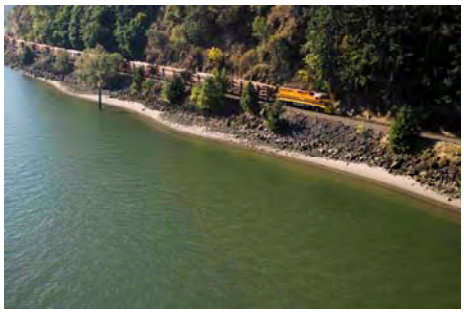
LOWER COLUMBIA RIVER RAIL CORRIDOR

RAIL SAFETY STUDY

Draft Final Report

March 2009



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Executive Summary

Purpose and Scope of Study

The transportation corridor between Portland and Astoria, including rail (the Portland & Western Railroad's Portland-Astoria Line) and highway (the Lower Columbia River Highway, referred to as "US 30" in this study) form the backbone for commerce, job access, emergency response, community connectivity and tourism for a large segment of the populations of both northwest Oregon and southwest Washington. The portion of that corridor from the Columbia/Multnomah county boundary on the south (or east) and Tongue Point, in Clatsop County, is the subject of this study, which focuses specifically on rail safety implications of longer, more frequent freight trains ("unit trains") serving local industry. (See Figures 1.3-1, 1.3-2, and 1.3-3 for an overview and detailed corridor segment maps.)

The study examines at-grade crossing conditions and issues; the ability of vehicles to make turning movements to and from US 30 when trains are occupying the adjacent railroad tracks and blocking the highway/railroad at-grade crossing; pedestrian and bicycle safety; vehicle delay caused by more frequent and longer trains (balanced by increased train speeds made possible by infrastructure investments); emergency response operations and communications; and community education and planning programs and concerns.

Although focused on rail-related safety issues, the study necessarily touches upon economic development, emergency access, land use and future commuter rail and other transit compatibility issues. A related study, being prepared simultaneously with this report, is the Traffic Analysis of 20 selected intersections of US 30 with local streets that cross the P&W Railroad tracks (primarily roadways with higher volumes).

Study Context

Railroad Safety, Regional Mobility and Economic Development

For rail-adjacent communities such as those in Columbia and Clatsop counties, rail is an economic engine, a potential safety threat, a mobility option and a local nuisance, all at the same time. The rail and highway corridors that connect, also bisect many of the same communities, some severely (Rainier, and to a lesser extent Scappoose and St. Helens). Various aspects of these basic characteristics are at work in different combinations all along the Portland and Western railroad segment, known as the A Line, which connects Portland to Astoria through the project study area.1

Increased rail use along the corridor means severing communities from business, residential, school, and emergency and law enforcement access, at unpredictable and potentially extended periods of time. Changes in the type of freight hauled may mean increased hazards if accidents do occur, and heightens the need to maintain good response time, adequate training and support for local responders, and to improve communications with the railroad and between responders and other local agencies. Required sounding of train horns can be a significant problem for those living close to the tracks. School access, school bus routes, and transit routes can all be impacted by longer, more frequent trains coming through towns and cities along the corridor.

Stakeholder Interviews Frame Corridor Issues

Approximately 55 individuals, in about 20 different interviews or telephone calls, were interviewed to discern a wide range of opinion on

[1] The project study area extends from the Columbia County/Multnomah County line to Tongue Point, in Clatsop County.

increased rail volumes and related safety issues between the Columbia County/Multnomah County line and Tongue Point in Clatsop County. Approximately a dozen other stakeholders were asked, but unable to or declined to comment during the stakeholder interview process.

In Appendix E, the issues identified below are associated with the stakeholders who specifically mentioned them. The bullets under each heading are listed from most frequently to least frequently identified. Note that stakeholders are not a representative sample, and that further, most stakeholders would probably consider the majority of the issues listed below "important." Still, it is revealing to observe the relative frequency of issues among the stakeholders who were included in the effort.

Safety & Emergency Response

- Provide safety upgrades at more crossings
- Ensure ability to meet fire and medical emergency response time, and honor mutual aid agreements
- Ensure law enforcement agencies' ability to meet response time goals
- Educate public (focus on youth education) about rail safety—use Operation Life Saver materials
- Ensure safety for school access (bus, bike, pedestrian and vehicle)
- Develop or update plan and precautions for hazmat on rail
- Educate public about federal requirements for horns, and general railroad rights/responsibilities
- Develop or update derailment response plans
- Improve safety-related communications between P&W and responders
- Minimize duration that community is exposed to hazardous rail cargo
- Make sure that increased emergency response resource needs are met

Rail Operations (Freight & Passenger)

- Increase velocity, capacity and reliability of rail
- Maintain highway capacity, safety and reliability
- Address trespasser issues
- More separation of vehicles from trains in Rainier
- Ensure adequate maintenance and inspection of rail
- Improve Clatsop County rail segment to Class 2
- Close public crossings, as possible
- Close private crossings, as possible
- Install automatic gates and lights interconnected to US 30 traffic lights

Highway/Local Road Operations (All Modes)

- Minimize vehicle delay (including school and transit bus) at grade crossings
- Address impact of more/longer trains on vehicle diversion, ped/bike mobility and safety
- Address back-up of vehicle traffic into traffic lanes (safety and mobility)
- Improve safety for hazmat trucks crossing rail
- Develop local through-streets parallel to US 30
- More signals on truck routes (Clatskanie, Beaver Falls)

Local Planning, Regulatory and Circulation

- Plan for higher speed freight and passenger trains over next 20 years
- Support existing and plan for future transit (bus and rail)
- Plan for future grade separations
- Develop vision for future multimodal corridor and associated development
- Identify and preserve industrial land along rail corridor
- Maintain or improve cross-track connectivity

Community & Environmental

- Reduce noise/examine Quiet Zone potential

Business & Industry

- Maintain or improve access to business or industrial sites for customers and shippers/suppliers
- Ensure good rail service to existing and smaller rail users
- Reduce train-related diversion through commercial parking lots

Economic Development

- Promote industrial development along rail corridor by providing rail access
- Shift freight from highway to rail
- Take advantage of existing funding offers (Rainier/ODOT Rail)

Project Implementation and Funding

- Obtain funding for needed safety and mobility improvements
- Seek contributions from all parties, including railroads, to mitigate impacts
- Begin to identify uses for *Connect*Oregon III funds

Project Recommendations

This chapter ranks the rail safety improvement projects identified in Table 5.7-1. Factors taken into consideration were the volumes of vehicles crossing at-grade railroad tracks, the number of trains per day (currently and in the future), safety issues reported by the community and the railroad, and economic development priorities and opportunities. It does not include the long term planning, emergency communication or community education initiatives discussed in Chapter 5, which should be implemented for the entire community.

Rail Projects

The P&W track conditions within the project area are FRA compliant, but should be upgraded for service reliability with higher tonnage loading and to make the freight rail system attractive and reliable for new business. The grade crossing recommendations brought forward are based on logic and experience, and designed to enhance safety and maintenance ability. They take into consideration ODOT Rail Division and P&W Railroad interests, concerns and needs, as well as community safety and economic development.

In the majority of instances where there is now passive protection, active rail crossing protection was recommended. However, given the cost of that improvement, the project did not always rate highest within communities, most often due to low vehicle and/or train volume at the crossing.

Highway Projects

The projects that have made the final cut for consideration have come from the community, ODOT Highway and Rail divisions, and consultant-prepared documents, including this Rail Safety Study and the companion Traffic Analysis conducted for 20 selected US 30 intersections and highway/railroad at-grade crossings. That analysis considered factors such as crossing geometry, conditions, special users (pedestrians, school buses, recreational vehicles or long trucks, e.g.) collision history, crossing control devices on US 30, storage capacity for turning vehicles and peak hour traffic volumes and delay.

Mitigations suggested for increased train-related vehicle delay or safety issues were developed when "intersections did not meet ODOT mobility standards, and/or for railroad crossings where forecasted vehicle queues exceed available storage.[2]" Thus, projects were brought to this stage only if they responded to a safety-related concern. There are degrees of risk and concern, however, and that is reflected in the following tables.

[2] Kittelson & Associates, Inc., (December 2008, p. 12)

Community Project Phasing Recommendations

The following tables show the projects and conceptual (order of magnitude) costs, in order of recommended implementation priority, based on a combination of project "implementability" factors including safety risk, community and railroad support, traffic volume at the US 30 intersection or the highway/railroad at-grade crossing, and fundability.

The ordering of projects in the tables below is also informed by consultation with corridor stakeholders and the Project Core Team. This consultation process provided important insight into community priorities and levels of concern regarding safety and congestion issues that would be aggravated by more frequent and longer trains.

Further study of identified candidates for closure at highway/railroad at-grade crossings as listed first within each community, because closing an at-grade crossing, when feasible alternative access is available or can be cost-effectively provided, is a primary rail safety goal of ODOT Rail Division. However, beyond support for closure of roads already identified (Santosh St. in Scappoose) there was not a substantial public demand for such closures expressed during the public involvement phase of this study. Possible closures at Wyeth and Old Portland Road near Berg Rd appear to offer the most potential for implementation.

It should be noted that the brief field inspection permitted in this project scope did not allow verification of ODOT Rail Division's suggested closures in rural Columbia and Clatsop County. Moreover, the targeted field inspection that was conducted suggested that it may be very difficult, if not impossible, to provide alternative access in some instances, due to topography. Thus further study in all cases is recommended.

Finally, an understanding of funding sources and categories, and likely support and funding for projects within federal, state and local programs helped determine relative ranking of projects. It should be noted that 2009 and near-future funding constraints as well as new opportunities (including federal and state stimulus packages) could significantly change the funding context for freight rail, rail safety and economic development projects.

Depending on funding sources and amounts, completing all projects relating to a specific intersection or cross street at the same time might also be desirable. However, most crossings and intersections have a combination of higher- and lower-ranking projects, so the issue would need to be revisited based on funding circumstances.

It is important to note that ODOT practice is to avoid installing signals on US 30 in rural segments. And even in urbanized areas, proposals for new traffic signals on state highways require the approval of the State Traffic Engineer prior to commencing with design. Closures or alterations of pedestrian and bicycle crossings of state highways (US 30) would also require such approval.

Table ES-1: Recommended Rail Safety Project Phasing-Scappoose

Location	Project	Conceptual Cost Estimate
Santosh St.	Close Street	N/A- tied to Havlik interchange improvement
Maple St.	Add cantilever to at-grade RR crossing	$30,000
High School Way	Replace obsolete gate at crossing	$45,000
Maple St.	Flatten grade on approach to RR	$52,800
High School Way	Add pedestrian gates, tactile yellow strips	$38,000 per gate
Maple St.	Replace pedestrian panels	$65,200
High School Way	100 ft NBRT storage	$24,800
Maple St.	Add pedestrian gates, tactile yellow strips	$38,000 per gate

Source: HDR

Table ES-2: Recommended Rail Safety Project Phasing-St. Helens

Crossing	Project	Conceptual Cost Estimate
Wyeth St.	Study possible closure	TBD

Table ES-2: Recommended Rail Safety Project Phasing-St. Helens

Crossing	Project	Conceptual Cost Estimate
Columbia Blvd.	Close pedestrian access or adjust signal timing to provide sufficient crossing time	Nominal
Columbia Blvd.	215 ft. SBLT storage	$56,800
Columbia Blvd.	65 ft NBRT storage	$17,200
Millard Rd.	US 30 traffic signals, inter-tied with existing RR protection [needs State Traffic Engineer approval]	$250,000
Millard Rd.	Add pedestrian grade crossing at RR	$45,000
Deer Island Rd.	Remove abandoned rail line	$25,000
Deer Island Rd.	Relocate gate, design for future transit center	$25,000
Deer Island Rd.	Pedestrian grade crossing	$45,000
Deer Island Rd.	150 ft. SBLT storage	$37,100
Gable Rd. (St. Helens Rail Yard)	Fence yard between Gable and Columbia Blvd. (3000 ft, on US 30 side)	$134,000 (with possible aesthetic upgrade)
St. Helens St.	Pedestrian grade crossing	$45,000
St. Helens St.	Replace obsolete gates	$90,000

Source: HDR

Table ES-3: Recommended Rail Safety Project Phasing-Columbia City

Location	Project	Conceptual Cost Estimate
I Street	Remove confusing crosswalk markings	$5,000
I Street	Escape bay (75 ft.)	$18,600

Source: HDR

Table ES-4: Recommended Rail Safety Project Phasing-Rainier

Crossing	Project	Conceptual Cost Estimate
Veterans Way	Escape bay (75 ft)	$18,600

Source: HDR

Table ES-5: Recommended Rail Safety Project Phasing-Columbia County Unincorporated/County Controlled Roadways

Crossing	Project	Conceptual Cost Estimate
Old Portland Rd. (near Berg Rd.)	Study possible closure	TBD
Marshland District Rd.	Study possible closure	TBD (a closure would eliminate need for $100,000 RR grade crossing material replacement)
Beaver Dike Rd	Study possible closure	TBD
Old Mill Rd. (Westport Ramp Rd)	Evaluate for potential closure of two-track crossing/with upgrade of Westport Ferry	TBD
Gable Rd.	Add 210 SBLT storage	$55,400
Johnsons Landing Rd. (Dike Rd.)	Upgrade RR equipment-new constant warning time activation equipment, standby battery and rectifier	$76,000
Columbia Ave.	110 ft. NBRT storage	$27,200
Columbia Ave.	Automatic tactile strips/warnings	$1000
Graham Rd. (Prescott)	Install flashing lights and gates at RR crossing	$190,000
West Lane	Improve pavement markings	$1000
West Lane	Prohibit WBLT and WB through traffic for trucks only	$500 (signage)
Old Portland Rd. (near Bennett Rd.)	Escape bay (75 ft.)	$18,600
Gable Rd.	Pedestrian/bicycle overpass	$6.1 Million
Goble Landing	Improve signage and pavement markings	$1000
Goble Landing	Remove old tracks, replace crossing surface	$100,000
Goble Landing	Install flashing lights and gates at RR crossing	$190,000
Goble Landing	NB/SB turn pocket	$1.1 Million
Goble Landing	Improve/pave escape bay area	$18,600
West Lane	Escape bay (75 feet)	$18,600
Kallunki Rd. (SPUR)	Install flashing lights and gates at RR crossing	$190,000

Table ES-5: Recommended Rail Safety Project Phasing-Columbia County Unincorporated/County Controlled Roadways

Crossing	Project	Conceptual Cost Estimate
Marshland County Rd.	Improved signage at RR crossing	$300-700
Marshland District Rd.	Install STOP sign on approach to US 30	$350
Kallunki Rd. (Main Line)	Install flashing lights and gates at RR crossing	$190,000
Hermo Rd.	Install flashing lights and gates at RR crossing	$190,000
Depot St.	Install flashing lights and gates at RR crossing	$190,000
Pt. Adams Rd. (Midland Rd, Clatskanie)	Install flashing lights and gates at RR crossing	$190,000
Woodson Rd.	Improve signage and markings at rail crossing	$6,000
Woodson Rd.	Install flashing lights and gates at RR crossing	$190,000
Woodson Rd.	Escape bay (75 ft)	$18,600
Marshland County Rd.	Remove vegetation blocking sight distance at RR crossing	$500 ($3,000 per acre)
Marshland County Rd.	SBLT pocket on US 30	$550,000
Marshland County Rd.	Escape bay (75 ft)	$18,600
Marshland District Rd.	Replace RR grade crossing material with concrete or asphalt; new ties and panels	$100,000
Old Mill Rd. (Westport Ramp Rd)	Remove vegetation to increase sight distance for WBLT movement	$500 ($3,000 per acre)
Woodson Rd.	NB/SB turn pockets on US 30	$1.1 Million

Source: HDR

Table ES-6: Recommended Rail Safety Project Phasing-Clatsop County Unincorporated/County Controlled Roadways

Crossing	Project	Conceptual Cost Estimate
Waterhouse Rd.	Study possible closure (using Knappa Rd. as alternative)	TBD

Table ES-6: Recommended Rail Safety Project Phasing-Clatsop County Unincorporated/County Controlled Roadways

Crossing	Project	Conceptual Cost Estimate
Westport Ferry Rd. (Westport Dock Rd.)	Replace RR crossing control circuitry-new cables, gates, flashers, bells and cantilevers	$190,000
Driscoll Slough Rd.	Remove brush and resurface crossing (concrete pads)	$100,000

Source: HDR

Table ES-7: Recommended Rail Safety Project Phasing-Portland & Western Railroad Projects

Location	Project	Conceptual Cost Estimate
US 30 Spur/Deer Island area	Replace Control Circuitry	$76,000
RR MP 62.7 (Columbia County) RR MP 84.71 (Clatsop County) RR MP 94.83 (Clatsop County	Movable Bridge Detailed Inspection & Recommendations Study	$40,000-120,000 per bridge
Dibblee Point, RR MP 48.75 to RR MP 50.35	Add 8,500 siding	$3.5 Million
St. Helens Yard	Relocate	$3.67 M (includes $84,000 for fencing existing yard; excludes ROW acquisition cost)

Source: HDR

Project Funding

All corridor stakeholders recognize that having an abundance of available and well-sited industrial lands with both highway and rail access was important not only to Cascade Grains, US Gypsum, Teevins and DynoNoble: this is a corridor-wide competitive advantage. Although the timing may not be right to leverage that advantage, funding must be found to make progress on the list of prioritized rail safety projects identified in Chapter 6.

Responsibility for Maintenance and Improvements of Grade Crossings

In order to have realistic expectations of project implementation, it is important for local jurisdictions to understand what is and is not the responsibility of the railroads. Maintenance of at grade crossings is the responsibility of the operating railroad for that part of the crossing surface above the crossties.

Outside that area, maintenance responsibility lies with the road authority. ODOT does not specify what kind of material is used in the crossing, only that it be maintained in a safe condition. Recently, some counties and railroads have chosen to work together and share costs to upgrade crossings from asphalt to concrete panels, and several similar projects were identified along the corridor as part of this study. This work can be performed without a Crossing Order as long as the physical dimensions of the crossing are not altered.

If either party chooses to alter a crossing such as widening or adding a track, in most cases, the party that applies for the alteration pays 100 percent of the cost. [3]

Federal Programs and Earmarks under SAFETEA-LU

Federal funding for rail comes generally in the form of grants or Federal financing tools that include traditional tax credits and loans, and the emerging "innovative" tools that range from private activity bonds to new loan types to public-private partnerships.

The federal transportation funding reauthorization process is driven by House/Senate authorizing committees every six years. Reauthorization earmarks are managed through authoring committees (House Transportation and Infrastructure; Senate Environment and Public Works). Freight provisions contained within the 1,231-page SAFETEA-LU bill4 include many that can offer funding avenues for rail projects, whether public, private or public-private for the period 2005-2009. Although some of the programs are completely subscribed (that is, 100% of the funding is already earmarked), details on the most promising provisions are provided because the next transportation reauthorization bill may have similar provisions and because the outcomes or experience with this set of provisions will have an impact on the content and structure of that reauthorization. Many believe the next bill will move more strongly to support a much-needed national and multi-state rail policy.

However, many freight rail proponents and stakeholders were disappointed that SAFETEA-LU did not permit as much flexibility in the use of funds, including highway funds, as was permitted for passenger rail uses.

Earmarking

In the past, the multi-year Federal omnibus transportation bills[5] contain earmarks for specific projects. They are administered through the Federal Highway Authority (FHWA) and the Federal Railroad Authority (FRA) and may also be referred to as FHWA or FRA grants.

Traditionally, earmarking has been an annual process driven by House/Senate appropriation committees each year. Amounts available in TEA-21 and SAFETEA-LU were discretionary monies that could be earmarked. Amounts for projects earmarked in excess of TEA-21 discretionary money generally deducted funds from the WSDOT work program and sometimes required the deferral or deletion of WSDOT work program projects. TEA-21 contained 1,849 earmarks, totaling $9.3 billion.

[3] Charles Kettenring, ODOT Rail Division, electronic correspondence March 2009.

[4] See FHWA HOFM Director Tony Furst's presentation on freight provisions (September 2005) at http://www.fhwa.dot.gov/freightplanning/safetea_lu.htm

[5] Beginning with the first five-year bill in 1991, they were known by their acronyms ISTEA, TEA-21 (1998) and the current authorization, SAFETEA-LU (2005-2009).

The current multi-year $244.1 billion omnibus transportation funding bill, signed into law in August 2005, is known by its acronym, SAFETEA-LU (Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users). It contains three times as many earmarks as its predecessor, TEA-21. With 5,600 budgeted earmarks totaling $19.4 billion through 2009. [6] While the bill's earmarked projects represent monies allocated, funding requests can still be formally routed to the House and Senate Transportation Appropriations Committees to get support for new projects. However, there is no guarantee of success.

Federal Railroad Administration Funds

The Railroad Rehabilitation and Improvement Financing Program (RRIF) was retained from TEA-21 within Section 9003 of SAFETEA-LU and was established to allow the Federal Railroad Administration (FRA) to provide $35 billion worth of loan authority to be used for loans and loan guarantees to state and local government, government sponsored authorities and corporation, railroads and joint ventures that include at least one railroad.

The funding may be used to:

- Acquire, improve, or rehabilitate intermodal or rail equipment or facilities, including track, components of track, bridges, yards, buildings and shops;
- Refinance outstanding debt incurred for the purposes listed above; and
- Develop or establish new intermodal or railroad facilities
- No operating expenses are to be financed or funded through this program

Direct loans can fund up to 100% of a railroad project with repayment periods of up to 25 years and interest rates equal to the cost of borrowing to the government.

Eligible borrowers include railroads, state and local governments, government-sponsored authorities and corporations, joint ventures that include at least one railroad, and limited option freight shippers who intend to construct a new rail connection.

More detailed explanations of the program are available at http://www.fra.dot.gov/us/content/177

A copy of the application form is available at http://www.fra.dot.gov/downloads/RRDev/rrif_app.doc

Federal Funding for Crossing Protection

When at-grade crossing protection (e.g., gates and warning lights) are installed in conjunction with a crossing closure, federal funding is available.

Programmatic Freight Provisions

Current programs identified below may not have funds now available, but should be monitored through the federal reauthorization process as funding pots are replenished (and possibly reorganized).

Section 1306: Freight Intermodal Distribution Pilot Grant Program

- Provides capital funds to states to address freight distribution and infrastructure needs at intermodal freight facilities and inland ports.
    - $30 million provided, already earmarked to five states

Section 5204: Training and Education

- (h) Freight Planning and Capacity Building Program
    - Section 5209: National Cooperative Freight Transportation Research Program

[6] *SAFETEA-LU Highlights for Local Transportation Agencies*, Technology News, November-December 2006 http://www.ctre.iastate.edu/pubs/Tech_News/2006/nov-dec/safetealu-2.pdf

- FHWA Section 130: Highway Railroad Grade Crossing Program (Federal share is 90%, funded at $220 million per year until FY 2009)

Finance Provisions

These expand the range of "innovative finance" mechanisms available to freight projects.

Section 1601: Transportation Infrastructure Finance and Innovation Act (TIFIA)

- Budget authority is $610 million for period 2005-2009 (or about $2B in lending authority)
  - Program eligibility was expanded to include public and private freight rail facilities that provide public benefit to highway users, as well as intermodal freight facilities.
  - Smaller projects can be grouped to reach new (reduced) minimum project size of $50 million (ITS project minimum was reduced to $15 million)

Section 1602: State Infrastructure Banks (SIB)

- All states included; multi-state projects are allowed
- SIB rail accounts are permitted
- SIBs provide for lower interest rates because bond purchasers are exempt from federal tax on bond revenue.
- National limit of $15 billion

Section 11-1143 Tax-exempt Financing of Highway Projects and Rail Truck Transfer Facilities (Private Activity Bonds)

- Tax-exempt financing of privately owned or operated rail-truck transfer facilities

Internal Revenue Code Section 45G: Railroad Track Maintenance Credit

- Track maintenance on any Class II or Class III track equal to 50% of the maintenance and rehabilitation expenditures

Projects and Grants

These include many grant categories which have major freight components.

Section 1301: Projects of National and Regional Significance (PNRS)

- Only states can apply; projects must be multi-modal
- Includes pre-construction activities, environmental mitigation and operational improvements for any project eligible under 23 USC, including freight railroad projects
- $1.779 billion (2005-2009) for 25 designated projects (i.e., program is 100% earmarked in this round; worth keeping an eye on for reauthorization, as "lessons learned" will be folded in to next bill's selection criteria)
- Up to $1 million per project, per year

Section 1302: National Corridor Infrastructure Program

- States only; $1.95 billion (2005-2009) for 33 designated projects

Capital Grants for Rail Line Relocation Projects (Section 9002)

- Only states may apply for local rail line relocation and improvement projects that spur economic development, under this provision. ($1.4 billion, authorized but not appropriated)
- Federal share is 80%, not to exceed $20 million

State Funding Considerations and Sources

In the near term, changing signal timing is a relatively easy solution. ODOT conducts analysis of each corridor on a three-year rotating basis. Approximately 230 signals have been identified for the next three years. Crosswalk lengths and cross times are recalibrated as part of the process.

ODOT notes that Gable Rd.—a concern of corridor stakeholders—is complicated, because the signal is over-capacity. ODOT is currently aware of the problem.

ODOT has noted that most of the north-bound right turn storage lane projects would require new pavement—not just a normal maintenance quick fix or a restriping projects which would typically be done as part of a preservation project.

Other projects--probably the majority of the storage issues—which may be able to be addressed as pavement preservation—mean that it will be quite some time for them to appear high on a regional priority list. This is because ODOT has recently performed corridor preservation activities and expended substantial funds on corridor projects.

A project as significant as an overpass would have to be a State Transportation Improvement Program (STIP) project, or potentially an earmark.

Bringing projects in as part of development review/frontage improvement, where signalization modification is already being required, is one strategy to work through a project list. Any time projects can be combined will help to reduce costs—if, for example, a crew is already in the area working, there may be the chance to reduce engineering or mobilization costs.

Potential for Public/Private Partnerships

It is possible that in the future there may be opportunities for public/private partnerships (PPPs, or P3s, as they are known). Such partnerships could include ODOT, city, county and private industrial or residential developers. Obviously, the 2009 economic picture does not inspire optimism for the short term, but the longer term opportunities for tourism and commuter-related transit development, as well as energy, wood products and ocean port industries remains strong. A period such as the current downturn can help leaders focus on sustainable future development.

*Connect*Oregon

As mentioned earlier, because of the (2009) economic recession, P& W Railroad will be returning the unused portion of its *Connect*Oregon II funding, and has not applied for *Connect*Oregon III funds for projects along the 'A' Line.

Economic Revitalization Programs

There are no identified economic revitalization funding programs at this time.

Oregon's Share of the American Recovery and Reinvestment Act (ARRA)

The American Recovery and Reinvestment Act (ARRA) provides Oregon (through ODOT) with $334 million in transportation funding (not including transit and fixed guideway modernization) of which $100 million must be distributed to local agencies. ODOT has already worked with local agencies to allocate some of that money, and the Clatsop and Columbia County stakeholders have been working with ODOT to provide input into the current and future lists.

Under ARRA, eligibility for use of Surface Transportation Program (STP) highway funds is expanded to include passenger and freight rail and port infrastructure.7.thus increasing the opportunity for funding freight rail projects. There is no local match requirement for these funds.

Next Steps

Engaging the Political Process for Project Development

Currently, projects associated with economic development and job creation will be seen as high priorities. The study will help position the county to apply for those by having documentation

[7] A summary of Oregon's transportation funding under http://www.oregon.gov/ODOT/HWY/docs/Economic_stimulus_FAQ.pdf

prepared with a list of projects and conceptual costs, to move implementation to the next phase.

Stakeholders and project proponents will need to coordinate their rail safety agendas through the Northwest Area Commission on Transportation, their county agencies, ODOT Highway and Rail Divisions, and possibly their state and federal representatives in order to secure regular or special funding.

In the case of bigger projects, or longer term solutions, corridor stakeholders can always approach their congressional delegation for earmarks, or work through the Oregon Transportation Commission, the Northwest Area Commission on Transportation (ACT) or other political channels. However, demonstration of substantial benefit of projects is usually required, and this is always more difficult in lower-volume areas such as Columbia and Clatsop counties.

Interagency cooperation and appropriate role allocation can help move projects, too. In the case of the L Street overpass in Columbia City, for example, the local agency administered the project, and ODOT constructed the project, but worked through local agency liaison.

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The Columbia and Clatsop stakeholders could also benefit from coordinating through the Oregon Freight Advisory Committee (OFAC) which provides recommendations on freight projects to the Oregon Transportation Commission (OTC). OFAC performs this function for STIP projects as well as *Connect*Oregon projects, ranking them according to OFAC freight mobility criteria. In consultation with ODOT, OFAC also provides its views on specific federal earmarks to OTC.

Additionally, here are often a variety of small funding pots –for projects such as intelligent transportation systems (ITS) applications—and special programs that can fund all, or separable pieces of projects. None have been identified at this time, but state and federal legislation should be monitored.

Coordination with the planning functions, schedules and staff of these agencies, including Metro, is advised. Coordination activities should also include monitoring and engaging the Oregon Freight Advisory Committee (OFAC) as well as those at ODOT involved in the current update of the Oregon Statewide Rail Plan and the Oregon Freight Plan.

Chapter 1: Introduction

1.1 Purpose and Scope of Study

The transportation corridor between Portland and Astoria, including rail (the Portland & Western Railroad's Portland-Astoria Line) and highway (the Lower Columbia River Highway, referred to as "US 30" in this study) form the backbone for commerce, job access, emergency response, community connectivity and tourism for a large segment of the populations of both northwest Oregon and southwest Washington. The portion of that corridor from the Columbia/Multnomah county boundary on the south (or east) and Tongue Point, in Clatsop County, is the subject of this study, which focuses specifically on rail safety implications of longer, more frequent freight trains ("unit trains") serving local industry. (See Figure 1.3-1, 1.3-2, and 1.3-3 for an overview and detailed corridor segment maps.)

The study examines at-grade crossing conditions and issues; the ability of vehicles to make turning movements to and from US 30 when trains are occupying the adjacent railroad tracks and blocking the highway/railroad at-grade crossing; pedestrian and bicycle safety; vehicle delay caused by more frequent and longer trains (balanced by increased train speeds made possible by infrastructure investments); emergency response operations and communications; and community education and planning programs and concerns.

Although focused on rail-related safety issues, the study necessarily touches upon economic development, emergency access, land use and future commuter rail and other transit compatibility issues. A related study, being prepared simultaneously with this report, is the Traffic Analysis of 20 selected intersections of US 30 with local streets that cross the P&W Railroad tracks (primarily roadways with higher volumes).

1.2 Study Context

1.2.1 Railroad Safety, Regional Mobility and Economic Development

For rail-adjacent communities such as those in Columbia and Clatsop counties, rail is an economic engine, a potential safety threat, a mobility option and a local nuisance, all at the same time. The rail and highway corridors that connect, also bisect many of the same communities, some severely (Rainier, and to a lesser extent Scappoose and St. Helens). Various aspects of these basic characteristics are at work in different combinations all along the Portland and Western railroad segment, known as the A Line, which connects Portland to Astoria through the project study area.8

Increased rail use along the corridor means severing communities from business, residential, school, and emergency and law enforcement access, at unpredictable and potentially extended periods of time. Changes in the type of freight hauled may mean increased hazards if accidents do occur, and heightens the need to maintain good response time, adequate training and support for local responders, and to improve communications with the railroad and between responders and other local agencies. Required sounding of train horns can be a significant problem for those living close to the tracks. School access, school bus routes, and transit routes can all be impacted by longer, more frequent trains coming through towns and cities along the corridor.

[8] The project study area extends from the Columbia County/Multnomah County line to Tongue Point, in Clatsop County.

1.2.2 "US 30 as Main Street" Creates Congestion and Safety Problems

Because the residents of towns along US 30 use that highway as a "main street" for local connectivity north and south, the local short hops on and off US 30, with associated accelerating, slowing, weaving and turning movements add to the congestion and time delays in the more populated segments of the highway. This situation is exacerbated by queuing for turns off US 30 when those turns are blocked by a train, as well as turns onto the highway from east-west side streets. A significant safety problem occurs when vehicles straddling the tracks waiting to turn onto US 30 cannot escape onto the highway to get out of the way of an approaching train.

1.2.3 Opportunities for a Growing Region with Lagging Freight Infrastructure

There is the recognition in both counties, and across all stakeholder groups, that infrastructure development supports regional economic viability. Given that capacity still exists in most parts, at most times, along US 30, those in Clatsop and Columbia counties recognize that significant capacity increases (beyond passing lanes or turn lanes) along the highway are unlikely in the near to mid term. Therefore, and in concert with the Portland-Astoria (US 30) Corridor Plan (May 2000), an effective and safe shift of freight (and eventually commute) trips from highway to rail is growing in importance.

Among the state's other rail corridors competing for future public investment dollars, the Lower Columbia River Corridor has attractive features that provides competitive advantages: deep water ports; barge, truck and rail modes; access through Longview, WA to Interstate 5, and well-located industrial land.

1.3 Two Counties, Two Perspectives

1.3.1 Columbia County

Columbia County is more ambivalent about increased rail use, because the impacts to adjacent land uses are more acute. School bus, bicycle and pedestrian patterns complicate issues of vehicle safety at the rail/highway crossings. Community connectivity is already difficult in spots; with more and longer trains and possible shifts in traffic patterns due to potential street closures, there is great concern about emergency access as well as ordinary mobility flow.

Even the County's desire for better commute options for residents has a downside: bus service or eventual commuter rail might have the perverse impact of encouraging the "bedroom community" trend. Residential growth that is not balanced by industrial development or family-wage employment opportunities results in an inadequate local tax base, certainly. But beyond that, the plague of latch-key children, neighbors who are strangers and commuting parents who are too tired to attend PTA or volunteer in their local institutions drain the lifeblood of communities. These problematic trends will themselves increase as the towns of Scappoose, St. Helens and Rainier face significant growth pressures over the coming decades.

It is probably safe to say that issues in Rainier, with the railroad running down the center of its main street ("A" Street), and local parking habits that require backing out of those spaces across the tracks, pose the largest challenge. It also has one of the best opportunities to successfully integrate a rail-oriented vision into renewed economic vitality. However, most Columbia County cities along the railroad struggle with the safety, noise and connectivity problems that will be aggravated with increased frequency and length of trains, added to issues associated with current switching operations.

1.3.2 Clatsop County

The development of Tongue Point and Bradwood Landing is key to understanding Clatsop County's goals for this study—to upgrade the railroad to Class 2 track, and permit safer and quicker train movements through the area. Without rail, the existing development would not have happened, and rail is viewed as essential infrastructure to solve the "chicken and egg" dilemma of attracting new family wage jobs to the area. The worries about connectivity are not as pronounced in Clatsop County, where the railroad hugs the Columbia River, mainly outside of town centers.

Emergency access could be a problem in the event of a derailment that occurred between the relatively more sparse public crossings.

1.3.3 Vision, Leadership and Courage Required to Get the Future People Want

Stakeholders clearly understand that change will come. People will grow their families and others will relocate into the attractive Lower Columbia River Corridor because of the quality of life. In order to keep the best features of that quality of life, vision and action is required now. Planning for change will keep the communities in control of their destiny, but failure to plan for growth on the highway, on the railroad, at the ports and in the towns will not prevent it.

ODOT's Rail and Highway Divisions, and the Office of the Governor have been supportive of economic revitalization and the infrastructure needed to initiate and sustain that in the corridor. Planning (long term) for an eventual two-track rail system that accommodate freight at speeds up to 45 mph and commuter rail up to 60 or 65 mph along the length of the corridor would provide opportunities for sustainable and desirable development patterns that would nourish community life. Today there are opportunities to make good, if difficult, decisions, to begin that process. If Clatsop and Columbia counties unite behind a coherent strategy for infrastructure investment and local land use planning and development, they will increase their potential for successful, funded projects.

Yet the difficulty of balancing competing goals—such as maintaining the integrity and utility of rail, while preserving multi-modal uses and co-existing with current and planned land use within rail-adjacent communities— persists. The remainder of this study will provide targeted traffic and operational analysis relative to a "tool kit" of solutions that will be used to create community-based strategy packages for consideration by local leaders and the residents they serve.

The stakeholders involved in this study stepped forward and offered numerous ideas for addressing some of the most vexing problems within their communities. However, it is important to understand that even the "solutions" pose their own set of problems, or at the very least, tradeoffs. For example:

- Reducing highway blockages means higher train speeds through town
- Obtaining ODOT support for safety upgrades means closing public crossings
- Closure forces traffic onto fewer highway cross streets
- Reducing noise through Quiet Zone implementation requires safety upgrades and railroad assumption of equipment maintenance costs
- Economic growth brings noise and congestion
- Planning for residential uses away from the noise and hazards of the rail line precludes development of desirable waterfront acreage

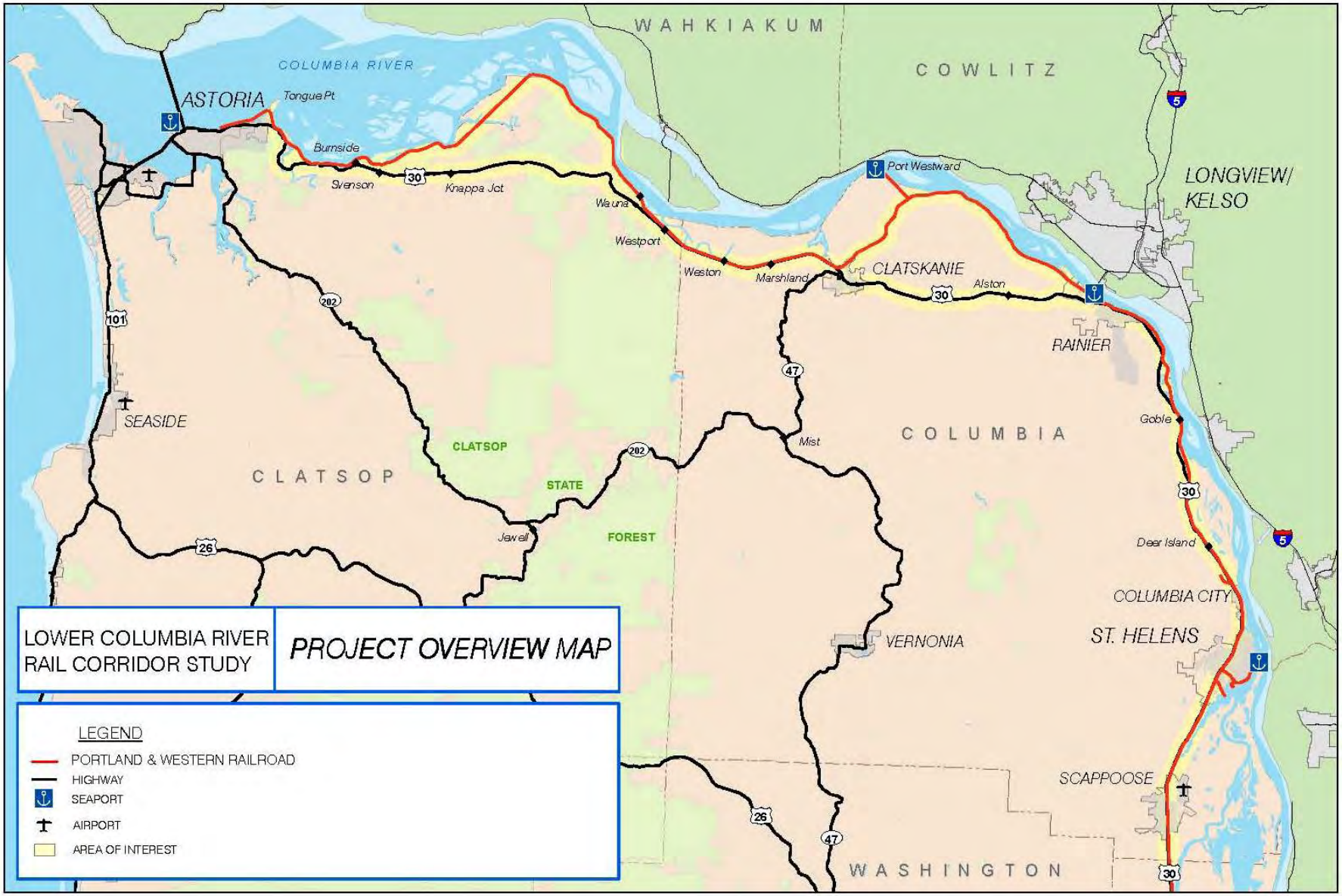

Figure 1.3-1: Lower Columbia River Rail Project Overview Map

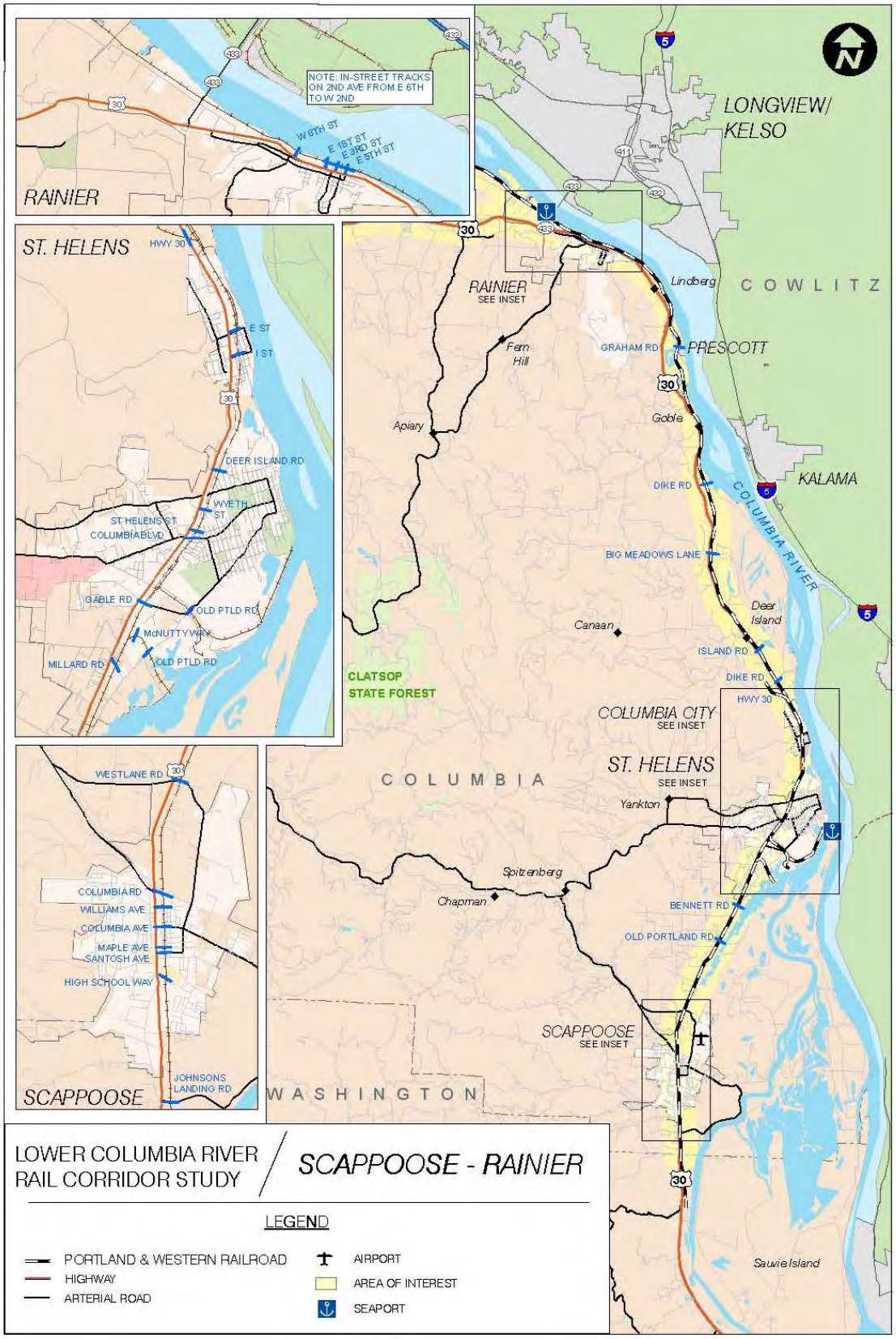

Figure 1.3-2: LCRRC Corridor Detail Scappoose – Rainier

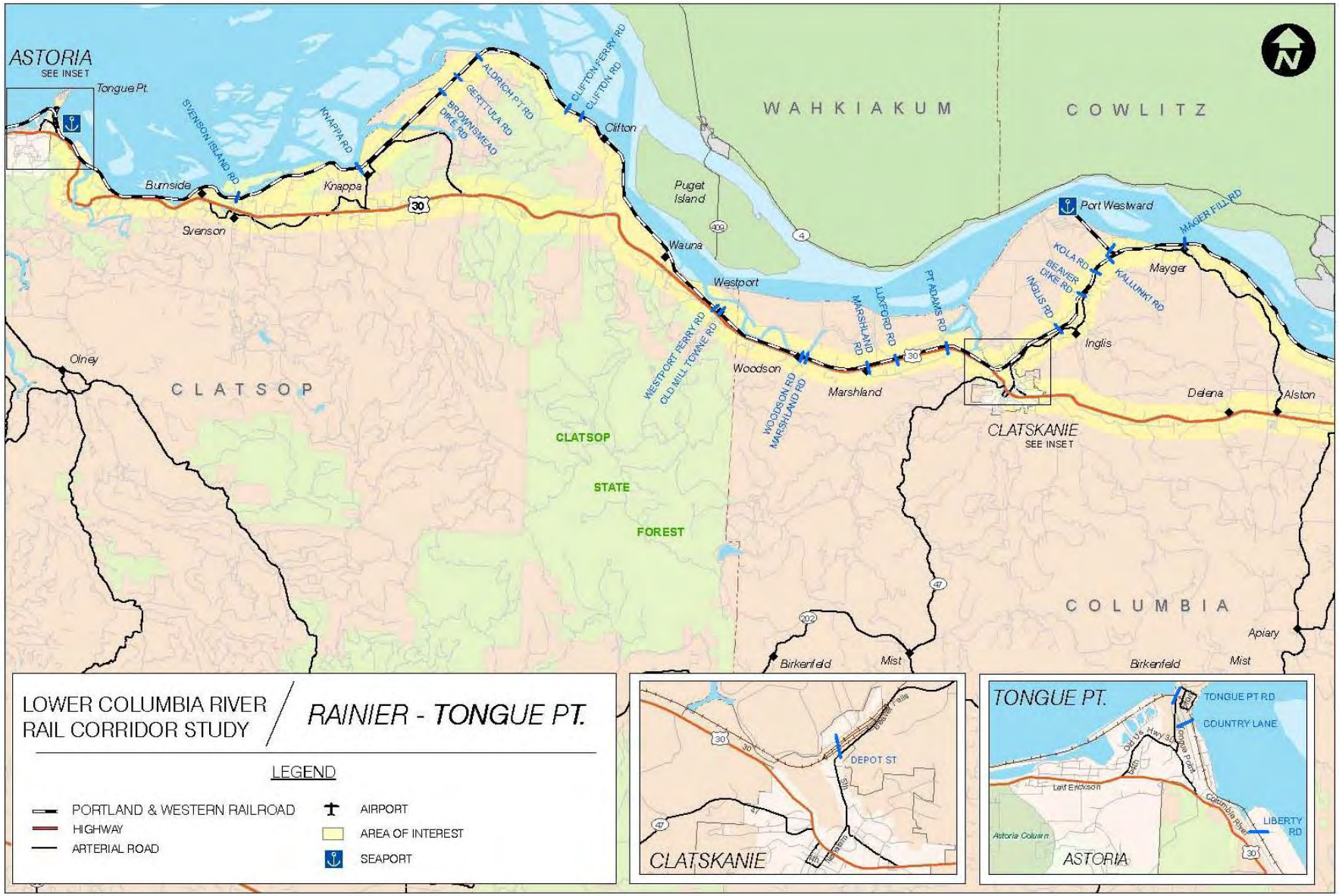

Figure 1.3-3: LCRRC Corridor Detail Rainier – Tongue Point

Chapter 2: Existing Conditions

2.1 Introduction

It was important to the study stakeholders and funders to use as much information from existing studies as possible, in order to use study resources and time most effectively. This section on existing conditions begins with highlights of previous corridor study and planning efforts that are most relevant to this rail safety study. A brief review of some existing conditions on US 30 follows. The chapter concludes with a summary of the rail inventory and conditions, which was the primary focus of the baseline condition assessment for this study.

