
- North Portland Junction; Rail Improvements
- Penn Junction, UP/BNSF Main Line; Track Realignment
- Several yard improvements

Tier 3

- Kenton Rail Line; Additional Tracks
- West Hayden Island Rail Yard Expansion, WHI

I-5 Rail Capacity Study - I-5 Trade and Transportation Partnership (2003)

This study, completed by HDR Engineering was the result of a partnership formed through a bi-state Task Force of community, business and elected representatives, specific to the I-5 corridor in the Portland/Vancouver metropolitan area. As the Tangent Report indicates, the study includes simulation models using current traffic and potential growth. The study makes several findings of incremental improvements that could be made to increase capacity for freight and intercity passenger rail. Most of the improvements are to the approaches to the rail bridge on either side of the bridge. These include:

- A two-main track bypass around BNSF's Vancouver Yard (note a single track bypass is being constructed)
- Revised crossovers and higher turnout speeds at North Portland junction (note some of these have been completed)
- A second main track and increased track speeds between North Portland junction, Peninsula Junction, and Fir on UP's Kenton line
- Additional yard upgrades etc.

These infrastructure improvements were discussed at the rail technical work session where ODOT's completion of preliminary engineering of the North Portland Junction improvements was mentioned as moving this project closer to construction.

It should be noted that increasing track speeds across the movable river spans is considered as a proposed improvement but is not expected to have the most significant impact on rail performance. When the report was written in 2003, these improvements were expected to be interim improvements over the next 5- 10 years. In addition, a longer term improvement over 10-20 years would be to provide improvements to the BNSF track between Vancouver and North Portland Junction to alleviate the need for trains to have to cross in front of each other when entering and exiting the mainline in this area. This includes the "Wye" to the Port's Terminal 6 yard. The report states that construction of a new heavy rail bridge is not necessary, but that replacing the current swing span with a lift span would be desirable.

This report was published nine years ago, but not all of the incremental improvements listed have been made. Several improvements currently under construction are in Vancouver, WA, but many improvements in the area of the North Portland and Peninsula Junctions have not occurred. These improvements, which range in cost from \$8M to \$25M would appear to provide the greatest positive impact on congestion.



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Summary of Findings of Studies

There are a number of studies that have addressed rail and freight congestion that have ranged in geographic scope from studies of issues within the metro area to studies that review potential freight issues along the entire West Coast. Several studies focused on freight issues specifically, while other studies considered the interaction between freight and passenger rail. When the studies specifically address congestion in the Portland and Vancouver region, there is general agreement that the track approaches on either side of the existing rail bridge need to be improved to reduce congestion and increase efficiency. Especially important on the Portland side are the BNSF tracks south of the slough bridge, which include the “Wye” to Terminal 6 of the Port of Portland, the North Portland Junction, and the Peninsula Junction on the UP tracks east of the BNSF mainline. The junctions provide the access between the UP and the BNSF tracks and have speed limitations that can cause delays for trains entering and exiting the BNSF line. Several of the suggested improvements in Vancouver are being completed as part of the West Vancouver Rail Expansion and Mainline Track Bypass, all of which should be completed by 2017-18. In Portland, some minor work has been completed on the cross-overs between the Terminal 6 and North Portland Junction, and the state is undertaking preliminary design work for some more substantial projects at the junction.

Improvement to the bridge itself was considered a need within a couple of the studies. One study determined that changing the mechanism of the bridge from a swivel to a lift span could reduce the amount of time the bridge is operated to accommodate ships. If mentioned in the studies, bridge replacement is related to the conflicts between passenger and freight rail, and especially with increases in the number of passenger trains and their greater sensitivity to ‘on-time’ performance. This issue was mentioned more often in reports that analyzed passenger rail needs. These reports also indicated the potential need to have a dedicated high speed rail line in the future. This is a need that would affect the entire rail corridor, not just the rail bridge.

Recommendations

Many of the studies conclude that rail congestion within the Portland area (and up and down the corridor) will increase without any investment in our rail infrastructure. It is also apparent that many of the issues are system issues. Placing additional rail sidings in strategic locations could relieve congestions down the line, as can providing a second or third mainline track and making general track improvements throughout the system. These improvements would also provide a benefit to passenger rail, and may need to include public financing and partnership with BNSF and UP. Much like the Columbia River Crossing, much of the congestion that occurs around the rail bridge is due to the slow speeds of the ‘merging traffic’ as trains transfer from one line to the other or from the yards to the main line. Increasing the speed of this merging rail traffic can aid the speed of the traffic as it crosses the bridge.

Based upon review of the listed studies, several of the interim infrastructure improvement measures that were proposed in the 2003 I-5 Rail Capacity Study remain valid, especially those in North Portland. Many of these “chokepoints” are also identified in other studies. Addressing the following issues would measurably alleviate rail congestion in the area of West Hayden Island in the short to medium term, although they are not directly affected by the proposed project on West Hayden Island.

- Construction of rail improvements that address access and speeds between the UP Kenton line and BNSF I-5 line. This could include building a flyover ramp from BNSF line to the UP line.
- Continued improvements to switching and cross-over along the BNSF line between North Portland Junction and Columbia River rail bridge.





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- Improvements to UP's Peninsula Junction to increase speeds through that junction, and building a second track east of this junction on Kenton line.
- Improvements to BNSF wye to Port or Portland's T-6 to increase speeds. Improvements should also consider a direct access to the UP's Kenton line as part of first bullet point.
- Changing the type of lift span on Columbia rail bridge to allow quicker opening and closing (to be considered after 1st four items have been completed).

The above improvements would broadly increase the efficiency of the rail system and the Columbia River bridge, and most of these improvements have been listed in several studies. However as one study mentioned (WA Ports Forecast 2009), BNSF has not publicly acknowledged having any North Portland projects on their construction timeline. BNSF may feel that the current infrastructure is adequate to handle projected growth, especially with potential efficiencies to be gained through directional flow between the Columbia Gorge and Stamped Pass. This study indicated that BNSF feels that potential inadequacies in infrastructure are driven more by the needs of passenger rail. Infrastructure improvement projects in the Portland Triangle may need to be funded through public/private partnerships as is currently practiced through the Connect Oregon funding program.

To ensure both freight and passenger rail growth in the future, and to provide for high speed passenger rail growth, the region may need to explore segregated freight and passenger lines, with new right of way and tracks dedicated to high-speed passenger rail, as is being explored on the route between Portland and Eugene. This could lead to requiring a new bridge across the Columbia River dedicated to high-speed passenger rail. A project of this size and scope would be completed jointly with the railroads and the States of Oregon and Washington, and would be part of a larger federal funding mechanism for high-speed rail. A dedicated line throughout the corridor would be expensive but would eliminate the remaining conflicts between freight and passenger rail operations.