2.2 Previous Studies & Documents

It is important to project stakeholders that this study build from, rather than unnecessarily repeat, the work of studies already completed for the US 30 corridor, including the "Astoria" line of the Portland & Western Railroad. This section describes those studies and

2.2.1 U.S. 30 Multimodal Study Lower Columbia River Corridor[9] (May 1991)

Though dated, this early study indicates how long ODOT and county and local planners have recognized the importance of the US 30 corridor to economic development and mobility in two counties which had (in 1991) been lagging in growth, compared to the state of Oregon in general. The document notes positive factors related to economic development (beyond wood and fisheries) along the corridor—available land for industry, maritime use, recreation and tourism; high-quality labor force, deep-water ports with Pacific Rim access, barge, rail and highway transportation and low-cost energy. These resources largely have remained consistent through today, and still offer the region a foundation upon which to build.

[9] Northwest Economic Associates, for ODOT

2.2.2 US 30 Corridor Plan (1996)[10]

The US 30 Corridor Plan consists of a Line Study, Transit Feasibility Study and Transportation Strategies Plan for the Portland-Astoria rail and highway corridor, prepared for ODOT Region 1.

The Transit Feasibility Study notes that current (1996) demand for fixed schedule transit service might not support commuter transit between Columbia City/St. Helens and the Portland area. However, projections indicated that congestion will grow, and that commuter service would be an effective way of addressing work-related travel demand during the peak periods. Those projections have, indeed, come to pass, and Columbia County has initiated commuter express service (CC Rider) to begin to address new commuter travel needs. The study also compared vanpool and fixed-route bus transit service in its discussion of alternatives to the automobile.

The Transportation Strategies Plan represented an early effort by ODOT to move from a traditional highway-only focus to multi-modal corridor planning. The plan is designed to resolve major planning issues prior to the development of specific projects. It emphasizes cooperation and collaboration between ODOT and local jurisdictions, so that as corridor plans and specific projects are developed, local comprehensive plan issues are simultaneously resolved. In this Rail Safety Study, the coordination of future land use that reflects the existence of the rail corridor and seeks to avoid unnecessary aggravation of town-rail conflicts would be an outcome supported by the Transportation Strategies Plan.

Within the plan, then-owner Burlington Northern Railroad (BN) was suggesting abandoning or possibly rail-banking of the line from Wauna to Astoria, due to lack of demand. The Port of Astoria and the City of Astoria were attempting (in 1994) to find tenants for the port at Tongue Point. Passenger rail was considered, but dismissed as a possible, at least for 20 years, due

[10] David Evans and Associates, for ODOT

to insufficient residential density, costs to upgrade infrastructure and operate passenger rail. Buses were offered as a more appropriate transit solution for the corridor.

2.2.3 Portland-Astoria (US 30) Corridor (September 1999)[11]

This Corridor Plan, now ten years old, identifies specific projects along US 30. Project prioritization was based on first maintaining facilities to be safe and functional; then, in order, preserving, optimizing, improving safety and capacity, and finally, completing projects that support economic development, especially recreation and tourism.

The plan recognizes the need for different approaches in different segments of the corridor (urban vs. rural congestion, for example). The Corridor Plan calls for development of local street networks to be used as an alternative to US 30 for short, in-town trips.

The plan includes the following observations on rail service:

> *The Corridor Plan supports the maintenance of existing rail services and improvements to the infrastructure, e.g., intermodal facilities, to enhance the investment climate for rail users. Increased use of rail to convey bulk commodities can limit the growth of truck freight on US 30. Managing the rail line to preserve future opportunities for passenger service is also promoted. (p. 19)*

2.2.4 Scappoose Rail Corridor Study (October 2002)[12]

A study of the rail corridor through Scappoose, examined highway-rail grade crossings resulted in a consensus recommendation on a preferred plan to accommodate growing demand for east-west travel across the Portland & Western Railroad corridor that parallels U.S. US 30 through town. The study area included the highway/railroad grade crossings between milepost (MP) 20.24 and 22.36 on US 30, and rail post 126.8 and 143.1 on the P&W rail line. Preliminary engineering on the preferred alternative[13], an improved highway/rail at-grade crossing at Havlik Drive (classified as a major collector) has been completed. The project is considered to be included as a future project within this LCRRC study. As this Rail Safety Study goes to print, the City of Scappoose is working with county and state agencies to apply for economic recovery stimulus funding (March 2009) to implement the project.

2.2.5 City of Columbia City Quiet Zone Crossing Order Application (July 28, 2008)

In this application to ODOT Rail Division, the City of Columbia City states its intention to implement a 24-hour Quiet Zone within the City limits. It proposed alterations to crossings at "E" Street, "I" Street and Pacific Street, in compliance with the direction from ODOT Rail Division staff.

The street alterations result in a change of Third Street from two-way to one-way southbound traffic for the block between "E" Street and "F" Street. On "I" Street, the City will construct a non-mountable curb on Fourth Street at "I" Street to channelize vehicle entering and exiting "I" Street at that location. In addition, eastbound trucks will be prohibited from making right-hand turns onto Fourth Street from "I" Street. Westbound truck traffic on "I" Street between Second Street and US 30 will not be allowed to enter US 30.

The state (ODOT Region 1 and ODOT Rail Division) will upgrade US 30/"E" Street traffic signal hardware, provide an escape/holding area for trucks on the shoulder of US 30 west of

[11] David Evans and Associates, for ODOT
[12] Kittelson/HDR, for ODOT

[13] It is noted that local voter actions and investment preferences expressed in Fall 2008 postponed implementation on Havlik, while another alternative (Jenny Drive) was considered. The most recent direction for the City, however, will progress the original Havlik Drive alternative toward implementation, with the closure of Santosh Street, a local two-lane street.

Pacific Street, and install and maintain the six "No Train Horn" signs that the City will fund.

2.2.6 Rainier "A" Street Streetscape and Railroad Safety Report (2003; cost updates 2008)[14]

The City of Rainier presents something of a special case along the study corridor. For approximately a decade, the City, local businesses, Columbia County, ODOT Region 1 and the ODOT Rail Division have been engaged in trying to address safety, mobility, noise and livability issues created by the fact that the Portland & Western Railroad runs "in-street" through the center of Rainier's main street, "A" Street.

The proposed project, extending from East 6th St to West 2nd St included street enhancements and safety improvements for rail, vehicular, bicycle and pedestrian traffic through the center of town. A plan to increase functionality of the railroad by opening the tracks (they are currently obscured by asphalt, except for the rails themselves), and allow trains to move through at 25 mph (as opposed to the current 10 mph) has been much discussed for some years. The plan, modified from a similar set of solutions implemented in Corvallis, OR, would have incorporated new raised curbs and landscaping to channelize traffic to designated intersections with automated safety protection, preventing vehicles or pedestrians and bicyclists from crossing the tracks at any point, as is currently the case.

In response to requests for funding of desired safety improvements, ODOT Rail Division offered to fund intersection safety upgrades in exchange for four road closures, an offer that has been under consideration by the City. However, the offer expired on December 31, 2008 without City action. Currently, there is no agreed-upon engineering solution to the long-standing issues in Rainier. Notably, there remain at least two primary problems: insufficient truck turn-around space at the south (or east) end of town (accessing Foss Maritime) and the space constraint on implementation of gates and at the north (or west) end, accessing US Post Office at West 2nd Street. The City is continuing to seek internal consensus on a workable engineering and civic design solution that works for rail safety as well as quality of life and economic development needs.

2.2.7 Lower Columbia River Rail Corridor Study/US 30 Intersection Study (December 2008)[15]

This study, completed in December 2008 for ODOT, examined 20 key intersections along US 30 in Columbia and Clatsop counties. The study was undertaken in association with the LCRRC Rail Safety Study, to determine potential vehicle queuing problems related to vehicles turning from US 30 (northbound or southbound) across the railroad tracks. The 20 intersections and the key results are shown in Table 2.4-1, below.

Based on an operational analysis of the highest 15 minute period of the peak traffic hour, under current conditions, the signalized intersections of High School Way, Maple Street and Columbia Avenue currently exceed ODOT volume/capacity (v/c) maximum of 0.75 on US 30, in the PM peak hour. In the AM peak, High School Way and Maple Street exceed the ODOT standard.

Queuing analysis was also performed, to determine whether sufficient storage capacity exists on US 30 to accommodate northbound right turns and southbound left turns from US 30 onto streets that then cross the railroad tracks. This analysis quantified concerns about trains blocking crossings and causing backup on US 30, expressed by many stakeholders in the larger LCRRC study. These long queues cause some frustrated drivers to perform risky maneuvers around the stopped vehicles. In addition, there are instances where vehicles traveling (north- and south-bound on US 30) may come around curves and encounter turning-vehicle queues without optimal stopping distance.

[14] W&H Pacific, for City of Rainier

[15] Kittelson & Associates, for ODOT

The analysis used a two-minute turning delay for the "no train" condition; a five-minute turning delay for the existing train events, and a ten-minute delay for the longer unit trains. Note that the five and ten minute delays are longer than the typical 3.5 and approximately 7-8 minute delay associated with corridor train lengths and speeds for the "normal" and unit trains in use.

This Rail Safety Study used the middle set of values (existing train events) to avoid over-estimating delay. The recommendations for safety improvements (Chapters 5 and 6) were based on that set of delay and vehicle queue figures.

2.3 Rail Conditions

2.3.1 Existing Corridor Infrastructure

An inventory of existing rail infrastructure along the alignment was made via field reconnaissance trips and data search and compilation efforts. Stakeholder agencies provided a great deal of background data and access to previous studies, as well as staff opinions and correspondence.

In addition, as part of the field work for this study, as well as the related US 30 Traffic Study, public and private roadway/rail at-grade crossings, as well as major US 30 intersections were observed, and their capacity, multi-modal amenities, condition and safety features noted.

2.3.2 Railroad Traffic Volumes

Volumes and lengths of trains under existing and future conditions is illustrated in Figure 2.4-1.

2.3.3 Hazardous Materials

Hazardous materials, such as chlorine going to the Wauna mill, are an issue. Yet, area residents understand that the hazardous materials are being used for family wage jobs.

2.3.4 P&W Train Crew Perspective on Corridor Safety

A scheduled on-train inspection trip (September 10, 2008) and interview with two Portland & Western train crews, afforded a unique and critical understanding of corridor safety issues. The notes and observations summarized below resulted from that effort.

2.3.4.1 Scappoose

During field reconnaissance, the consultant team noticed grade-school children crossing the tracks (some walking, some carrying their bicycles across the tracks) near the EM Watts Elementary School on the west side of US 30. The trespassing was occurring between Santosh Street and High School Way (well outside the public crossings).

2.3.4.2 St. Helens Yard

It is more common for the railroad to have close calls with pedestrians in areas with multiple tracks where they are switching cars. Often, they will see pedestrians walking across the yard in front of the locomotive when they are switching cars. Sometimes they will see pedestrians and bicyclists hop in-between stationary cars to cross the yard. The railroad is concerned with pedestrians being surprised by an unforeseen moving train when they hop to the other side of a stationary set of cars (especially if permitted to travel at the 25/30 mph track speed). There is little room between tracks when cars occupy the lines.

2.3.4.3 Gable Road

The railroad has had some close calls with pedestrians (children) on the sidewalk. In notable cases, the pedestrian did not realize the train was coming until the last minute despite the warnings from the crossing gates and the train whistles from the engineer. St. Helens High School is located on Gable Road, on the opposite side of US 30 from the railroad. Often they will see children and teenagers with headphones on, or talking on their cell phones as they cross the tracks on the sidewalk.

2.3.4.4 Public Crossings in St. Helens

In general, the railroad does not have a problem with the public crossings in St. Helens with regard to vehicle traffic. They may have an occasional car that tries to beat the gates before they close,

but in general, the crossings are not an issue with vehicle traffic when the gates are closed. Again, the one issue that stood out was the close calls on Gable Road with pedestrians (young people) on the sidewalk crossing (see Gable Road, above).

The P&W engineers noted a problem with storage for cars turning left from US 30, and being stopped at the railroad crossing protection gates. Since some of these crossings can hold only one or two vehicles, this has a traffic impact.

2.3.4.5 Private Crossing at MP 31.45

Gravel trucks hauling trailers foul the track when they are waiting to turn onto US 30.

2.3.4.6 Private Crossings between St. Helens and Rainier

The private crossings between St. Helens and Rainier generally have not been an issue for the railroad.

2.3.4.7 Goble Landing (Lake St.)

The railroad has had some close calls at this crossing. Trucks will cross US 30 to Goble Landing and be stopped by a train. At times, the trucks may not see the train because they are focused on crossing US 30 before they approach the tracks. Also, since there is only a stop sign at the tracks, the vehicles will treat this as a yield sign and continue to cross the tracks despite the approaching train.

2.3.4.8 Graham Road

So far, the P&W conductor has not experienced any close calls at this crossing; however, he believes this is a potential hazard because of visibility issues with the crossing.

2.3.4.9 Fishermen between MP 42.5 and MP 45.5

There have been a few occasions where the railroad has encountered fishermen either walking along the tracks or crossing along this corridor. There are homes up on the hillside; the railroad is between the Columbia River and the homes. Also, a "pirate" or illegal crossing was placed approximately a mile east of 6th Street in Rainier.

2.3.4.10 Downtown Rainier ("A" Street)

The railroad tracks run "in-street" through the middle of "A" Street in downtown Rainier. In general, the railroad does not experience a significant number of close calls in this area. This may be due to the local's familiarity with the railroad and the restricted speed of the trains (10 mph). The railroad will, however, experience an occasional parked delivery truck fouling the tracks or a vehicle driving along the tracks in front of the train (not directly in front, but within a block of the train). The conductor believes these are not local drivers. The railroad blows its horn and sounds the bells through this area as required by the FRA.[16]

2.3.4.11 Teevin Brothers (Private Crossings)

The railroad has experienced its largest number of close calls in this area. As the train approaches this area, they are slowing down to begin switching cars. Often, the logging trucks will slow down when they see the approaching train, but when they judge how fast the train is moving, they speed up and cross in front of the approaching train. Although no accidents have occurred, if a train were to pass through at track speed (25mph/30mph), an incident will more than likely occur. In particular, the railroad experiences the greatest number of close calls at MP 47.0. At this crossing, (and a second nearby private crossing with similar issues) trucks are unloaded and ready to leave the premises for another haul. There is a large pile of logs blocking the visibility of the trucks as they approach the tracks from the yard. The railroad crew made a point of saying that the problem was due to **outside haulers** and ***not the Teevin Brothers haulers.***

2.3.4.12 Fish Station Road (Private Crossing, MP 55.66)

In this area, the railroad has experienced some close calls with fishermen fouling the track near this crossing. Also, there is a railroad bridge near the area that crosses a creek tributary to the

[16] Stakeholder interviews revealed local concern with

Columbia River. On one occasion, the engineer surprised a father and son sitting on the bridge fishing. The father and son barely had clearance from the passing cars; however, if a unit train were to pass through the area, they may not have had enough clearance.

2.3.4.13 Pt. Adams Rd

This public crossing has signals for oncoming traffic, but does not have an active system. Visibility is an issue at this crossing and the railroad recommends the installation of gates.

2.3.4.14 West of Rainier

In general, there are fewer people, fewer vehicles and fewer problems as the corridor progresses westward toward Astoria from Rainier. From Fish Station Road to Wauna, the train crews will encounter an occasional close call with fishermen fouling the track, but close calls with vehicles decrease notably.

2.3.4.15 Wauna

Since the railroad is switching cars at Wauna, track speed is generally 15 mph. Because of the slower speed and because they actively blow their horns, they typically do not have many problems arise at Wauna.

2.3.4.16 Aldrich Pt. Road

Visibility is an issue looking east toward a westbound train. The crossing has a passive system (stop signs).

2.3.4.17 Fishermen – Near MP 86.93 (West of Waterhouse Rd. in Knappa)

While operating the Bicentennial Train, often the RR would encounter fishermen fishing off the bridge into the creek at this location.

2.3.5 Public & Private Roadway/Railroad At-Grade Crossings

Appendix A, Inventory Master Summary, provides inventory information on the corridor, including:

- Crossing number (1995 Track Chart)
- U.S. DOT identification number
- Milepost
- Average annual daily traffic (from several sources)
- Number of lanes
- Existence of sidewalks and bicycle lanes
- Type of at-grade crossing protection
- Crossing surface type
- Roadway surface type
- Vehicle storage lengths (right turn from US 30; left turn onto US 30)
- Length of rail cars at the crossing
- Number of local and unit trains under current, post-*Connect*Oregon II improvements, and for projected 10 year 8% annual growth in rail demand

Where information was supplied, the number of school buses crossing the tracks is also included. [17]

2.3.6 Portland & Western Railroad Safety Protocols and Practices

Because this study is focused primarily on rail safety, it is important to understand the extent to which the Portland & Western Railroad is committed to the spirit, as well as the letter, of its federal and state safety requirements and its company practices. See Appendix B, P&W Safety Initiative Fact Sheet and Emergency Response Plan.

Key safety facts are:

- Locomotives are inspected daily by engineers and mechanical staff
- Track inspection occurs regularly
- P&W Railroad puts all of its employees through rigorous and ongoing safety training and testing

[17] As the deliverable for Task 3—Corridor Inventory, photographs and field inventory sheets for each crossing that could be accessed was provided to Columbia County, electronically (CD-ROM) and in a hard-copy notebook. Appendix A represents a summary of that information. It was used in subsequent evaluation and candidate project development and rating.

- Communication with local emergency responders is recognized as a key safety factor

2.3.7 Operation Life Saver

Funded by the railroads and state departments of transportation, Operation Life Saver is run mainly by volunteers, with some paid staff. The organization's mission is to educate the public, enforce traffic and private property (trespass) laws, and improve the design and engineering element of rail safety throughout the country and the world. In Oregon, Operation Life Saver can provide customized presentations for the audience-bus drivers, elementary schools, businesses, citizen groups, and the like.[18]

2.4 Existing Roadway Conditions

2.4.1 US 30

US 30 is a Statewide Highway, which means that it should function to provide interregional traffic. It is also designated as a National Highway System (NHS) route and a freight route.

ODOT Region 1 is concerned with the impacts of increased rail operations on the safety and operation of US 30, which parallels the railroad. ODOT is especially concerned about adequate storage and queuing capacity for turning movements in both directions on US 30 that may be delayed as trains pass through and block cross streets. In addition, the reliability and capacity of the highway, as it operates in conjunction with increased train volumes, is an ODOT concern.

Identification of the extent of those problems, and development and prioritization of potential solutions is a focus of this Rail Safety Study.

Ensuring the future development of the highway as a multi-modal transportation corridor is important to many stakeholders. Thus, the existence and condition of pedestrian, bicycle, transit and conditions that might affect Americans with Disabilities (ADA) required access to corridor facilities was recorded.

New traffic counts for 20 selected US 30 intersections were conducted in summer 2008, and provide the basis for analysis of conditions and impacts associated with those intersections and at-grade crossings. This material is summarized, along with project recommendations in Appendix C.

A simultaneous study focusing on siting transit stops along US 30 has not been released, but transit stop locations were generally discussed.

2.4.2 Corridor Transit

2.4.2.1 Columbia County

Columbia County Rider (CC Rider) stops at the following locations on fixed service schedule:

St. Helens:

- Medical Mall
- Rite-Aid off Gable Road.

Warren:

- Warren Baptist Church

Scappoose:

- Railroad property by Scappoose City Hall
- Grocery Outlet store on US 30

2.4.2.2 Clatsop County

Sunset Empire Transportation District provides service in Clatsop County with limited (twice daily) connections to Columbia County Rider at Westport. [19]

[18] Oregon Operation Lifesaver's website is www.oregonol.org.

[19] The Sunset Empire Transportation District website may be accessed at http://www.ridethebus.org/ . Westport Shuttle routes and connections to Columbia County Rider is shown at http://www.ridethebus.org/route/westport.html

Table 2.4-1: Lower Columbia River Rail Corridor Study: 20 Selected Crossings—Vehicle Count Data (2008)

Location	US 30 Intersection	Vehicles Crossing the Railroad Tracks						
	PM Peak Hour Volume (at US 30 intersection)	NB Right Turn Volume	SB Left Turn Volume	WB Left Turn + Through Volume	EB Through Volume	WB Right Volume	PM Peak Hour Total Vehicles Crossing Railroad Tracks	Calculated average vehicle/hour: 55%* of Peak*
High School Way	3190	145	75	100	5	80	405	225
Maple Street	3096	51	21	68	26	18	184	102
Columbia Avenue	2774	160	80	175	-	70	485	269
West Lane Road	2395	20	30	10	<5	40	105	58
Old Portland Road	2273	10	<5	<5	-	<5	10-25	6
Bennett Road	2344	180	15	60	<5	5	265	147
Millard Road	2170	5	35	15	5	15	75	42
Gable Road	2747	105	130	325	165	170	895	497
Columbia Boulevard	2410	230	120	-	255	-	605	336
St. Helens Road	2072	-	-	440	-	230	670	372
Deer Island Road	1624	115	50	90	<5	85	345	192
I Street	1319	45	10	30	<5	10	100	56
E Street	1213	10	5	15	5	5	40	22
Goble Landing (Nicolai Road)	719	10	5	5	<5	<5	20-30	14
Veterans Way	1114	5	30	10	5	25	75	42
Marshland Rd	572	<5	<5	5	<5	<5	<25	6
Marshland District Rd	580	<5	<5	<5	-	<5	<20	4
Woodson Rd	563	5	10	5	<5	5	25	14
Old Mill Rd	585	15	<5	20	<5	5	40-50	25
Westport Ferry Rd	556	5	10	10	-	5	30	17

**Possible rounding discrepancies*

Source: 2008 Kittleson & Associates, Inc. Study (Summer 2008 US 30 Corridor Vehicle Counts for ODOT Region 1)

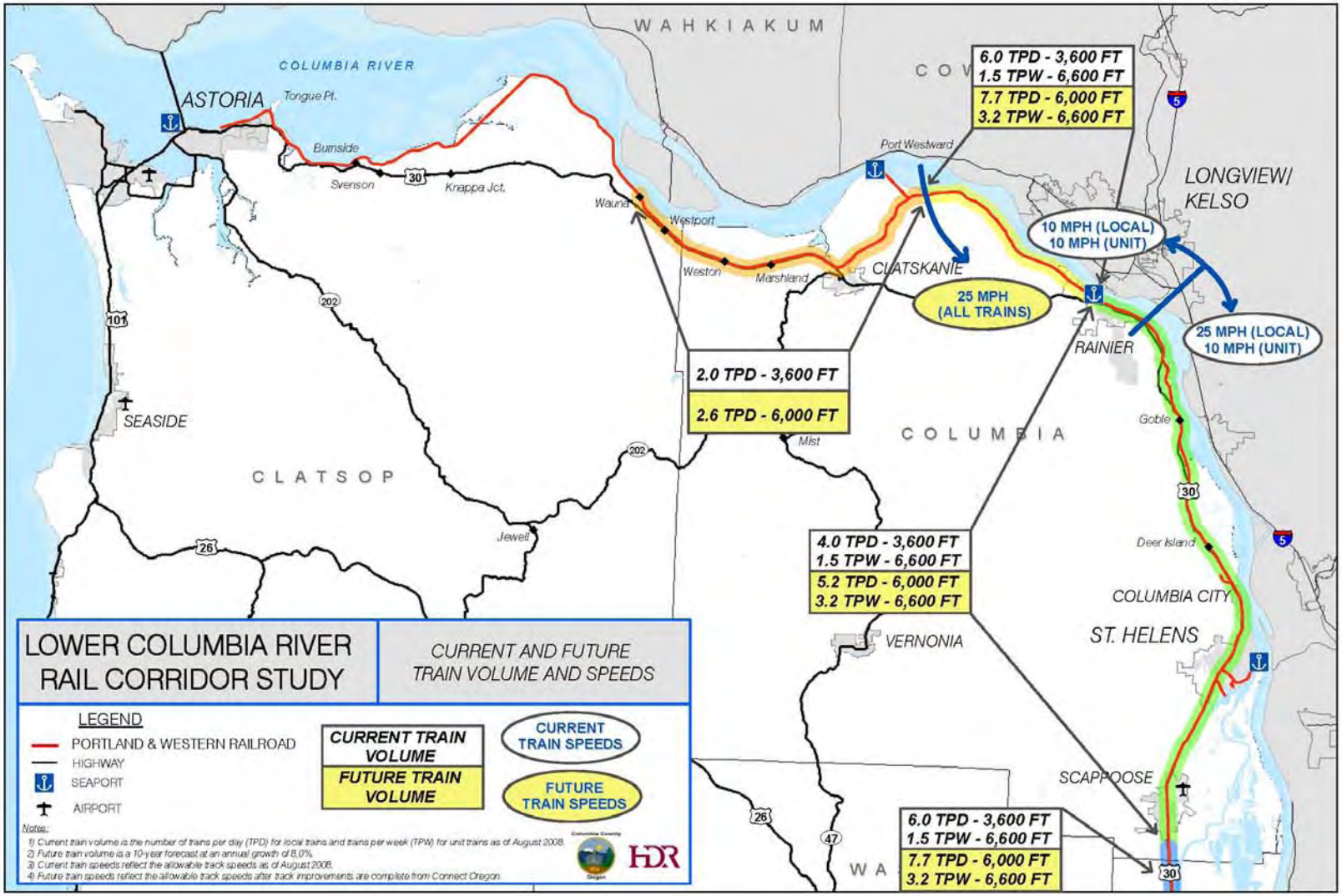

Figure 2.4-1: Current and Future Train Volume and Speeds

Chapter 3: Future Rail & Roadway Conditions

3.1 Future Train Volumes and Speeds

With proposed infrastructure improvements (track upgrades included as part of the *Connect*Oregon II funding package) track speeds will increase in sections from 10 to 25 mph in all sections of the 'A' Line from Scappoose through Wauna, with the exception of Rainier, which will remain at 10 mph absent local improvements.

Figure 2.4-1 above identifies those changes in speed, as well as current and future train volumes along the study corridor. Note that as rail-shipped freight demands grow, the railroad will add more cars to existing trains before adding another train (which would require additional equipment and labor costs.) Under this assumption, Scappoose-to-Rainier area residents and travelers would see an increase in local trains from 4 to 5.2 trains per day, and in unit trains from 1.5 trains per *week* to 3.2 trains per week between 2008 and 2018 (with 8% annual growth). Obviously, the economic recession will slow down potential growth here and elsewhere.

3.2 Future Hazardous Materials

There may be some incremental increase in the amount of hazardous materials shipped to P&W's existing customers, but this would not change emergency response protocols for the railroad or the corridor jurisdictions: ongoing safety training and improvements will continue. The amount or type of future hazardous materials that might be shipped by rail if the railroad was restored and upgraded all the way to Tongue Point is unknown. However, if that restoration occurred, Clatsop County would have to plan for accidents and derailments as Columbia County does now.

3.3 Rail-Related Vehicle Delay

Vehicle delay at railroad crossings is a primary concern of the corridor stakeholders. It is not only an inconvenience, but it also has implications for emergency response to situations on the other side of the tracks.

Unit trains, because of their greater length and slower acceleration and deceleration, create greater delay than local (shorter) trains would under the same track speed conditions. Because unit trains travel the corridor an average of only three times per week, however, their influence on total train-related delay is small compared to the influence of the more frequent local trains.

In terms of total daily delay (in vehicle hours per day) due to local and unit trains blocking crossings with the post-*Connect*Oregon improvements in track speed, the top ten public crossings in the active portion of the corridor can be ranked as follows (from greatest to least total daily delay):

- Gable Rd. (Columbia County/St. Helens)
- St. Helens St. (St. Helens)
- Columbia Blvd. (St. Helens)
- Columbia Ave. (Scappoose)
- High School Way (Scappoose)
- Deer Island Rd. (St. Helens)
- Old Portland Rd. (near Bennett Rd.)
- Maple St. (Scappoose)
- 2nd Street (Rainier)
- Depot St. (Columbia County)

The ranking of all public crossings (from Johnsons Landing Rd. to Driscoll Slough Rd.) are found in Appendix D, Train Crossing Delay Calculations. Delay is shown, and ranked, according to total daily hours of vehicle delay (Table 2.4-1) as well as delay per single crossing event due to local and unit train blockage. Delay rankings are shown for current conditions, post-*Connect*Oregon II improvements, and a 10-year projection of growth in trains (calculated at 8% per year).

Table 3.3-1 shows features of 20 key US 30 intersections, and rates them (A = most concern), based on peak hour capacity, crash history, and turning movement storage capacity. These ratings are factors that inform project prioritization.

Table 3.3-1: Key US 30 Intersection Factors and Performance under "Worst Case" Scenario (10-min Unit Train at Peak of Peak)

Intersection	Intersection Control Type	Peak Hour Capacity	Crash History	Rt. Turn Queue Capacity	Lt. Turn Queue Capacity	Overall Rating
High School Way	Signalized	A	A	A	B	A
Maple Street	Signalized	A	A	C	A	B
Columbia Avenue	Signalized	A	A	A	B	A
West Lane	Unsignalized	C	C	C	C	C
Old Portland Road	Unsignalized	C	C	NQ	C	C/NQ
Bennett Road	Unsignalized	A	A	A	C	B
Millard Road	Unsignalized	C	B	C	C	C
Gable Road	Signalized	B	A	B	B	B
Columbia Blvd	Signalized	B	A	A	B	A
St. Helens Road (1-way WB)	Signalized	C	C	NA	NA	C
Deer Island Road	Signalized	C	B	B	B	B
I Street	Unsignalized	C	C	C	C	C
E Street	Signalized	C	B	C	C	C
Nicolai Road	Unsignalized	C	C	NQ	NQ	B/NQ
Veterans Way	Unsignalized	C	B	C	C	C
Marshland Dist. Rd./Schroeder Rd.	Unsignalized	C	C	NQ	C	C/ NQ
Marshland District Rd	Unsignalized	C	V	NQ	NQ	C/ NQ
Woodson Road	Unsignalized	C	C	NQ	NQ	C/ NQ
Old Mill Town Road	Unsignalized	C	A	C	C	C
Westport Ferry Road	Unsignalized	C	B	C	C	C

Source: Kittelson, December 2008
A = Most concern B = Some concern C = Little concern NQ = No exclusive turn lane to queue in; queuing occurs in a US 30 through lane

Chapter 4: Corridor and Community Rail Safety Solutions

4.1 Stakeholder Interviews Frame Corridor Issues

Approximately 55 individuals, in about 20 different interviews or telephone calls, were interviewed to discern a wide range of opinion on increased rail volumes and related safety issues between the Columbia County/Multnomah County line and Tongue Point in Clatsop County. Approximately a dozen other stakeholders were asked, but unable to or declined to comment during the stakeholder interview process.

In a separate document, the issues identified below are associated with the stakeholders who specifically mentioned them (see Appendix E). The bullets under each heading are listed from most frequently to least frequently identified. Note that stakeholders are not a representative sample, and that further, most stakeholders would probably consider the majority of the issues listed below "important." Still, it is revealing to observe the relative frequency of issues among the stakeholders who were included in the effort.

4.1.1 Safety & Emergency Response

- Provide safety upgrades at more crossings
- Ensure ability to meet fire and medical emergency response time, and honor mutual aid agreements
- Ensure law enforcement agencies' ability to meet response time goals
- Educate public (focus on youth education) about rail safety—use Operation Life Saver materials
- Ensure safety for school access (bus, bike, pedestrian and vehicle)
- Develop or update plan and precautions for hazmat on rail
- Educate public about federal requirements for horns, and general railroad rights/responsibilities
- Develop or update derailment response plans
- Improve safety-related communications between P&W and responders
- Minimize duration that community is exposed to hazardous rail cargo
- Make sure that increased emergency response resource needs are met

4.1.2 Rail Operations (Freight & Passenger)

- Increase velocity, capacity and reliability of rail
- Maintain highway capacity, safety and reliability
- Address trespasser issues
- More separation of vehicles from trains in Rainier
- Ensure adequate maintenance and inspection of rail
- Improve Clatsop County rail segment to Class 2
- Close public crossings, as possible
- Close private crossings, as possible
- Install automatic gates and lights interconnected to US 30 traffic lights at certain locations

4.1.3 Highway/Local Road Operations (All Modes)

- Minimize vehicle delay (including school and transit bus) at grade crossings
- Address impact of more/longer trains on vehicle diversion, ped/bike mobility and safety
- Address back-up of vehicle traffic into traffic lanes (safety and mobility)
- Improve safety for hazmat trucks crossing rail
- Develop local through-streets parallel to US 30
- More signals on truck routes (Clatskanie, Beaver Falls) (could include active crossing protection or local traffic signals or warning signs)

4.1.4 Local Planning, Regulatory and Circulation

- Plan for higher speed freight and passenger trains over next 20 years
- Support existing and plan for future transit (bus and rail)
- Plan for future grade separations
- Develop vision for future multimodal corridor and associated development
- Identify and preserve industrial land along rail corridor
- Maintain or improve cross-track connectivity

4.1.5 Community & Environmental

- Reduce noise/examine Quiet Zone potential

4.1.6 Business & Industry

- Maintain or improve access to business or industrial sites for customers and shippers/suppliers
- Ensure good rail service to existing and smaller rail users
- Reduce train-related diversion through commercial parking lots

4.1.7 Economic Development

- Promote industrial development along rail corridor by providing rail access
- Shift freight from highway to rail
- Take advantage of existing funding offers (Rainier/ODOT Rail)

4.1.8 Project Implementation and Funding

- Obtain funding for needed safety and mobility improvements
- Seek contributions from all parties, including railroads, to mitigate impacts
- Begin to identify uses for *Connect*Oregon III funds

4.2 Pros and Cons of Increased Train Activity

Through the combination of stakeholder interviews, Study Core Team meetings, and informal discussions, an understanding of the tradeoffs involved in more, longer and faster trains traveling on the P&W Railroad emerged, as listed below.

4.2.1 Benefits of Increased Train Speeds and Volumes

- Trains are greener than trucks (360 ton-miles vs. 30 ton-miles per gallon of fuel for trucks)
- Each railcar means 3 trucks off the highways
- Rail service will facilitate economic development
- Rail is needed for development of Tongue Point
- Time savings for rail shipments compared to current service
- Increased industry and jobs (from railroad itself plus rail-served businesses)
- Higher property values (in the case of planned transit-oriented development, or industrial rail-accessible property development)
- Infrastructure improvements support eventual commuter rail
- Opportunity to improve or enhance existing community mobility and way of life (commuter rail and associated transit/walkable development)

4.2.2 Costs of Increased Train Speeds and Volumes

- The railroad is exposed to increased risk at grade crossings
- Potential time delay for vehicles, pedestrians, bicyclists, at grade crossings from longer trains
- Noise
- Emergency response access issues
- Impacts on community connectivity
- Increased exposure to potential safety issues at passive grade crossings

- Automatic crossing protection is expensive; could create additional diversion issues
- Potential service impacts to existing or smaller businesses
- Changes to existing community mobility and way of life

4.3 November 2008 Community Forums

Two community forums were held on November 12 and 13, 2008 at the Columbia County Courthouse, in St. Helens, OR and the Clatskanie River Inn, Clatskanie, OR, respectively. The purpose of the forums was to get input from the public on rail safety issues generally, and specific safety concerns at public and private highway/rail at-grade crossings.

4.3.1 November 12, 2008 Forum

Forum Attendees (in alphabetical order) were:

April Bamburg, The Chronicle

Rita Bernhard, Columbia County Commissioner

Greg Cohen, Coast River Business Journal

Michael Greisen, Scappoose Rural Fire District

Dale Hansen, Portland & Western Railroad Chief Engineer

Henry Heimuller, Transit Coordinator Columbia County Transit District

Josette Hugo, for Rep. Witt

David Kim, ODOT Rail

Donna Nyberg, for Rep. Witt

John Schull, Scappoose Rural Fire District

Lonny Welter, Columbia County Road Department

Oregon State Representative Brad Witt

Janet Wright, Columbia County

Diane Young, Portland & Western Railroad Safety Officer

4.3.2 Brief Presentations

After self-introductions, Deborah Redman (HDR) introduced the project purpose and background, progress to date and identified the next steps. She explained how to provide input during the meeting.

Kurt Reichelt (HDR) reviewed the data collection and existing conditions report, and explained how the information was gathered.

Dale Hansen and Diane Young from Portland & Western Railroad (P&W) presented information about their safety record (one of the best in the country, if not the best) and on emergency protocols, emergency training and communication with local responders, and Operation Lifesaver.

- Operation Lifesaver is funded by the railroads and the state DOTS. It's a national organization with a full range of safety training and educational modules, which can be customized for different audiences such as school children, bus drivers, emergency responders.
- Locomotives are inspected daily by engineers and mechanical staff
- Track inspection is ongoing, and is required by the Federal Railroad Administration
- P&W conducts ongoing hazardous materials and other safety training for its own personnel
- P&W trained Scappoose Rural Fire District (and others along the corridor, through the Regional Fire Operations Group) in rail emergency response, such as where the fuel shutoffs are, how to move through the cars, how to get help from the train crew, set and release brakes, and so on.
- Good communication between the railroad and the local communities is the foundation for safe operations

4.3.3 Issues Discussed

- Rainier is the main problem in this segment of the study corridor.

- Access to businesses on the north side of A Street in Rainier.
- What happens if there's a problem with the crossing protection?
  - Dale Hansen explained the 1-800 telephone number that was posted at each protected crossing. Also, dial 911 to alert emergency personnel and they will arrive to guard the crossing until the railroad comes to address it.
- Could a "chase car" be sent in advance of all trains to ensure that crossings were not blocked and to prevent incidents?
  - Not likely to be a solution the railroads would endorse. In addition, it may not address issues of concern.
- Emergency response—what about advance notice to the local responders?
  - This has not worked out; Scappoose Fire District found it not to be a relevant solution. They have not actually been prevented from responding due to a train blocking a crossing. Their approach is simply to look for the nearest available crossing, if a crossing is blocked.

4.3.4 November 13, 2008 Forum

Forum Attendees were:

Margaret Cemulini, Rainier

Terry Deaton, Rainier

Dale Hansen, Portland & Western Railroad Chief Engineer

Henry Heimuller, Transit Coordinator Columbia County Transit District

Ruth Howard, Clatskanie

Robert Keyser, Clatskanie

Paul Langner, Teevin Brothers, Rainier

Donna Nyberg, Representative Witt's staff

E.L. Oliver, Clatskanie

Mayor Diane Pohl, City of Clatskanie

Ray Pohl, Clatskanie

Rosemary Brinson Siipola, CWCOG-MPO

Darrl Taylor, Rainier

Judith Taylor, Rainier

Kristi Ward, US Gypsum (?), Clatskanie

Oregon State Representative Brad Witt

Janet Wright, Columbia County

The forum began with a brief presentation, similar to that provided to the public on November 12. The forum was then open to questions and discussion.

4.3.5 Issues Discussed

- Potential for P&W to simply continue to travel at 10 mph, or perhaps head in to town at 10 mph and increase speed to 25 mph as the train travels through Rainier, thus reducing the time that the train blocks A Street.
- A member of the public asked if trains are running faster at night. P&W representative Dale Hansen was not aware of this, and it is not their policy to run faster at night. He asked for information of any specific issues to be sent to him.
- What about vibration from the railroad? Could it affect stability of hillside development?
  - Two citizens expressed concern about vibrations with longer, heavier trains.
  - P&W and HDR discussed the fact that with improved rail (use of continuous welded rail instead of jointed rail) some vibrations will be reduced. Vibrations are not typically a problem, but Dale Hansen said he would look into the specific location in Rainier that was brought up by a citizen participant.
- Look at the impact of putting the freight cars back on the road, and compare that with the tradeoff of increasing rail traffic.

- Look at transit across the bridge to Washington; Greyhound is coming back to Kelso Depot, and there are four Cascades trains per day
- Goal is 110 mph, ultimately, for Amtrak route in Washington
- Port of St. Helens—the train is a must; 90% of future clients want power, water and rail access
- Clatsop County—trying to acquire Tongue Point, and that will add to the need for improved rail and safety.
- Look at integrated freight and commuter rail throughout the corridor.
- What portions of the corridor remain to be upgraded after *Connect*Oregon II?
  - Approximately five total miles remain to be upgraded out of a total 38 miles of light-weight rail, divided into several smaller segments: the stretch between Mayger and Port Westward, a segment in Rainier and about 1.5 miles near Deer Island.
- What hazmat is going up and down the railroad?
  - Further discussion about the fact that hazardous materials trucked up and down US 30 is probably more dangerous.
  - Dale Hansen explained that the latest ethanol railcars are designed to stay upright in the unlikely event of a derailment
- Participants discussed the tradeoffs between decreasing speed vs. increasing speed and reducing crossing blockage duration
- Consider the fiscal impact of the Rainier street closure plan on the citizens of Rainier
- Consider quiet zones through cities
- Ensure good rail service to existing and smaller rail users in the future
- Promote good land use planning, and preserve the potential for commuter rail and grade separations now.

4.4 Preliminary Corridor "Tool Kit" Solutions

The following list of potential solutions for the issues identified along the corridor come from a variety of sources, including the ODOT Rail letter to Janet Wright, May 25, 2007; LCRRC stakeholder interviews and Core Team meetings, Portland & Western Railroad management and rail crews, previous planning documents and consultant team assessment.

4.4.1 Railroad-Focused Ideas

- Scappoose to Port Westward—existing 85-90 pound rail, ties and sidings must be replaced to support ethanol plant at Port Westward ($25 M est. cost)
- Port Westward to Tongue Point—existing 85-90 pound rail, ties and sidings must be replaced ($18.5 M est. cost)
- Three swing span drawbridges—cannot be adjusted to become fully automated—either weld in position if waterways can be closed to navigation, or consider new automated lift span bridges
- Inspect, inventory all rail bridges to determine load capacity, remaining life cycle, cost to repair or replace
- Tunnel—raise ceiling to permit double stack carloads
- Add more rail storage
- Use sidings for operations, rather than storage, in critical areas
- Relocating switching operations
- Siting new or relocating existing yards
- Fencing (to fence or not to fence)
- Improve site visibility (vegetation, grade, horizontal alignments)

4.4.2 Roadway-Focused Ideas

- Overpasses
  - One per community (longer term)
  - Potential of pedestrian/bicycle grade separated paths in key areas (e.g., near schools)
- Escape lane for vehicles turning onto US 30
- Longer queuing on US 30
- Improve site visibility (vegetation, grade, horizontal alignments)
- Information technology to alert traffic to alternative roads during blockages
- Improve connectivity parallel to US 30, to reduce need to use US 30 as "Main Street"

4.4.3 Crossing Ideas

- Crossing upgrades
  - Ensure interconnection with US 30 traffic lights to prevent vehicles from being stuck on track
  - Install protective gates and lights:
    - Graham Rd., Prescott
    - Kallunki Rd., main entrance to Port Westward
- Active Warning Devices with Grade Crossing Predictor to measure train speed
- Landscape barriers to channel crossings safely
- Pedestrian/bicycle bridges

4.4.4 Eliminating public or private crossings

- Roads that cannot be closed were identified as follows (not intended to be an exhaustive list):
  - Aldrich Pt. Road access a boat ramp, and cannot be closed
  - No county roads in Clatsop can be closed.
  - 6th Street East, Rainier
- Closure Candidates (from ODOT Rail Division)
  - Old Portland Rd.—poor line of sight, alternate access available (both Old Portland Rd. crossings should not be closed; one must remain open to avoid pushing traffic to Gable Rd. or create long out-of-direction travel patterns for some residents)
  - Waterhouse Road might be able to be closed, because Knappa Dock accesses that area; consolidate with Knappa Road
  - Beaver Dike Rd., Quincy, consolidate with Hermo Rd.
  - Identify those private crossings without a valid agreement between the state, railroad and property owner
- Closure Candidate (other stakeholders)
  - Wyeth Road
  - Santosh Road
  - Old Portland Road (Bennett)

4.4.5 Rainier "A" Street Ideas

- ODOT Rail recommends opening up the track; curb it; close three of the following crossings, and install gates and lights at the other three (note that federal assistance for installation of gates and lights is available in conjunction with a crossing closure)
  - 6th Street East (keep open/install gates and lights)
  - 5th Street East, Rainier
  - 4th Street East, Rainier
  - 3rd Street East
  - 2nd Street East
  - 1st Street
  - 2nd Street West
- Implement the 2003 Plan for "A" Street

4.4.6 Emergency Response and Access Issues

- Improve communication between railroad and emergency responders
  - Train operations (as possible)

- Hazardous materials information
- Support community preparation, training and staffing for increased hazmat risks

4.4.7 Community/Livability Ideas

- Implement Quiet Zones

4.4.8 Educational Ideas

- Corridor-wide education in schools, businesses and community organizations
  - Work with Operation Life Saver
  - Law enforcement component—identify the trespass risks and penalties

4.4.9 Planning/Regulatory Ideas

- Review and revise local zoning to support safer at-grade crossing from built environment perspective
- Minimize incompatible development near railroad
- Revise comprehensive plans to identify and preserve future grade separated crossings, local and regional bus and commuter rail facilities, and appropriate industrial land to support economic development as well as transit-oriented and recreational land

Chapter 5: Refinement of the Preliminary "Tool Kit" of Corridor Solutions

5.1 Transforming Ideas into Solutions

Based on review of the proposed solutions with stakeholders and with the railroad, some of the ideas presented in Chapter 4 were taken to the next level of development, as discussed below.

Based on extensive stakeholder engagement, review of previous plans, and available data, this study developed a set of improvement alternatives that fall into distinct categories, as follows:

- Railroad-focused Solutions
- Roadway/Railroad At-Grade Crossing Solutions
- Roadway-focused Solutions
- Roadway/railroad at-grade crossing treatment
- Emergency Response and Communications
- Community Planning, Education and Livability Strategies

Recommendations from the preliminary list suggested by stakeholders were screened down to include only specifically safety-related projects.

This chapter also includes conceptual level cost estimates. It must be emphasized that these are not engineered cost estimates; they are to be used for relative ranking and to help communities understand the order of magnitude costs associated with different possible solutions to identified concerns and corridor problems.

Chapter 6 will provide a framework for assessing the performance of recommended solutions against some broad evaluation criteria--safety, rail and highway operations, emergency response, stakeholder support and economic development—identified through the stakeholder engagement process. Based upon a final round of stakeholder input, the solutions will be grouped, by category (e.g., railroad crossing protection upgrades) and sorted into community-focused strategies designed to help affected residents, businesses and local and state agencies seek funding and implement preferred projects. Projects will be placed into three tiers for funding prioritization.

5.2 Conceptual Cost Development for Alternative Prioritization

The cost estimates associated with identified safety and congestion improvements are conceptual only. They were developed based on available information, unit costs, recent corridor experience and professional judgment, for the purpose of evaluating and prioritizing corridor alternatives. They are not sufficient for funding applications or engineering work. In no cases do they account for right-of-way acquisition. See Appendix F for conceptual cost estimate detail.

5.3 Railroad-Focused Solutions

5.3.1 Complete Track Upgrades

The P&W Railroad received the top-ranked regional award from *Connect*Oregon II funds--$6.3 million in 2008 to upgrade 23 miles of track (to accommodate 286,000 lb. railcars) along the Portland-Astoria rail line. The intent of this track upgrade was to:

1. Enable the 'A' Line to safely and efficiently accommodate 286,000 lb gross weight freight cars, compared to the existing capability for 263,000 lb gross weight freight cars. This allows rail-served shippers and receivers on the 'A' Line to reduce their transportation costs, and better compete with shippers and receivers in other locales.
2. Improve train speeds and train capacity on the 'A' Line, commensurate with other safety requirements.
3. Reduce track maintenance costs.
4. Reduce roadway/railroad at-grade crossing occupancy times by trains, potentially.

Cascade Grain Products LLC filed for Chapter 11 bankruptcy protection on January 29, 2009, shutting down its 113 million gallon per year ethanol operation, due to economic conditions and technical issues. The need for Portland & Western Railroad to accommodate 286,000 lb. cars has diminished. Though there is a possibility that the plant will reopen, the problems with plant operation and function that are related to the bankruptcy remain to be resolved.

As of February 2009, P&W had upgraded 7 of the 23 miles funded under *Connect*Oregon II. Not only have plans to complete the entire corridor upgrade (though *Connect*Oregon III) been halted, but P&W may return funding to ODOT Rail Division, and seek a refund of its proportionate matching funds.

Conceptual Construction Cost: $N/A – Project On Hold

5.3.2 Additional Train Storage/Siding

Sidings are used to increase operational flexibility and efficiency in serving rail customers, for purposes that include sorting, staging and storing railcars. P&W has looked at locations between Rainier and St. Helens to add capacity, but there are issues with land availability and difficult terrain, as well as funding.

South of the study area, near Sauvie Island, there is a possible site that might accommodate a 7,000 foot siding extension of the Harbor Siding to Larson Road. A site at the northern end of the study area, near Mayger Rd., was also identified as a possible siding location.

Discussions with P&W Railroad indicated interest in a site just north (west) of Rainier. There, an 8,500 foot flat site at Dibblee Point might accommodate a siding, or potentially a yard, extending from railroad mile post (RR MP) 48.75 to RR MP 50.35 and would be constructed within existing right-of-way. Construction would be contingent on future business conditions. See Appendix G for location map.

Conceptual Construction Cost: $3.47 million

5.3.3 Inspect and Inventory Movable Rail Bridges

There are three movable swing-span type drawbridges between Port Westward and Tongue Point. According to ODOT Rail Division engineers, the three bridges are not conducive to either remote-control operation or automatic operation. However, ODOT recommended that a bridge consultant should be hired to determine load limits on those bridges, and determine if the waterways can be closed to navigation. Permanently affixing the bridges into a closed position may add years to the useable life of the bridges. If bridges cannot be permanently affixed due to waterway needs, consideration should be given to replacing them with fully automated lift span bridges with sufficient vertical clearance to enable the 'A' Line to accommodate double-stack container trains. To make these determinations, qualified engineers should manually inspect each bridge.

Swing Span Bridge Structure at RR MP 62.7 (Columbia County) Due to the speed restriction of 5 mph on this 223 foot bridge over the Clatskanie River, a bridge structural engineer should be hired to determine what it would require to increase the speed on the bridge to 40 mph. The bridge is rated for 268,000 lb rail cars, and would need to be upgraded to accommodate 286,000 lb cars.

Swing Span Bridge Structure at RR MP 84.71 (Clatsop County) This bridge is approximately 688 feet long, including approaches, and spans the Blind Slough.

Swing Span Bridge Structure at RR MP 94.83 (Clatsop County) This bridge crosses the John Day River, and is approximately 312 feet long (including approaches).

Conceptual Engineering Study Cost: Approximately $40,000-$120,000 per bridge

The wide variation in likely consulting fees is due to variables in bridge condition, access issues and scope of work. Safety and staging complexities also vary according to site characteristics, and these and other factors affecting actual study cost

would be determined as part of scoping a request for proposal. This range assumes field inspection by a crew of two to three people, possibly with mobile lift platforms for access, and includes preparation of a detailed report on findings and recommendations for functional repairs. The level of detail needed for findings and requirements for cost estimates for resulting recommendations would affect the study cost.

5.3.4 Relocate St. Helens Switching Operations

St. Helens Yard is a rail yard that supports local rail-served customers. It also creates a mobility barrier within the community for motor vehicle and pedestrian traffic. Both the community and the railroad are concerned about trespassing, as it creates a safety risk and liability issue. Even if the yard is not relocated, fencing along US 30 is proposed. (The $3.67 million relocation cost includes an estimated $84,000 for fencing the yard along US 30.)

P&W must serve customers in the St. Helens area, and it may be impossible for the railroad to completely vacate the yard. However, storage (as opposed to active switching) activities might be economical to accomplish elsewhere, and the railroad might be interested in relocating, with provision of a new yard on a one-to-one replacement ratio. The cost of moving is an issue, as is finding suitable land.

Conceptual Relocation Cost: $3.7 M (exclusive of right-of-way acquisition)

5.3.4.1 Fencing or landscape barriers-St. Helens Yard

Fencing along St. Helens yard is recommended as a partial solution to trespassers. Additional law enforcement is also a possible solution to the trespass problem in this location. P&W RR is committed to enforcing the law against trespassers and working with local law enforcement. Fencing cost below is based on 3,000 feet of chain-link fence on US 30 side of the existing yard. The City of St. Helens may be interested in a more visually appropriate fencing solution, such as incorporating sight-obscuring slats or landscape elements, though this would likely involve additional costs.

Conceptual Fencing Cost: $84,000 (Does not include maintenance, which would become City responsibility.)

5.4 Roadway/Railroad At-Grade Crossing Solutions (Public Crossings)

5.4.1 Railroad Crossing Protection Upgrades

Each public roadway/railroad at-grade crossing along the study corridor was examined during a field inventory conducted in July 2008. A follow-up examination by train added information from the P&W railroad crew perspective, and is incorporated into the considerations and recommended solutions for each crossing.

5.4.1.1 Crossing device upgrades

Grade-crossing safety improvements are categorized each grade crossing into similar risk reduction groups.

CATEGORY OF CROSSING TYPE: The crossings have been segregated into nine (9) distinct categories. The following specifies the work associated with each category:

1. **Category 1** Control Circuitry Replacement: requires new approaching train detection and arrival time prediction electronics, shunt enhancing equipment, new track leads, new batteries and battery charging equipment.
2. **Category 2** Partial Replacement or Upgrade: requires replacement or addition of one or more flasher / gate assemblies, along with some or all of the Control Circuitry Replacement identified in Category 1.
3. **Category** 3 Complete Replacement: requires complete replacement of electronic equipment, including new shelters and ground equipment. New shelter to include: control circuitry (category 1). New ground equipment

to include cables, gates, flashers, bells and cantilevers as required. However, there are some crossings where existing apparatus (e.g., cantilever, gate assembly) are adequate for use but will require re-cabling.

4. **Category 4** Complete Signalization of an Un-signalized Crossing: requires installation as per ODOT crossing order.
5. **Category 5** Roadway Geometry, Drainage and Crossing Surface Upgrade.
6. **Category 6** Roadway Traffic Signal and Crossing Pre-emption Upgrade.
7. **Category 7** Crossings to be Considered for Closure and Traffic Rerouted.
8. **Category 8** Crossings to have a complete Diagnostic Review.
9. **Category 9** Crossings that require no changes or investment to reduce risk at this time. (In some cases, non-critical improvements are recommended, however.)

Costs for recommended improvements (see Table 5.7-1) are based on recent experience with Portland & Western Railroad in Oregon and on the corridor, and represent close matches to ODOT Rail Division estimates (2002) with approximate 6% annual cost escalator incorporated.

5.4.1.2 Pedestrian/bicycle Access

Notable pedestrian and bicycle facility gaps, poor conditions and special users (schools, elderly or disabled needs, community connectivity) affect the ability of pedestrians and bicyclists to cross the railroad tracks. Depending on the crossing, treatment can be to do nothing, improve (replace or repair) the between-track surface to make it easier to traverse, to improve signage or signal timing, or, in the most-used intersections, to consider a pedestrian/bicycle overpass. Such improvements are listed in Table 5.7-1.

Because the railroad (and in many places, US 30) pose connectivity problems for pedestrians and bicyclists, a grade-separated pedestrian bridge is a solution that was examined for potential application in the corridor. Through discussions with stakeholders and examination of traffic issues, the top candidate for such treatment was determined to be Gable Road (St. Helens).

Conceptual Pedestrian/Bicycle Bridge Construction Cost: $6.1 Million

5.4.2 Road Closures to Improve Safety

5.4.2.1 Road Closure Issues

Eliminating redundant or unnecessary roadway/-railroad at-grade crossings is an important part of improving safety of rail corridors. Yet, closing a road is a serious, and possibly contentious, undertaking. Property owners must be provided access to the transportation network, and even with alternative access, there is often resistance to changing long-standing travel patterns. Thus, the goals of safety, public necessity, convenience, economics and the right to access property along a railroad alignment must be balanced, when considering closing roads.

A highway operations concern related to road closures is that traffic would be diverted to other crossings, which could, given sufficient diversion volumes, become congested, or could otherwise result in undesirable traffic patterns. The traffic study (companion study) of this corridor review attempted to identify those issues, and did not find that roads mentioned for possible closure would divert a problematic level of vehicles to other nearby roads. That said, the list of potential closure candidates is provided with the caveat that it is advisory, and more community discussion is needed to move forward with most of the identified candidates.

ODOT (Rail Division) has the authority, within Oregon, to eliminate highway/rail at grade crossings (ORS Section 824.206 (1998)). Closure requests can be initiated by ODOT, the railroad or the local jurisdiction.

In an effort to make closures more attractive to local communities, ODOT Rail offers assistance in improving intersections at locations near those which can be closed. Because at-grade crossing

safety upgrades are expensive (in the neighborhood of $190,000 to $250,000 per crossing) ODOT Rail's approach to closures enables more frequently used crossings to receive the needed safety upgrades.

Such a plan was part of the proposed Rainier solution to in-street railroad conflicts with local traffic, parking and pedestrian activity. That proposal did not result in city approval, and is being re-examined through a different process. The Rainier crossings are therefore not considered in this study.

Conceptual Closure Cost: To be determined based on site-specific factors. While simple closure of an unsignalized active crossing might be relatively low, local and site-specific requirements for right-of-way to create needed cul-de-sacs would add significantly to project costs, as would signal removal.

5.4.2.2 Potential Closure Candidates

Below is a list of closure candidates that warrant further exploration with the local jurisdictions and ODOT Rail:

Santosh Road, in Scappoose, is planned for closure in connection with the Havlik Drive/US 30 interchange project.

Old Portland Rd.(near Berg Rd.) This at-grade crossing has poor roadway geometry (narrow lanes, curvature and a steep westbound approach to the railroad). It's a low-volume road, and a small amount of traffic could access US 30 using Bennett Road.

Wyeth Road in St. Helens is the strongest closure candidate in that community

Beaver Dike Road is recommended for further review as a potential closure location, with traffic diverted to Hermo Rd.

Marshall District Road in Marshall is a very low volume road that could be closed, with diversion to Woodson a possibility.

5.4.2.3 Clatsop County

It was determined that no county roads in Clatsop County could be closed. It was also noted that Aldrich Pt. Road accesses a boat ramp, and must remain open.

One possible closure is Waterhouse Rd, since Knappa Rd. could be used as an alternative.

5.4.3 Private Crossings

ODOT Rail and the P&W Railroad want to close or consolidate as many private crossings as are feasible. The railroad and ODOT Rail Division are currently in the process of determining which existing private crossings lack a valid agreement between the state, railroad and property owner. Those can become the subject of closure negotiations with property owners, where alternative access exists.

5.5 Roadway-Focused Solutions

5.5.1 US 30 Storage Capacity-Northbound Right Turn

Traffic, especially during the evening peak period, can begin to queue to make right turns onto streets with at-grade highway/rail crossings within the corridor. Without adequate storage, these queues can block US 30 through traffic, and create hazards, notably rear-end collision potential. The situation also adds to peak period delay.

Additional storage to accommodate the existing train delay "worst case scenario" was identified as part of the ODOT Traffic Study Report (December 2008). The situation assessed is, indeed, a worst case, because it assumes that a local train will block crossings for five minutes during the 15 minute "peak of the peak" (during the a.m. or p.m. peak hour) under current track speed conditions. Recommendations for improvements are identified in Table 5.7-1.

5.5.2 US 30 Storage Capacity-Southbound Left Turn

Southbound motorists wishing to make left hand turns onto cross streets with highway/rail at-grade

crossings can be blocked by trains. Queues at signalized US 30 intersections can back up significantly during peak periods (notably morning peaks). This situation adds to congestion, and creates a safety concern as motorists encounter a long queue and/or try to go around it. Additional storage and/or signalization is recommended at several locations on the corridor, as shown in Table 5.7-1.

In all cases of excessive queuing, but especially for the southbound left turn from US 30, ODOT traffic planners should consider extending the green arrow phase to clear the queue, once the train has passed the blocked at-grade crossing. Given the fact that through-traffic will have had unobstructed time while the train was present, this solution should not pose a problem.

5.5.3 Corridor Cross Streets: Westbound Railroad-to-US 30 Capacity

A third area of roadway concern relates to westbound traffic, especially at unsignalized intersections with US 30, where westbound left turn vehicles can be trapped without ability to complete the left turn, as a train approaches. Emergency escape bays, located on the shoulder of US 30 (north of the intersection) would permit vehicles in such situations to move out of the way of approaching trains. Locations and conceptual costs for building those escape bays are identified in Table 5.7-1.

5.6 Emergency Response and Communications

5.6.1 Ongoing Emergency Planning

Emergency responder stakeholders in the Scappoose area noted that they have had training for rail emergencies, which emphasized how to move through the cars, how to get help effectively from the train crew, and where the emergency fuel shutoffs were located and how to operate them. In addition, they learned how to set and release brakes on the rail cars. This type of training and preparation is typical in communities along the P&W 'A' Line.

5.6.2 At-Grade Crossing Protection Problems

Paragon Systems operates a 1-800 telephone number for anyone to report problems with crossings. The crossing identification number is identified clearly on equipment located at each crossing.

Conceptual Construction Cost: N/A

5.6.3 Intelligent Transportation Systems (ITS) Strategies

Stakeholders expressed interest in information technology systems to alert traffic to alternative roads during blockages, as well as to make emergency response dispatchers aware of train locations in order to reduce the potential for emergency response vehicles to encounter waits at grade crossings for trains.

A related important note is that, during the stakeholder interviews, emergency responders themselves largely expressed the view that they currently "worked around" the blockages, were familiar with alternative routes to access during emergency response events. However, the potential solution was evaluated, and is summarized here.

Of relevance is the fact that the Portland & Western "A" Line is dispatched by Track Warrant Control, a Method of Operation that does not inherently require or provide real-time monitoring of train location to deliver safe and efficient train movement authorities. Monitoring the train's location in real-time with sufficient precision to be of use to an emergency response dispatching office is not feasible with a Track Warrant Control system. It is possible, to a degree, with other Methods of Operation such as Centralized Traffic Control (which uses wayside signals to authorize train movement) or Positive Train Control (which monitors train location using a combination of GPS, axle tachometers, and transponders mounted on the track at fixed points and read by the train as the train passes over

them). Both PTC and CTC would require multi-million dollar expenditures to equip the "A" Line.

Methods of Operation are designed to prevent train-to-train and train-to-maintenance-of-way collisions, and to efficiently prioritize train movements and maintenance activities. They are not designed to provide real-time locational monitoring except as required to meet railroad operations purposes. In a low-train density operation such as the "A" Line, a train may be authorized the entire distance of the line at one time, if there are no other trains or maintenance personnel that will require entrance to the line, prior to the train completing its work and exiting the line. Thus an Emergency Response System that monitored P&W's TWC dispatching system would in almost all cases not provide information that was useful for emergency vehicle dispatching.

An alternate possibility is to equip P&W locomotives with GPS transceivers and monitor the locations of locomotives from the emergency dispatching center using a mapping type display. Such systems are in wide use for tracking military vehicles (Blue Star Tracker), commercial trucks (FleetTek, Fleetmatics, Trimble), and emergency vehicles. The technology is inexpensive and off-the-shelf. The drawbacks are that the system only informs the user of the location of a vehicle, it does not disclose the intent of the vehicle's operator and projections of a vehicle's future location must be done by the user. The cost to equip a vehicle such as a locomotive is in the $300 to $1,000 range depending upon the robustness and transmission range of the transceiver, and cost of a central dispatching view client is in the $10,000 range. Communications bandwidth must be available to support the signal between the GPS transceiver on the vehicle and the view client. The cost of providing communications bandwidth can be extremely high if infrastructure with sufficient capacity is not available.

The drawback of such a system is that the GPS transceiver only tracks the locomotive to which it is attached. The P&W has approximately 40 locomotives of which any one could be on the "A" Line on any given day. The system tracks every locomotive unless someone turns off the transceiver when it's attached to a trailing locomotive in a multiple locomotive consist (and is meticulous about turning it back on when the locomotive is live and leading a train), which can clutter and overwhelm the capacity of the view client. Each of the transceivers has to be maintained and inspected. There may be Homeland Security, trade secret, or other reasons that makes the disclosure of locomotive location prohibited. Without an encryption scheme, the signal from the transponders can be read by low-cost commercial receivers available to hobbyists. Maintenance costs to ensure the GPS signals were reliable, accurate, and on when needed and off when not needed will be high. Bandwidth costs could be high.

For these reasons, this solution is not recommended for implementation.

5.6.4 Emergency Communications, Response, Training & Support

Portland & Western expressed a strong commitment to maintain and improve its safety practices which now make it one of the safest regional railroads in the country. P&W has an emergency response plan (see Appendix B) and is continually training its own staff and train crews in emergency response protocols, including how to handle spills of hazardous materials. In the latter case, the primary responsibility of the railroad is to communicate the necessary information on type of material to the local emergency responders.

In Clatsop County, the issue of distance from the nearest at-grade crossing and a potential accident or derailment is a problem. For example, from Brownsmead Dike Road to Blind Slough station, there is a distance of about five miles with no good emergency access. However, discussions with stakeholders did not reveal any practical solution. Essentially, if something happens, the conductor must radio for assistance and try to stop at the nearest crossing and wait for emergency responders to meet or access the train.

During stakeholder interviews, the Knappa Fire District indicated that the developer of the proposed LNG facility at Bradwood was working cooperatively with the Fire District to ensure that needed safety precautions are put in place. However, adequate staffing, training and equipping of emergency responders is a concern all along the corridor.

5.7 Community Planning, Education and Livability Strategies

5.7.1 Planning for Railroad Communities

Future land use planning should acknowledge existence of, and potential expansion of both freight and commuter rail operations along the Lower Columbia River.

5.7.2 Future Grade Separations

Many stakeholders voiced a strong desire to have reliable access across the railroad that would provide certain connectivity between two sides of communities straddling the railroad. Discussions of "one grade separation per community" took place, and general agreement that each community should identify locations where future grade separations could be built. In addition, the possibility of a second track or siding in some locations to accommodate future commuter rail should be factored in to future planning.

According to FHWA, Highway-Rail grade separations should be considered when the average annual daily traffic exceeds 100,000 (in urban areas) or 50,000 in rural area, when an average 150 or more trains per day or 300 million gross tons per year pass through the crossing, or when vehicle delay exceeds 40 vehicle hours per day.[20] Note that at the highway/rail at-grade crossing now experiencing the most total vehicle hours of delay per day (Gable Rd. in St. Helens) that total reaches only 3.5 hours per day (including local and both empty and loaded unit trains). That figure would be reduced to 2.2 hours per day by the improvement of track speeds proposed (put on hold in the spring of 2009). If the local and unit train volumes increased by eight percent per year for ten years, and the *Connect*Oregon II improvements were made, total delay at this worst crossing would still only reach six hours per day.

However, in addition to formidable economic factors, in many cases, a grade separated highway/rail intersection is not feasible for engineering and/or land use issues. Scappoose, for example, has developed along US 30 to a degree that now prevents an easy or obvious location for a future grade separation.

In St. Helens, the top priority for an eventual grade separation would be at Pittsburg Road/West Road, between Wyeth St. and Deer Island Rd. Pittsburg Rd. is a major link to US 30 for many city and county residents. A grade separation would need to extend over both US 30 and the railroad. Careful analysis and engineering will be required to ensure that sufficient connection to US 30 at that location is maintained.

Notwithstanding these concerns, stakeholders are interested in identifying and preserving possible locations for future grade separations based on long-term projections in growth and associated increased needs for emergency access. This will be accomplished through the normal planning review process such as local comprehensive planning and transportation system planning updates.

Conceptual Construction Cost $5.6 M - $9 M The lower range of this estimate was prepared by HDR, assuming characteristics of the Pittsburg Rd/West St. site in St. Helens, excluding right-of-way acquisition. The upper range was suggested by ODOT as a typical overpass cost.

[20] *Guidance on Traffic Control Devices at Highway-Rail Grade Crossings*. Washington, DC: Federal Highway Administration (FHWA), Highway/Rail Grade Crossing Technical Working Group, November 2002.

5.7.3 Develop Alternative Routes Parallel to US 30

A major reason for the peak congestion of US 30 is that local traffic is forced on to the street during peak periods, simply to make short local trips. This congestion adds to the turn-lane storage problems and resulting safety issues during times when trains block turning movements. The cities of St. Helens and Scappoose are particularly impacted by the lack of parallel alternatives, and they may wish to develop local traffic plans that address the problem. Major impediments to proceeding in the direction of such a solution include the disruption to local business and established circulation patterns, and right-of-way acquisition costs.

Conceptual Construction Cost: To be determined, depending on scope, right-of-way issues

5.7.4 Transit Planning

Columbia County is in the final phases of a study designed to identify required elements of basic corridor transit plan. The former Stimson lumber mill site (Deer Island Rd., St. Helens) has been proposed by Columbia County as a future transit hub. Removal of abandoned tracks and repaving should be accomplished to advance that plan. The conceptual cost estimate for track removal and relocation of the gate, in anticipation of use of the site for a transit center is listed below.

More generally, as part of local transportation plan updates, cities and the counties should consider optimal locations for possible future commuter rail platforms, park and rides and other supporting services to facilitate multi-modal choices along the corridor.

Former Stimson Lumber Mill Site Conceptual Preparation Cost $50,000 (excludes construction of transit hub)

5.7.5 Community Awareness

Signalized highway/rail at-grade crossings are one issue; Unsignalized, unprotected crossings pose additional challenges. This is especially true with young people who may not have grown up in a train environment. Train safety education and programs should be implemented in both counties, if train volumes and speeds increase. Increased public announcements, inclusion of railroad safety education in schools, libraries and parks programs, and parental guidance are all part of community responsibility for keeping its residents, especially children, safe where railroads and vehicle or pedestrian travel routes intersect.

5.7.6 Operation Lifesaver

Operation Lifesaver is an international organization, whose non-profit local branch is known as Oregon Operation Lifesaver. The organization (locally and internationally) is dedicated to ending collisions, fatalities and injuries at highway/railroad at-grade crossings, and along railroad rights-of-way. This purpose is accomplished through education, enforcement and continued research and innovation in engineering.

Educational programs with volunteer speakers are available to speak to schools and civic organizations. In Oregon, Operation Lifesaver has been recently underfunded, and so local funding support might increase the level of educational coverage that OL could handle. Localities are urged to contact Oregon's Operation Lifesaver at www.oregonol.org to schedule presentations.

Enforcement of safety, traffic and trespass laws is another important piece of the safety puzzle, and on that P&W Railroad is firmly committed to. Here is another opportunity for railroad/local jurisdiction cooperation and one that has been fruitful in the past.

5.7.7 Quiet Zones & Locomotive Horn Requirements

Although implementation of a Quiet Zone was frequently mentioned, the tradeoffs necessary to secure ODOT Rail funding for necessary upgrades are challenging: for each upgrade, ODOT Rail asks that a highway/rail at-grade crossing be closed.

According to the FHWA Railroad-Highway Grade Crossing Handbook (Revised Second Edition, p. 38) "Outside of quiet zones, railroads must sound the horn 15-20 seconds prior to a train's arrival at the highway-rail grade crossing, but not more than one-quarter –mile in advance of the crossing."

Because train whistle noise is often a major complaint of those who live or work near railroad tracks, the establishment of a quiet zone is a potential option in some locations. Discussions with the Portland and Western Railroad revealed that it would find a partial quiet zone (e.g., restricting train horn sounding to daylight hours) unacceptable, for safety reasons due to confusion of both the engineer and the public.

Requirements for quiet zones are contained within 49 U.S.C. 20153, and are included in Appendix H of this report. Depending on the level of risk at a given crossing or set of crossings, supplementary and alternative safety measures are required that compensate adequately for the absence of a train horn. Quiet zones can be implemented in low-risk situations without additional safety improvements.

Within the study corridor, the City of Columbia City is completing implementation of a quiet zone in spring of 2009.

In some locations, such as St. Helens, a quiet zone is not practical since it would have to encompass the entire town to be most effective. Nonetheless, city stakeholders identified the area near Deer Island Rd. as a potential for future consideration based on future residential land use and a transit center. A closure at Wyeth, which is a low volume street, could be part of such an application to ODOT Rail Division.

The Rainier issue is being explored by the City, separately. No other obvious location for quiet zone application within the corridor was identified.

5.7.8 Landscaping

The need to improve site visibility by removing vegetation was noted in several locations within the study corridor (see Table 5.7-1).

Conceptual Construction Cost: $3,000 per acre for clearing and grubbing; estimated $300-500 per clearing of localized areas to make traffic and warning signs more clearly visible..

Table 5.7-1 was revised March 3, 2009, incorporating contributions from February 17, 2009 Core Team Meeting.

"Concern Level" Definitions: A = Most Concern; B = Some Concern; C = Least Concern (Based on factors including at-grade crossing issues, train and vehicle volumes, existing infrastructure, rail-related operational problems.)

Note: Cost estimates are CONCEPTUAL ONLY and do not include right-of-way costs. Cost of signals is not included unless specified. Mobilization and contingency = 50%.

Table 5.7-1: LCRRC Recommended Projects and Conceptual Cost Estimates

Road Crossing Name & Overall Concern Level	US 30 Intersection Signalization	Total Daily Vehicle Delay Ranking Post *Connect* Oregon Unit Train Scenario (1 or A = most delay; some roads are tied for same ranking)	Existing Highway/Railroad At-Grade Crossing Protection	Recommended Projects + Conceptual (Order of Magnitude) Cost Estimates: Highway/Railroad At-Grade Crossing	US 30 Capacity (Northbound Right Turn)	US 30 Storage Capacity (Southbound Left Turn)	RR to US 30 Storage (Westbound Left Turn) **	Pedestrian, Bicycle & ADA Connectivity or Highway/Rail Grade Crossing Safety	Notes
Johnsons Landing (Dike Rd.) (Columbia County control)) **Concern Level C**	Unsignalized	31 (C)	Signalized with gate	Upgrade equipment-New constant warning time activation equipment, standby battery and rectifier $76,000	No recommendations	No recommendations	No recommendations	No recommendations	Average demand crossing tracks: 100 v/d; 6 v/h ((ODOT)) 100 ft WBLT storage,
High School Way (Scappoose) **Concern Level A**	Signalized	5 (A)	Signalized, gate and cantilever No pedestrian warning signs or automatic gates to control pedestrian crossings when train is present.	(2)Replace obsolete gate, standby battery and rectifier $45,000	Add NBRT storage (100 ft) $24,800	No recommendations	No recommendations	Pedestrian gates, tactile yellow strips Remove vegetation $38,000 per gate	Average demand crossing tracks: 4050 v/d; 223 VPH (KAI 2008) PM Peak crossing tracks: 405 VPH (KAI 2008) PM Peak at US 30 Intersection: 3190 (KAI 2008) 31 ft WBLT storage High school and elementary school children crossing (pedestrian/bicycle) Capacity improvements needed (not safety-related) SBLT queue may block driveway
Santosh St. (Scappoose) **Concern Level C**	Unsignalized	20 (B)	Stop sign	Closure tied to Havlik Drive interchange	N/A	N/A	A	N/A	Average demand crossing tracks: 978 v/d; 54 VPH (ODOT) 43 ft WBLT storage Will Close w/New Havlik Connection
Maple St. (Scappoose) **Concern Level B**	Signalized	8 (A)	Signalized with gate	Add cantilever Review right turn arrow pavement striping related to driver confusion. $30,000	No recommendations (NBRT storage capacity is gained when Santosh St. closes)	No recommendations	Close Santosh Street; Close 1st Street access to Maple Future-flatten grade on approach to RR, to AASHTO Standards (max 50 ft pavement) $52,800	Install automatic pedestrian gates, strips, warnings (not typical) $38,000 per gate Replace pedestrian panels $65,160 pedestrian panels	Average demand crossing tracks: 1840 v/d; 102 v/h (KAI 2008) PM Peak crossing tracks 184 VPH (KAI 2008) PM Peak at US 30 Intersection: 3096 (KAI 2008) 38)ft WBLT storage,–steep grade on east side of railroad can obscure the storage capacity limit on the west side Middle School, Fire Station nearby
Columbia Ave. (Columbia County control) **Concern Level A**	Signalized	4 (A)	Signalized, gate and cantilever	No recommendation	Increase NBRT lane by 110 feet $27,200	No recommendation	No recommendations	Consider automatic tactile strips/warnings $1,000 (approx)	Average demand crossing tracks: 4850 v/d; 269 v/h (KAI 2008) PM Peak crossing tracks: 485 VPH (KAI 2008) PM Peak at US 30 Intersection: 2774 (KAI 2008) 37 ft. WBLT storage Main track + siding Pedestrian and skate-board users
Crown Zellerbach Rd. (Scappoose) **Concern Level C**	Signalized	22 (B)	Signalized, gate and cantilever	No recommendations	No recommendations	No recommendations	No recommendations	No recommendations	Average demand crossing tracks: 425 v/d; 24 v/h (KAI 2008) 43 ft. WBLT storage)
West Lane Rd. (Columbia County control) **Concern Level C**	Unsignalized	13 (A)	Sign to warn long vehicles not to stop on tracks	No recommendations	No recommendations	No recommendations	Escape bay (75 feet) $18,600 Improve pavement markings $1,000 Prohibit WBLT and WB through traffic for trucks only		Average demand crossing tracks: 1050 v/d; 56 v/h (KAI 2008) PM Peak crossing tracks: 105 VPH (KAI 2008) PM Peak at US 30 Intersection: 2395 (KAI 2008) 56 ft WBLT storage-potential for am/pm queue across tracks Traffic Signage and Preemption Significant truck use

Road Crossing Name & Overall Concern Level	US 30 Intersection Signalization	Total Daily Vehicle Delay Ranking Post *Connect* Oregon Unit Train Scenario (1 or A = most delay; some roads are tied for same ranking)	Existing Highway/Railroad At-Grade Crossing Protection	Recommended Projects + Conceptual (Order of Magnitude) Cost Estimates					Notes
				Highway/Railroad At-Grade Crossing	US 30 Capacity (Northbound Right Turn)	US 30 Storage Capacity (Southbound Left Turn)	RR to US 30 Storage (Westbound Left Turn) **	Pedestrian, Bicycle & ADA Connectivity or Highway/Rail Grade Crossing Safety	
Old Portland Rd. (near Berg Rd.) (Columbia County control) **Concern Level C**	Unsignalized	37 (C)	Stop sign and crossbucks	Consider Closure	No recommendations	No recommendations	No recommendations	No recommendations	Average demand crossing tracks 200 v/d; 6 v/h (KAI 2008) PM Peak crossing tracks: 10-25 VPH (KAI 2008) PM Peak at US 30 Intersection: 2273 (KAI 2008) 53 ft WBLT storage Needs Diagnostic Review if closure is not possible; visibility issues-site distance due to curvature, steep westbound approach to rail crossing, narrow lane width Potential to close this crossing, but would divert traffic to US 30/Bennett Road Crossing; possible diversion also to already congested Gable, according to City.
Old Portland Rd. (near Bennett Rd.) (Columbia County control) **Concern Level A**	Unsignalized	7 (A)	Signalized with gate No Lane markings between US 30 and the rail crossing	No recommendations	No recommendations	No recommendations	A	No recommendations	Average demand crossing tracks: 2650 v/d; 147 v/h (KAI 2008) PM Peak crossing tracks: 265 VPH (KAI 2008) PM Peak at US 30 Intersection: 2344 (KAI 2008) 50 ft WBLT storage Articulated trucks from Port of St. Helens using intersection. No heavy pedestrian use.
Millard Rd. (St. Helens) **Concern Level B**	Unsignalized	15 (A)	Signalized, gate and cantilever	Install US 30 traffic signals inter-tied with existing railroad crossing protection $250,000 (8 phase signal)	No recommendations	No recommendations	No recommendations	Existing concrete panels are in good condition, though there is no sidewalk. Possible to add pedestrian grade crossing. $45,000	Average demand crossing tracks: 750 v/d; 42 v/h (KAI 2008) PM Peak crossing tracks: 75 VPH (KAI 2008) PM Peak at US 30 Intersection: 2170 (KAI 2008) 47 ft WBLT storage City desires full crossing facilities for bike/ped (bike lanes/crosswalks) US 30/Millard Rd is next CITY (not ODOT) priority for signalization in St. Helens. However, it has not been approved by the State Traffic Engineer.
Gable Rd. (Columbia County control) **Concern Level A**	Signalized	1 (A)	Signalized, gate and cantilever Guard rail damaged (RT from US 30)	Fence the yard between Gable and Columbia Blvd. (Approx 3,000 feet) on US 30 side $134,000	No recommendations	Add 210 SBLT queue storage $55,400		Pedestrian/bicycle overpass (ADA compliant)-over RR and US 30 $6.1 Million	Average demand crossing tracks: 8905 v/d; 497 v/h (KAI 2008) PM Peak crossing tracks: 895 VPH (KAI 2008) PM Peak at US 30 Intersection: 2747 (KAI 2008) 34 ft WBLT storage Some switching across Gable to St. Helens Yard Truck Route (St. Helens Transportation System Plan, p. 4-5) 3.2% trucks pm peak; Could be a "Job Cluster" for economic development, taking advantage of 20 acre site (Port of St. Helens vacant property) along McNulty Way. Existing concern for ped/bike—left turning vehicles, 150 ft crossing over RR and US 30 City desires full crossing facilities for bike/ped (bike lanes/crosswalks)
Columbia Blvd. (St. Helens) **Concern Level A**	Signalized	3 (A)	Signalized with gate (one way street, so no cantilever)	No recommendations	Because of switching activity, 65 feet of NBRT queue storage is recommended $17,200	Add 215 feet SBLT queue storage $56,800	N/A	Close ped access or adjust signal timing to provide sufficient crossing time for pedestrians (Note: closing ped access across US 30 would require State Traffic Engineer approval)	Average demand crossing tracks: 6050 v/d; 336 v/h (KAI 2008) PM Peak crossing tracks: 605 VPH (KAI 2008) PM Peak at US 30 Intersection: 2410 (KAI 2008) One-Way EB Street Lack of pedestrian walk time across US 30 is not a rail-related safety problem, but was identified by City. City desires full crossing facilities for bike/ped (bike lanes/crosswalks)

Road Crossing Name & Overall Concern Level	US 30 Intersection Signalization	Total Daily Vehicle Delay Ranking Post *Connect* Oregon Unit Train Scenario (1 or A = most delay; some roads are tied for same ranking)	Existing Highway/Railroad At-Grade Crossing Protection	Recommended Projects + Conceptual (Order of Magnitude) Cost Estimates					Notes
				Highway/Railroad At-Grade Crossing	US 30 Capacity (Northbound Right Turn)	US 30 Storage Capacity (Southbound Left Turn)	RR to US 30 Storage (Westbound Left Turn) **	Pedestrian, Bicycle & ADA Connectivity or Highway/Rail Grade Crossing Safety	
St. Helens St. (St. Helens) **Concern Level A**	Signalized	2 (A)	Signalized, gate and cantilever	Replace obsolete gates $90,000	N/A	N/A	None identified	Pedestrian grade crossing $45,000	Average demand crossing tracks: 6700 v/d;: 372 v/h (KAI 2008) PM Peak crossing tracks: 670 VPH (KAI 2008) PM Peak at US 30 Intersection: 2070 (KAI 2008) 41 ft WBLT storage City desires full crossing for bike/ped—Ped facilities exist No rail-related safety problems identified
Wyeth St. (St. Helens) **Concern Level B**	Unsignalized	38 (C)	Signalized with gates	Add traffic signal with intertie to rail crossing, if not closed for future Quiet Zone $250,000	No recommendations	No recommendations	No recommendations	No recommendations	Average demand crossing tracks: 63 v/d; 4 v/h (ODOT) 48 ft WBLT storage 300 feet existing storage on US 30 for NBRT Could be closure candidate, to be included in future Deer Island Rd. Quiet Zone application
Deer Island Rd. (St. Helens) **Concern Level B**	Signalized	6 (A)	Signalized with gates	Remove abandoned rail line and restripe the intersection of Deer Island Rd/Oregon Rd. (former siding) Future: Move the gate, design for transit center use, if that proposed County project and design moves forward. $25,000 for track removal; 180 feet of in-street trackage + restriping and repaving. $25,000 for gate relocation	No recommendations	Consider dedicated SBLT storage up to 150 feet $62,265	No recommendations	Pedestrian grade crossing. $45,000	Average demand crossing tracks: 3450 v/d; 192 v/h (KAI 2008) PM Peak crossing tracks: 345 VPH (KAI 2008) PM Peak at US 30 Intersection: 1624 (KAI 2008) 45 Ft WBLT storage Likely to become commercial/residential on east side of US 30-could be germ of future TOD Former Stimson Lumber site proposed for corridor multi-modal transit hub City desires full crossing facilities for bike/ped (bike lanes/crosswalks) SBLT peak queue 150 feet—anticipated to be greater problem with transit center implementation
I St. (Columbia City) **Concern Level C**	Unsignalized	14 (A)	Gates	No recommendations	No recommendations	No recommendations	Add emergency right turn bay (75 feet) $18,600	Remove confusing crosswalk markings, as there are no sidewalks on either I or 4th Street. $5,000	Average demand crossing tracks: 1000 v/d; 56 v/h (KAI 2008) PM Peak crossing tracks: 100 VPH (KAI 2008) PM Peak at US 30 Intersection: 1319 (KAI 2008) 46 ft WBLT storage Columbia City residential traffic Traffic Signals and Site Distance-Trucks not permitted to enter US 30 from I Street L Street Overpass available as alternative access if train blocks I St. or E. St.
E St. (Columbia City) **Concern Level C**	Signalized	23 (B)		No recommendations	No recommendations	No recommendations	No recommendations	No recommendations	Average demand crossing tracks: 400 v/d; 22 v/h (KAI 2008) PM Peak crossing tracks: 40 VPH (KAI 2008) PM Peak at US 30 Intersection: 1213 (KAI 2008) 40 ft WBLT storage (but low volume street-390 VPD), 400 AADT (August 2008 KAI Study) No issues noted
Pacific St. (Columbia City) **Concern Level C**	Unsignalized	28 (C)		No recommendations	No recommendations	No recommendations	Dixieline Lumber-owned by ODOT, and emergency right turn being constructed N/A	No recommendations	Average demand crossing tracks: 175 v/d; 10 v/h (ODOT) 35 ft WBLT storage (Dixieline Lumber-owned by ODOT, and emergency right turn being constructed to prevent trucks fouling tracks)

Road Crossing Name & Overall Concern Level	US 30 Intersection Signalization	Total Daily Vehicle Delay Ranking Post *Connect* Oregon Unit Train Scenario (1 or A = most delay; some roads are tied for same ranking)	Existing Highway/Railroad At-Grade Crossing Protection	Recommended Projects + Conceptual (Order of Magnitude) Cost Estimates					Notes
				Highway/Railroad At-Grade Crossing	US 30 Capacity (Northbound Right Turn)	US 30 Storage Capacity (Southbound Left Turn)	RR to US 30 Storage (Westbound Left Turn) **	Pedestrian, Bicycle & ADA Connectivity or Highway/Rail Grade Crossing Safety	
US 30 (spur)			Old equipment; poor angle	Control Circuitry Replacement: requires new activation equipment, shunt enhancing equipment new track leads, new batteries and batter charging equipment $76,000	N/A	N/A	N/A	N/A	
Goble Landing (Lake St./Nicolai Road) (Columbia County control) **Concern Level C**	Unsignalized	31 (C)	Yield sign and STOP sign	Improve signage and pavement markings at grade crossing Remove old tracks, repair/replace crossing surface and signalize with gates and lights $190,000 (RR signalized with flashing lights and gates) $100,000 Rebuilt panels, track removal and new ties, track	NBRT lane $1,136,600 (N/S turn pockets) [this estimate assumes that street widening would be required; if that is not the case, or can be mitigated, this figure would be reduced]	SBLT pocket See cell to left.	Emergency right turn escape bay (75 foot) Long term—consider realigning US 30 or railroad to increase distance between railroad and highway. $18, 563 (escape bay)	No recommendations	Average demand crossing tracks: 250 v/d; 14 v/h (KAI 2008) PM Peak crossing tracks: 20-30 VPH (KAI 2008) PM Peak at US 30 Intersection: 719 (KAI 2008) 58 ft WBLT Access to RV park and a quarry Long, slow moving vehicles may queue across the rail crossing School bus route; very close to US 30—just enough for a bus, which sometimes has to edge onto the Hwy shoulder to cross. Good site visibility lessens safety concerns.
Graham Rd. (Prescott) **Concern Level B**	Unsignalized	34 (C)	Stop signs and cross bucks, rubber crossing surface	Flashing lights with gates $190,000	No recommendations	No recommendations	No recommendations	No recommendations	Average demand crossing tracks: 220 v/d; 12 v/h (ODOT) Poor visibility; school bus route
Veterans Way (Rainier) **Concern Level B**	Signalized	12 (A)	Signalized with gates	No recommendations	No recommendations	No recommendations	Emergency right turn escape bay (75 foot) $18, 563 (escape bay)	No recommendations	Average demand crossing tracks: 750 v/d; 42 v/h (KAI 2008) PM Peak crossing tracks: 75 VPH (KAI 2008) PM Peak at US 30 Intersection: 1114 (KAI 2008) 49 ft WBLT storage Pedestrian facilities exist. School bus route. Can be very congested with boat launch, Senior Center and housing development
Dike Rd. (Columbia County control) **Concern Level C**	Unsignalized	31 (C)	Gates and signals	No recommendations	No recommendations	No recommendations	No recommendations	No recommendations	Average demand crossing tracks: 99 v/d; 6 v/h (ODOT)
Mayger Fill Rd. (Columbia County control) **Concern Level C**	Unsignalized	26 (B)	Stop sign and cross bucks	No recommendations	No recommendations	No recommendations	No recommendations	No recommendations	Average demand crossing tracks: 300 v/d; 17 v/h (ODOT) No buses
Kallunki Rd. (SPUR) (Columbia County control) **Concern Level C**		N/A	Yield signs and cross bucks.	Flashing lights with gates $190,000	N/A	N/A	N/A	N/A	Off main rail line Main road into Port Westward, with high truck use
Kallunki Rd. (Columbia County control) **Concern Level B**	Unsignalized	24 (B)	Stop signs and crossbucks	Flashing lights with gates $190,000	No recommendations	No recommendations	No recommendations	No recommendations	Average demand crossing tracks: 250 v/d; 14 v/h (ODOT) 75 ft WBLT storage 6 daily school bus crossings Future trucks to Cascade Grain and carbon dioxide facility-large county investment in industrial development

Road Crossing Name & Overall Concern Level	US 30 Intersection Signalization	Total Daily Vehicle Delay Ranking Post *Connect* Oregon Unit Train Scenario (1 or A = most delay; some roads are tied for same ranking)	Existing Highway/Railroad At-Grade Crossing Protection	Recommended Projects + Conceptual (Order of Magnitude) Cost Estimates					Notes
				Highway/Railroad At-Grade Crossing	US 30 Capacity (Northbound Right Turn)	US 30 Storage Capacity (Southbound Left Turn)	RR to US 30 Storage (Westbound Left Turn) **	Pedestrian, Bicycle & ADA Connectivity or Highway/Rail Grade Crossing Safety	
Hermo Rd. (Columbia County control) **Concern Level C**	Unsignalized	11 (A)	Stop signs and crossbucks	Flashing lights with gates $190,000 $160,000 w/o gate	No recommendations	No recommendations	No recommendations	No recommendations	Average demand crossing tracks: 750 v/d; 42 v/h (ODOT) Diagnostic Review 3 daily school bus crossings ODOT Rail identifies as possible closure, but Columbia County indicates this is not practical or desirable, as County is building connection from Hermo Rd. to Port Westward. ODOT Rail has recommended flashing lights and gates at the grade crossing; Columbia County does not view this as a high priority.
Beaver Dike Rd. (Columbia County control) **Concern Level C**		27 (b)	Stop signs and crossbucks	No recommendations	No recommendations	No recommendations	No recommendations	No recommendations	Average demand crossing tracks 150 v/d; 8 v/h (ODOT) Diagnostic Review (possible flashing lights in future) 3 daily school bus crossings
Depot St. (Columbia County control) **Concern Level B**	**N/A**	10 (A)	Stop sign and Cross bucks, poor visibility and profile.	Flashing lights with gates $190,000 $160,000 w/o gate	No recommendations	No recommendations	No recommendations	No recommendations	Average demand crossing tracks 756 v/d; 42 v/h (ODOT) County (Lonny Welter) suggested eliminating gates, but gates were included because it is not significantly more costly than installing equipment and circuitry for flashing lights. 6 daily school bus crossings
Pt. Adams Rd. (Midland Rd)-Clatskanie (Columbia County control) **Concern Level B**	Unsignalized	40 (C)	Flashers only (can cease working if battery dies)	Complete replacement with new shelter grounding equipment, circuitry. $190,000	No recommendations	No recommendations	No recommendations	No recommendations	Average demand crossing tracks 12 v/d; 1 v/h (ODOT) 86 ft WBLT storage, 12 AADT 8 daily school bus crossings Railroad recommends gates
Marshland Rd. (Co. Rd. 198) Marshland (Columbia County control **Concern Level C**	Unsignalized	30 (C)	Stop sign and crossbucks	Provide rail crossing warning signs for drivers on Marshland Rd. Long term: improve alignment to eliminate sharp WB turn on approach to railroad tracks. Remove vegetation blocking sight distance at rail crossing. $300-700 warning signs $3000 per acre to remove vegetation		Provide SBLT pocket $550,000 [this estimate assumes that street widening would be required; if that is not the case, or can be mitigated, this figure would be reduced]	Emergency right turn escape bay (75 foot) $18, 563 (escape bay)	Add lighting and improve pavement markings at US 30/Marshland Rd. (not rail-related)	Average demand crossing tracks: 100 v/d; 6 v/h (KAI 2008) PM Peak crossing tracks: <25 VPH (KAI 2008) PM Peak at US 30 Intersection: 572 (KAI 2008) 78 ft WBLT storage Diagnostic Review (for long term improvement to road geometry) 4 daily school bus crossings
Marshland Dist. Rd. #4119 Woodson (Columbia County control) **Concern Level C**	Unsignalized	35 (C)	Stop sign and crossbucks	Replace grade crossing material with concrete or asphalt Study closure of crossing and alternative routes (Woodson, potentially) New ties and panels-with concrete crossing surface complete-$100,000	No recommendations	No recommendations	Install STOP sign on approach to US 30 $350	Replace grade crossing material with concrete or asphalt (included in $100,000 ties and panel replacement)	Average demand crossing tracks: 80 v/d; 4 v/h (KAI 2008) PM Peak crossing tracks: <20 VPH (KAI 2008) PM Peak at US 30 Intersection: 580 (KAI 2008) 55 ft WBLT Storage No pedestrian facilities Deteriorated wood and dirt surface at rail crossing; potential for erosion and subsequent trapping of vehicle wheels on rail tracks. Noted as possible closure –use Woodson Rd. (might be difficult)

Road Crossing Name & Overall Concern Level	US 30 Intersection Signalization	Total Daily Vehicle Delay Ranking Post *Connect* Oregon Unit Train Scenario (1 or A = most delay; some roads are tied for same ranking)	Existing Highway/Railroad At-Grade Crossing Protection	Recommended Projects + Conceptual (Order of Magnitude) Cost Estimates					Notes
				Highway/Railroad At-Grade Crossing	US 30 Capacity (Northbound Right Turn)	US 30 Storage Capacity (Southbound Left Turn)	RR to US 30 Storage (Westbound Left Turn) **	Pedestrian, Bicycle & ADA Connectivity or Highway/Rail Grade Crossing Safety	
Woodson Rd. Woodson (Columbia County control) **Concern Level A**	Unsignalized	24 (B)	Stop signs and crossbucks	Improve signage and markings at rail crossing $6,000 Flashing lights and gates $190,000	NBRT lane $1.14 M [this estimate assumes that street widening would be required; if that is not the case, or can be mitigated, this figure would be reduced]	SBLT lane (included in NBRT)	Escape bay (65 feet) $18,563	None identified	Average demand crossing tracks: 250 v/d; 14 v/h (KAI 2008) PM Peak crossing tracks: 25 VPH (KAI 2008) PM Peak at US 30 Intersection: 563 (KAI 2008) 63 ft WBLT Storage 12 daily school bus crossings
Old Mill Rd. (Westport Ramp Rd.) Westport (Columbia County control) **Concern Level C**		17 (B)	Stop signs and crossbucks, 2-track sign	Evaluate for potential closure of two-track crossing, in association with upgrade of Westport Ferry Cost TBD—depending on scope of study	No recommendations	No recommendations	Remove vegetation to increase site distance for WBLT movement $3000 per acre to remove vegetation	No recommendations	Average demand crossing tracks: 450 v/d; 25 v/h (KAI 2008) PM Peak crossing tracks: 45 VPH (KAI 2008) PM Peak at US 30 Intersection: 585 (KAI 2008) No safety issues identified 4 daily school bus crossings P&W to talk to Georgia Pacific about rail storage and crossing visibility issues.
Westport Ferry Rd. (Westport Dock Rd.) Westport (Clatsop County control **Concern Level C**		19 (B)	Flashers	Control circuitry replacement, new cables, gates, flashers, bells and cantilevers $190,000	No recommendations	No recommendations	No recommendations	No recommendations	Average demand crossing tracks: 300 v/d; 17 v/h (KAI 2008) PM Peak crossing tracks: 30 VPH (KAI 2008) PM Peak at US 30 Intersection: 556 (KAI 2008) 4 daily school bus crossings Trains could block access to ferry/SR-4, and thus to I-5 in Washington Recommendation to restripe US 30/Old Mill Rd intersection to ODOT standards (approx. $5,000) is not related to railroad safety issues (Stimulus funding of a 9-17 passenger ferry is being sought)
Driscoll Slough Rd. Wauna (Clatsop County control) **Concern Level C**		41 (C)	Stop signs and crossbucks	Remove brush and resurface crossing $100,000 (concrete pads)	No recommendations	No recommendations	No recommendations	No recommendations	Average demand crossing tracks 10 v/d; 1 v/h (ODOT) Must avoid blocking access at Wauna

NOTES: Any recommendation for signalization of US 30, or closure of access across US 30 (to bicyclists or pedestrians, e.g.) would require approval of the State Traffic Engineer.

Includes relevant site information from the following sources:

- HDR corridor inventory (for WBLT storage capacity)
- Kittelson (KAI) Traffic Study for ODOT (December 2008)
  - 20 Selected Crossings-Peak Hour counts + 55 % of peak to estimate average vehicle/hour crossing the RR Tracks
  - Peak Hour Volume at US 30 Intersection
  - AADT Crossing RR tracks calculated from 2008 counts as 10 x PM Peak
- ODOT Rail or Highway Data for average vehicles per day (AADT-v/d) and calculated average vehicle/hour (v/h) (data may be old; this data is used for roads where newer counts are unavailable)

Stakeholder & Consultant knowledge

Source: Recommended Project Performance Ratings for "20 Selected US 30 Intersections" from Kittelson December 2008 Traffic Study Report; Remaining Recommended Project Performance Ratings from HDR Engineering. Data from ODOT Highway and Rail Divisions, Corridor Counties and Cities, study stakeholder information and 2008 traffic counts at 20 locations.

*** In most cases, HDR rated site concern level "A" in cases where US 30 is Unsignalized and there was is than 75 feet distance between the RR and US 30. All other Unsignalized US 30 intersections were rated B, because there is always some concern. Signalized intersections were C.*

Chapter 6: Ranking of Project Alternatives

6.1 Safety Improvement Project Ranking Framework

6.1.1 Project Recommendations

This chapter ranks the rail safety improvement projects identified in Table 5.7-1. Factors taken into consideration were the volumes of vehicles crossing at-grade railroad tracks, the number of trains per day (currently and in the future), safety issues reported by the community and the railroad, and economic development priorities and opportunities. It does not include the long term planning, emergency communication or community education initiatives discussed in Chapter 5, which should be implemented for the entire community.

6.1.1.1 Rail Projects

The P&W track conditions within the project area are FRA compliant, but should be upgraded for service reliability with higher tonnage loading and to make the freight rail system attractive and reliable for new business. The grade crossing recommendations brought forward are based on logic and experience, and designed to enhance safety and maintenance ability. They take into consideration ODOT Rail Division and P&W Railroad interests, concerns and needs, as well as community safety and economic development.

In the majority of instances where there is now passive protection, active rail crossing protection was recommended. However, given the cost of that improvement, the project did not always rate highest within communities, most often due to low vehicle and/or train volume at the crossing.

6.1.1.2 Highway Projects

The projects that have made the final cut for consideration have come from the community, ODOT Highway and Rail divisions, and consultant-prepared documents, including this Rail Safety Study and the companion Traffic Analysis conducted for 20 selected US 30 intersections and highway/railroad at-grade crossings. That analysis considered factors such as crossing geometry, conditions, special users (pedestrians, school buses, recreational vehicles or long trucks, e.g.) collision history, crossing control devices on US 30, storage capacity for turning vehicles and peak hour traffic volumes and delay.

Mitigations suggested for increased train-related vehicle delay or safety issues were developed when "intersections did not meet ODOT mobility standards, and/or for railroad crossings where forecasted vehicle queues exceed available storage.[21]" Thus, projects were brought to this stage only if they responded to a safety-related concern. There are degrees of risk and concern, however, and that is reflected in the tables in Section 6.2.

It is important to note that ODOT practice is to avoid installing signals on US 30 in rural segments. And even in urbanized areas, proposals for new traffic signals on state highways require the approval of the State Traffic Engineer prior to commencing with design.

6.2 Community Project Phasing Recommendations

The following tables show the projects and conceptual costs, in order of recommended implementation priority, based on a combination of project "implementability" factors including safety risk, community and railroad support, traffic volume at the US 30 intersection or the highway/railroad at-grade crossing, and fundability.

The ordering of projects in the tables below is also informed by consultation with corridor stakeholders and the Project Core Team. This consultation process provided important insight into community priorities and levels of concern regarding safety and congestion issues that would be aggravated by more frequent and longer trains.

[21] Kittelson & Associates, Inc., (December 2008, p. 12)

Further study of identified candidates for closure at highway/railroad at-grade crossings as listed first within each community, because closing an at-grade crossing, when feasible alternative access is available or can be cost-effectively provided, is a primary rail safety goal of ODOT Rail Division. However, beyond support for closure of roads already identified (Santosh St. in Scappoose) there was not a substantial public demand expressed for such closures during the public involvement phase of this study. Possible closures at Wyeth and Old Portland Road near Berg Rd appear to offer the most potential for implementation.

It should be noted that the brief field inspection permitted in this project scope did not allow verification of ODOT Rail Division's suggested closures in rural Columbia and Clatsop County. Moreover, the targeted field inspection that was conducted suggested that it may be very difficult, if not impossible, to provide alternative access in some instances, due to topography. Thus further study in all cases is recommended.

Finally, an understanding of funding sources and categories, and likely support and funding for projects within federal, state and local programs helped determine relative ranking of projects. It should be noted that 2009 and near-future funding constraints as well as new opportunities (including federal and state stimulus packages) could significantly change the funding context for freight rail, rail safety and economic development projects.

Depending on funding sources and amounts, completing all projects relating to a specific intersection or cross street at the same time might also be desirable. However, most crossings and intersections have a combination of higher- and lower-ranking projects, so the issue would need to be revisited based on funding circumstances as they appear.

Table 6.2-1: Recommended Rail Safety Project Phasing-Scappoose

Location	Project	Conceptual Cost Estimate
Santosh St.	Close Street	N/A- tied to Havlik interchange improvement
Maple St.	Add cantilever to at-grade RR crossing	$30,000
High School Way	Replace obsolete gate at crossing	$45,000
Maple St.	Flatten grade on approach to RR	$52,800
High School Way	Add pedestrian gates, tactile yellow strips	$38,000 per gate
Maple St.	Replace pedestrian panels	$65,200
High School Way	100 ft NBRT storage	$24,800
Maple St.	Add pedestrian gates, tactile yellow strips	$38,000 per gate

Source: HDR

Table 6.2-2: Recommended Rail Safety Project Phasing-St. Helens

Crossing	Project	Conceptual Cost Estimate
Wyeth St.	Study possible closure	TBD
Columbia Blvd.	Close pedestrian access or adjust signal timing to provide sufficient crossing time	Nominal
Columbia Blvd.	215 ft. SBLT storage	$56,800
Columbia Blvd.	65 ft NBRT storage	$17,200
Millard Rd.	US 30 traffic signals, inter-tied with existing RR protection [needs State Traffic Engineer approval]	$250,000
Millard Rd.	Add pedestrian grade crossing at RR	$45,000
Deer Island Rd.	Remove abandoned rail line	$25,000
Deer Island Rd.	Relocate gate, design for future transit center	$25,000
Deer Island Rd.	Pedestrian grade crossing	$45,000
Deer Island Rd.	150 ft. SBLT storage	$37,100
Gable Rd. (St. Helens Rail Yard)	Fence yard between Gable and Columbia Blvd. (3000 ft, on US 30 side)	$134,000 (with possible aesthetic upgrade)
St. Helens St.	Pedestrian grade crossing	$45,000
St. Helens St.	Replace obsolete gates	$90,000

Source: HDR

Table 6.2-3: Recommended Rail Safety Project Phasing-Columbia City

Location	Project	Conceptual Cost Estimate
I Street	Remove confusing crosswalk markings	$5,000
I Street	Escape bay (75 ft.)	$18,600

Source: HDR

Table 6.2-4: Recommended Rail Safety Project Phasing-Rainier

Crossing	Project	Conceptual Cost Estimate
Veterans Way	Escape bay (75 ft)	$18,600

Source: HDR

Table 6.2-5: Recommended Rail Safety Project Phasing-Columbia County Unincorporated/County-Controlled Roadways

Crossing	Project	Conceptual Cost Estimate
Old Portland Rd. (near Berg Rd.)	Study possible closure	TBD
Marshland District Rd.	Study possible closure	TBD (a closure would eliminate need for $100,000 RR grade crossing material replacement)
Beaver Dike Rd	Study possible closure	TBD
Old Mill Rd. (Westport Ramp Rd)	Evaluate for potential closure of two-track crossing/with upgrade of Westport Ferry	TBD
Gable Rd.	Add 210 SBLT storage	$55,400
Johnsons Landing Rd. (Dike Rd.)	Upgrade RR equipment-new constant warning time activation equipment, standby battery and rectifier	$76,000
Columbia Ave.	110 ft. NBRT storage	$27,200
Columbia Ave.	Automatic tactile strips/warnings	$1000
Graham Rd. (Prescott)	Install flashing lights and gates at RR crossing	$190,000
West Lane	Improve pavement markings	$1000
West Lane	Prohibit WBLT and WB through traffic for trucks only	$500 (signage)

Table 6.2-5: Recommended Rail Safety Project Phasing-Columbia County Unincorporated/County-Controlled Roadways

Crossing	Project	Conceptual Cost Estimate
Old Portland Rd. (near Bennett Rd.)	Escape bay (75 ft.)	$18,600
Gable Rd.	Pedestrian/bicycle overpass	$6.1 Million
Goble Landing	Improve signage and pavement markings	$1000
Goble Landing	Remove old tracks, replace crossing surface	$100,000
Goble Landing	Install flashing lights and gates at RR crossing	$190,000
Goble Landing	NB/SB turn pocket	$1.1 Million
Goble Landing	Improve/pave escape bay area	$18,600
West Lane	Escape bay (75 feet)	$18,600
Kallunki Rd. (SPUR)	Install flashing lights and gates at RR crossing	$190,000
Marshland County Rd.	Improved signage at RR crossing	$300-700
Marshland District Rd.	Install STOP sign on approach to US 30	$350
Kallunki Rd. (Main Line)	Install flashing lights and gates at RR crossing	$190,000
Hermo Rd.	Install flashing lights and gates at RR crossing	$190,000
Depot St.	Install flashing lights and gates at RR crossing	$190,000
Pt. Adams Rd. (Midland Rd, Clatskanie)	Install flashing lights and gates at RR crossing	$190,000
Woodson Rd.	Improve signage and markings at rail crossing	$6,000
Woodson Rd.	Install flashing lights and gates at RR crossing	$190,000
Woodson Rd.	Escape bay (75 ft)	$18,600
Marshland County Rd.	Remove vegetation blocking sight distance at RR crossing	$500 ($3,000 per acre)
Marshland County Rd.	SBLT pocket on US 30	$550,000
Marshland County Rd.	Escape bay (75 ft)	$18,600

Table 6.2-5: Recommended Rail Safety Project Phasing-Columbia County Unincorporated/County-Controlled Roadways

Crossing	Project	Conceptual Cost Estimate
Marshland District Rd.	Replace RR grade crossing material with concrete or asphalt; new ties and panels	$100,000
Old Mill Rd. (Westport Ramp Rd)	Remove vegetation to increase sight distance for WBLT movement	$500 ($3,000 per acre)
Woodson Rd.	NB/SB turn pockets on US 30	$1.1 Million

Source: HDR

Table 6.2-6: Recommended Rail Safety Project Phasing-Clatsop County Unincorporated/County Controlled Roadways

Crossing	Project	Conceptual Cost Estimate
Waterhouse Rd.	Study possible closure (using Knappa Rd. as alternative)	TBD
Westport Ferry Rd. (Westport Dock Rd.)	Replace RR crossing control circuitry-new cables, gates, flashers, bells and cantilevers	$190,000
Driscoll Slough Rd.	Remove brush and resurface crossing (concrete pads)	$100,000

Source: HDR

Table 6.2-7: Recommended Rail Safety Project Phasing-Portland & Western Railroad Projects

Location	Project	Conceptual Cost Estimate
US 30 Spur/Deer Island area	Replace Control Circuitry	$76,000
RR MP 62.7 (Columbia County) RR MP 84.71 (Clatsop County) RR MP 94.83 (Clatsop County	Movable Bridge Detailed Inspection & Recommendations Study	$40,000-120,000 per bridge
Dibblee Point, RR MP 48.75 to RR MP 50.35	Add 8,500 siding	$3.5 Million
St. Helens Yard	Relocate	$3.67 M (includes $84,000 for fencing existing yard; excludes ROW acquisition cost)

Source: HDR

Chapter 7: Recommended Phasing and Funding for Candidate Project

7.1 Project Funding

All corridor stakeholders recognize that having an abundance of available and well-sited industrial lands with both highway and rail access was important not only to Cascade Grains, US Gypsum, Teevins and DynoNoble: this is a corridor-wide competitive advantage. Although the timing may not be right to leverage that advantage, funding must be found to make progress on the list of prioritized rail safety projects identified in Chapter 6.

7.2 Responsibility for Maintenance and Improvements of Grade Crossings

In order to have realistic expectations of project implementation, it is important for local jurisdictions to understand what is and is not the responsibility of the railroads. Maintenance of at grade crossings is the responsibility of the operating railroad for that part of the crossing surface above the crossties.

Outside that area, maintenance responsibility lies with the road authority. ODOT does not specify what kind of material is used in the crossing, only that it be maintained in a safe condition. Recently, some counties and railroads have chosen to work together and share costs to upgrade crossings from asphalt to concrete panels, and several similar projects were identified along the corridor as part of this study. This work can be performed without a Crossing Order as long as the physical dimensions of the crossing are not altered.

If either party chooses to alter a crossing such as widening or adding a track, in most cases, the party that applies for the alteration pays 100 percent of the cost. [22]

[22] Charles Kettenring, ODOT Rail Division, electronic correspondence March 2009.

7.3 Federal Programs and Earmarks under SAFETEA-LU

Federal funding for rail comes generally in the form of grants or Federal financing tools that include traditional tax credits and loans, and the emerging "innovative" tools that range from private activity bonds to new loan types to public-private partnerships.

The federal transportation funding reauthorization process is driven by House/Senate authorizing committees every six years. Reauthorization earmarks are managed through authoring committees (House Transportation and Infrastructure; Senate Environment and Public Works). Freight provisions contained within the 1,231-page SAFETEA-LU bill23 include many that can offer funding avenues for rail projects, whether public, private or public-private for the period 2005-2009. Although some of the programs are completely subscribed (that is, 100% of the funding is already earmarked), details on the most promising provisions are provided because the next transportation reauthorization bill may have similar provisions and because the outcomes or experience with this set of provisions will have an impact on the content and structure of that reauthorization. Many believe the next bill will move more strongly to support a much-needed national and multi-state rail policy.

However, many freight rail proponents and stakeholders were disappointed that SAFETEA-LU did not permit as much flexibility in the use of funds, including highway funds, as was permitted for passenger rail uses.

[23] See FHWA HOFM Director Tony Furst's presentation on freight provisions (September 2005) at http://www.fhwa.dot.gov/freightplanning/safetea_lu.htm

7.3.1 Earmarking

In the past, the multi-year Federal omnibus transportation bills[24] contain earmarks for specific projects. They are administered through the Federal Highway Authority (FHWA) and the Federal Railroad Authority (FRA) and may also be referred to as FHWA or FRA grants.

Traditionally, earmarking has been an annual process driven by House/Senate appropriation committees each year. Amounts available in TEA-21 and SAFETEA-LU were discretionary monies that could be earmarked. Amounts for projects earmarked in excess of TEA-21 discretionary money generally deducted funds from the WSDOT work program and sometimes required the deferral or deletion of WSDOT work program projects. TEA-21 contained 1,849 earmarks, totaling $9.3 billion.

The current multi-year $244.1 billion omnibus transportation funding bill, signed into law in August 2005, is known by its acronym, SAFETEA-LU (Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users). It contains three times as many earmarks as its predecessor, TEA-21. With 5,600 budgeted earmarks totaling $19.4 billion through 2009. [25] While the bill's earmarked projects represent monies allocated, funding requests can still be formally routed to the House and Senate Transportation Appropriations Committees to get support for new projects. However, there is no guarantee of success.

7.4 Federal Railroad Administration Funds

The Railroad Rehabilitation and Improvement Financing Program (RRIF) was retained from TEA-21 within Section 9003 of SAFETEA-LU and was established to allow the Federal Railroad Administration (FRA) to provide $35 billion worth of loan authority to be used for loans and loan guarantees to state and local government, government sponsored authorities and corporation, railroads and joint ventures that include at least one railroad.

The funding may be used to:

- Acquire, improve, or rehabilitate intermodal or rail equipment or facilities, including track, components of track, bridges, yards, buildings and shops;
- Refinance outstanding debt incurred for the purposes listed above; and
- Develop or establish new intermodal or railroad facilities
- No operating expenses are to be financed or funded through this program

Direct loans can fund up to 100% of a railroad project with repayment periods of up to 25 years and interest rates equal to the cost of borrowing to the government.

Eligible borrowers include railroads, state and local governments, government-sponsored authorities and corporations, joint ventures that include at least one railroad, and limited option freight shippers who intend to construct a new rail connection.

More detailed explanations of the program are available at http://www.fra.dot.gov/us/content/177

A copy of the application form is available at http://www.fra.dot.gov/downloads/RRDev/rrif_app.doc

7.4.1 Federal Funding for Crossing Protection

When at-grade crossing protection (e.g., gates and warning lights) are installed in conjunction with a crossing closure, federal funding is available.

[24] Beginning with the first five-year bill in 1991, they were known by their acronyms ISTEA, TEA-21 (1998) and the current authorization, SAFETEA-LU (2005-2009).
[25] *SAFETEA-LU Highlights for Local Transportation Agencies*, Technology News, November-December 2006 http://www.ctre.iastate.edu/pubs/Tech_News/2006/nov-dec/safetealu-2.pdf

7.4.1.1 Programmatic Freight Provisions

Current programs identified below may not have funds now available, but should be monitored through the federal reauthorization process as funding pots are replenished (and possibly reorganized).

Section 1306: Freight Intermodal Distribution Pilot Grant Program

- Provides capital funds to states to address freight distribution and infrastructure needs at intermodal freight facilities and inland ports.
    - $30 million provided, already earmarked to five states

Section 5204: Training and Education

- (h) Freight Planning and Capacity Building Program
    - Section 5209: National Cooperative Freight Transportation Research Program
    - FHWA Section 130: Highway Railroad Grade Crossing Program (Federal share is 90%, funded at $220 million per year until FY 2009)

7.4.1.2 Finance Provisions

These expand the range of "innovative finance" mechanisms available to freight projects.

Section 1601: Transportation Infrastructure Finance and Innovation Act (TIFIA)

- Budget authority is $610 million for period 2005-2009 (or about $2B in lending authority)
    - Program eligibility was expanded to include public and private freight rail facilities that provide public benefit to highway users, as well as intermodal freight facilities.
    - Smaller projects can be grouped to reach new (reduced) minimum project size of $50 million (ITS project minimum was reduced to $15 million)

Section 1602: State Infrastructure Banks (SIB)

- All states included; multi-state projects are allowed
- SIB rail accounts are permitted
- SIBs provide for lower interest rates because bond purchasers are exempt from federal tax on bond revenue.
- National limit of $15 billion

Section 11-1143 Tax-exempt Financing of Highway Projects and Rail Truck Transfer Facilities (Private Activity Bonds)

- Tax-exempt financing of privately owned or operated rail-truck transfer facilities

Internal Revenue Code Section 45G: Railroad Track Maintenance Credit

- Track maintenance on any Class II or Class III track equal to 50% of the maintenance and rehabilitation expenditures

Projects and Grants

These include many grant categories which have major freight components.

Section 1301: Projects of National and Regional Significance (PNRS)

- Only states can apply; projects must be multi-modal
- Includes pre-construction activities, environmental mitigation and operational improvements for any project eligible under 23 USC, including freight railroad projects
- $1.779 billion (2005-2009) for 25 designated projects (i.e., program is 100% earmarked in this round; worth keeping an eye on for reauthorization, as "lessons learned" will be folded in to next bill's selection criteria)
- Up to $1 million per project, per year

Section 1302: National Corridor Infrastructure Program

- States only; $1.95 billion (2005-2009) for 33 designated projects

Capital Grants for Rail Line Relocation Projects (Section 9002)

- Only states may apply for local rail line relocation and improvement projects that spur economic development, under this provision. ($1.4 billion, authorized but not appropriated)
- Federal share is 80%, not to exceed $20 million

7.4.2 State Funding Considerations and Sources

In the near term, changing signal timing is a relatively easy solution. ODOT conducts analysis of each corridor on a three-year rotating basis. Approximately 230 signals have been identified for the next three years. Crosswalk lengths and cross times are recalibrated as part of the process. ODOT notes that Gable Rd.—a concern of corridor stakeholders—is complicated, because the signal is over-capacity. ODOT is currently aware of the problem.

ODOT has noted that most of the north-bound right turn storage lane projects would require new pavement—not just a normal maintenance quick fix or a restriping projects which would typically be done as part of a preservation project.

Other projects--probably the majority of the storage issues—which may be able to be addressed as pavement preservation—mean that it will be quite some time for them to appear high on a regional priority list. This is because ODOT has recently performed corridor preservation activities and expended substantial funds on corridor projects.

A project as significant as an overpass would have to be a State Transportation Improvement Program (STIP) project, or potentially an earmark.

Bringing projects in as part of development review/frontage improvement, where signalization modification is already being required, is one strategy to work through a project list. Any time projects can be combined will help to reduce costs—if, for example, a crew is already in the area working, there may be the chance to reduce engineering or mobilization costs.

7.4.3 Potential for Public/Private Partnerships

It is possible that in the future there may be opportunities for public/private partnerships (PPPs, or P3s, as they are known). Such partnerships could include ODOT, city, county and private industrial or residential developers. Obviously, the 2009 economic picture does not inspire optimism for the short term, but the longer term opportunities for tourism and commuter-related transit development, as well as energy, wood products and ocean port industries remains strong. A period such as the current downturn can help leaders focus on sustainable future development.

7.4.4 *Connect*Oregon

As mentioned earlier, because of the (2009) economic recession, P& W Railroad will be returning the unused portion of its *Connect*Oregon II funding, and has not applied for *Connect*Oregon III funds for projects along the 'A' Line.

7.4.5 Economic Revitalization Programs

There are no identified economic revitalization funding programs at this time.

7.5 Oregon's Share of the American Recovery and Reinvestment Act (ARRA)

The American Recovery and Reinvestment Act (ARRA) provides Oregon (through ODOT) with $334 million in transportation funding (not including transit and fixed guideway modernization) of which $100 million must be distributed to local agencies. ODOT has already worked with local agencies to allocate some of that money, and the Clatsop and Columbia County stakeholders have been working with

ODOT to provide input into the current and future lists.

Under ARRA, eligibility for use of Surface Transportation Program (STP) highway funds is expanded to include passenger and freight rail and port infrastructure.26.thus increasing the opportunity for funding freight rail projects. There is no local match requirement for these funds.

7.6 Next Steps

7.6.1 Engaging the Political Process for Project Development

Currently, projects associated with economic development and job creation will be seen as high priorities. The study will help position the county to apply for those by having documentation prepared with a list of projects and conceptual costs, to move implementation to the next phase.

Stakeholders and project proponents will need to coordinate their rail safety agendas through the Northwest Area Commission on Transportation, their county agencies, ODOT Highway and Rail Divisions, and possibly their state and federal representatives in order to secure regular or special funding.

In the case of bigger projects, or longer term solutions, corridor stakeholders can always approach their congressional delegation for earmarks, or work through the Oregon Transportation Commission, the Northwest Area Commission on Transportation (ACT) or other political channels. However, demonstration of substantial benefit of projects is usually required, and this is always more difficult in lower-volume areas such as Columbia and Clatsop counties.

Interagency cooperation and appropriate role allocation can help move projects, too. In the case of the L Street overpass in Columbia City, for example, the local agency administered the project, and ODOT constructed the project, but worked through local agency liaison.

The Columbia and Clatsop stakeholders could also benefit from coordinating through the Oregon Freight Advisory Committee (OFAC) which provides recommendations on freight projects to the Oregon Transportation Commission (OTC). OFAC performs this function for STIP projects as well as *Connect*Oregon projects, ranking them according to OFAC freight mobility criteria. In consultation with ODOT, OFAC also provides its views on specific federal earmarks to OTC.

Additionally, here are often a variety of small funding pots –for projects such as intelligent transportation systems (ITS) applications—and special programs that can fund all, or separable pieces of projects. None have been identified at this time, but state and federal legislation should be monitored.

Coordination with the planning functions, schedules and staff of these agencies, including Metro, is advised. Coordination activities should also include monitoring and engaging the Oregon Freight Advisory Committee (OFAC) as well as those at ODOT involved in the current update of the Oregon Statewide Rail Plan and the Oregon Freight Plan.

[26] A summary of Oregon's transportation funding under http://www.oregon.gov/ODOT/HWY/docs/Economic_stimulus_FAQ.pdf

Appendix A: Lower Columbia River Rail Corridor Inventory Master Summary

LOWER COLUMBIA RIVER RAIL CORRIDOR - TASK 3 - EXISTING CONDITIONS DATA SUMMARY (WORKING DRAFT 11-17-08)

																	Storage			Current Conditions (As of August 2008)								10-Year Growth @ 8%/yr					Bus Crossings		
HDR Photo File #	Crossing # (1995 Track Chart)	U.S. DOT No.	Street Name	Milepost	Public/Private	AADT	Summer 2008 ODOT AADT	Number of Lanes	Sidewalks	Bicycle Lane	Protection	Traffic Control Devices	Stop Bar	Cross Bucks	Crossing Surface Type	Roadway Surface	Rt. Turn from Hwy 30	Lt. Turn to Hwy 30	Average Length of Rail Cars	3,600 ft Local Trains Per Day	# Locomotives Per Local Train	Local Trains and Non-Loaded Unit Trains	Loaded Unit Trains	Local Trains Blockage Duration	6,600 ft Unit Trains Per Week	# Locomotives Per Unit Train	Unit Trains Blockage Duration	6,000 ft Local Trains Per Day	6,600 ft Unit Trains Per Week	Speed Limit All Trains	Local Trains Blockage Duration	Unit Trains Blockage Duration	Morning 6:45am-7:45am	Midday 11am-12pm	Afternoon 2:30pm-4:30pm
1	57893T		Watson Rd.	17.37	Private														60 ft	6	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
2	57895G	057895G	St. Johns Landing (Dike Rd.)	18.05	Public	100		2	No	No	Active	Signalized with Gate	Yes	Yes	Asphalt	Asphalt	200 ft	100 ft	60 ft	6	1	25 mph	10 mph	2.28 min	1.5	4 (2 front, 2 rear)	8.23 min	7.7	3.2	25 mph	3.37 min	3.64 min			
3	57896N		Havlik Rd.	18.78	Private														60 ft	6	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
4	57897V		Candlestick Factory	18.88	Private														60 ft	6	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
5	101358B	101854W	High School Rd.	19.38	Public	3919	3900	3	Yes	No	Active	Signalized, Gate, & Cantilever	Yes	Yes	Concrete & Timber	Asphalt	172 ft	31 ft	60 ft	4	1	25 mph	10 mph	2.29 min	1.5	4 (2 front, 2 rear)	8.25 min	5.2	3.2	25 mph	3.38 min	3.65 min			
6	57900B	057900B	Santosh St.	19.61	Public	978		3	Yes	No	Passive	Stop Sign	Yes	Yes	Rubber	Asphalt & Concrete	180 ft	43 ft	60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.66 min	5.2	3.2	25 mph	2.79 min	3.07 min			
7	57901H	057901H	Maple St.	19.67	Public	595	1800	3	Yes	No	Active	Signalized with Gate	Yes	Yes	Concrete & Timber	Asphalt & Concrete	245 ft	38 ft	60 ft	4	1	25 mph	10 mph	2.29 min	1.5	4 (2 front, 2 rear)	8.25 min	5.2	3.2	25 mph	3.38 min	3.65 min			
8	57902P	057902P	Columbia Ave.	19.90	Public	4664	4900	3	Yes	No	Active	Signalized, Gate, & Cantilever	Yes	Yes	Concrete & Timber	Asphalt & Concrete	160 ft	37 ft	60 ft	4	1	25 mph	10 mph	2.29 min	1.5	4 (2 front, 2 rear)	8.25 min	5.2	3.2	25 mph	3.38 min	3.65 min			
9		916564S	Crown Zellerbach Rd.	20.31	Public	425		3	Yes	Yes	Active	Signalized, Gate, & Cantilever	Yes	Yes	Concrete	Asphalt	310 ft	43 ft	60 ft	4	1	25 mph	10 mph	2.29 min	1.5	4 (2 front, 2 rear)	8.25 min	5.2	3.2	25 mph	3.38 min	3.65 min			
10	57906S			20.84	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
11	57910G	057910G	West Lane Rd.	21.48	Public	1450	1000	2	No	No	Active	Signalized with Gate	Yes	Yes	Concrete	Asphalt	400 ft	56 ft	60 ft	4	1	25 mph	10 mph	2.28 min	1.5	4 (2 front, 2 rear)	8.23 min	5.2	3.2	25 mph	3.37 min	3.64 min			
12		057911N	Columbia Mem. Gardens (Cemetery Rd)	21.94	Public	99		2	No	No	Passive	Stop Sign	No	Yes	Asphalt	Asphalt	55 ft	55 ft	60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
13	57913C			22.33	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
14	57914J			22.59	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
15	57915R			22.68	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
16	57917E			23.29	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
17	57918L			23.48	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
18	57919T			23.56	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
19				23.61	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
20	57920M			23.72	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
21	57921U	057921U	Old Portland Rd. (Berg Rd.)	23.98	Public	300	100	2	No	No	Passive	Yield Sign and Stop Sign	Yes	Yes	Asphalt	Asphalt	44 ft	53 ft	60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
22	57924P	057924P	Old Portland Rd. (Bennet Rd.)	24.78	Public	1050	2700	2	No	No	Active	Signalized with Gate	Yes	Yes	Concrete	Asphalt	500 ft	50 ft	60 ft	4	1	25 mph	10 mph	2.28 min	1.5	4 (2 front, 2 rear)	8.23 min	5.2	3.2	25 mph	3.37 min	3.64 min			
23	57927K	057927K	Millard Rd.	25.92	Public	300	800	3	No	No	Active	Signalized, Gate, & Cantilever	Yes	Yes	Concrete	Asphalt & Concrete	200 ft	47 ft	60 ft	4	1	25 mph	10 mph	2.29 min	1.5	4 (2 front, 2 rear)	8.25 min	5.2	3.2	25 mph	3.38 min	3.65 min			
24	57930T	057930T	Gable Rd.	26.67	Public	2500	8900	3	Yes	Yes	Active	Signalized, Gate, & Cantilever	Yes	Yes	Concrete	Asphalt	320 ft	34 ft	60 ft	4	1	25 mph	10 mph	2.29 min	1.5	4 (2 front, 2 rear)	8.25 min	5.2	3.2	25 mph	3.38 min	3.65 min			
25	57937R	057932G	Columbia Blvd.	27.54	Public	8300	5800	2	Yes	No	Active	Signalized with Gate	Yes	Yes	Concrete	Asphalt	400 ft	N/A	60 ft	4	1	25 mph	10 mph	2.28 min	1.5	4 (2 front, 2 rear)	8.23 min	5.2	3.2	25 mph	3.37 min	3.64 min			
26	97938X	057938X	St. Helens St.	27.65	Public	7160	6800	3	No	No	Active	Signalized, Gate, & Cantilever	Yes	Yes	Concrete	Asphalt & Concrete	N/A	41 ft	60 ft	4	1	25 mph	10 mph	2.29 min	1.5	4 (2 front, 2 rear)	8.25 min	5.2	3.2	25 mph	3.38 min	3.65 min			
27	57941F	057941F	Wyeth St.	27.94	Public	63		2	Yes	No	Active	Signalized with Gate	Yes	Yes	Concrete	Asphalt	300 ft	48 ft	60 ft	4	1	25 mph	10 mph	2.28 min	1.5	4 (2 front, 2 rear)	8.23 min	5.2	3.2	25 mph	3.37 min	3.64 min			
28	57943U	057943U	Deer Island Rd.	28.42	Public	8065	3400	2	Yes	No	Active	Signalized with Gate	Yes	Yes	Concrete	Asphalt	280 ft	45 ft	60 ft	4	1	25 mph	10 mph	2.28 min	1.5	4 (2 front, 2 rear)	8.23 min	5.2	3.2	25 mph	3.37 min	3.64 min			
29	57946P	057946P	I St.	29.75	Public	627	900	2	No	No	Active	Signalized with Gate	Yes	Yes	Concrete	Asphalt	200 ft	46 ft	60 ft	4	1	25 mph	10 mph	2.28 min	1.5	4 (2 front, 2 rear)	8.23 min	5.2	3.2	25 mph	3.37 min	3.64 min			
30	57947W	057947W	E St.	30.03	Public	932	400	2	Yes	No	Active	Signalized with Gate	Yes	Yes	Concrete	Asphalt	110 ft	40 ft	60 ft	4	1	25 mph	10 mph	2.28 min	1.5	4 (2 front, 2 rear)	8.23 min	5.2	3.2	25 mph	3.37 min	3.64 min			
31	57948D	057948D	Pacific St.	30.58	Public	175		2	No	No	Active	Signalized with Gate	Yes	Yes	Concrete	Asphalt	105 ft	56 ft	60 ft	4	1	25 mph	10 mph	2.28 min	1.5	4 (2 front, 2 rear)	8.23 min	5.2	3.2	25 mph	3.37 min	3.64 min			
32	57951L			31.25	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
33	57954G			31.45	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
34	57955N		Kinder Cemetery	31.62	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
35	910156L			31.76	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
36	57956V			32.04	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
37	57957C		Island Dr.	32.66	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
38	57958J			33.16	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
39	57959R		Morse Bros.	33.61	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
40	57961S			34.13	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
41	57963F			35.50	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
42	57964M			35.83	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
43	57966B			37.25	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
44	57967H			37.99	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
45	57968P			38.91	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
46	57969W	057969W	Goble Landing (Lake St.)	39.41	Public	100	800	2	No	No	Passive	Yield Sign and Stop Sign	Yes	No	3/4" Minus	Asphalt	58 ft	58 ft	60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min	2	0	2
47	57970R			39.86	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
48	57971X			40.60	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
49	57972E			41.16	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
50	57973L			41.20	Private														60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
51	57974T	057974T	Graham Rd.	41.85	Public	220		2	No	No	Passive	Stop Sign	Yes	Yes	Rubber	Asphalt			60 ft	4	1	25 mph	10 mph	1.70 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min	2 reg, 2 spec. needs	0	2 reg, 2 spec. needs
52	57975A	057975A	6th St.	45.54	Public	24		2	Yes	No	Passive	Yield Sign	Yes	No	Asphalt	Gravel			60 ft	4	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
53	57976G	057976G	5th St.	45.60	Public	210		2	Yes	No	Passive	Yield Sign	Yes	Yes	Asphalt	Asphalt			60 ft	4	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
54	57977N	057977N	4th St.	45.65	Public	283		2	Yes	No	Passive	Yield Sign	Yes	Yes	Asphalt	Asphalt			60 ft	4	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
55	57978V	057978V	3rd St.	45.71	Public	900		2	Yes	No	Passive	Yield Sign	Yes	Yes	Asphalt	Asphalt			60 ft	4	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
56	57999C	057979C	2nd St.	45.76	Public	1043		2	Yes	No	Passive	Yield Sign	Yes	Yes	Asphalt	Asphalt			60 ft	4	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
57	57980W	057980W	1st St.	45.82	Public	1255		2	Yes	No	Passive	Stop Sign	Yes	Yes	Asphalt	Asphalt			60 ft	4	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
58	57981D	057981D	2nd St.	45.88	Public	2188		2	Yes	No	Passive	Stop Sign	Yes	Yes	Asphalt	Asphalt			60 ft	4	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	5.2	3.2	25 mph	2.79 min	3.06 min			
59		916561W	Veterans Way	46.19	Public	1320	800	3	Yes	Yes	Active	Signalized with Gate	Yes	Yes	Concrete	Asphalt	160 ft	149 ft	60 ft	6	1	10 mph	10 mph	4.84 min	1.5	4 (2 front, 2 rear)	8.25 min	7.7	3.2	25 mph	3.38 min	3.65 min	2	0	2
60	57982K			46.65	Private														60 ft	6	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
61	57983S			47.00	Private														60 ft	6	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
62	57985F			47.33	Private														60 ft	6	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
63	57987U			47.38	Private														60 ft	6	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
64				47.44	Private														60 ft	6	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
65		916559V	Dike Rd.	48.48	Public	99		2	No	No	Active	Signalized with Gate	Yes	Yes	Concrete	Asphalt			60 ft	6	1	10 mph	10 mph	4.82 min	1.5	4 (2 front, 2 rear)	8.23 min	7.7	3.2	25 mph	3.37 min	3.64 min			
66	57991J			51.29	Private														60 ft	6	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
67	57992R			55.66	Private														60 ft	6	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
68	57993X	057993X	Mayger Fill Rd.	55.80	Public	300		2	No	No	Passive	Stop Sign	Yes	Yes	Gravel	Asphalt			60 ft	6	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
69	57994E			57.00	Private														60 ft	6	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
70	957995L			57.19	Private														60 ft	6	1	10 mph	10 mph	4.24 min	1.5	4 (2 front, 2 rear)	7.65 min	7.7	3.2	25 mph	2.79 min	3.06 min			
71	57996T	057996T	Kallunki Rd.	58.02	Public	250		2	No	No	Passive	Stop Sign	Yes	Yes	Asphalt	Asphalt			60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min		2	0	4
72	57997A			58.32	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
73	57998G			58.60	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
74	58001V			59.11	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
75	58002C	058002C	Hermo Rd.	59.32	Public	750		2	No	No	Passive	Stop Sign	Yes	Yes	Asphalt	Asphalt			60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min		1	0	2
76	58004R	058003J	Beaver Dike Rd.	59.57	Public	150		2	No	No	Passive	Stop Sign	Yes	Yes	Asphalt	Asphalt			60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min		1	0	2
77	58006E	058006E	Depot St.	62.20	Public	756		2	No	No	Passive	Stop Sign	Yes	Yes	Asphalt	Asphalt			60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min		2	2	2
78	910159G			62.35	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
79	58007L			62.45	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
80				63.20	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
81	58008T			63.71	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
82	58009A			64.00	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
83	58010U	058010U	Pt. Adams Rd. (Midland Rd)	64.30	Public	12		2	No	No	Passive	Signalized, but no Gate	Yes	Yes	Asphalt	Asphalt			60 ft	2	1	10 mph	10 mph	4.82 min				2.6		10 mph	7.55 min		3	1	4
84	58011B			65.73	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
85	58012H	058012H	Marshland Rd. (Co. Rd. 198)	66.60	Public	50	100	2	No	No	Passive	Stop Sign	Yes	Yes	Asphalt	Asphalt	78 ft	72 ft	60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min		1	1	2
86	58013D			67.26	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
87	58014W			67.75	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
88	58015D			68.11	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
89	58016K	058016K	Marshland Dist. Rd. #4119	68.41	Public	80		2	No	No	Passive	Stop Sign	Yes	One Side	Gravel & Timber	Asphalt & Gravel	46 ft	55 ft	60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
90	58017S	058017S	Woodson Rd.	68.51	Public	300	300	2	No	No	Passive	Stop Sign	Yes	Yes	Asphalt	Asphalt	73 ft	63 ft	60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min		4	0	8
91	58018Y			69.89	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
92	910160B			70.14	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
93	58020A	058020A	Old Mill Rd. (Westport Ramp Rd.)	71.11	Public	20	400	2	No	No	Passive	Stop Sign	Yes	Yes	Asphalt	Asphalt			60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min		1	1	2
94	058021G	058021G	Westport Ferry Rd. (Westport Dock Rd.)	71.27	Public	438	300	2	No	No	Passive	Signalized, but no Gate	Yes	One Side	Asphalt	Asphalt			60 ft	2	1	10 mph	10 mph	4.82 min				2.6		10 mph	7.55 min		1	1	2
95	58022N	058022N	Driscoll Slough Rd.	72.88	Public	10		1	No	No	Passive	Stop Sign	Yes	No	Gravel & Timber	Gravel			60 ft	2	1	10 mph	10 mph	4.22 min				2.6		10 mph	6.95 min				
96	910162P			73.11	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
97	58023V			73.25	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
98	58024C			73.53	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
99	910163W			73.71	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
100	58025J			73.82	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
101	58028E			73.26	Private														60 ft	2	1	10 mph	10 mph	4.24 min				2.6		10 mph	6.97 min				
102	58029L			76.82	Private																	10 mph	10 mph							10 mph					
103	58030F	058030F	Clifton Rd.	78.40	Private	5																10 mph	10 mph							10 mph					
104	58031M	058031M	Clifton Ferry Rd.	78.58	Private	5																10 mph	10 mph							10 mph					
105	58032U	058032U	Aldrich Pt. Rd.	81.75	Public	20		2	No	No	Passive	One Stop Sign	No	No	Rubber	Asphalt						10 mph	10 mph							10 mph					
106	58033B	05833B	Gertula Rd.	82.74	Public	49																10 mph	10 mph							10 mph					
107	58034H	058034H	Brownsmead Dike Rd.	83.35	Public	120		2	No	No	Passive	None	One Side	Yes	Asphalt	Asphalt						10 mph	10 mph							10 mph					
108	58035P			84.60	Private																	10 mph	10 mph							10 mph					
109	910165K			84.90	Private																	10 mph	10 mph							10 mph					
110	58037D	058037D	Waterhouse Rd.	86.56	Public	30		2	No	No	Passive	None	One Side	Yes	Asphalt	Asphalt						10 mph	10 mph							10 mph					
111	58038K	058038K	Svenson Island Rd.	90.22	Private	62																10 mph	10 mph							10 mph					
112	910169M			91.25	Private																	10 mph	10 mph							10 mph					
113	910170G			92.66	Private																	10 mph	10 mph							10 mph					
114	910171N			92.95	Private																	10 mph	10 mph							10 mph					
115	910172V			92.99	Private																	10 mph	10 mph							10 mph					
116	58040L	058040L	Liberty Ln. (Maritime Rd.)	95.71	Public	170		2	No	No	Passive	Signalized, but no Gate	Yes	Yes	Timber	Asphalt						10 mph	10 mph							10 mph					
117	58041T			96.43	Private																	10 mph	10 mph							10 mph					
118	58042A			96.82	Private																	10 mph	10 mph							10 mph					
119	58045V		39th St.	98.67	Public			2	No	No	Passive	One Stop Sign	Yes	Yes	Rubber	Asphalt																			

Appendix B: Portland & Western Railroad Safety Initiatives Fact Sheet and Emergency Response Plan

a Genesee & Wyoming Company

Safety Initiatives

Operation Lifesaver

Oregon Operation Lifesaver is a not-for-profit Oregon corporation that is part of an international family of organizations devoted to ending tragic collisions, fatalities and injuries at highway-railroad crossings and on railroad rights-of-way. To accomplish our mission, we promote the 3 E's:

Education: Operation Lifesaver strives to increase public awareness about the dangers around the rails. The program seeks to educate both drivers and pedestrians to make safe decisions at crossings and around railroad tracks.

Enforcement: Operation Lifesaver promotes active enforcement of traffic laws relating to crossing signs and signals and private property laws related to trespassing.

Engineering: Operation Lifesaver encourages continued engineering research and innovation to improve the safety of railroad crossings.

Oregon OL is funded almost entirely by voluntary contributions for Oregon's railroads, and a small amount of grant money provided by the Federal Railroad Administration, administered through OLI.

More than 40 Certified Operation Lifesaver Presenters volunteer throughout the state of Oregon, offering free programs to a wide variety of audiences. Operation Lifesaver Presenters receive rigorous training and have access to a range of sophisticated curriculum developed by OLI. OLI is constantly reviewing and improving the materials designed to educated children from pre-school to teens, mature drivers, bicyclists and the general public. Special programs are available for school bus drivers, commercial drivers, emergency responders, and law enforcement.

For more information about Oregon's Operation Lifesaver, go to www.oregonol.org. You can contact the State Coordinator to request a presentation.

Portland and Western's Emergency Response Plan

Our Plan is actually three plans in one: Emergency Response, Security, and Environmental Response. A current copy of each is located at each of our facilities. Responsibilities, contacts and protocols are set out in each plan.

For example, our Emergency Response Plan is designed to work in conjunction with our training on Hazardous Materials. Every employee completes Hazardous Materials training which ensures:

1. Hazardous Materials recognition
2. Hazardous Materials handling
3. Hazardous Materials incident response

Railroad and local fire, hospital, and police contact information is included in the plans. Of course, the contacts are specific to the area. For Columbia County, NWFF Environmental in Philomath and Jammies Environmental in Longview are the 24-hr emergency contacts for a hazardous materials spill.

Each plan contains maps of our main yards, information regarding commonly transported commodities, and reporting protocols.

Hazardous Materials Training

Every P & W employee is trained annually on recognition, handling (switching and placement in train), and spill response. The training includes additional information on TIH/PIH handling (Toxic/Poison Inhalation Hazard) and the security issues associated with transporting hazardous materials through a High Urban Threat Area.

Other Safety Initiatives

The Portland and Western has sponsored and participated in Railroad Emergency Response training for the Scappoose, St. Helens, and Clatskanie Fire/Rescue departments. This included classroom and hands-on training.

Environmental concerns are a serious issue for our railroad. We have strict spill prevention and storm water pollution controls. This training is also an annual requirement.

CHIEF / TRAIN DISPATCHER'S EMERGENCY CALL LIST AND PROCEDURES:

The ***Chief/ Train Dispatcher*** must be sure the appropriate people and agencies are notified in the event of a derailment, injury, hazardous materials release, accident, terrorist act or incident. In order to contact all the required parties the calling procedure identified in the following pages must be followed. It is also very important to gather as much information as possible, from the person making the initial notification, in order to properly complete the form as stated in the procedure.

In the event of a major incident, the dispatcher will not have the ability to handle making all the necessary calls and continue taking care of the normal dispatching activities. Therefore, the dispatcher will contact a local manager who will immediately report to the dispatcher's office and handle the remaining notification calls. That manager must stay at the dispatcher's office and render assistance as necessary.

Date_____ Time_____ Location_____

Portland & Western Railroad

Type of Emergency: (Check as necessary)

☐ Derailment ☐ Employee Injury

☐ Grade Crossing Collision ☐ Trespasser Injury

☐ Hazardous Materials Release ☐ Other_____

Train Symbol_____ On Duty_____ Cond_____

Engines_____ Engr_____

Loads_____ Empties_____ Tons_____ Brkm_____

Number of cars derailed_____ Number of Haz-Mat cars derailed_____

Engines derailed_____ Location of derailed cars in train_____

Identity all Haz-Mat leaking_____

Estimated Quantity of Haz-Mat derailed_____

Is there a danger of Haz-Mat reaching water or the public?_____

Reported to the Dispatcher by_____

Description of incident_____

_____

_____

PROCEED TO NEXT PAGE

Did the incident result in:

a. injury to anyone
b. fire
c. danger to the public
d. disruption of highway traffic
e. blockage of main track
f. major track or equipment damage

YES

Refer to "Appendix B" in this Plan. Based on the nature of the accident, call the nearest **Hospital, Police Department** and/or **Fire Department**. Provide all information available to assist in providing emergency services to any injured personnel.

NEXT

NO

Is the incident **minor** but involves the derailment of a Haz-Mat car that is not leaking or a non-HazMat car that is leaking? If YES, go the ↯ on the next page.

PROCEED TO NEXT PAGE

Company Personnel: In the event of a serious incident where the ***Chief / Train Dispatcher*** does not have the time to make the required notifications, the ***Chief/ Train Dispatcher*** should contact the nearest available Manager / Employee for assistance.

Did the incident involve **Haz-Mat** and:
a. There is an **unintentional release** of hazardous material, or
b. derailed cars are **not upright,** or
c. the **car body** or **tank shell** is damaged

AND

Did the incident involve a **Haz-Mat** car and the car is not leaking?

AND

Did the incident involve a non-**Haz-Mat** car and the car is leaking?

AND

Does the incident involve?

a. The death of a person
b. Injury to five or more people
c. Injuries that require hospitalization
d. Fatality at a grade-crossing
e. $25,000 damage to non-railroad property
f. $150,000 or more total damage
g. damage to tank cars resulting in a leak or evacuation
h. Failure of a locomotive or parts thereof, including electrical that cause an injury or incident
i. Spill of any liquid, including fuel oil, into any waterway
j. **In doubt, make the call**

YES

Call: **CHEMTREC**
at: **(800) 424-9300**
Name:_____
Time:_____

Also refer to Appendix B and call the nearest Emergency Response Specialists and request their immediate presence at the site.

AND

YES

Call: Mike Lundell, ***Emergency Coordinator*** at (503) 480-7765 or (503) 816-6001

Name:_____

Time:_____

YES

Call: NRC (National Response Center) at (**800) 424-8802**. Ask them to notify the **FRA** and regional **EPA** if the accident involves a Haz-Mat spill

Name:_____

Time:_____

YES

Also call: **911** and the nearest **Hospital, Fire Department, and Police Department**. Provide all information available to assist in providing emergency services to any injured personnel.

PROCEED TO NEXT PAGE

For any major train accident or an accident involving hazardous materials, also make the following calls:

CALL: **FRA Region 8**
Vancouver, WA Office
At: (800) 724-5998

Name:_____
Time:_____

AND

Call local authorities as required.

AND

CALL: **Oregon Emergency Management Division (OEMD)**
At: (800) 452-0311

Name:_____
Time:_____

AND CALL BELOW AS NEEDED

FRA – Hazardous Materials Division

Hazardous Materials Divison, Vancouver, WA, (360) 696-7537

DEQ – Oregon, Salem Office

Western Region
750 Front St, Ste 120
Salem, OR 97310
(503) 378-8240 or
(800) 452-4011

U.S. EPA – Region 10 Office

1200 Sixth Ave.
Seattle, WA 98101
(800) 424-4372

END OF PROCEDURE

Appendix C: Lower Columbia River Rail Corridor/Traffic Analysis (December 2008)

Lower Columbia Corridor Rail Study

Columbia County, Oregon

December 2008

Lower Columbia Corridor Rail Study

Columbia County, Oregon

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Project No. 9464.00

December, 2008

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Section 1
Executive Summary

Executive Summary

This study investigates twenty key intersections along US-30 in Columbia and Clatsop Counties. Each intersection is in the vicinity of a railroad grade crossing along the Lower Columbia River Rail Corridor. The intersections are so close to the railroad grade crossing that vehicles intending to turn from US-30 onto the cross street must queue on the highway while trains pass. The intersections were identified by Oregon Department of Transportation (ODOT) staff as potentially being impacted if rail traffic increased or if the duration of rail crossings increased.

The investigation was precipitated by the anticipated addition of "unit" train operations along the Rail Corridor. The Portland & Western Railroad will upgrade the Corridor's track in 2009 to accommodate the increase in train traffic and delays at rail crossings due to the unit trains serving Port Westward. Columbia County has hired HDR Engineering to prepare a Lower Columbia Rail Corridor Study to address the impact on local community transportation and emergency response due to the increase in train traffic and potential rail crossing closures.

The report will be used by ODOT and Columbia County to help identify and prioritize improvements that should be considered in the broader Lower Columbia Rail Corridor Study.

Unit trains are expected to travel the corridor an average of three times per week. The unit train's schedule is expected to be unpredictable but the probability of any given driver being delayed by a unit train is small. For those who are delayed by a unit train, their average delay will be twice as long as the delay created by existing trains. For the purposes of this study, grade crossing durations for existing trains were assumed to be five minutes. Crossing durations for unit trains were assumed to be ten minutes.

The physical and operational characteristics of the twenty US-30 intersections were studied, but the most fundamental characteristic under review was each intersection's ability to accommodate the increased vehicle queues caused by longer train crossing times. The study looked at the performance of each intersection during the most demanding 15-minutes of the a.m. and p.m. peak traffic periods, with and without the influence of trains passing through at the same time.

The following table identifies the intersections that were studied and qualitatively summarizes each intersection's performance in the areas of capacity to serve peak hour traffic, crash history, and ability to keep US-30 through lanes clear while a unit train passes. A more detailed one-page summary for each of the twenty studied intersections is provided in the Appendix.

The study identified three signalized intersections that do not meet ODOT operations standards for signalized intersections as well as one unsignalized intersection (Bennett Rd) whose minor cross streets experience significant delay during peak traffic periods. It is recommended that, as resources allow, these intersections be studied more thoroughly to see how their performance might be enhanced. These locations received a "C" in the Peak Hour Capacity portion of the Executive Summary table.

The study identified four locations where, if a unit train passed through during the peak traffic period, the northbound outside through lane of US-30 could be blocked by delayed right-turning vehicles. The intersections of most concern received a "C" in the Right Turn Queue Capacity portion of the Executive Summary table. Similarly, given the same circumstance, some driveways and public cross streets could be blocked by train-delayed vehicles waiting to turn left from US-30. The five intersections of most concern received a "B" in the Left Turn Queue Capacity portion of the Executive Summary table.

The study also noted five intersections where vehicles must wait in a US-30 through lane while a train passes. At some intersections, US 30 is only two lanes wide. In each case the cross street's traffic volumes appear to be very light. This is an existing condition, but the increased delay associated with unit trains makes this a notable concern. These locations received a "Cx" in the Executive Summary table.

Table 1 Summary of Intersection Performance

Intersection	Intersection Control Type	Peak hour Capacity	Crash History	Rt. Turn Queue Capacity *	Lt. Turn Queue Capacity **	Overall Rating
High School Way	Signalized	C	C	C	B	C
Maple St	Signalized	C	C	A	A	B
Columbia Avenue	Signalized	C	C	C	B	C
West Lane	Unsignalized	A	A	A	A	A
Old Portland Road	Unsignalized	A	A	Cx	A	A/Cx
Bennett Road	Unsignalized	C	C	C	A	B
Millard Road	Unsignalized	A	B	A	A	A
Gable Road	Signalized	B	C	B	B	B
Columbia Blvd	Signalized	B	C	C	B	C
St. Helens Rd (1-way Wbnd)	Signalized	A	A	n.a.	n.a.	A
Deer Island Road	Signalized	A	B	B	B	B
I Street	Unsignalized	A	A	A	A	A
E Street	Signalized	A	B	A	A	A
Nicolai Rd	Unsignalized	A	C	Cx	Cx	B/Cx
Veterans Way	Unsignalized	A	B	A	A	A
Marshland Dist. Rd /- Schroeder Rd	Unsignalized	A	A	Cx	A	A/Cx
Marshland District Rd	Unsignalized	A	C	Cx	Cx	A/Cx
Woodson Rd	Unsignalized	A	A	Cx	Cx	A/Cx
Old Mill Town Road	Unsignalized	A	C	A	A	A
Westport Ferry Road	Unsignalized	A	B	A	A	A

A = Little concern. B = Some concern. C = Most concern.

Cx = There is no exclusive turn lane to queue in. Queuing occurs in a US 30 through lane

* Rt. Turn Queue Capacity = Ability to hold US 30's unit train-delayed right-turning vehicles

** Lt. Turn Queue Capacity = Ability to hold US 30's unit train-delayed left-turning vehicles

Section 2
Introduction

Introduction

PROJECT DESCRIPTION

This study investigates twenty key intersections along US-30 in Columbia and Clatsop Counties. Each intersection is in the vicinity of a railroad grade crossing along the Lower Columbia River Rail Corridor. The intersections were identified by Oregon Department of Transportation (ODOT) staff as potentially being impacted if rail traffic increased or if the duration of rail crossings increased. This study focuses on the physical and operational characteristics of the twenty US-30 intersections identified the scope of work below.

The investigation was precipitated by the anticipated addition of "unit" train operations along the Rail Corridor. The Portland & Western Railroad will upgrade the corridor's track in 2009 to accommodate the increase in train traffic and delays at rail crossings due to the unit trains serving Port Westward. Columbia County has hired HDR Engineering to prepare a Lower Columbia Rail Corridor Study to address the impact on local community transportation and emergency response due to the increase in train traffic and potential rail crossing closures.

The report will be used by ODOT and Columbia County to help identify and prioritize improvements that should be considered in the broader Lower Columbia Rail Corridor Study.

SCOPE OF THE REPORT

This report looks at each intersection and its related railroad grade crossing and assesses current conditions and future conditions after the longer unit trains begin traveling the corridor. The US-30 (Columbia River Highway) intersections considered in this report are at the following cross streets:

- High School Way
- Maple Street
- Columbia Avenue
- West Lane
- Old Portland Road
- Bennett Road
- Millard Road
- Gable Road
- Columbia Boulevard
- Saint Helens Road
- Deer Island Road
- I Street
- E Street
- Goble RV Park Access/Nicolai Road
- Veterans Way
- Marshland District Rd/Schroeder Rd
- Marshland District Road
- Woodson Road
- Old Milltown Road
- Westport Ferry Road

The scope of work for this report consists of:

- **Site Visit/Inventory-** Undertake a site visit to all study intersections and rail crossings and identify their existing physical and operational characteristics, including lane configurations, sight distances, street widths, posted speeds, and pedestrian and bicycle facilities. The inventory of each site also includes a qualitative evaluation of available queue storage, traffic control, and current active and passive grade crossing protection devices. Relevant safety concerns in the vicinity of each site are also identified.
- **Traffic Counts-** For each intersection, gather a.m. and p.m. peak hour traffic turning movement count data from ODOT.
- **Existing Conditions Analysis-** Conduct an operational analysis of each of the study intersections under their respective current weekday a.m. and p.m. peak hour conditions. Use the *2000 Highway Capacity Manual* analysis methodology to determine existing level of service, volume/capacity ratio, and queue lengths. This existing condition analysis assumes no train crossing events during the peak hours.
- **Crash Data Review-** Review ODOT crash data for each intersection and railroad grade crossing.
- **Queue Storage Assessment -** Estimate the greatest possible existing and future queue storage needs at the highway/rail grade crossings. Existing train crossing durations are assumed to be five minutes long. With the introduction of unit trains, future train crossing durations are assumed to be ten minutes long. For the sake of being conservative, both of these assumed durations are greater than actually anticipated.

  The queuing analyses assume that train crossings occur during the peak fifteen minutes of the a.m. and p.m. peak hours, vehicles arrive at the crossing at a uniform rate, and none of the existing traffic redirects to alternate routes during the train crossing event.
- **Mitigation Alternatives Analysis -** For intersections that do not meet ODOT mobility standards and/or for railroad crossings where forecasted vehicle queues exceed available storage, identify and qualitatively summarize potential mitigation measures.
- **Summary of Inventory, Analysis and Recommendations –** For each intersection and rail crossing site summarize the site inventory, existing and future conditions analysis, and recommended operational and safety improvements.

REPORT STRUCTURE

This report contains a relatively large amount of data and analysis results. In order to present a clear and concise summary of the evaluation's methodology, findings, and recommendations; the report is structured to summarize the evaluation of all twenty intersections in the main body of the report. The appendix provides a more focused look at each individual site. Each appendix includes details about the site inventory, notable operational and safety observations, and site specific recommendations. More specifically, for each of the twenty locations the appendix contains a one-page summary of figures documenting the site inventory details, intersection and rail grade crossing lane configurations, existing a.m. and p.m. peak hour operational analysis, crash data

analysis, site location, site aerial, site photograph, notes on observed safety concerns and options for mitigations.

Section 3
Project Methodology

Project Methodology

The methodology used to obtain and analyze data for this report is summarized herein. This work consisted of four main activities:

- Obtaining data from external and internet resources;
- Collecting site specific data during a site visit;
- Analyzing the data to determine the impact of unit train operation upon US-30 operations; and,
- Making quantitative and qualitative recommendations.

This study's scope is limited to considering the impact of unit train-related delays on existing traffic volumes. The study does not consider future traffic growth on the US-30 corridor or substantial increases in rail services beyond the introduction of unit trains to the rail corridor.

Data Obtained from External and Internet resources:

- Intersection turning movement volumes for the a.m. and p.m. peak hour (provided by ODOT) – The peak hour turning movement volumes are included in the site summary figures shown in Appendix 2 – 21. Note that the north-south traffic volumes on US-30 were collected in late Spring 2008 and are seasonally adjusted (i.e., increased) by 6%;
- Traffic signal timing plans (provided by ODOT);
- US-30 corridor crash history data (provided by ODOT) – Summarized herein;
- Aerial photography of site vicinity and intersection layout (sourced from maps.live.com) and provided in Appendix 2-21; and,
- Information regarding existing and future Portland & Western Railroad operations (provided by HDR Engineering).

Data obtained during site visit

- Intersection configurations, traffic control devices and available queue storage lengths;
- Rail crossing configuration, control devices and available queue storage (on both east and west approaches);
- Notable trip generators and facilities of interest in vicinity of site (e.g. schools and emergency services);
- Safety concerns and features of interest; and,
- Photographs of site and vicinity.

Analysis of Data

- Operational analysis of each of the study intersections under the respective current weekday a.m. and p.m. peak hour conditions. For the purposes of evaluation, the intersection volume/capacity ratio, average delay and Level of Service are determined following the *2000 Highway Capacity Manual* analysis methodology. Note that in some instances, a.m. peak hour turning movement volumes were not provided.
- Safety analysis of historic crash data was undertaken to determine the crash frequency, crash rate and crash types and severities occurring at each of the intersections and their related railroad grade crossing. Intersections with notable concerns have been identified.
- Queuing analysis was conducted for three different scenarios. To be conservative, the worst case scenarios were assumed.
    - 95th percentile queues were calculated for the a.m. and p.m. peak 15 minutes, assuming no train event occurred.
    - 95th percentile queues were calculated for the a.m. and p.m. peak 15 minutes, assuming a typical 5-minute train event occurred during those timeframes, and
    - 95 percentile queues were calculated for the a.m. and p.m. peak 15 minutes, assuming a 10-minute unit train event.

For signalized intersections, Synchro 7 was used to determine 95th percentile queues. For unsignalized intersections the ODOT "two-minute" rule was applied to turning traffic volumes to determine 95th percentile queues. Note that while the ODOT methodology requires that this rule is usually applied to left turning movements, for the purposes of evaluation of the 'with' and 'without' train scenario, the "two-minute" rule has been applied to right turn movements.

The duration of train crossing events varies with the speed and length of the train. To provide conservative analysis, it was assumed that typical train crossings last five minutes and that unit train crossings take ten minutes at all sites.

Notable Concerns

Notable safety and operational concerns for each intersection and its related railroad grade crossing are documented in the Figures presented in Appendix 2 – 21 and are summarized herein.

Recommended Options for Mitigation

Options for improving the safety and operational performance of each site are documented in Figures presented in Appendix 2 -21 and summarized herein.

Section 4
Site Inventory and Existing Conditions Analysis

Site Inventory and Existing Conditions Analysis

SITE INVENTORY

In addition to data provided by ODOT, a site inventory for each of the twenty intersections and rail crossings was conducted on Friday August 1, 2008. At each site, geometric features of the site were recorded, photographs taken, and observations regarding the signage, pavement markings, sight distances, notable concerns, and general recommendations where recorded. Sight distances where only recorded in the case of uncertainty as to whether sufficient sight distance existed.

Appendix 2 through Appendix 21 of this report contains a detailed site inventory of each site. Table 2, below, summarizes how each location's highway intersection and railroad grade crossing is controlled. Each highway intersection is either controlled by a traffic signal (Signalized) or the minor cross street is controlled by a STOP sign (Unsignalized). Each railroad grade crossing is protected by automatic gates and flashing lights (Active) or simply distinguished with cross-bucks and pavement markings (Passive).

Table 2 Site Summary

Intersection Name	US-30 Milepoint	Intersection Type	Rail Grade Crossing Type
High School Way	20.35	Signalized	Active
Maple Street	20.67	Signalized	Active
Columbia Avenue	20.9	Signalized	Active
West Lane	22.49	Unsignalized	Active
Old Portland Road	25	Unsignalized	Passive
Bennett Road	25.8	Unsignalized	Active
Millard Road	26.96	Unsignalized	Active
Gable Road	27.69	Signalized	Active
Columbia Boulevard	28.56	Signalized	Active
St. Helens Road	28.67	Signalized	Active
Deer Island Road	29.42	Signalized	Active
I Street	30.75	Unsignalized	Active
E Street	31.02	Signalized	Active
Nicolai Road	40.47	Unsignalized	Passive
Veterans Way	47.34	Unsignalized	Active
Marshland District Road /Schroeder Road	65.99	Unsignalized	Passive
Marshland District Road	67.84	Unsignalized	Passive
Woodson Road	67.95	Unsignalized	Passive
Old Mill Town Road	70.46	Unsignalized	Passive
Westport Ferry Road	70.68	Unsignalized	Passive

EXISTING TRAFFIC OPERATIONS ANALYSIS

The Figures in Appendix 2 through Appendix 21 of this study contain details about the a.m. and p.m. peak hour traffic operations at each intersection. The information assumes no train-related impacts. Tables 3, below, summarizes the operational performance of all twenty study intersections during the a.m. peak hour and p.m. peak hour. Operational analysis was undertaken for the highest 15 minute period of each peak hour. For analysis purposes, traffic volumes on US-30 were seasonally adjusted by 6% for through movement traffic only. Results below were calculated using the methodologies specified in the *2000 Highway Capacity Manual*.

The *1999 ODOT Highway Plan* evaluates intersections based on the volume-to-capacity (v/c) ratio. For signalized intersections on US-30, the ODOT requirement is a maximum v/c of 0.75. For unsignalized intersections, the ODOT requirement is a maximum v/c of 0.85 (on the critical movement).

In the a.m. peak hour, the signalized intersections of High School Way and Maple Street currently exceed the ODOT v/c ratio requirements.

In the p.m. peak hour, the signalized intersections of High School Way, Maple Street and Columbia Avenue currently exceed the ODOT v/c requirements.

Table 3 Summary of Peak Hour Intersection Operations Analysis (without rail crossing)

		A.M. Peak Hour		P.M. Peak Hour	
Intersection	**Intersection Control Type**	**V/C Ratio**	**Average Delay (sec)**	**V/C Ratio**	**Average Delay (sec)**
High School Way	Signalized	**0.8**	16.3	**0.85**	20.7
Maple St	Signalized	**0.8**	18	**0.87**	13.7
Columbia Avenue	Signalized	0.64	13.8	**0.82**	24.3
West Lane	Unsignalized	0.43	>50	0.45	>50
Old Portland Road	Unsignalized	0.03	25.3	0.05	>50
Bennett Road	Unsignalized	0.77	>50	>1.0	>50
Millard Road	Unsignalized	0.19	>50	0.45	>50
Gable Road	Signalized	0.6	40.8	0.77	42.5
Columbia Blvd	Signalized	0.59	48.4	0.62	26.1
St. Helens Rd	Signalized	0.42	13.7	0.47	16.9
Deer Island Road	Signalized	0.52	17.9	0.56	13.5
I Street	Unsignalized	0.6	>50	0.24	35.2
E Street	Signalized	0.39	7.8	0.41	4.8
Nicolai Rd	Unsignalized	NA	NA	0.05	18.6
Veterans Way	Unsignalized	0.13	15.5	0.12	26.1
Marshland Dist. Rd /- Schroeder Rd	Unsignalized	NA	NA	0.01	14
Marshland District Rd	Unsignalized	NA	NA	0.01	12
Woodson Rd	Unsignalized	NA	NA	0.01	13.6
Old Mill Town Road	Unsignalized	NA	NA	0.08	15.4
Westport Ferry Road	Unsignalized	NA	NA	0.03	15.5

Bolded values exceed ODOT threshold of acceptability.

QUEUING ANALYSIS

The primary concern related to queuing is whether sufficient storage capacity exists on US-30 for northbound right turns and southbound left turns, and on minor street approaches associated with the rail grade crossing. Note that in order to present intersections and analysis in a consistent manner, US-30 is assumed to run north-south with northbound in the direction of Astoria and southbound in the direction of Portland.

The analysis of queuing has been undertaken considering three scenarios for both the a.m. peak hour and p.m. peak hour. These scenarios are:

- The 95th percentile queue lengths expected during the a.m. and p.m. peak hour without a train event occurring. For signalized intersections, the Synchro methodology was used to determine the 95 percentile queues. For unsignalized intersections, the ODOT "two-minute" rule has been used (assumption that turning movements are stopped for two minutes at the peak hour flow rate).
- The maximum predicted queue lengths expected if an existing train crossing event occurs during the peak fifteen minutes of the a.m. and p.m. peak hours. For the existing train events, a five minute duration has been assumed at all crossings. This represents the maximum existing train event duration.
- The maximum predicted queue lengths expected if a unit train crossing event occurs during the peak fifteen minutes of the a.m. and p.m. peak hours. For the unit train events, a ten minute duration has been assumed at all crossings. This represents the maximum anticipated unit train event duration, which occurs where the unit train speed is slowest.

A tabular summary of all queuing analysis information is included at Appendix 1. The table summarizes the available storage lengths, predicted 95th percentile queue during an existing train crossing event, and predicted 95th percentile queue during a unit train crossing event. These queues are shown only for the turning movements associated with the rail grade crossing (northbound right turn – NBRT, southbound left turn – SBLT, eastbound – EB, westbound left turn – WBLT, westbound through – WBT, westbound right turn – WBRT).

The eastbound (EB) and westbound (WB) queue storage distances refer to the available queue space between US-30 and the nearest rail of the railroad crossing. The available westbound queue storage distance is only relevant for analysis of unsignalized intersections, where westbound queues may spill back across the tracks. Available eastbound queue storage is only relevant at locations where eastbound queues might spill back into US-30.

At signalized intersections, a pre-emptive signal phase prior to the lowering of the crossing gates ensures that westbound queues have time to clear. Therefore EB and WB storage availability is not a consideration but has been presented throughout the table in Appendix 1 for consistency.

Note that consideration has only been given to whether there is sufficient storage capacity available to meet the peak hour demands with and without train events. No consideration is given to deceleration lane requirements, which should be provided in addition to queue storage capacity.

A summary of notable queuing concerns is presented in Table 4.

Table 4 Notable Queuing Concerns

High School Way	During the p.m. peak period, the queue during a 10-minute train crossing has the potential to exceed the storage capacity of the Northbound Right Turn lane by up to 300 feet. The southbound left turn queue storage was measured as the distance to the nearest intersection or driveway. While the analysis of the p.m. peak shows it is exceeded by 100 feet, in practice there is additional storage capacity available, but access into and out of the nearest driveway may be restricted during the p.m. peak.
Columbia Avenue	The p.m. peak period queues during a 5-minute train crossing potentially exceed the northbound right turn lane storage by 110 feet. The predicted queues during a 10-minute train crossing in the p.m. peak may potentially exceed the northbound right turn lane storage capacity by 460 feet. The southbound left turn queue storage was measured as the distance to the nearest intersection or driveway. While the analysis of the p.m. peak shows it is exceeded by 170 feet, in practice there is additional storage capacity available but access into and out of the nearest driveway may be restricted during the p.m. peak.
West Lane	West Lane is used by a significant number of trucks. The queuing distance for the westbound approach to US-30 is 56 feet. As this is an unsignalized intersection, a large vehicle could potentially be trapped behind another vehicle, unable to turn onto US-30. This situation applies regardless of the duration of the train crossing event.
Bennett Road	Westbound left turns are likely to queue across the tracks during the existing a.m. & p.m. peak periods, representing a significant safety concern. During a 10-minute train crossing in the p.m. peak, the predicted queues for the northbound right turn lane could potentially exceed the queue storage available by 320 feet.
Gable Road	There is a two-way left-turn lane in this location that provides queuing capacity. During a 10-minute train crossing in the p.m. peak period, queues may extend up to 560 feet beyond the nearest driveway. This will impact access and egress to all driveways blocked by the queue. During a 10-minute train crossing, the queues may exceed the northbound right turn lane storage capacity by 100 feet.
Columbia Boulevard	During a 5-minute train crossing in the a.m. peak, the predicted queues could potentially exceed the southbound left-turn lane storage capacity by 215 feet. During a 10-minute train crossing in the a.m. peak period the southbound left turn queue could potentially exceed the storage capacity by 540 feet. As the southbound left turn lane is a two-way left-turn lane, additional storage capacity exists but queuing may impact the access to local driveways During the a.m. peak period, the queues during 5-minute train crossings may exceed the northbound right turn lane by 65 feet. During a 10-minute train crossing in the a.m. peak period, the predicted queues could potentially exceed the northbound right turn capacity by 640 feet.
Deer Island Road	In the a.m. the predicted queue during a 5-minute train event may exceed the southbound left turn by 150 feet in the a.m. peak and by 400 feet during a 10-minute train crossing event. The southbound left-turn queue storage was measured as the distance to the nearest intersection or driveway. While the analysis of the a.m. peak shows it is exceeded by 400 feet, in practice there is additional storage capacity available, but access into and out of the nearest driveway may be restricted during the p.m. peak. The predicted queue for the northbound right turn lane during a 10-minute train event may exceed the storage by 110 feet in the p.m. peak.
Nicolai Road/Goble RV access	The intersection is unsignalized and the storage distance between US-30 and the rail crossing is 60 feet. Due to the high number of long and slow moving heavy vehicles (such as SUVs towing trailers) using this intersection, there is a concern that vehicles may queue across the rail crossing or make an inappropriate turning movement onto US-30 to avoid an approaching train.

Marshland District Road / Schroeder Road	Tall vegetation parallels the railroad in this location. As the Marshland Road approach to the rail crossing runs parallel to the track and turns a sharp horizontal curve to approach the rail crossing, the sight distance in this location was noted as a concern. There is no center line on the approach to US-30 in the vicinity of the railroad crossing. There is no street lighting at the intersection or rail crossing.
Woodson Road	US-30 is a two-lane cross section in this location. Due to the proximity of the rail crossing to the intersection, during a train event a turning vehicle may block traffic on US-30 until the train passes.

CRASH DATA ANALYSIS

Five years of crash data (2002 -2007) for the US-30 corridor between MP 20.35 and 70.68 were provided by ODOT. For each intersection in the study the number of accidents, accident types, accident severity, crash rate, and crash frequency is presented in Table 5. The crash rate was calculated as the number of crashes per million entering vehicles (MEV). Entering volumes were estimated using the assumption that observed p.m. peak hour volumes typically equal 10% of the daily total volume. Intersections that are on the ODOT 2008 Top 10% SPIS List are indicated in bold in Table 5.

Table 5 Crash Data Summary

Intersection	Type	Number of Crashes	Lane Change/Turning	Rear End	Angle	Pedestrian	Other	FATALITY (K)	Personal Injury (A + B + C)	Property Damage Only	Crash rate (Crashes/MEV)	>1 Crash/MEV
High School Way	**Signalized**	**68**	**26**	**38**	**3**		**1**		**48**	**20**	**1.2**	**Yes**
Maple Street	**Signalized**	**114**	**13**	**96**			**5**		**80**	**34**	**2.0**	**Yes**
Columbia Avenue	Signalized	65	17	39	4		5		37	28	1.3	Yes
West Lane	Unsignalized	17	10	2		2	3	2	9	6	0.4	
Old Portland Road	Unsignalized	16	4	7			5		10	6	0.4	
Bennett Road	**Unsignalized**	**47**	**27**	**8**	**9**		**3**		**35**	**12**	**1.1**	**Yes**
Millard Road	Unsignalized	18	7	7	2	2	0	2	10	6	0.5	
Gable Road	**Signalized**	**89**	**24**	**45**	**15**		**5**		**33**	**56**	**1.8**	**Yes**
Columbia Blvd	Signalized	61	29	20	10		2		33	28	1.4	Yes
St. Helens Rd	Signalized	12	6		4	2	0		8	4	0.3	
Deer Island Road	Signalized	18	4	8			6		13	5	0.6	
I Street	Unsignalized	8	7				1		7	1	0.3	
E Street	Signalized	17	5	7	7		0		13	4	0.8	
Nicolai Rd	Unsignalized	20	9	9	2		0		16	4	1.5	Yes
Veterans Way	Signalized	15	7	2	4		2		7	8	0.7	
Marshland/Schroeder Rd	Unsignalized	3		2			1	1	2		0.3	
Marshland District Rd 4119	Unsignalized	23	4	12			7		23		2.2	
Woodson Rd	Unsignalized	3		3			0		3		0.3	
Old Mill Town Road	Unsignalized	16	5	6	4		1		14	2	1.5	Yes
Westport Ferry Road	Unsignalized	7		4			3		6	1	0.7	

The intersections of High School Way, Maple Street, Bennett Road and Gable Road are on the ODOT 2008 Top 10% SPIS List. All of the sites on the SPIS list have a crash rate of greater than 1.0 crashes per million entering vehicles (MEV). Columbia Avenue, Nicolai Road and Old Mill Town Road were also identified as having crash rates in excess of 1.0 crashes /MEV.

Section 5
Summary of
Notable Concerns

Summary of Notable Concerns

A summary of reconnaissance level notable safety concerns is provided in Table 6 below. Note that locations where little or no concern was identified are not included in the Table. A complete list of notable concerns for each location is presented in Appendix 2 – Appendix 21.

Table 6 Summary of Notable Concerns

High School Way	No pedestrian warning signage or automatic gates to control pedestrian crossings when a train is present. Significant numbers of high school and elementary school students are likely to use the southerly sidewalk. "DO NOT STOP ON TRACKS SIGN" on westbound approach is obscured by vegetation. The response times for police and emergency services may be affected by the increase in rail crossing duration.
Maple Street	The westbound approach to the rail crossing is very steep and may cause problems for commercial vehicles. Due to the steepness of grade, drivers unfamiliar with the area may not realize that there is only sufficient storage for one vehicle on the area between the tracks and US-30. The westbound approach lanes to the crossing are very narrow (9 feet). No pedestrian warning signage or automatic gates to control pedestrian crossings when a train is present. Significant numbers of school students are likely to use this sidewalk.
Columbia Avenue	One rail crossing is signal-and gate-controlled while the other is a yield-controlled rail crossing. The separation between the two tracks allows for a westbound vehicle to potentially be trapped between the two rail crossings. While only one train operates on the line at this time, the addition of a unit train may lead to a situation where both rail crossings will be occupied by trains at the same time. No pedestrian warning signage or automatic gates to control pedestrian crossings when a train is present. Significant numbers of pedestrians are likely to use this pedestrian facility due to the shops in the vicinity of the intersection. The response times for police and emergency services may be affected by the increase in rail crossing duration.
West Lane	A significant numbers of trucks use West Lane. The distance between the westbound approach's stop line at US-30 and the rail crossing is 56 feet. As this is an unsignalized intersection, a large vehicle could potentially be trapped behind another vehicle, unable to turn onto US-30. The response times for police and emergency services may be affected by the increase in rail crossing duration.
Old Portland Road	The westbound approach to this rail crossing has very steep grade, and extremely narrow lane widths. Vegetation hinders sight distances for the rail crossing. Very low traffic volume was observed at the intersection. The overall geometry of the crossing is poor. Vehicles using Old Portland Road have the option to access US-30 via Bennett Road.
Bennett Road	A number of articulated trucks from the Port of Saint Helens were observed using this road for access to US-30. Due to limited queue storage, an articulated vehicle may be unable to completely cross the tracks while waiting to access US-30. The estimated AADT of this crossing is approximately 2,700vpd. This intersection exceeds a v/c ratio of 1.0 in the PM peak hour, and is identified as being on the ODOT 2008 Top 10% SPIS List. Because of heavy traffic volumes on US-30, westbound left turning vehicles are likely to queue across the tracks during the a.m. and p.m. peak periods.

Millard Road	The STOP sign for the southbound McNulty Way approach is obscured by a tree. The YIELD sign for Millard Road's eastbound approach is obscured (surrounded) by a tree. Pavement markings for the eastbound approach are very faint. Sight distance for the east bound approach of Millard was measured as 120 feet. There are no lane markings between US-30 and the rail crossing.
Deer Island Road	The current traffic controls are set up for a second defunct rail crossing that formed a siding into industrial premises. As the second crossing is now defunct, the complexity of the current railroad crossing traffic control features could be reduced.
I Street	The intersection layout of I Street and 4th Street is confusing as there is a crosswalk on I street at the intersection with 4th but there are no sidewalks on either street. There is a significant uphill grade approaching US-30.
Nicolai Road/Goble RV access	This is a STOP-controlled rail grade crossing which provides access and egress to an RV park and a quarry. The intersection is unsignalized and the storage distance between US-30 and the rail crossing is 60 feet. Due to the high number of long and slow moving heavy vehicles (such as SUVs towing trailers) using this intersection, there is a concern that vehicles may queue across the rail crossing or make an inappropriate turning movement onto US-30 to avoid an approaching train. The signage and pavement markings at the rail grade crossing are generally deficient.
Marshland District Road / Schroeder Road	Tall vegetation parallels the rail in this location. As the Marshland Road approach to the rail crossing runs parallel to the line and makes a sharp horizontal curve to approach the rail crossing, the sight distance in this location is a concern. No center line on the approach to US-30 is provided which may cause vehicles to verge into the opposing lane. There is no lighting at the intersection or rail crossing.
Marshland District Road	STOP sign is missing from the approach to US-30. The grade crossing material in the rail crossing consists of wood and dirt. Erosion of the material is likely to occur and a vehicle may become stuck in the tracks.
Woodson Road	US-30 is a two-lane cross section in this location. Due to the proximity of the rail crossing to the intersection, during a train event a turning vehicle may block traffic on US-30 until the train passes (this could occur for either a left or right turn). Some pavement markings and signage are deficient at this intersection.
Westport Ferry Road	While there are no notable safety concerns with this rail grade crossing, the intersection geometry at the US-30/Westport Ferry Dock Road intersection is unorthodox and substandard.

Section 6
Mitigation Options
& Safety
Enhancements

Mitigation Options & Safety Enhancements

Options to address notable concerns and queuing impacts are recommended for each location with notable concerns. Note that these options are not extensive, nor are they mutually exclusive (i.e., more than one option can be implemented). When selecting an appropriate option for implementation at the site, consideration should be given to the degree of risk associated with the safety concerns identified, the volume of vehicular and pedestrian traffic at the site, and the economic cost associated with each option. A summary of options for mitigating safety concerns is provided in Table 7. Where no safety concerns were identified, the site has been excluded from the table.

Table 7 Summary of Mitigation Options

High School Way	Option 1. Improve pedestrian facilities at this crossing. Consider installing an automatic pedestrian gate, tactile yellow strips, and/or warning signs for pedestrians. Option 2. Remove vegetation obscuring signage. Option 3. Apply Intelligent Transportation Systems (ITS) technologies to inform emergency services of the direction, duration, and arrival time of an approaching train to limit the impact of train crossings on emergency service response times. Option 4. Explore capacity improvements that will improve peak hour v/c ratios during the peak traffic periods of the day. Option 5. Investigate whether the northbound right turn lane storage capacity can be increased.
Maple Street	Option 1. Close the Santosh Street rail crossing. Detouring Santosh Street traffic to Maple is unlikely to significantly increase traffic volumes and travel times. Option 2. Reduce the approach grade on Maple Street by closing 1st Street's access to Maple Street. This would allow Maple Street to be rebuilt to a flatter grade. Option 3. Improve pedestrian facilities at this crossing. Consider installing automatic pedestrian gates, tactile yellow strips, and/or warning signs for pedestrians. Option 4. Apply ITS technologies to inform emergency services of the direction, duration, and arrival time of an approaching train to limit the impact of train crossings on emergency service response times. Option 5. Explore capacity improvements that will improve peak hour v/c ratios during the peak traffic periods of the day.
Columbia Avenue	Option 1. Investigate whether a signal and automatic gate is appropriate on the westbound approach to the west most rail crossing (replacing existing yield control on the first rail crossing). Option 2. Improve pedestrian facilities at this crossing. Consider installing automatic pedestrian gate, tactile yellow strips. and/or warning signs for pedestrians. Option 3. . Apply ITS technologies to inform emergency services of the direction, duration, and arrival time of an approaching train to limit the impact of train crossings on emergency service response times. Option 4. Investigate whether the northbound right turn lane storage capacity can be increased Option 5. The future traffic demands and operational characteristics of this intersection further investigated.

West Lane	Option 1. Improve pavement markings. Add signage at crossing to advise drivers of longer vehicles to avoid stopping on tracks. Option 2. Consider adding an emergency right turn bay for vehicles that are unable to enter US-30 before an approaching train arrives.
Old Portland Road	Option 1. Close the crossing. Traffic currently using this intersection would be diverted to the US-30/Bennett Road intersection. Option 2. Upgrade crossing to ODOT standards. Provide adequate sight distance and cross-section at the rail crossing.
Bennett Road	Option 1. Signalize the intersection to address both safety and operational concerns. Option 2. Investigate safety or operational improvements at the intersection which do not involve signalization. Option 3. Investigate whether the northbound right turn lane storage capacity can be increased.
Millard Road	Option 1. Replace existing YIELD sign on eastbound approach with STOP sign, restripe stop line, and remove vegetation obstructing sight distance.
Gable Road	Option 1. Investigate whether the northbound right turn lane storage capacity can be increased.
Columbia Boulevard	Option 1. Investigate whether the northbound right turn lane storage capacity can be increased.
St. Helens Road	Option 1. Add pavement marking on N Milton Way approach to Saint Helens Road to indicate left through movement only.
Deer Island Road	Option 1. Remove defunct rail line and restripe the intersection of Deer Island Road/Oregon Road. Option 2. Move the active rail crossing control closer to the grade crossing. This will provide more storage on Deer Island Road (westbound) and prevent obstruction of Deer Island Road during rail crossings. Option 3. Investigate whether the northbound right turn lane storage capacity can be increased.
I Street	Option 1. Remove crosswalk markings and restripe intersection appropriately. Option 2. Consider adding an emergency right turn bay for vehicles that are unable to enter US-30 before an approaching train arrives.

Nicolai Road/Goble RV access	Option 1 Consider adding an emergency right turn bay for vehicles that are unable to enter US-30 before an approaching train arrives. Option 2. Increase the separation distance between US-30 and the rail crossing.
Marshland District Road / Schroeder Road	Option 1. Improve the alignment of Marshland Road approaching the rail crossing to improve approach sight distance. Option 2. Provide rail crossing warning signs on Marshland Road to let drivers know they are approaching a rail crossing. Option 3. Remove vegetation that is blocking sight distance at the rail crossing. Option 4. Add lighting and improve pavement markings at the intersection with US-30.
Marshland District Road	Option 1. Install STOP sign on approach to US-30. Option 2. Replace grade crossing material with concrete or asphalt.
Woodson Road	Option 1. Install short left and right turn lanes on US-30 to get vehicles that are waiting for a train to pass out of the through lanes. Option 2. Provide a gravel parking bay along US-30 so vehicles can be moved out of the through traffic while waiting for a train to pass. Option 3. Improve the signage and pavement markings at the rail grade crossing.
Old Mill Town Road	Option 1. Remove vegetation on US-30 to improve sight distance for westbound left turners.
Westport Ferry Road	Option 1. Restripe the intersection to ODOT standards. This is not associated with safety concerns relating to the crossing.

Section 7
Conclusions

Conclusions

This study investigates twenty key intersections along US-30 in Columbia and Clatsop Counties. Each intersection is in the vicinity of a railroad grade crossing along the Lower Columbia River Rail Corridor. The intersections are so close to the railroad grade crossing that vehicles intending to turn from US-30 onto the cross street must queue on the highway while trains pass. The intersections were identified by Oregon Department of Transportation (ODOT) staff as potentially being impacted if rail traffic increased or if the duration of rail crossings increased.

The investigation was precipitated by the anticipated addition of "unit" train operations along the Rail Corridor. The Portland & Western Railroad will upgrade the Corridor's track in 2009 to accommodate the increase in train traffic and delays at rail crossings due to the unit trains serving Port Westward. Columbia County has hired HDR Engineering to prepare a Lower Columbia Rail Corridor Study to address the impact on local community transportation and emergency response due to the increase in train traffic and potential rail crossing closures.

The report will be used by ODOT and Columbia County to help identify and prioritize improvements that should be considered in the broader Lower Columbia Rail Corridor Study.

Unit trains are expected to travel the corridor an average of three times per week. The unit train's schedule is expected to be unpredictable but the probability of any given driver being delayed by a unit train is small. For those who are delayed by a unit train, their average delay will be twice as long as the delay created by existing trains. For the purposes of this study, grade crossing durations for existing trains were assumed to be five minutes. Crossing durations for unit trains were assumed to be ten minutes.

The physical and operational characteristics of the twenty US-30 intersections were studied, but the most fundamental characteristic under review was each intersection's ability to accommodate the increased vehicle queues caused by longer train crossing times. The study looked at the performance of each intersection during the most demanding 15-minutes of the a.m. and p.m. peak traffic periods, with and without the influence of trains passing through at the same time.

The following table identifies the intersections that were studied and qualitatively summarizes each intersection's performance in the areas of capacity to serve peak hour traffic, crash history, and ability to keep US-30 through lanes clear while a unit train passes. A more detailed one-page summary for each of the twenty studied intersections is provided in the Appendix.

The study identified three signalized intersections that do not meet ODOT operations standards for signalized intersections as well as one unsignalized intersection (Bennett Rd) whose minor cross streets experience significant delay during peak traffic periods. It is recommended that, as resources allow, these intersections be studied more thoroughly to see how their performance might be enhanced. These locations received a "C" in the Peak Hour Capacity portion of the Executive Summary table.

The study identified four locations where, if a unit train passed through during the peak traffic period, the northbound outside through lane of US-30 could be blocked by delayed right-turning vehicles. The intersections of most concern received a "C" in the Right Turn Queue Capacity portion of the Executive Summary table. Similarly, given the same circumstance, some driveways and public cross streets could be blocked by train-delayed vehicles waiting to turn left from US-30. The five intersections of most concern received a "B" in the Left Turn Queue Capacity portion of the Executive Summary table.

The study also noted five intersections where vehicles must wait in a US-30 through lane while a train passes. At some intersections, US 30 is only two lanes wide. In each case the cross street's traffic volumes appear to be very light. This is an existing condition, but the increased delay associated with unit trains makes this a notable concern. These locations received a "Cx" in the Executive Summary table.

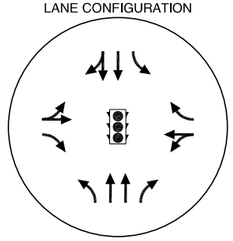
Appendix 1
Queue Analysis
Results Summary

Queue Analysis Results Summary

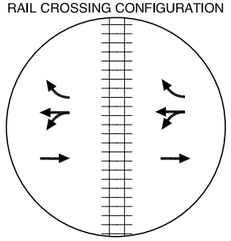
Intersection		Existing 95%ile Queue (ft) without Xing						Existing Train Event Duration - Max Queue (ft)						UNIT Train Event Duration Max Queue (ft)					
		Northbound Right Turn	Southbound Left Turn	Westbound Left Turn	Westbound Through	Westbound Right	Eastbound Through	Northbound Right Turn	Southbound Left Turn	Westbound Left Turn	Westbound Through	Westbound Right	Eastbound Through	Northbound Right Turn	Southbound Left Turn	Westbound Left Turn	Westbound Through	Westbound Right	Eastbound Through
High School Way	Storage	300	200	32		32	19	300	200	32		32	19	300	200	32		32	19
	AM	8	22	58		121	41	25	25	75		25	25	25	50	125		75	25
	PM	31	100	130		45	46	300	150	225		175	25	600	300	400		350	25
	Storage Exceeded	OK	OK	N/A (Signals)		N/A (Signals)	N/A (Signals)	OK	OK	N/A (Signals)		N/A (Signals)	N/A (Signals)	PM by 300	PM by 100	N/A (Signals)		N/A (Signals)	N/A (Signals)
Maple Street	Storage	440	175	25		25	25	440	175	25		25	25	440	175	25		25	25
	AM	7	33	124		16	124	25	25	250		25	125	50	75	475		50	250
	PM	12	42	98		22	119	100	50	150		50	50	225	100	300		75	100
	Storage Exceeded	OK	OK	N/A (Signals)		N/A (Signals)	N/A (Signals)	OK	OK	N/A (Signals)		N/A (Signals)	N/A (Signals)	OK	OK	N/A (Signals)		N/A (Signals)	N/A (Signals)
Columbia Avenue	Storage	240	180	80	80		NA	240	180	80	80		NA	240	180	80	80		NA
	AM	16	64	173	0		NA	100	100	275	125		NA	200	200	575	225		NA
	PM	56	113	251	0		NA	350	175	300	250		NA	700	350	575	475		NA
	Storage Exceeded	OK	OK	N/A (Signals)	N/A (Signals)		N/A (Signals)	PM by 110	OK	N/A (Signals)	N/A (Signals)		N/A (Signals)	PM by 460	AM by 20 & PM by 170	N/A (Signals)	N/A (Signals)		N/A (Signals)
West Lane	Storage	800	400	56			40	800	400	56			40	800	400	56			40
	AM	48	26	20			2	75	25	75			25	125	75	150			25
	PM	28	48	11			0	50	75	125			25	75	125	225			25
	Storage Exceeded	OK	OK	OK			OK	OK	OK	AM by 19 & PM by 69			OK	OK	OK	AM by 94 & PM by 169			OK
Old Portland Road	Storage	NA	400	53			NA	NA	400	53			NA	NA	400	53			NA
	AM	6	0	6			NA	25	25	75			NA	25	25	75			NA
	PM	12	0	3			NA	25	25	75			NA	25	25	75			NA
	Storage Exceeded	OK	OK	OK			OK	OK	OK	AM by 22 & PM by 22			OK	OK	OK	AM by 22 & PM by 22			OK
Bennett Road	Storage	480	300	52			36	480	300	52			36	480	300	52			36
	AM	122	2	88			2	175	25	175			25	350	25	300			25
	PM	280	25	91			3	400	25	175			25	800	75	300			25
	Storage Exceeded	OK	OK	AM by 36 & PM by 39			OK	OK	OK	AM by 123 & PM by 123			OK	PM by 320	OK	AM by 248 & PM by 248			OK
Millard Road	Storage	280	290	48		48	36	280	290	48			36	280	290	48			36
	AM	42	12	8		17	3	50	25	50			25	125	25	50			25
	PM	11	55	20		26	5	25	75	50			25	25	150	75			25
	Storage Exceeded	OK	OK	OK		OK	OK	OK	OK	AM by 2 & PM by 2			OK	OK	OK	AM by 2 & PM by 27			OK
Gable Road	Storage	400	140	28	28		16	400	140	28	28		16	400	140	28	28		16
	AM	38	194	234	333		293	250	350	400	525		300	500	700	775	1025		600
	PM	39	146	206	375		262	225	275	400	625		350	450	550	800	1300		700
	Storage Exceeded	OK	AM by 54 & PM by 6	N/A (Signals)	N/A (Signals)		N/A (Signals)	OK	AM by 210 & PM by 135	N/A (Signals)	N/A (Signals)		N/A (Signals)	AM by 100 & PM by 50	AM by 560 & PM by 410	N/A (Signals)	N/A (Signals)		N/A (Signals)
Columbia Boulevard	Storage	510	110	NA			NA	510	110	NA			NA	510	110	NA			NA
	AM	23	114	NA			425	575	325	NA			675	1150	650	NA			1350
	PM	39	120	NA			394	525	275	NA			500	1050	550	NA			1000
	Storage Exceeded	OK	AM by 4 & PM by 10	NA			N/A (Signals)	AM by 65 & PM by 15	AM by 215 & PM by 165	NA			N/A (Signals)	AM by 640 & PM by 540	AM by 540 & PM by 440	NA			N/A (Signals)
St. Helens Road	Storage	NA	NA	40	NA	40	NA	NA	NA	40	NA	40	NA	NA	NA	40	NA	40	NA
	AM	NA	0	141	NA	31	NA	NA	0	900	NA	250	NA	NA	0	1800	NA	500	NA
	PM	NA	0	169	NA	94	NA	NA	0	975	NA	500	NA	NA	0	1950	NA	1025	NA
	Storage Exceeded	OK	OK	N/A (Signals)	N/A (Signals)	N/A (Signals)	N/A (Signals)	OK	OK	N/A (Signals)	N/A (Signals)	N/A (Signals)	N/A (Signals)	OK	OK	N/A (Signals)	N/A (Signals)	N/A (Signals)	N/A (Signals)
Deer Island Road	Storage	390	100	41			27	390	100	41			27	390	100	41			27
	AM	15	111	148			15	125	250	450			25	225	500	875			25
	PM	27	70	150			19	250	125	400			25	500	225	800			25
	Storage Exceeded	OK	AM by 11	N/A (Signals)			N/A (Signals)	OK	AM by 150 & PM by 25	N/A (Signals)			N/A (Signals)	PM by 110	AM by 400 & PM by 125	N/A (Signals)			N/A (Signals)
I Street	Storage	230	230	46			32	230	230	46			32	230	230	46			32
	AM	62	8	112			6	125	25	250			25	225	25	475			25
	PM	66	15	37			2	100	25	100			25	200	50	150			25
	Storage Exceeded	OK	OK	AM by 66			OK	OK	OK	AM by 204 & PM by 54			OK	OK	OK	AM by 429 & PM by 104			OK
E Street	Storage	204	230	41			22	204	230	41			22	204	230	41			22
	AM	13	22	55			28	175	25	175			25	325	50	275			25
	PM	4	11	31			24	25	25	75			25	25	25	125			25
	Storage Exceeded	OK	OK	N/A (Signals)			N/A (Signals)	OK	OK	N/A (Signals)			N/A (Signals)	AM by 121	OK	N/A (Signals)			N/A (Signals)
Nicolai Road	Storage	NA	NA	60			60	NA	NA	60			60	NA	NA	60			60
	AM	NA	NA	NA			NA	NA	NA	NA			NA	NA	NA	NA			NA
	PM	12	6	5			2	25	25	75			25	50	25	75			25
	Storage Exceeded	OK	OK	OK			OK	OK	OK	PM by 15			OK	OK	OK	PM by 15			OK
Veterans Way	Storage	150	200	100	150		138	150	200	100	150		138	150	200	100	150		138
	AM	9	23	3	22		15	25	25	25	50		25	25	75	25	75		50
	PM	8	49	9	51		8	25	75	25	75		25	25	125	25	150		25
	Storage Exceeded	OK	OK	OK	OK		OK	OK	OK	OK	OK		OK	OK	OK	OK	OK		OK
Marshland District Road/Schroeder Rd	Storage	NA	NA	74			85	NA	NA	74			85	NA	NA	74			85
	AM	NA	NA	NA			NA	NA	NA	NA			NA	NA	NA	NA			NA
	PM	2	3	5			2	25	25	75			25	25	25	75			25
	Storage Exceeded	OK	OK	OK			OK	OK	OK	PM by 1			OK	OK	OK	PM by 1			OK
Marshland District Road	Storage	NA	NA	68			52	NA	NA	68			52	NA	NA	68			52
	AM	NA	NA	NA			NA	NA	NA	NA			NA	NA	NA	NA			NA
	PM	2	3	2			0	25	25	25			25	25	25	25			25
	Storage Exceeded	OK	OK	OK			OK	OK	OK	OK			OK	OK	OK	OK			OK
Woodson Rd	Storage	NA	NA	92			76	NA	NA	92			76	NA	NA	92			76
	AM	NA	NA	NA			NA	NA	NA	NA			NA	NA	NA	NA			NA
	PM	11	18	9			2	25	25	75			25	25	50	75			25
	Storage Exceeded	OK	OK	OK			OK	OK	OK	OK			OK	OK	OK	OK			OK
Old Mill Town Road	Storage	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	AM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PM	22	0	29	NA	6	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Storage Exceeded	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Westport Ferry Road	Storage	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	AM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PM	11	3	15	NA	8	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Storage Exceeded	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK

Appendix 2
High School Way

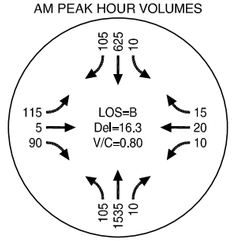
LANE CONFIGURATION



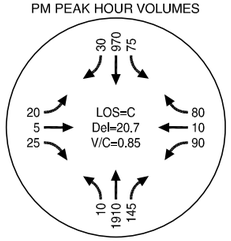
RAIL CROSSING CONFIGURATION



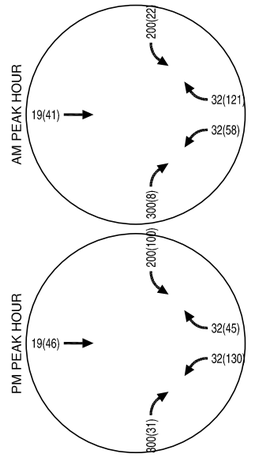
AM PEAK HOUR VOLUMES



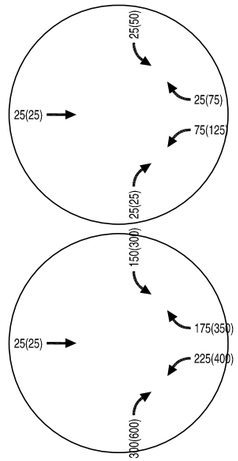
PM PEAK HOUR VOLUMES



EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)



EXISTING TRAIN EVENT DURATION MAXIMUM = XX
UNIT TRAIN EVENT DURATION MAXIMUM QUEUE (FT)= (XX)



Site Number #	1
Intersection Name	High School Way
US-30 Milepoint	20.35
Intersection ODOT ID	5A-019.35
US Dot Crossing ID	101854W
Intersection Type	Signalized
Rail Crossing Type	Active
Number of Tracks	1
Secondary intersection	None
Secondary Intersection Type	N/A
Notable Trip Generators	High school, Elementary School,
Emergency Facilities in Vicinity	Scappoose Fire Station
Pedestrian Facilities at Crossing	Yes
Estimated AADT (vpd)	3,930
Sight Distance Issue Noted	na
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.8	0.85
Average Delay	16.3	20.7
Level Of Service	B	C

Crash Analysis (2002 - 2007)	
Total Crashes in period	23
Crashes per Year	7.7
Peak Hour Total Entering Vehicles	3,190
Million Entering Vehicles (MEV)/Year	11.6
Crashes/MEV	0.7
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	13
Rear End	7
Angle	3
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	11
Property Damage Only (O)	12

NOTABLE CONCERNS

No pedestrian warning signage or automatic gates to control pedestrian crossings when a train is present. Significant numbers of high school and elementary school students are likely to use the southerly sidewalk.
"DO NOT STOP ON TRACKS SIGN" on westbound approach is obscured by vegetation.
The response times for police and emergency services may be affected by the increase in rail crossing duration.

OPTIONS FOR MITIGATION

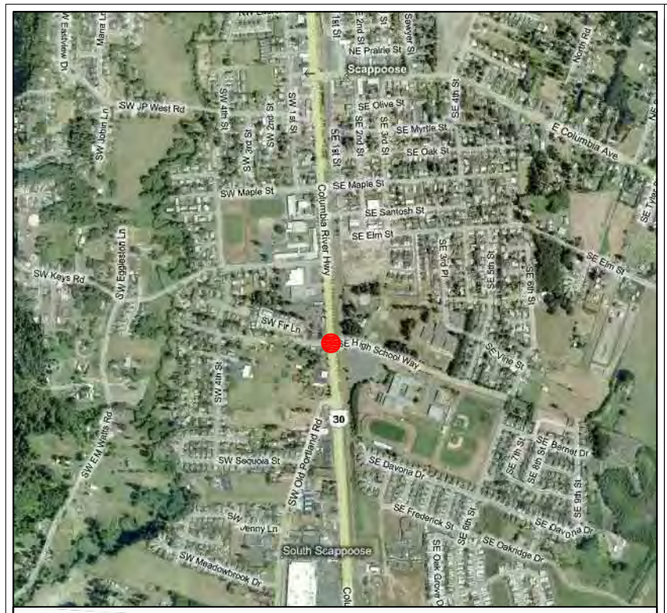
Option 1. Improve pedestrian facilities at this crossing. Consider installing an automatic pedestrian gate, tactile yellow strips, and/or warning signs for pedestrians.
Option 2. Remove vegetation obscuring signage.
Option 3. Add ITS system to inform emergency services of the direction, duration, and arrival time of an approaching train to limit the impact of train crossings on emergency service response times.
Option 4. The future traffic demands and operational characteristics of this intersection should be further investigated.
Option 5. Investigate whether the northbound right turn lane storage capacity can be increased.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

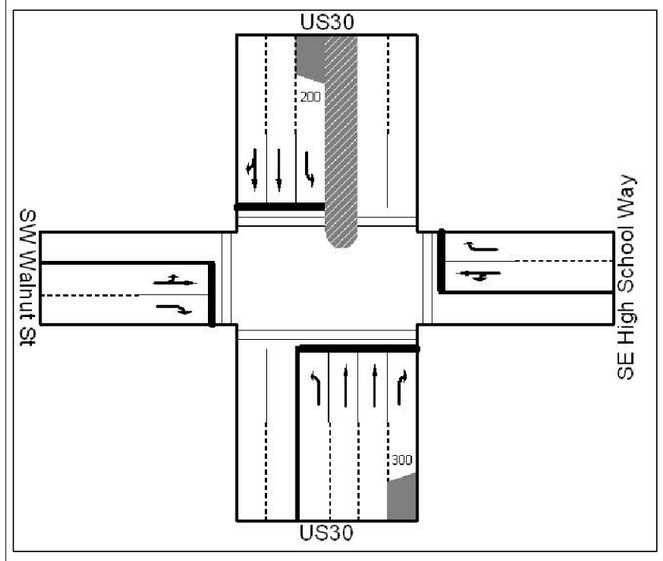
- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)



SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

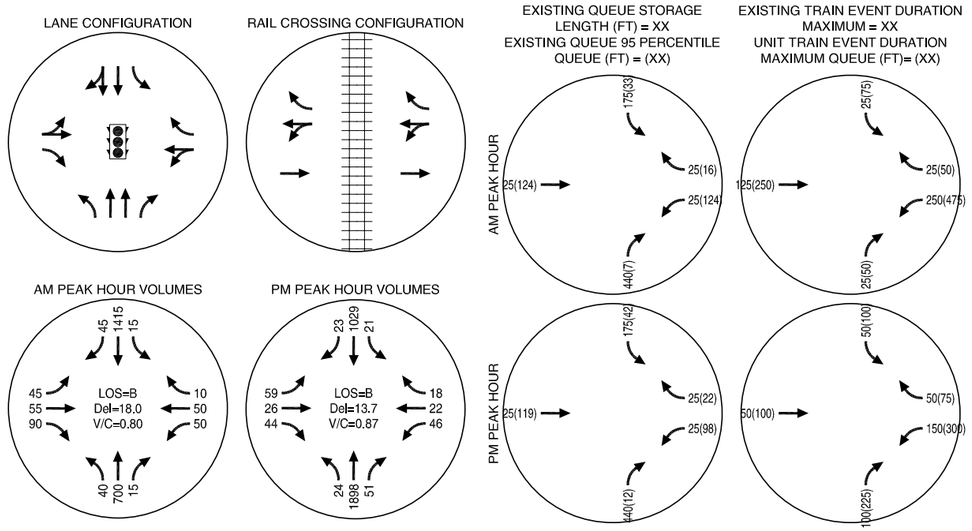
PHOTOGRAPH OF SITE (WESTBOUND)

US-30 / HIGH SCHOOL WAY
COLUMBIA RIVER RAIL CROSSING
SCAPPOOSE, OREGON

FIGURE 1

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Appendix 3
Maple Street



Site Number #	2
Intersection Name	Maple Street
US-30 Milepoint	20.67
Intersection ODOT ID	5A-019.67
US Dot Crossing ID	057901H
Intersection Type	Signalized
Rail Crossing Type	Active
Number of Tracks	1
Secondary intersection	NE 1st Street
Secondary Intersection Type	Unsignalized
Notable Trip Generators	Middle School. Residential Traffic
Emergency Facilities in Vicinity	Scappoose Fire Station
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	1,840
Sight Distance Issue Noted	na
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methedelogy	AM	PM
v/c	0.8	0.87
Average Delay	18	13.7
Level Of Service	B	B

Crash Analysis (2002 - 2007)	
Total Crashes in period	12
Crashes per Year	4.0
Peak Hour Total Entering Vehicles	3,096
Million Entering Vehicles(MEV)/Year	11.3
Crashes/MEV	0.4
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	0
Rear End	12
Angle	0
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	9
Property Damage Only (O)	3

NOTABLE CONCERNS

The westbound approach to the rail crossing is very steep and may cause problems for commercial vehicles. Due to the steepness of grade, drivers unfamiliar with the area may not realize that there is only sufficient storage for one vehicle on the east (US-30) side of the tracks.

OPTIONS FOR MITIGATION

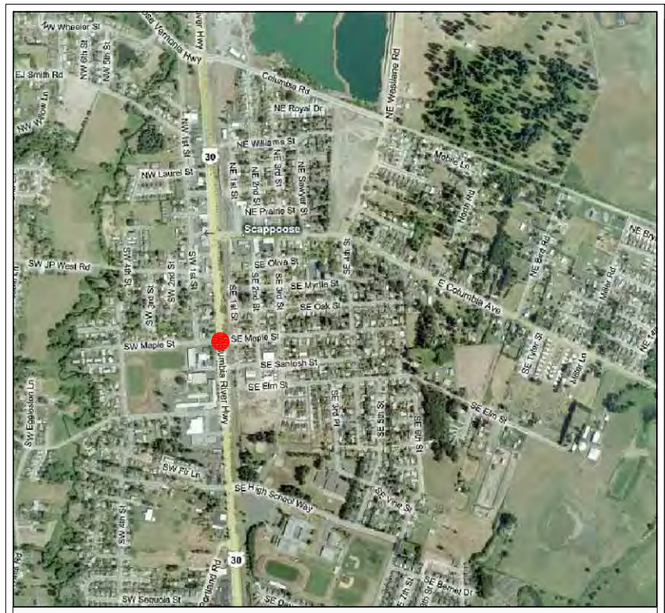
Option 1. Close the Santosh Street rail crossing. Detouring Santosh Street traffic to Maple is unlikely to significantly increase traffic volumes and travel times.
Option 2. Reduce the approach grade on Maple Street by closing 1st Street's access to Maple Street. This would allow Maple Street to be rebuilt to a flatter grade.
Option 3. Improve pedestrian facilities at this crossing. Consider installing automatic pedestrian gates, tactile yellow strips, and/or warning signs for pedestrians.
Option 4. Add ITS system to inform emergency services of the direction, duration, and arrival time of an approaching train to limit the impact of train crossings on emergency service response times.
Option 5. The future traffic demands and operational characteristics of this intersection further investigated.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

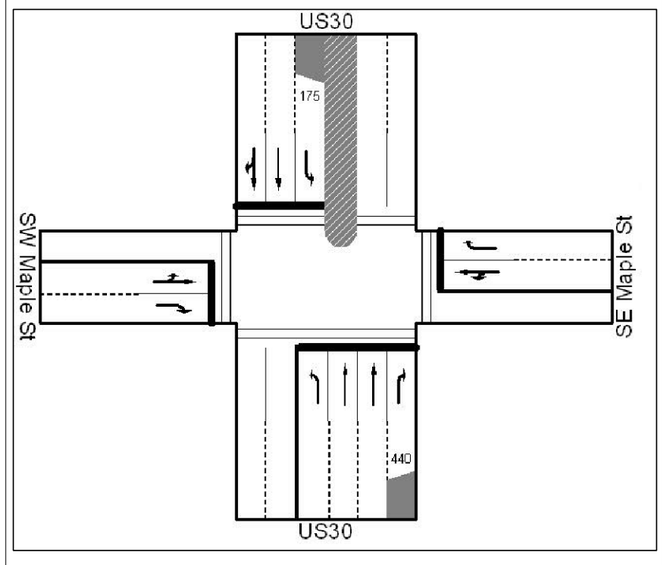
- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)



SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (WESTBOUND)

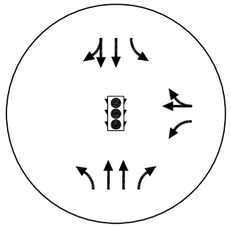
US-30 / MAPLE STREET
COLUMBIA RIVER RAIL CROSSING
SCAPPOOSE, OREGON

FIGURE 2

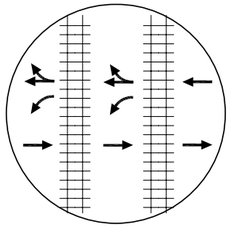
KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Appendix 4
Columbia Avenue

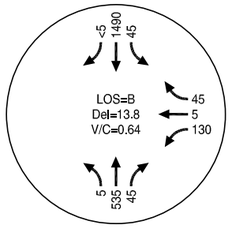
LANE CONFIGURATION



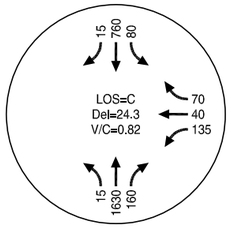
RAIL CROSSING CONFIGURATION



AM PEAK HOUR VOLUMES

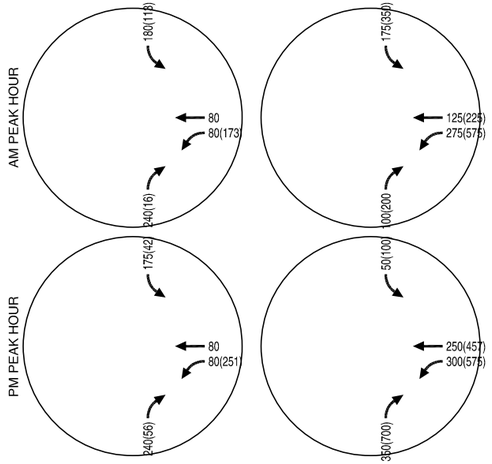


PM PEAK HOUR VOLUMES



EXISTING QUEUE STORAGE
LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE
QUEUE (FT) = (XX)

EXISTING TRAIN EVENT DURATION
MAXIMUM = XX
UNIT TRAIN EVENT DURATION
MAXIMUM QUEUE (FT)= (XX)



Site Number #	3
Intersection Name	Columbia Avenue
US-30 Milepoint	20.9
Intersection ODOT ID	5A-019.90
US Dot Crossing ID	057902P
Intersection Type	Signalized
Rail Crossing Type	Active
Number of Tracks	2
Secondary intersection	NE 1st Street
Secondary Intersection Type	Unsignalized/Stop signs
Notable Trip Generators	Restaurants, Gas Station, Shops, Vet
Emergency Facilities in Vicinity	Police Station, Scappoose Fire Station?
Pedestrian Facilities at Crossing	Yes
Estimated AADT (vpd)	4,900
Sight Distance Issue Noted	na
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methedology	AM	PM
v/c	0.64	0.82
Average Delay	13.8	24.3
Level Of Service	B	C

Crash Analysis (2002 - 2007)	
Total Crashes in period	6
Crashes per Year	2.0
Peak Hour Total Entering Vehicles	2,774
Million Entering Vehicles(MEV)/Year	10.1
Crashes/MEV	0.2
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	2
Rear End	2
Angle	2
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (F)	0
Personal Injury (A + B + C)	2
Property Damage Only (O)	4

NOTABLE CONCERNS

One rail crossing is signal-and gate-controlled while the other is a yield-controlled rail crossing. The separation between the two tracks allows for a westbound vehicle to potentially be trapped between the two rail crossings. While only one train operates on the line at this time, the addition of a unit train may lead to a situation where both rail crossings will be occupied by trains at the same time.

OPTIONS FOR MITIGATION

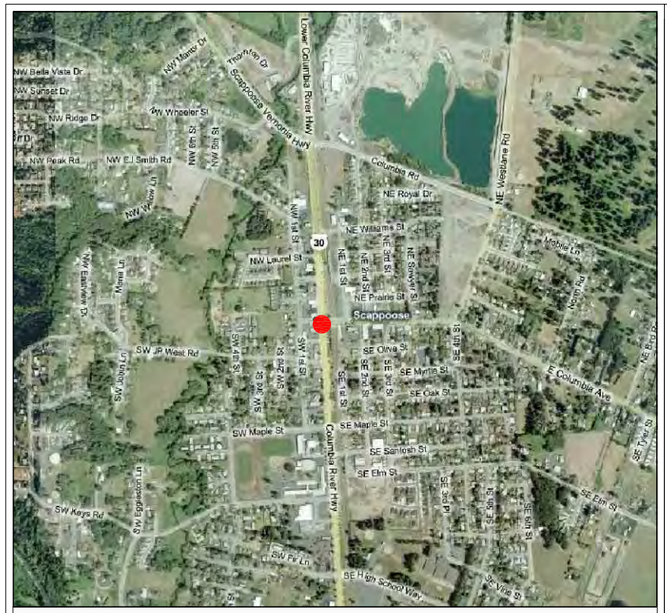
Option 1. Investigate whether a signal and automatic gate is appropriate on the westbound approach to the west most rail crossing (replacing existing yield control on the first rail crossing).
Option 2. Improve pedestrian facilities at this crossing. Consider installing automatic pedestrian gate, tactile yellow strips. and/or warning signs for pedestrians.
Option 3. Add ITS system to inform emergency services of the direction, duration, and arrival time of an approaching train to limit the impact of train crossings on emergency service response times. .
Option 4. Investigate whether the northbound right turn lane storage capacity can be increased
Option 5. The future traffic demands and operational characteristics of this intersection further investigated.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

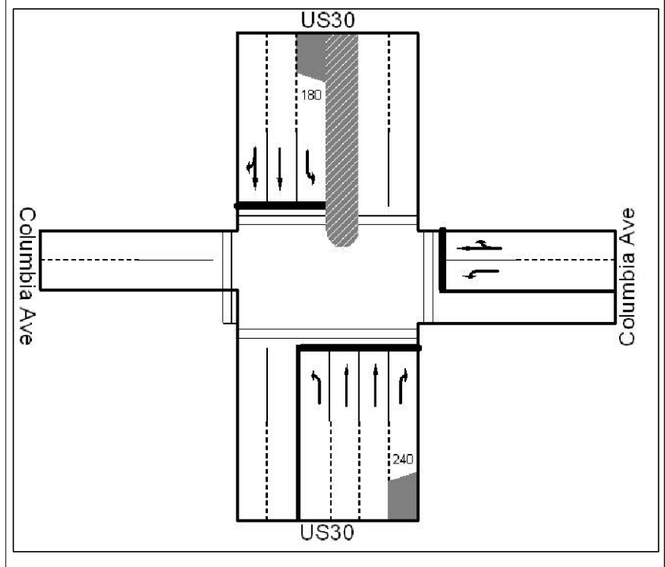
- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)



SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (WESTBOUND)

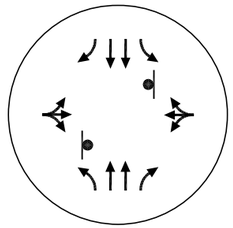
US-30 / COLUMBIA AVENUE
COLUMBIA RIVER RAIL CROSSING
SCAPPOOSE, OREGON

FIGURE 3

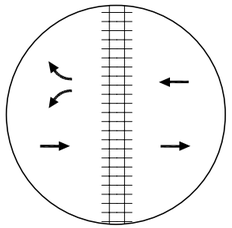
KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Appendix 5
West Lane

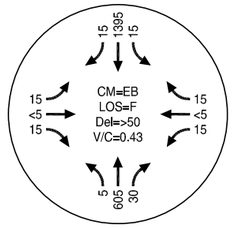
LANE CONFIGURATION



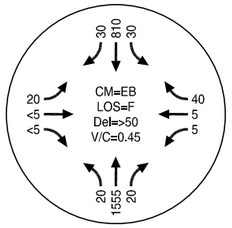
RAIL CROSSING CONFIGURATION



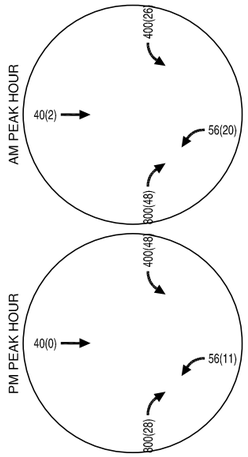
AM PEAK HOUR VOLUMES



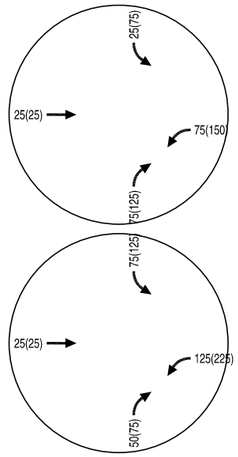
PM PEAK HOUR VOLUMES



EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)



EXISTING TRAIN EVENT DURATION MAXIMUM = XX
UNIT TRAIN EVENT DURATION MAXIMUM QUEUE (FT)= (XX)



Site Number #	4
Intersection Name	West Lane
US-30 Milepoint	22.49
Intersection ODOT ID	5A-021.50
US Dot Crossing ID	057910G
Intersection Type	Unsignalized
Rail Crossing Type	Active
Number of Tracks	1
Secondary intersection	Paradise Lane
Secondary Intersection Type	Unsignalized/Stop signs
Notable Trip Generators	Scappoose Airfield, City Dump
Emergency Facilities in Vicinity	Fire Station
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	1,000
Sight Distance Issue Noted	Westlane Westbound approach to
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.43	0.45
Average Delay	>50	>50
Level Of Service	F	F

Crash Analysis (2002 - 2007)	
Total Crashes in period	9
Crashes per Year	3.0
Peak Hour Total Entering Vehicles	2,395
Million Entering Vehicles(MEV)/Year	8.7
Crashes/MEV	0.3
>1 Crash/MEV	No
	Collision Types
Lane Change Turning	4
Rear End	0
Angle	0
Pedestrian	2
Single Vehicle	3
	Severity Types
Fatalities (K)	2
Personal Injury (A + B + C)	7
Property Damage Only (O)	0

NOTABLE CONCERNS

A significant numbers of trucks use West Lane. The distance between the westbound approach's stop line at US-30 and the rail crossing is 56 feet. As this is an unsignalized intersection, a large vehicle could potentially be trapped behind another vehicle, unable to turn onto US-30. The response times for police and emergency services may be affected by the increase in rail crossing duration.

OPTIONS FOR MITIGATION

Option 1. Improve pavement markings. Add signage at crossing to advise drivers of longer vehicles to avoid stopping on tracks.
Option 2. Consider adding an emergency right turn bay for vehicles that are unable to enter US-30 before an approaching train arrives.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

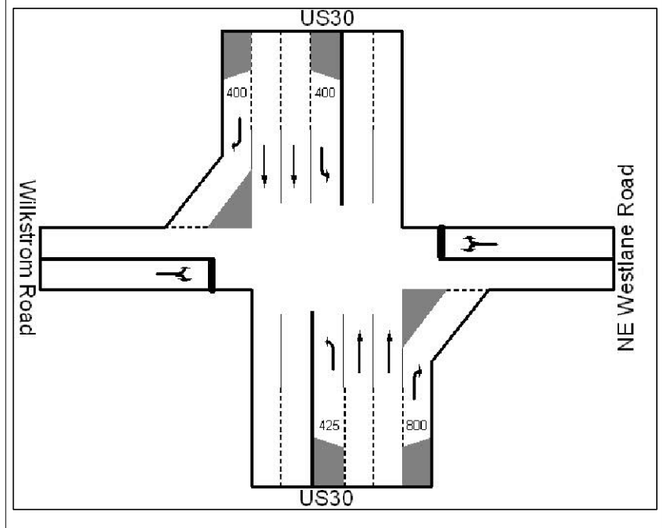
- STOP SIGN

- TRAFFIC SIGNAL

(NO SCALE)

SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (WESTBOUND)

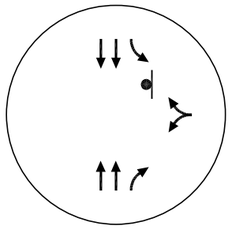
US-30 / WESTLANE ROAD
COLUMBIA RIVER RAIL CROSSING
COLUMBIA COUNTY, OREGON

FIGURE 4

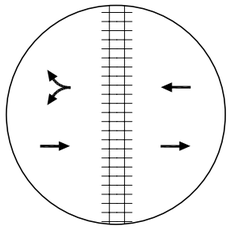
KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Appendix 6
Old Portland Road

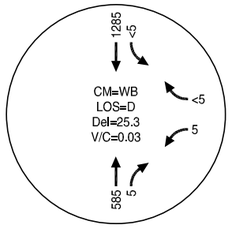
LANE CONFIGURATION



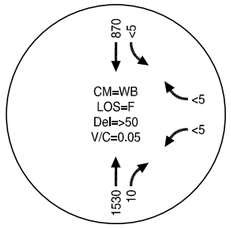
RAIL CROSSING CONFIGURATION



AM PEAK HOUR VOLUMES

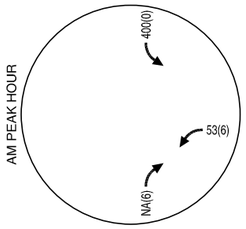


PM PEAK HOUR VOLUMES

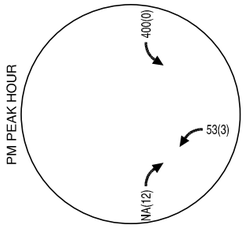


EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)

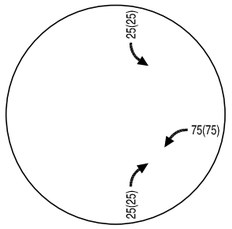
AM PEAK HOUR

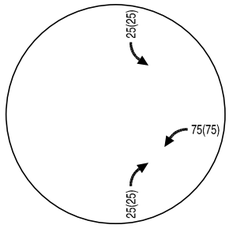


PM PEAK HOUR



EXISTING TRAIN EVENT DURATION MAXIMUM = XX
UNIT TRAIN EVENT DURATION MAXIMUM QUEUE (FT)= (XX)





(NO SCALE)

Site Number #	5
Intersection Name	Old Portland Road
US-30 Milepoint	25
Intersection ODOT ID	5A-026.60-C
US Dot Crossing ID	057936J
Intersection Type	Unsignalized
Rail Crossing Type	Passive
Number of Tracks	1
Secondary intersection	0
Secondary Intersection Type	0
Notable Trip Generators	nil - Access to farms
Emergency Facilities in Vicinity	NA
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	110
Sight Distance Issue Noted	Due to curvature of Old Portland
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.03	0.05
Average Delay	25.3	>50
Level Of Service	D	F

Crash Analysis (2002 - 2007)	
Total Crashes in period	0
Crashes per Year	0.0
Peak Hour Total Entering Vehicles	2,273
Million Entering Vehicles(MEV)/Year	8.3
Crashes/MEV	0.0
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	0
Rear End	0
Angle	0
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	0
Property Damage Only (O)	0

NOTABLE CONCERNS

The westbound approach to this rail crossing has very steep grade, and extremely narrow lane widths. Vegetation hinders sight distances for the rail crossing. Very low traffic volume was observed at the intersection. The overall geometry of the crossing is poor. Vehicles using Old Portland Road have the option to access US-30 via Bennett Road.

OPTIONS FOR MITIGATION

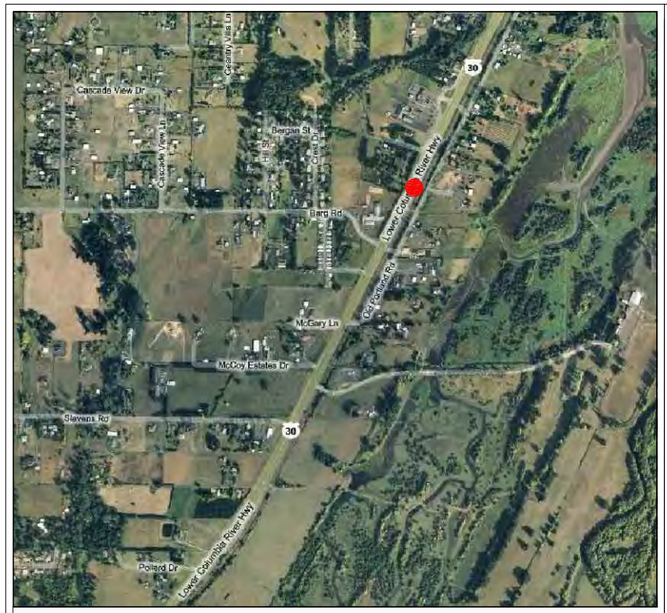
Option 1. Close the crossing. Traffic currently using this intersection would be diverted to the US-30/Bennett Road intersection.
Option 2. Upgrade crossing to ODOT standards. Provide adequate sight distance and cross-section at the rail crossing.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

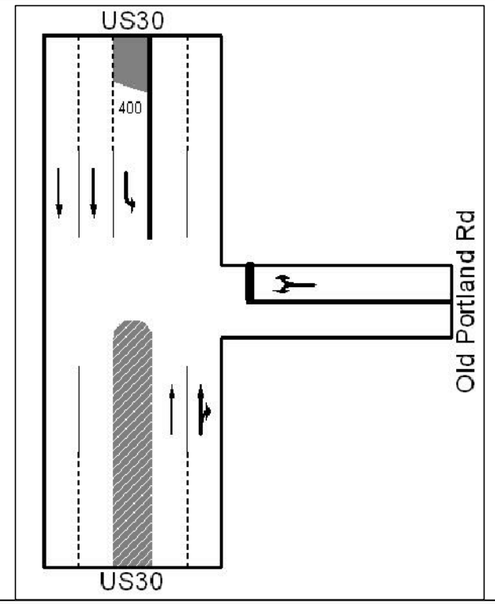
- STOP SIGN

- TRAFFIC SIGNAL



SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (EASTBOUND)

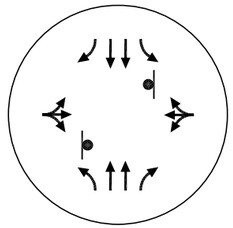
US-30 / OLD PORTLAND ROAD
COLUMBIA RIVER RAIL CROSSING
COLUMBIA COUNTY, OREGON

FIGURE 5

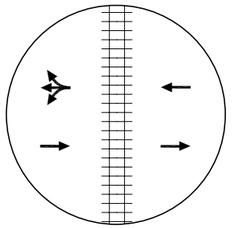
KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Appendix 7
Bennett Road

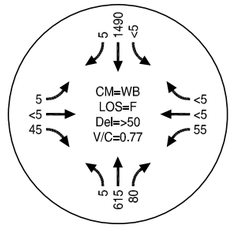
LANE CONFIGURATION



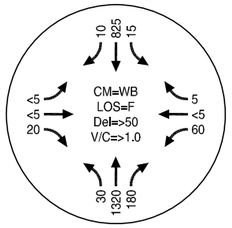
RAIL CROSSING CONFIGURATION



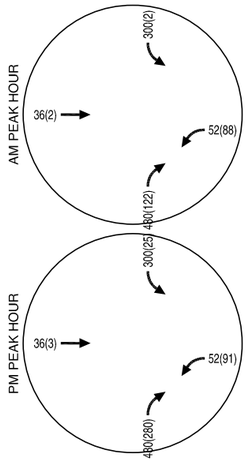
AM PEAK HOUR VOLUMES



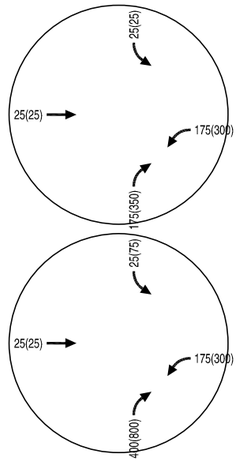
PM PEAK HOUR VOLUMES



EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)



EXISTING TRAIN EVENT DURATION MAXIMUM = XX
UNIT TRAIN EVENT DURATION MAXIMUM QUEUE (FT)= (XX)



Site Number #	6
Intersection Name	Bennett Road
US-30 Milepoint	25.8
Intersection ODOT ID	5A-024.80
US Dot Crossing ID	057924P
Intersection Type	Unsignalized
Rail Crossing Type	Passive
Number of Tracks	1
Secondary intersection	Old Portland Road
Secondary Intersection Type	Unsignalized/Stop signs
Notable Trip Generators	Port of Saint Helens
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	2,640
Sight Distance Issue Noted	na
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.77	>1.0
Average Delay	>50	>50
Level Of Service	F	F

Crash Analysis (2002 - 2007)	
Total Crashes in period	27
Crashes per Year	9.0
Peak Hour Total Entering Vehicles	2,344
Million Entering Vehicles(MEV)/Year	8.6
Crashes/MEV	1.1
>1 Crash/MEV	Yes
	Collision Types
Lane Change/Turning	17
Rear End	4
Angle	6
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	21
Property Damage Only (O)	6

NOTABLE CONCERNS

A number of articulated trucks from the Port of Saint Helens were observed using this road for access to US-30. Due to limited queue storage, an articulated vehicle may be unable to completely cross the tracks while waiting to access US-30. The estimated AADT of this crossing is approximately 2,700vpd. This intersection exceeds a v/c ratio of 1.0 in the PM peak hour, and is identified as being on the ODOT 2008 Top 10% SPIS List. Because of heavy traffic volumes on US-30, westbound left turning vehicles are likely to queue across the tracks during the a.m. and p.m. peak periods.

OPTIONS FOR MITIGATION

Option 1. Signalize the intersection to address both safety and operational concerns.
Option 2. Investigate safety or operational improvements at the intersection which do not involve signalization.
Option 3. Investigate whether the northbound right turn lane storage capacity can be increased.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

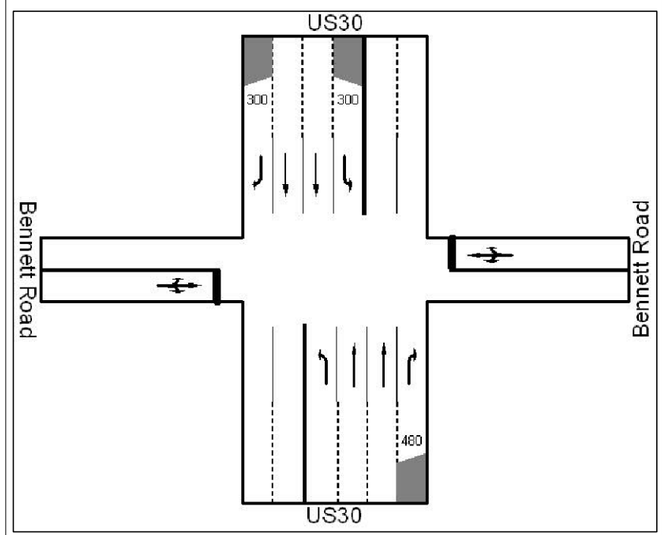

- STOP SIGN


- TRAFFIC SIGNAL

(NO SCALE)

SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (WESTBOUND)

US-30 / BENNETT ROAD
COLUMBIA RIVER RAIL CROSSING
WARREN, OREGON

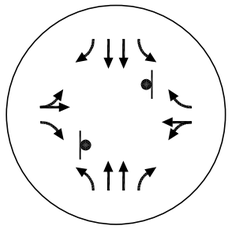
FIGURE 6

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

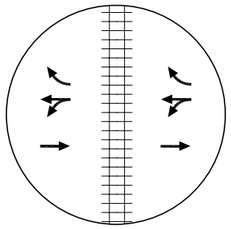
Layout Tab: Fig06
H:\profile\9464 - Lower Columbia Corridor Rail Study\dwgs\figs\9464Fig02.dwg Dec 22, 2008 - 4:19pm - mbell

Appendix 8
Millard Road

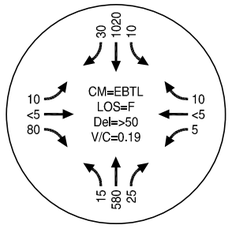
LANE CONFIGURATION



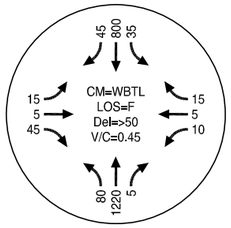
RAIL CROSSING CONFIGURATION



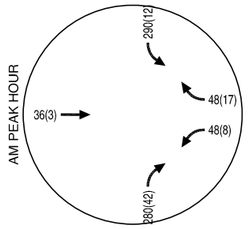
AM PEAK HOUR VOLUMES



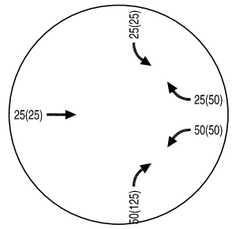
PM PEAK HOUR VOLUMES



EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)



EXISTING TRAIN EVENT DURATION
MAXIMUM = XX
UNIT TRAIN EVENT DURATION
MAXIMUM QUEUE (FT)= (XX)



Site Number #	7
Intersection Name	Millard Road
US-30 Milepoint	26.96
Intersection ODOT ID	5A-025.94
US Dot Crossing ID	057927K
Intersection Type	Unsignalized
Rail Crossing Type	Active
Number of Tracks	1
Secondary intersection	S McNulty Way
Secondary Intersection Type	Unsignalized/Stop signs
Notable Trip Generators	Port of Saint Helens
Emergency Facilities in Vicinity	n a
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	760
Sight Distance Issue Noted	Eastbound - existing approach is
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.19	0.45
Average Delay	>50	>50
Level Of Service	F	F

Crash Analysis (2002 - 2007)	
Total Crashes in period	2
Crashes per Year	0.7
Peak Hour Total Entering Vehicles	2,170
Million Entering Vehicles(MEV)/Year	7.9
Crashes/MEV	0.1
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	2
Rear End	0
Angle	0
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	0
Property Damage Only (O)	2

NOTABLE CONCERNS

The STOP sign for the southbound McNulty Way approach is obscured by a tree. The YIELD sign for Millard Road's eastbound approach is obscured (surrounded) by a tree. Pavement markings for the eastbound approach are very faint. Sight distance for the east bound approach of Millard was measured as 120 feet. There are no lane markings between US-30 and the rail crossing.

OPTIONS FOR MITIGATION

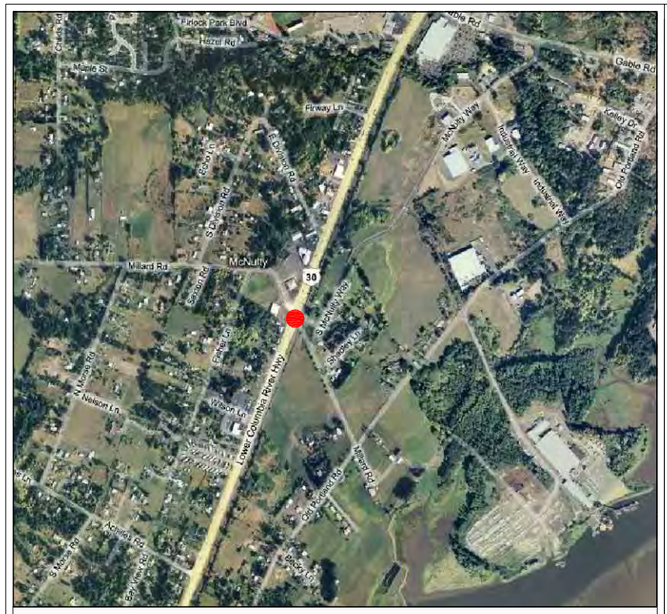
Option 1. Replace existing YIELD sign on eastbound approach with STOP sign, restripe stop line, and remove vegetation obstructing sight distance.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

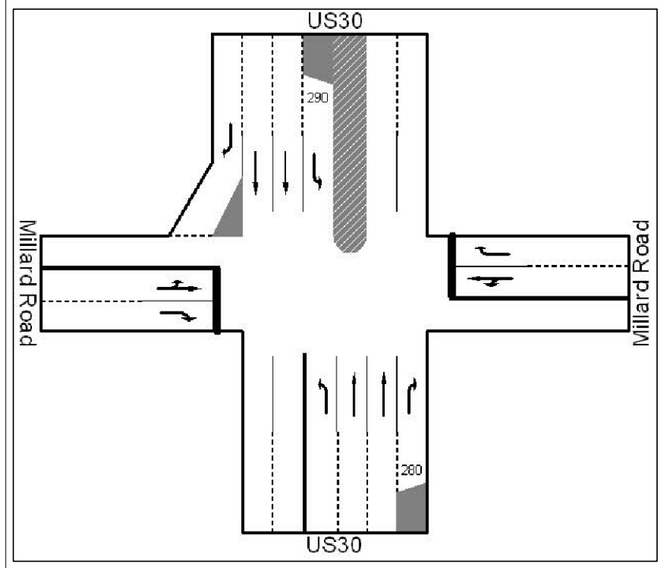
- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)



SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

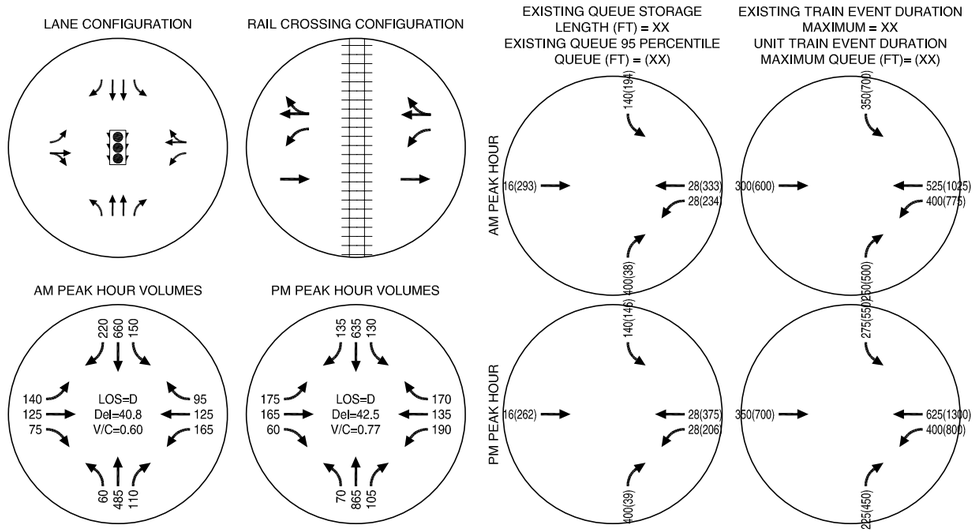
PHOTOGRAPH OF SITE (WESTBOUND)

US-30 / MILLARD ROAD
COLUMBIA RIVER RAIL CROSSING
MCNULTY, OREGON

FIGURE 7

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Appendix 9
Gable Road



Site Number #	8
Intersection Name	Gable Road
US-30 Milepoint	27.69
Intersection ODOT ID	5A-026.70
US Dot Crossing ID	057930T
Intersection Type	Signalized
Rail Crossing Type	Active
Number of Tracks	1
Secondary intersection	None
Secondary Intersection Type	N/A
Notable Trip Generators	Commercial centre access of Gable
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	Yes
Estimated AADT (vpd)	8,910
Sight Distance Issue Noted	na
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.6	0.77
Average Delay	40.8	42.5
Level Of Service	D	D

Crash Analysis (2002 - 2007)	
Total Crashes in period	42
Crashes per Year	14.0
Peak Hour Total Entering Vehicles	2,747
Million Entering Vehicles(MEV)/Year	10.0
Crashes/MEV	1.4
>1 Crash/MEV	Yes
	Collision Types
Lane Change/Turning	15
Rear End	14
Angle	13
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	21
Property Damage Only (O)	21

NOTABLE CONCERNS

No safety concerns were noted at this site. This intersection is identified as being on the ODOT 2008 Top 10% SPIS List. Queuing of the southbound left turn was identified as an issue, however as there is a two way left turn lane in this location additional queuing capacity exists, but queues may affect access and egress to driveways - queuing up to 560 feet beyond the available capacity (but within the two way left turn lane). Due to the conservative nature of this analysis it is considered that the risks associated with impacts to local driveway access and egress are low. During the unit train event, the queues may exceed the northbound right turn lane storage capacity by 100 feet.

OPTIONS FOR MITIGATION

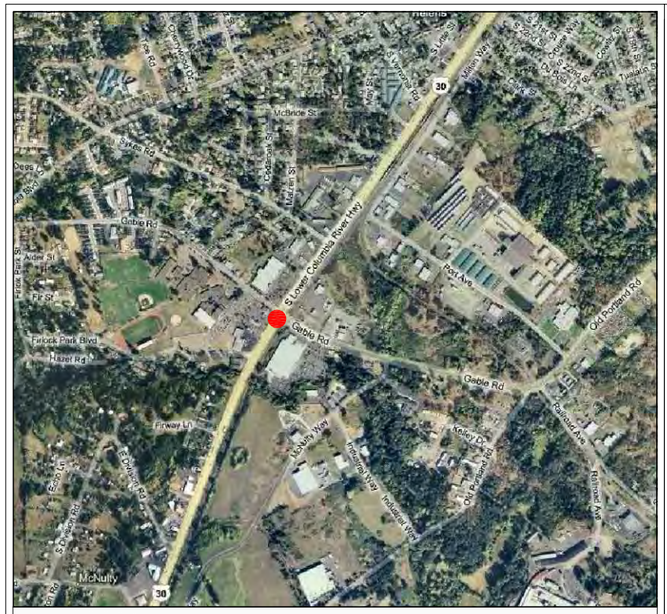
Option 1. Investigate whether the northbound right turn lane storage capacity can be increased.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

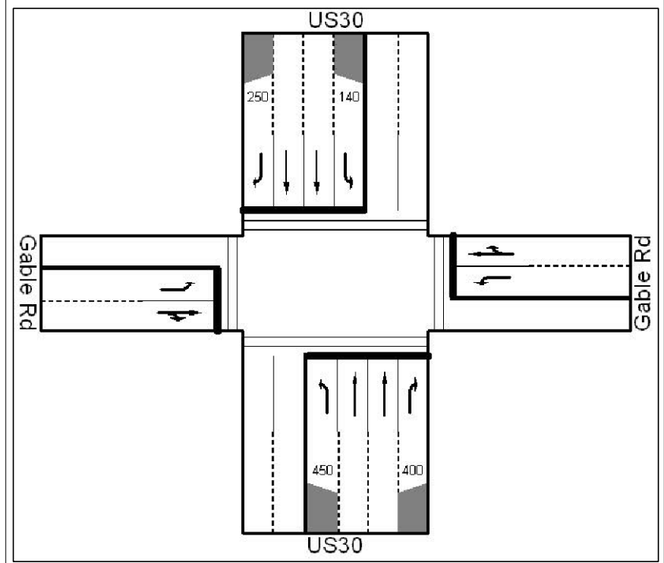
- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)



SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

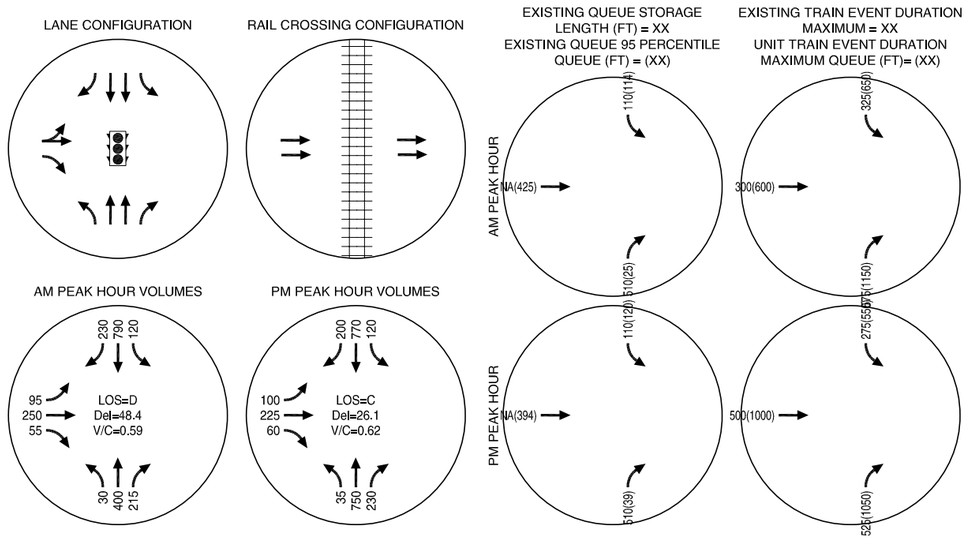
PHOTOGRAPH OF SITE (WESTBOUND)

US-30 / GABLE ROAD
COLUMBIA RIVER RAIL CROSSING
WEST SAINT HELENS, OREGON

FIGURE 8

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Appendix 10
Columbia Boulevard



Site Number #	9
Intersection Name	Columbia Boulevard
US-30 Milepoint	28.56
Intersection ODOT ID	5A-027.50
US Dot Crossing ID	057932G
Intersection Type	Signalized
Rail Crossing Type	Active
Number of Tracks	1
Secondary intersection	Milton Way
Secondary Intersection Type	Unsignalized
Notable Trip Generators	City of Saint Helens
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	yes
Estimated AADT (vpd)	5,780
Sight Distance Issue Noted	na
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.59	0.62
Average Delay	48.4	26.1
Level Of Service	D	C

Crash Analysis (2002 - 2007)	
Total Crashes in period	6
Crashes per Year	2.0
Peak Hour Total Entering Vehicles	2,410
Million Entering Vehicles(MEV)/Year	8.8
Crashes/MEV	0.2
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	0
Rear End	4
Angle	2
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	2
Property Damage Only (O)	4

NOTABLE CONCERNS

No safety concerns were noted at this site.

OPTIONS FOR MITIGATION

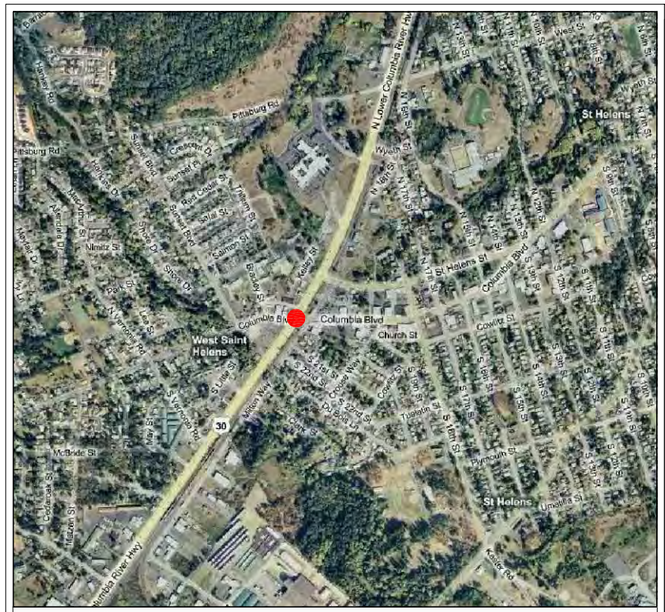
Option 1. Investigate whether the northbound right turn lane storage capacity can be increased.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

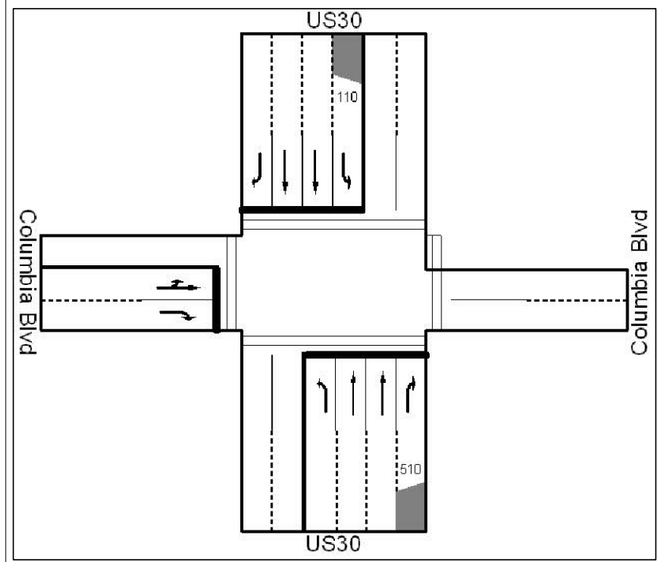
- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)



SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (WESTBOUND)

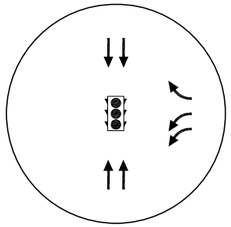
US-30 / COLUMBIA BOULEVARD
COLUMBIA RIVER RAIL CROSSING
WEST SAINT HELENS, OREGON

FIGURE 9

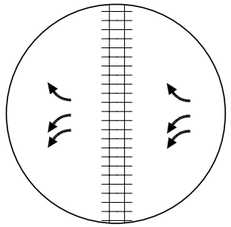
KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Appendix 11
St. Helens Road

LANE CONFIGURATION

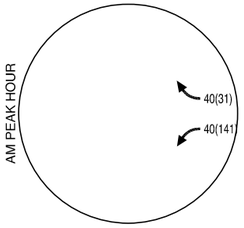


RAIL CROSSING CONFIGURATION

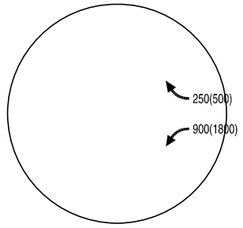


EXISTING QUEUE STORAGE
LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE
QUEUE (FT) = (XX)

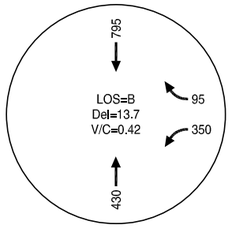
AM PEAK HOUR



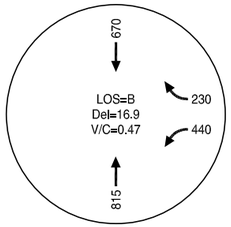
EXISTING TRAIN EVENT DURATION
MAXIMUM = XX
UNIT TRAIN EVENT DURATION
MAXIMUM QUEUE (FT)= (XX)



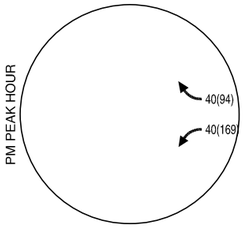
AM PEAK HOUR VOLUMES

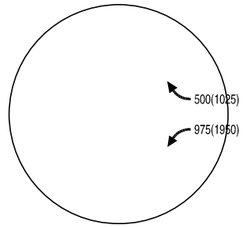


PM PEAK HOUR VOLUMES



PM PEAK HOUR





Site Number #	10
Intersection Name	St. Helens Road
US-30 Milepoint	28.67
Intersection ODOT ID	5A-027.60
US Dot Crossing ID	057938X
Intersection Type	Signalized
Rail Crossing Type	Active
Number of Tracks	1
Secondary intersection	N Milton Way
Secondary Intersection Type	Unsignalized
Notable Trip Generators	City of Saint Helens
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	Yes
Estimated AADT (vpd)	6,730
Sight Distance Issue Noted	na
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.42	0.47
Average Delay	13.7	16.9
Level Of Service	B	B

Crash Analysis (2002 - 2007)	
Total Crashes in period	10
Crashes per Year	3.3
Peak Hour Total Entering Vehicles	2,072
Million Entering Vehicles(MEV)/Year	7.6
Crashes/MEV	0.4
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	6
Rear End	0
Angle	4
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	4
Property Damage Only (O)	6

NOTABLE CONCERNS

Pavement marking on N Milton Way could be improved to indicate that Saint Helens Road is one way. No significant safety concerns with site were noted.

OPTIONS FOR MITIGATION

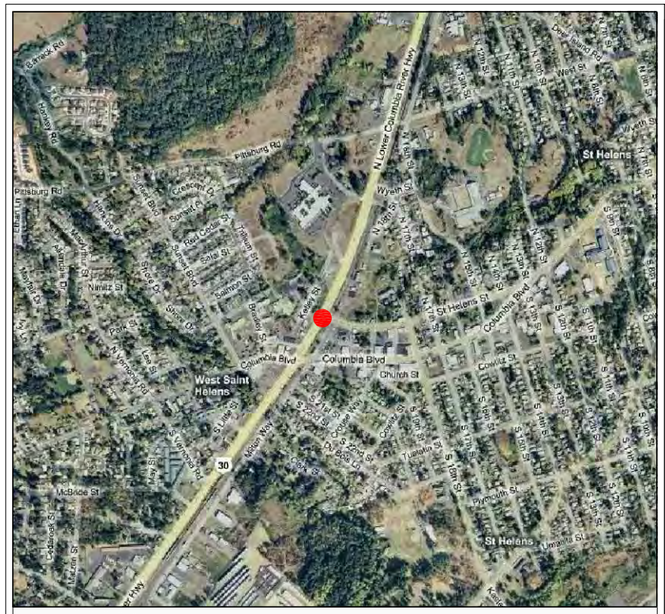
Option 1. Add pavement marking on N Milton Way approach to Saint Helens Road to indicate left through movement only.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

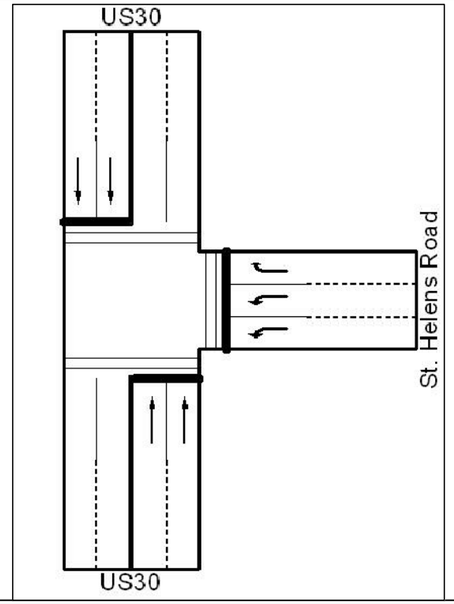
- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)



SITE VICINITY

AERIAL OF INTERSECTION



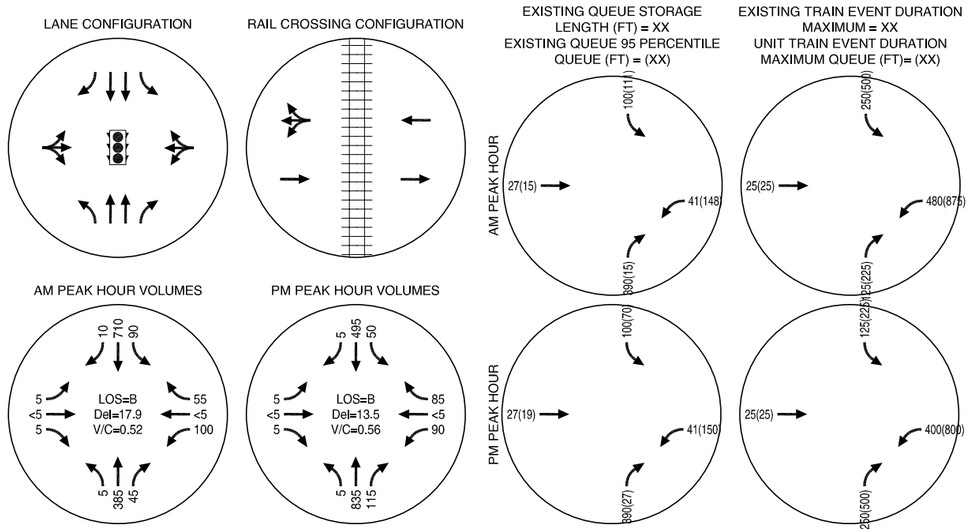
EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (WESTBOUND)

US-30 / SAINT HELENS ROAD
COLUMBIA RIVER RAIL CROSSING
SAINT HELENS, OREGON

FIGURE 10

Appendix 12
Deer Island Road



Site Number #	11
Intersection Name	Deer Island Road
US-30 Milepoint	29.42
Intersection ODOT ID	5A-028.40
US Dot Crossing ID	057943U
Intersection Type	Signalized
Rail Crossing Type	Active
Number of Tracks	2
Secondary intersection	Oregon St
Secondary Intersection Type	Unsignalized/Stop signs
Notable Trip Generators	City of Saint Helens
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	Yes
Estimated AADT (vpd)	3,430
Sight Distance Issue Noted	0
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.52	0.56
Average Delay	17.9	13.5
Level Of Service	B	B

Crash Analysis (2002 - 2007)	
Total Crashes in period	4
Crashes per Year	1.3
Peak Hour Total Entering Vehicles	1,624
Million Entering Vehicles(MEV)/Year	5.9
Crashes/MEV	0.2
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	2
Rear End	2
Angle	0
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	2
Property Damage Only (O)	2

NOTABLE CONCERNS

The current traffic controls are set up for a second defunct rail crossing that formed a siding into industrial premises. As the second crossing is now defunct, the complexity of the current railroad crossing traffic control features could be reduced.

OPTIONS FOR MITIGATION

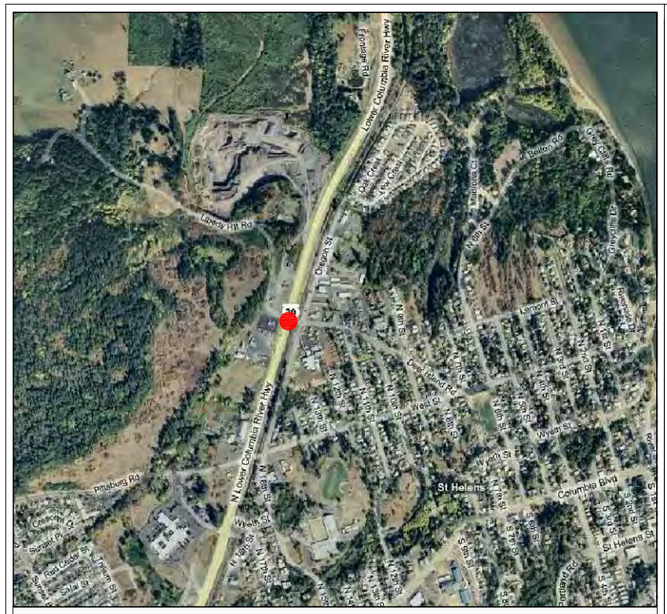
Option 1. Remove defunct rail line and restripe the intersection of Deer Island Road/Oregon Road.
Option 2. Move the active rail crossing control closer to the grade crossing. This will provide more storage on Deer Island Road (westbound) and prevent obstruction of Deer Island Road during rail crossings.
Option 3. Investigate whether the northbound right turn lane storage capacity can be increased.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

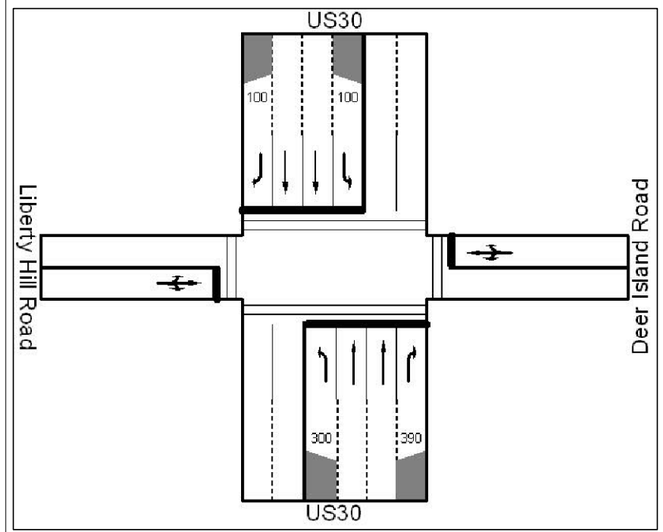
- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)



SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (WESTBOUND)

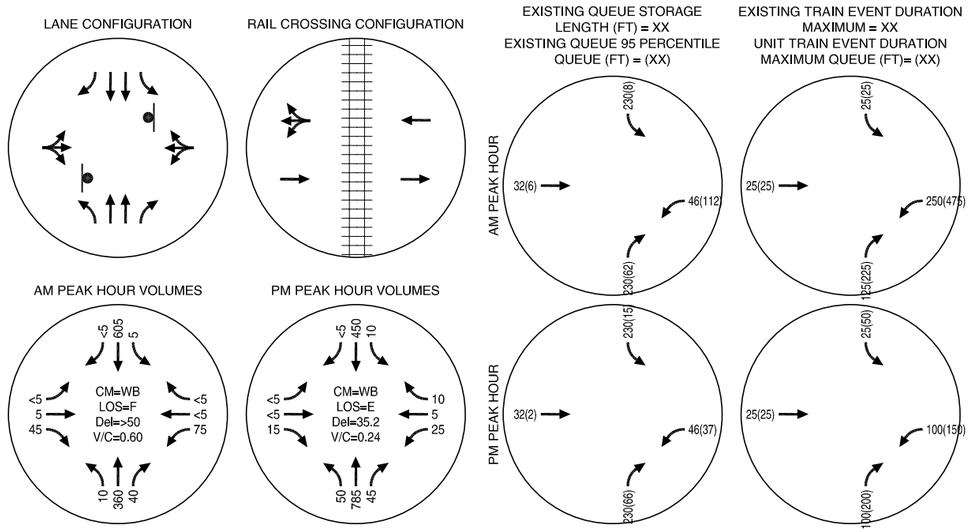
US-30 / DEER ISLAND ROAD
COLUMBIA RIVER RAIL CROSSING
ST HELENS, OREGON

FIGURE 11

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Layout Tab: Fig11
Dec 22, 2008 - 4:20pm - mbell
H:\profile\9464 - Lower Columbia Corridor Rail Study\dwgs\figs\9464Fig02.dwg

Appendix 13
I Street



Site Number #	12
Intersection Name	I Street
US-30 Milepoint	30.75
Intersection ODOT ID	5A-029.80
US Dot Crossing ID	057946P
Intersection Type	Unsignalized
Rail Crossing Type	Active
Number of Tracks	1
Secondary intersection	4th Street
Secondary Intersection Type	Unsignalized/Stop signs
Notable Trip Generators	Columbia City Residential Traffic
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	890
Sight Distance Issue Noted	0
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.6	0.24
Average Delay	>50	35.2
Level Of Service	F	E

Crash Analysis (2002 - 2007)	
Total Crashes in period	4
Crashes per Year	1.3
Peak Hour Total Entering Vehicles	1,319
Million Entering Vehicles(MEV)/Year	4.8
Crashes/MEV	0.3
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	2
Rear End	0
Angle	2
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	2
Property Damage Only (O)	2

NOTABLE CONCERNS

The intersection layout of I Street and 4th Street is confusing as there is a crosswalk on I street at the intersection with 4th but there are no sidewalks on either street. There is a significant uphill grade approaching US-30.

OPTIONS FOR MITIGATION

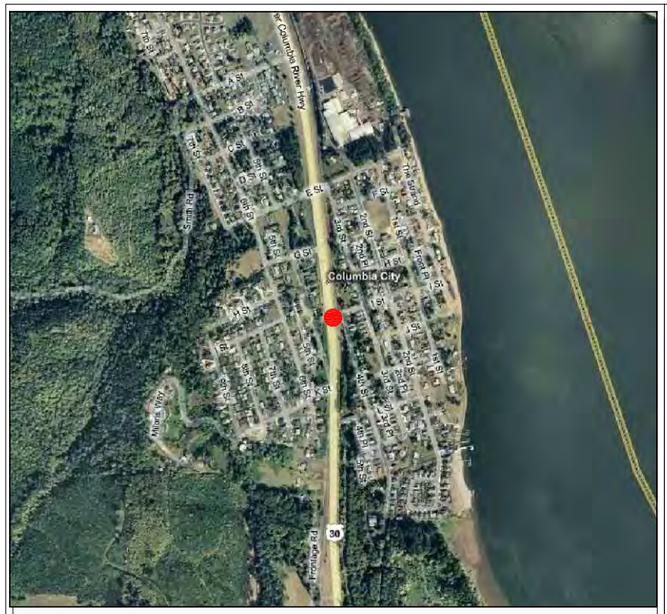
Option 1. Remove crosswalk markings and restripe intersection appropriately.
Option 2. Consider adding an emergency right turn bay for vehicles that are unable to enter US-30 before an approaching train arrives.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

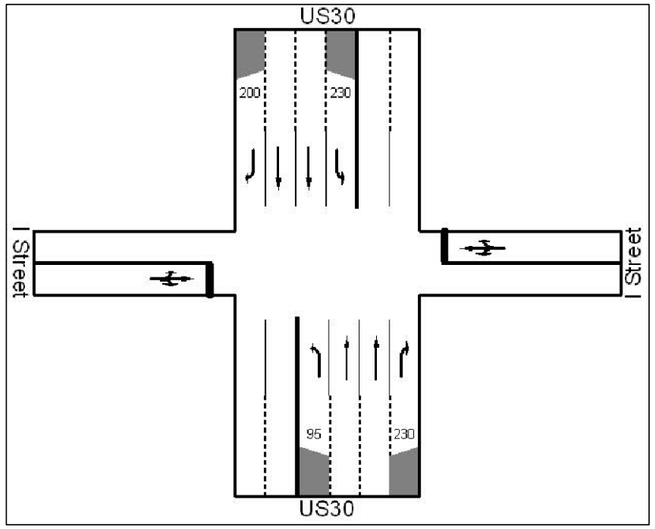
- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)



SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

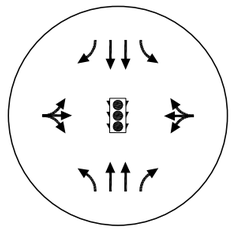
PHOTOGRAPH OF SITE (WESTBOUND)

US-30 / I STREET
COLUMBIA RIVER RAIL CROSSING
COLUMBIA CITY, OREGON

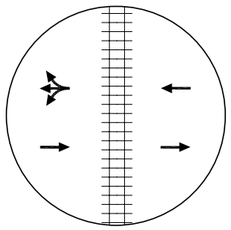
FIGURE 12

Appendix 14
E Street

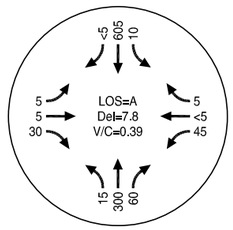
LANE CONFIGURATION



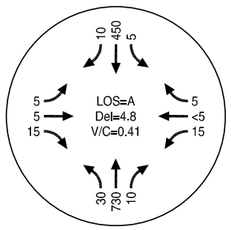
RAIL CROSSING CONFIGURATION



AM PEAK HOUR VOLUMES

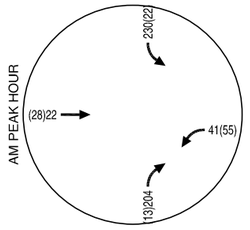


PM PEAK HOUR VOLUMES

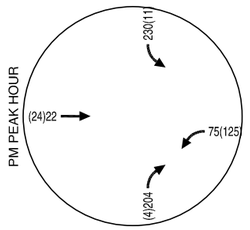


EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)

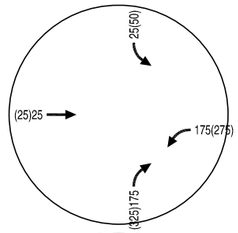
AM PEAK HOUR

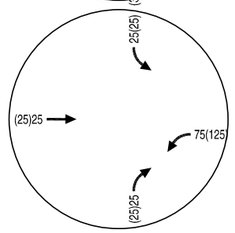


PM PEAK HOUR



EXISTING TRAIN EVENT DURATION
MAXIMUM = XX
UNIT TRAIN EVENT DURATION
MAXIMUM QUEUE (FT)= (XX)





Site Number #	13
Intersection Name	E Street
US-30 Milepoint	31.02
Intersection ODOT ID	5A-030.00
US Dot Crossing ID	057947W
Intersection Type	Signalized
Rail Crossing Type	Active
Number of Tracks	1
Secondary intersection	3rd Street
Secondary Intersection Type	Unsignalized/Stop signs
Notable Trip Generators	Port of Saint Helens, Columbia City
Emergency Facilities in Vicinity	n a
Pedestrian Facilities at Crossing	0
Estimated AADT (vpd)	390
Sight Distance Issue Noted	0
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.39	0.41
Average Delay	7.8	4.8
Level Of Service	A	A

Crash Analysis (2002 - 2007)	
Total Crashes in period	5
Crashes per Year	1.7
Peak Hour Total Entering Vehicles	1,213
Million Entering Vehicles(MEV)/Year	4.4
Crashes/MEV	0.4
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	0
Rear End	5
Angle	0
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	3
Property Damage Only (O)	2

NOTABLE CONCERNS

No safety concerns were noted at this site.

OPTIONS FOR MITIGATION

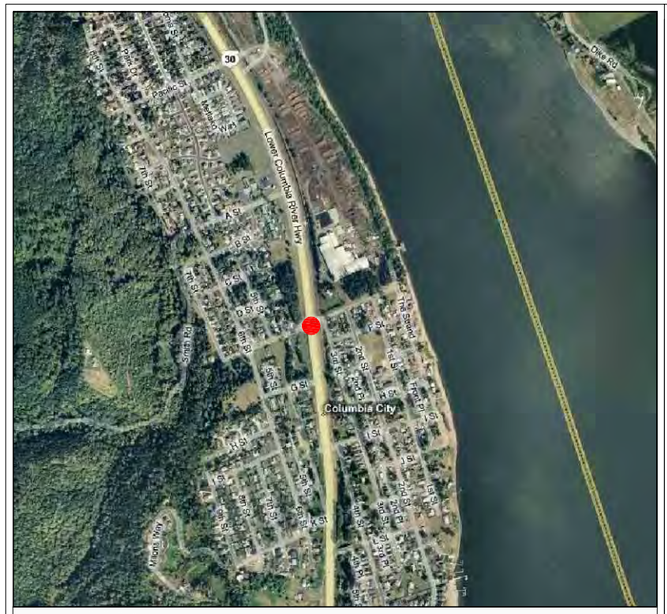
No recommendation required.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

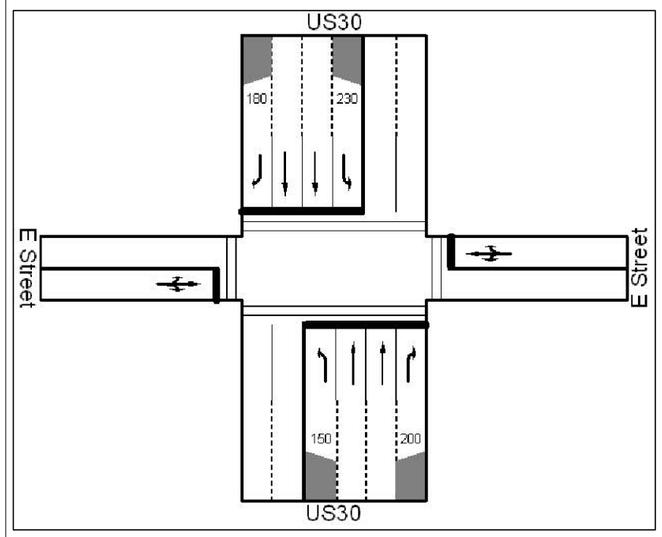
- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)



SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

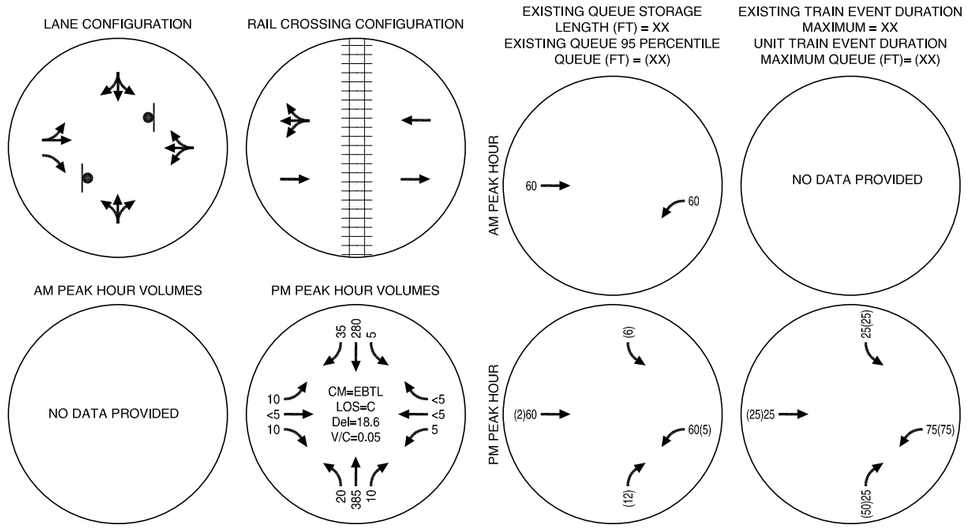
PHOTOGRAPH OF SITE (EASTBOUND)

US-30 / E STREET
COLUMBIA RIVER RAIL CROSSING
COLUMBIA CITY, OREGON

FIGURE 13

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Appendix 15
Nicolai Road/Goble RV Access



Site Number #	14
Intersection Name	Nicolai Road/Goble RV access
US-30 Milepoint	40.47
Intersection ODOT ID	0
US Dot Crossing ID	0
Intersection Type	Unsignalized
Rail Crossing Type	Passive
Number of Tracks	1
Secondary intersection	None
Secondary Intersection Type	N/A
Notable Trip Generators	Quarry , RV Park
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	190
Sight Distance Issue Noted	0
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	NA	0.05
Average Delay	NA	18.6
Level Of Service	NA	C

Crash Analysis (2002 - 2007)	
Total Crashes in period	11
Crashes per Year	3.7
Peak Hour Total Entering Vehicles	719
Million Entering Vehicles(MEV)/Year	2.6
Crashes/MEV	1.4
>1 Crash/MEV	Yes
	Collision Types
Lane Change/Turning	7
Rear End	2
Angle	2
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	11
Property Damage Only (O)	0

NOTABLE CONCERNS

This is a STOP-controlled rail grade crossing which provides access and egress to an RV park and a quarry. The intersection is unsignalized and the storage distance between US-30 and the rail crossing is 60 feet. Due to the high number of long and slow moving heavy vehicles (such as SUVs towing trailers) using this intersection, there is a concern that vehicles may queue across the rail crossing or make an inappropriate turning movement onto US-30 to avoid an approaching train. The signage and pavement markings at the rail grade crossing are generally deficient.

OPTIONS FOR MITIGATION

Option 1 Consider adding an emergency right turn bay for vehicles that are unable to enter US-30 before an approaching train arrives.
Option 2. Increase the separation distance between US-30 and the rail crossing.

LEGEND

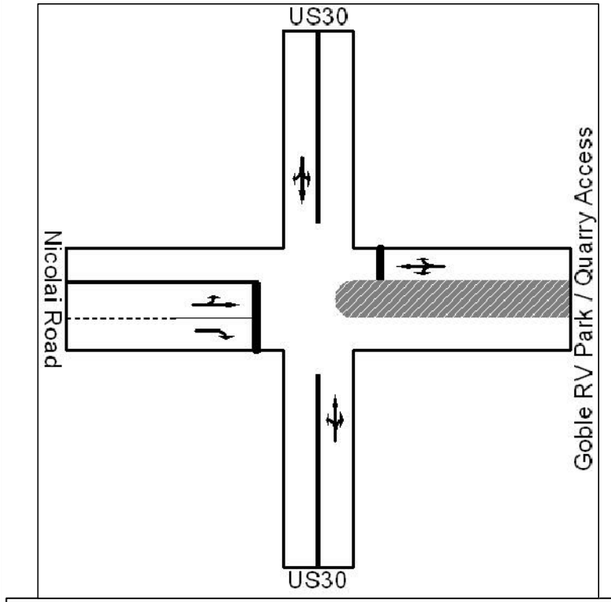
CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)

SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (SOUTHBOUND)

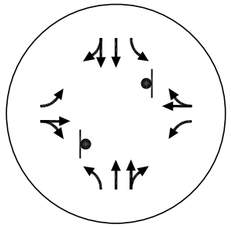
US-30 / NICOLAI ROAD
COLUMBIA RIVER RAIL CROSSING
GOBLE, OREGON

FIGURE 14

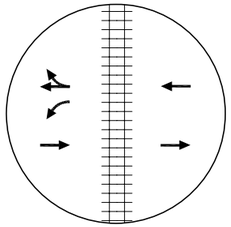
KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Appendix 16
Veterans Way

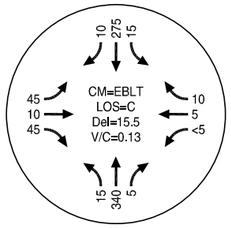
LANE CONFIGURATION



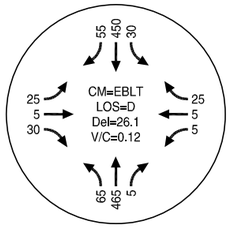
RAIL CROSSING CONFIGURATION



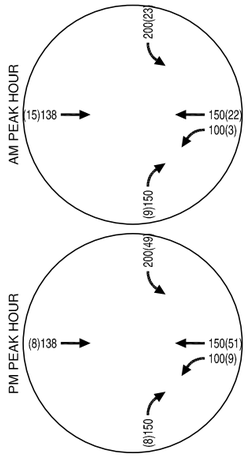
AM PEAK HOUR VOLUMES



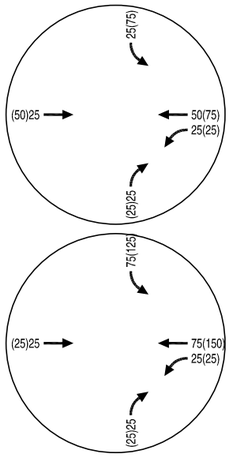
PM PEAK HOUR VOLUMES



EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)



EXISTING TRAIN EVENT DURATION MAXIMUM = XX
UNIT TRAIN EVENT DURATION MAXIMUM QUEUE (FT)= (XX)



Site Number #	15
Intersection Name	Veterans Way
US-30 Milepoint	47.34
Intersection ODOT ID	5A-046.17
US Dot Crossing ID	916561W
Intersection Type	Unsignalised
Rail Crossing Type	Active
Number of Tracks	1
Secondary intersection	0
Secondary Intersection Type	0
Notable Trip Generators	Recreational Parks
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	Yes
Estimated AADT (vpd)	810
Sight Distance Issue Noted	0
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	0.13	0.12
Average Delay	15.5	26.1
Level Of Service	C	D

Crash Analysis (2002 - 2007)	
Total Crashes in period	4
Crashes per Year	1.3
Peak Hour Total Entering Vehicles	1,114
Million Entering Vehicles(MEV)/Year	4.1
Crashes/MEV	0.3
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	2
Rear End	0
Angle	2
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	0
Property Damage Only (O)	4

NOTABLE CONCERNS

No safety concerns were noted at this site.

OPTIONS FOR MITIGATION

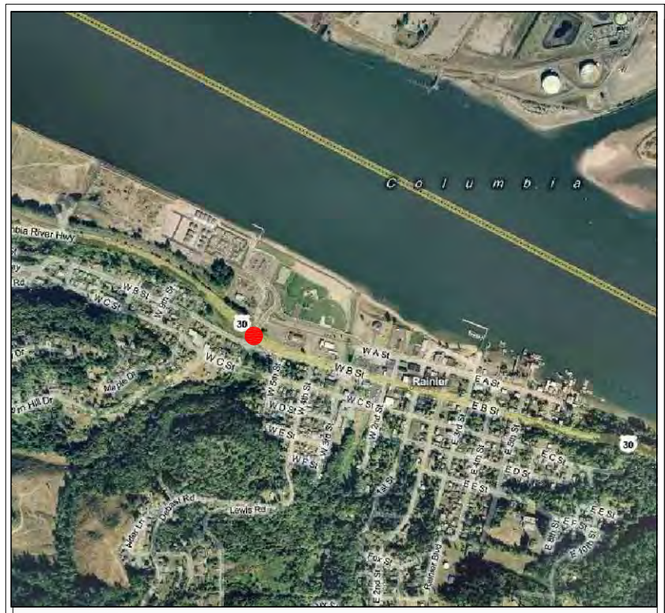
No recommendation made during site inspection

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

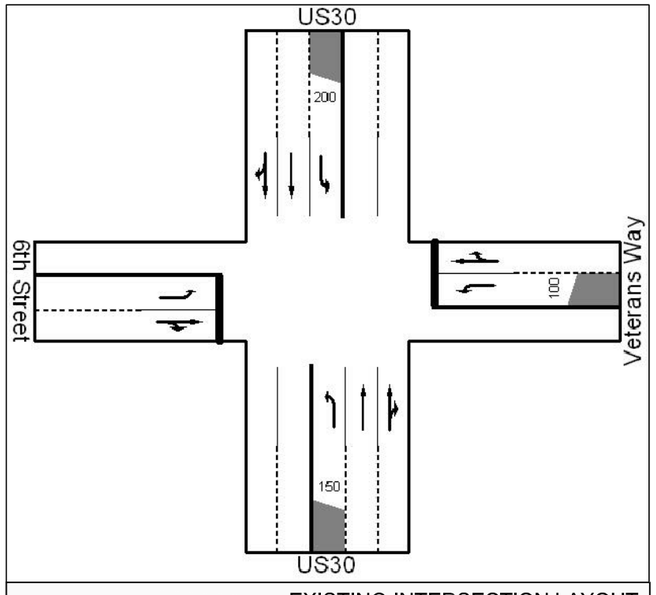
- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)



SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

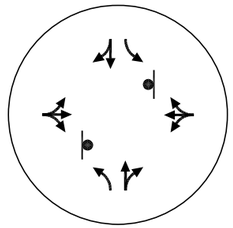
PHOTOGRAPH OF SITE (WESTBOUND)

US-30 / VETERANS WAY
COLUMBIA RIVER RAIL CROSSING
RAINIER, OREGON

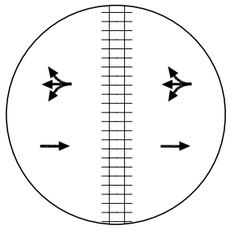
FIGURE 15

Appendix 17
Marshall District Road, South

LANE CONFIGURATION

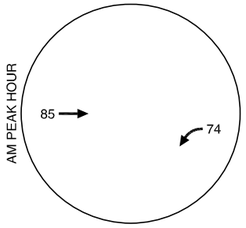


RAIL CROSSING CONFIGURATION

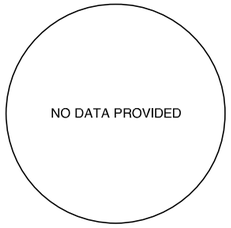


EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)

AM PEAK HOUR

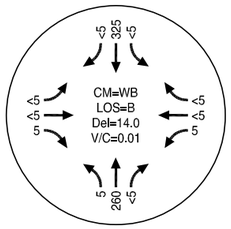


EXISTING TRAIN EVENT DURATION MAXIMUM = XX
UNIT TRAIN EVENT DURATION MAXIMUM QUEUE (FT)= (XX)

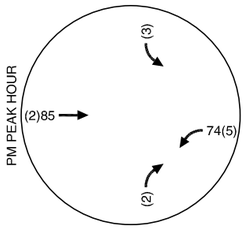


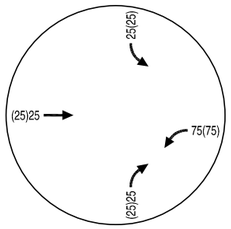
AM PEAK HOUR VOLUMES

PM PEAK HOUR VOLUMES



PM PEAK HOUR





Site Number #	16
Intersection Name	arshland District Road / Schroeder Ros
US-30 Milepoint	65.99
Intersection ODOT ID	5A-066.60
US Dot Crossing ID	058012H
Intersection Type	Unsignalized
Rail Crossing Type	Passive
Number of Tracks	1
Secondary intersection	Hanhi Dr
Secondary Intersection Type	Unsignalized/Stop signs
Notable Trip Generators	na
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	90
Sight Distance Issue Noted	0
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	NA	0.01
Average Delay	NA	14
Level Of Service	NA	B

Crash Analysis (2002 - 2007)	
Total Crashes in period	0
Crashes per Year	0.0
Peak Hour Total Entering Vehicles	572
Million Entering Vehicles(MEV)/Year	2.1
Crashes/MEV	0.0
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	0
Rear End	0
Angle	0
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	0
Property Damage Only (O)	0

NOTABLE CONCERNS

Tall vegetation parallels the rail in this location. As the Marshland Road approach to the rail crossing runs parallel to the line and makes a sharp horizontal curve to approach the rail crossing, the sight distance in this location is a concern. No center line on the approach to US-30 is provided which may cause vehicles to verge into the opposing lane. There is no lighting at the intersection or rail crossing.

OPTIONS FOR MITIGATION

Option 1. Improve the alignment of Marshland Road approaching the rail crossing to improve approach sight distance.
Option 2. Provide rail crossing warning signs on Marshland Road to let drivers know they are approaching a rail crossing.
Option 3. Remove vegetation that is blocking sight distance at the rail crossing.
Option 4 Add lighting and improve pavement markings at the intersection with US-30.

LEGEND

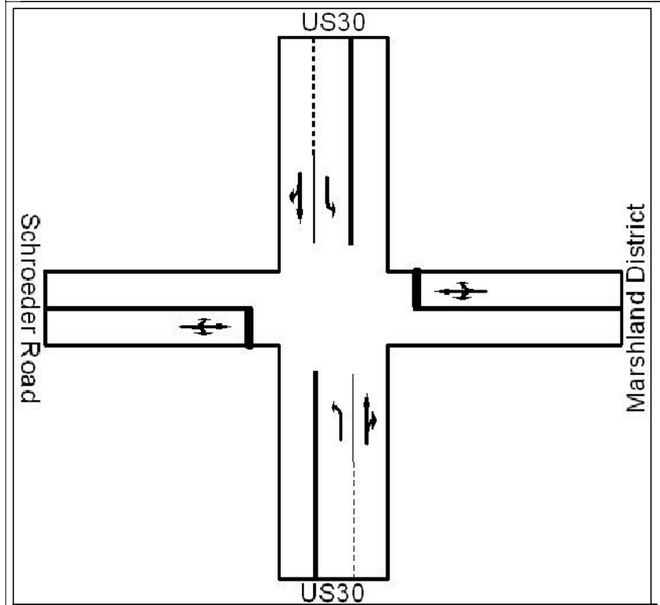
CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)

SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

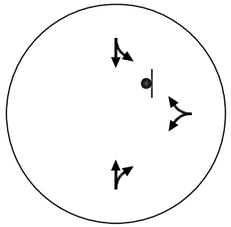
PHOTOGRAPH OF SITE (WESTBOUND)

US-30 /MARSHLAND ROAD/ SCHROEDER ROAD
COLUMBIA RIVER RAIL CROSSING
COLUMBIA COUNTY, OREGON

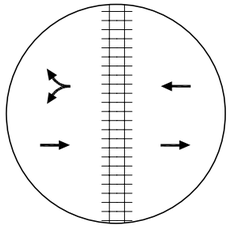
FIGURE 16

Appendix 18
Marshall District Road,
North

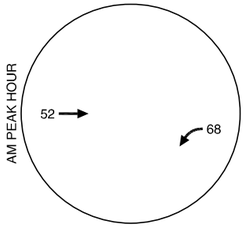
LANE CONFIGURATION



RAIL CROSSING CONFIGURATION



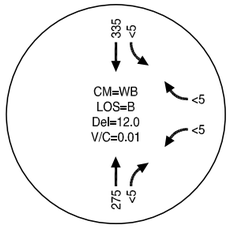
EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)

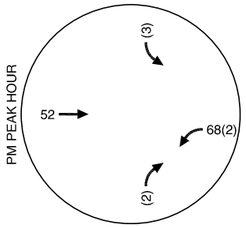


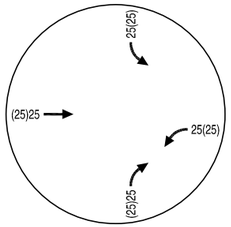
EXISTING TRAIN EVENT DURATION MAXIMUM = XX
UNIT TRAIN EVENT DURATION MAXIMUM QUEUE (FT)= (XX)

AM PEAK HOUR VOLUMES

PM PEAK HOUR VOLUMES







Site Number #	17
Intersection Name	Marshland District Road
US-30 Milepoint	67.84
Intersection ODOT ID	5A-068.37
US Dot Crossing ID	058016K
Intersection Type	Unsignalized
Rail Crossing Type	Passive
Number of Tracks	1
Secondary intersection	None
Secondary Intersection Type	N/A
Notable Trip Generators	na
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	50
Sight Distance Issue Noted	0
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	NA	0.01
Average Delay	NA	12
Level Of Service	NA	B

Crash Analysis (2002 - 2007)	
Total Crashes in period	10
Crashes per Year	3.3
Peak Hour Total Entering Vehicles	580
Million Entering Vehicles(MEV)/Year	2.1
Crashes/MEV	1.6
>1 Crash/MEV	Yes
	Collision Types
Lane Change/Turning	4
Rear End	6
Angle	0
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	10
Property Damage Only (O)	0

NOTABLE CONCERNS

STOP sign is missing from the approach to US-30. The grade crossing material in the rail crossing consists of wood and dirt. Erosion of the material is likely to occur and a vehicle may become stuck in the tracks.

OPTIONS FOR MITIGATION

Option 1. Install STOP sign on approach to US-30.
Option 2. Replace grade crossing material with concrete or asphalt

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

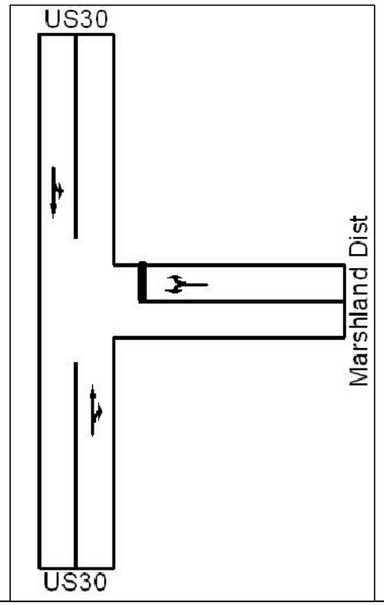

- STOP SIGN

- TRAFFIC SIGNAL

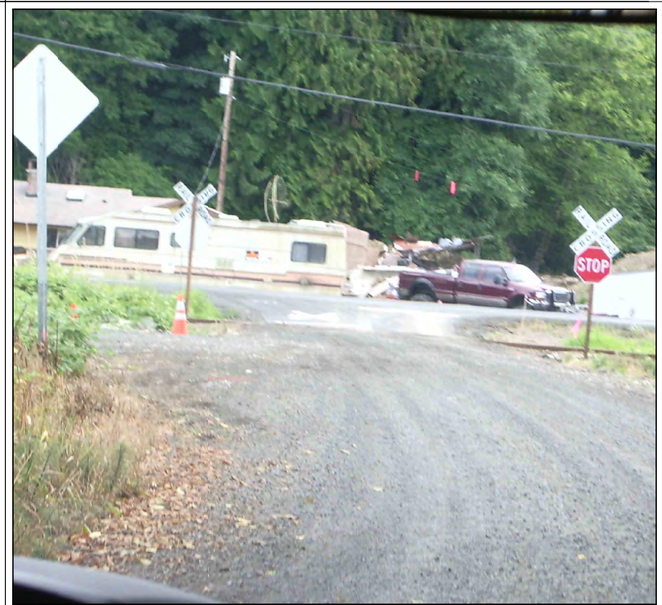
(NO SCALE)

SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT



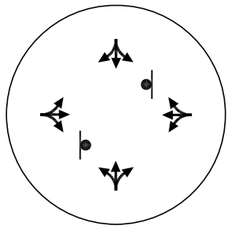
PHOTOGRAPH OF SITE (WESTBOUND)

US-30 / MARSHLAND ROAD
COLUMBIA RIVER RAIL CROSSING
MARSHLAND, OREGON

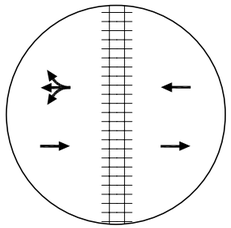
FIGURE 17

Appendix 19
Woodson Road

LANE CONFIGURATION

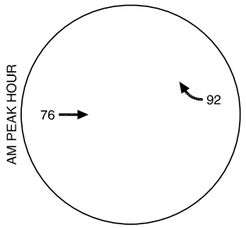


RAIL CROSSING CONFIGURATION

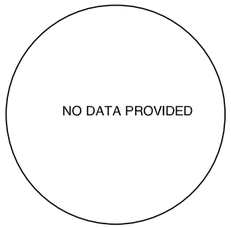


EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)

AM PEAK HOUR

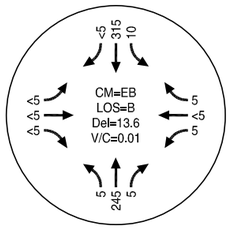


EXISTING TRAIN EVENT DURATION MAXIMUM = XX
UNIT TRAIN EVENT DURATION MAXIMUM QUEUE (FT)= (XX)

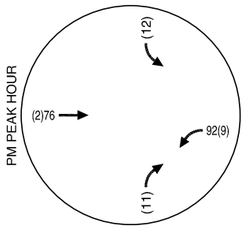


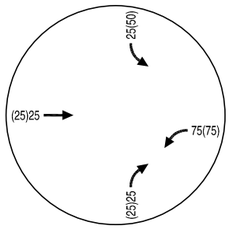
AM PEAK HOUR VOLUMES

PM PEAK HOUR VOLUMES



PM PEAK HOUR





Site Number #	18
Intersection Name	Woodson Road
US-30 Milepoint	67.95
Intersection ODOT ID	5A-068.50
US Dot Crossing ID	058017S
Intersection Type	Unsignalized
Rail Crossing Type	Passive
Number of Tracks	1
Secondary intersection	None
Secondary Intersection Type	N/A
Notable Trip Generators	na
Emergency Facilities in Vicinity	na
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	320
Sight Distance Issue Noted	0
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	NA	0.01
Average Delay	NA	13.6
Level Of Service	NA	B

Crash Analysis (2002 - 2007)	
Total Crashes in period	0
Crashes per Year	0.0
Peak Hour Total Entering Vehicles	563
Million Entering Vehicles(MEV)/Year	2.1
Crashes/MEV	0.0
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	0
Rear End	0
Angle	0
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	0
Property Damage Only (O)	0

NOTABLE CONCERNS

US-30 is a two-lane cross section in this location. Due to the proximity of the rail crossing to the intersection, during a train event a turning vehicle may block traffic on US-30 until the train passes (this could occur for either a left or right turn). Some pavement markings and signage are deficient at this intersection .

OPTIONS FOR MITIGATION

Option 1. Install short left and right turn lanes on US-30 to get vehicles that are waiting for a train to pass out of the through lanes.
Option 2. Provide a gravel parking bay along US-30 so vehicles can be moved out of the through traffic while waiting for a train to pass.
Option 3. Improve the signage and pavement markings at the rail grade crossing.

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

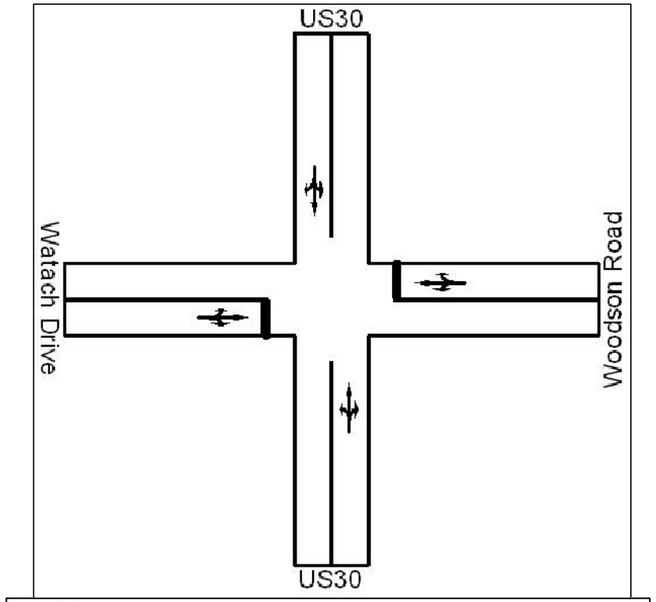
- STOP SIGN

- TRAFFIC SIGNAL

(NO SCALE)

SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

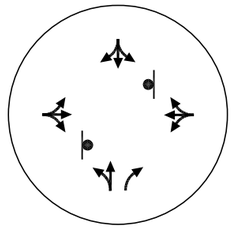
PHOTOGRAPH OF SITE (WESTBOUND)

US-30 / WOODSON ROAD
COLUMBIA RIVER RAIL CROSSING
MARSHLAND, OREGON

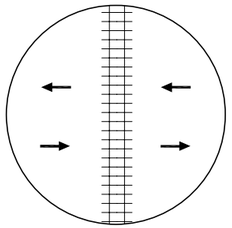
FIGURE 18

Appendix 20
Old Mill Town Road

LANE CONFIGURATION



RAIL CROSSING CONFIGURATION



EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)

EXISTING TRAIN EVENT DURATION MAXIMUM = XX
UNIT TRAIN EVENT DURATION MAXIMUM QUEUE (FT)= (XX)

AM PEAK HOUR

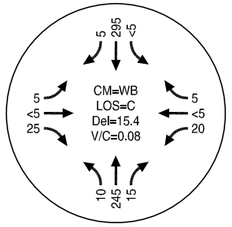
NO DATA PROVIDED

NO DATA PROVIDED

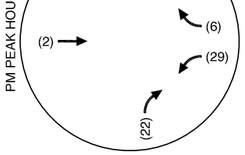
AM PEAK HOUR VOLUMES

NO DATA PROVIDED

PM PEAK HOUR VOLUMES



PM PEAK HOUR



NO DATA PROVIDED

Site Number #	19
Intersection Name	Old Mill Town Road
US-30 Milepoint	70.46
Intersection ODOT ID	5A-071 20
US Dot Crossing ID	058020A
Intersection Type	Unsignalized
Rail Crossing Type	Passive
Number of Tracks	1
Secondary intersection	None
Secondary Intersection Type	N/A
Notable Trip Generators	Westport, Service Station
Emergency Facilities in Vicinity	Volunteer Fire Service
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	380
Sight Distance Issue Noted	0
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	NA	0.08
Average Delay	NA	15.4
Level Of Service	NA	C

Crash Analysis (2002 - 2007)	
Total Crashes in period	0
Crashes per Year	0.0
Peak Hour Total Entering Vehicles	585
Million Entering Vehicles(MEV)/Year	2.1
Crashes/MEV	0.0
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	0
Rear End	0
Angle	0
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	0
Property Damage Only (O)	0

NOTABLE CONCERNS

Vegetation on US-30 restricts the sight distance for the Westbound Left Turn onto US-30. No safety concerns associated with the rail crossing were identified.

OPTIONS FOR MITIGATION

Option 1. Remove vegetation on US-30 to improve sight distance for westbound left turners.

LEGEND

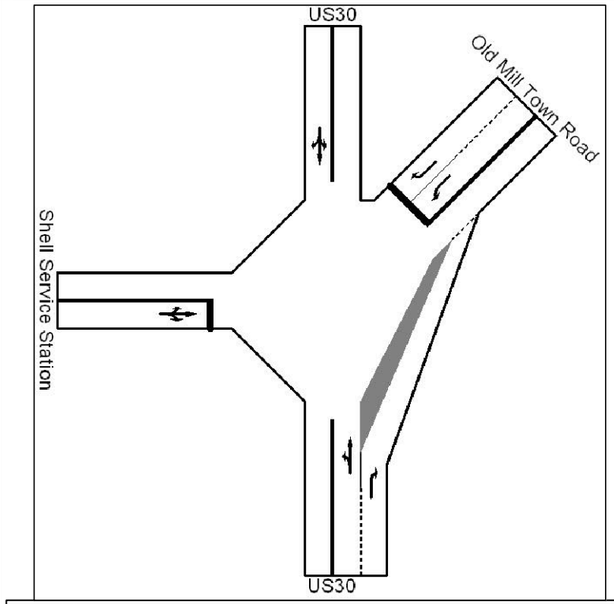
CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)

SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (WESTBOUND)

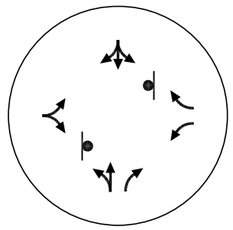
US-30 / OLD MILL TOWN ROAD
COLUMBIA RIVER RAIL CROSSING
WESTPORT, OREGON

FIGURE 19

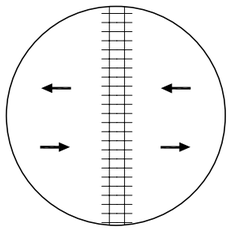
KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Appendix 21
Westport Ferry Road

LANE CONFIGURATION



RAIL CROSSING CONFIGURATION



EXISTING QUEUE STORAGE LENGTH (FT) = XX
EXISTING QUEUE 95 PERCENTILE QUEUE (FT) = (XX)

AM PEAK HOUR

NO DATA PROVIDED

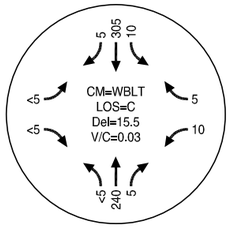
EXISTING TRAIN EVENT DURATION MAXIMUM = XX
UNIT TRAIN EVENT DURATION MAXIMUM QUEUE (FT)= (XX)

NO DATA PROVIDED

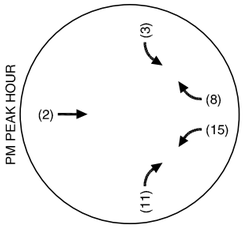
AM PEAK HOUR VOLUMES

NO DATA PROVIDED

PM PEAK HOUR VOLUMES



PM PEAK HOUR



NO DATA PROVIDED

Site Number #	20
Intersection Name	Westport Ferry Road
US-30 Milepoint	70.68
Intersection ODOT ID	5A-071.30
US Dot Crossing ID	058021G
Intersection Type	Unsignalized
Rail Crossing Type	Passive
Number of Tracks	1
Secondary intersection	None
Secondary Intersection Type	N/A
Notable Trip Generators	Westport
Emergency Facilities in Vicinity	Volunteer Fire Service
Pedestrian Facilities at Crossing	No
Estimated AADT (vpd)	250
Sight Distance Issue Noted	0
Existing Train Duration (min)	5
Unit Train Crossing Duration (min)	10
Average Vehicle Length at Crossing (ft)	25

Operational Analysis Using HCM Methodology	AM	PM
v/c	NA	0.03
Average Delay	NA	15.5
Level Of Service	NA	C

Crash Analysis (2002 - 2007)	
Total Crashes in period	0
Crashes per Year	0.0
Peak Hour Total Entering Vehicles	556
Million Entering Vehicles(MEV)/Year	2.0
Crashes/MEV	0.0
>1 Crash/MEV	No
	Collision Types
Lane Change/Turning	0
Rear End	0
Angle	0
Pedestrian	0
Single Vehicle	0
	Severity Types
Fatalities (K)	0
Personal Injury (A + B + C)	0
Property Damage Only (O)	0

NOTABLE CONCERNS

While there are no notable safety concerns with this rail grade crossing, the intersection geometry at the US-30/Westport Ferry Dock Road intersection is unorthodox and substandard.

OPTIONS FOR MITIGATION

Option 1. Restripe the intersection to ODOT standards. This is not associated with safety concerns relating to the crossing.

LEGEND

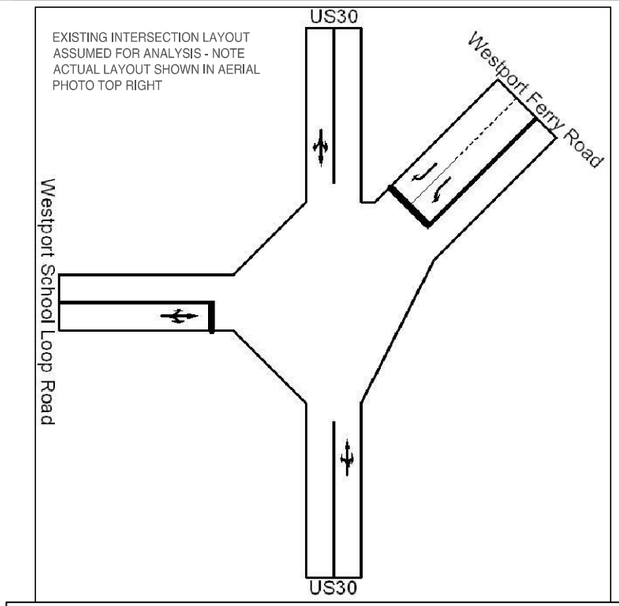
CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

- STOP SIGN
- TRAFFIC SIGNAL

(NO SCALE)

SITE VICINITY

AERIAL OF INTERSECTION



EXISTING INTERSECTION LAYOUT

PHOTOGRAPH OF SITE (WESTBOUND)

US-30 / WESTPORT FERRY ROAD
COLUMBIA RIVER RAIL CROSSING
WESTPORT, OREGON

FIGURE 20

Appendix D: Train Crossing Delay Calculations (February 28, 2009)

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING
610 SW Alder Street, Suite 700, Portland, OR 97205 P 503.228.5230 F 503.273.8169

MEMORANDUM

Date: February 27, 2009 Project #: 9225

To: Deb Redman
HDR
1001 SW 5th Avenue, Suite 1800
Portland, OR 97204-1134

From: Mike Coleman P.E. and Rohit Rai
Project: PNWRR Lower Columbia Corridor Railroad Study
Subject: Train Crossing Delay Calculations

INTRODUCTION

Kittelson & Associates has completed the attached tables ranking the public railroad grade crossings along the Lower Columbia Corridor according to their anticipated motor vehicle delay associated with train crossings.

The key highway/rail crossings reviewed in conjunction with this study are located adjacent to Highway 30. There currently is no definitive delay analysis procedure for evaluating highway/rail crossings operating in close proximity to other highway intersections short of creating detailed simulation modeling. Simulation modeling was not within the scope of work for this project so a basic delay analysis methodology was used to generate a relative comparison of intersection delay. The approximate daily vehicular delay per grade crossing was calculated using the delay analysis methodology described in *Traffic Flow Fundamentals (Adolph D. May 1990).*

Specifically, the following equation was used to approximate delay:

$$Delay=f \times ((t^2 \times C \times V))/(2(C-V)))$$

Where:

- D = vehicle-hours of delay per day
- f = the frequency of train crossing events per day
- C = the roadway's capacity to serve vehicles (vehicles-per-hour)
- V = the volume of traffic that crossing the grade crossing (vehicles-per-hour)
- t = the duration of the train crossing event (hours per event)

PURPOSE

The delay calculations provide a methodical basis for comparing the relative impact of train activity upon motor vehicle delay at each of the Corridor's grade crossings. The resulting tables compare and rank the grade crossings according to vehicular delay caused by anticipated train activity.

METHODOLOGY & CONSIDERATIONS

The calculated values for delay should not be taken as the absolute literal vehicle delays that will be experienced. The accuracy of the results is only as reliable as the accuracy of the delay formula itself and the accuracy of the values assigned to the formula's variables. Given that the table is only intended for relative comparison purposes at a planning level, basic assumptions and conventions were applied when assigning values to the delay formula's variables. Specific assumptions and conventions include:

- Unit train frequency (f) was converted from the expressed events-per-week (epw) to events-per-day (epd) by dividing it by seven (1.5 epw / 7 days per week = .21 epd = f).

- In the case where loaded and unloaded unit trains travel at different speeds and block grade crossings for different durations, the frequency (f) for each was assumed to be one half of the assumed frequency (.10 epd = f).

- At grade crossings in the vicinity of signalized intersections, the grade crossing's capacity (C) to serve traffic demand is influenced by the signalized intersection. Based on general assumptions made about the Corridor's signalized intersections, the value of C near signalized intersections was assumed to be 1,575 vehicles-per-hour (vph) with one westbound approach lane and 1,925 with two westbound approach lanes.

- At grade crossings in the vicinity of STOP-controlled intersections, the grade crossing's capacity (C) to serve traffic demand is influenced by the STOP controlled intersection. The capacity at unsignalized intersections can vary widely depending on the turn movement patterns, lane configuration, and through traffic volumes on the highway. Lacking actual turn movement counts at most intersections, four estimated capacity values (vehicles per hour) were assumed for unsignalized intersections based on detailed capacity analysis conducted at unsignalized intersections along US 30 for a separate ODOT report. The assumptions are as follows:

Number of Lanes on US 30	Number of Lanes on Minor Street	Capacity
Area Between Linnton and Rainier		
5	2	1,085 vph
5	3	1,450 vph
Intersections in Rainier and Points North		
5	2	1,150 vph
2	2	1,400 vph

- The duration of a crossing event (t) was calculated using an assumed train length and train speed.

- The value for traffic demand (V) varies with each grade crossing. Most of the available traffic demand data was expressed as average daily traffic (ADT, vpd). The age of the available data varies but, absent a basis for adjusting traffic volumes, the values were used without regard for age. Twenty of the crossings have afternoon peak hour volume information that was collected in August 2008.

- Where ADT's were used, the value for V was converted from vehicles-per-day (vpd) to vehicles-per-hour (vph) by dividing by 18 for use in the delay formula. Dividing by 18 instead of 24 acknowledges that traffic volumes are not uniform from hour to hour. Applying an average hourly volume, rather than a peak hour volume, acknowledges that train crossing events occur randomly during at day. Where peak hour volumes were used, an average hourly volume was assumed to be 55% of the peak hour volume.

The approach described above achieves the objectives of the vehicle delay analysis in a methodical and economical way. While the individual crossing-specific results should not be taken literally, the tables are useful for comparing and ranking the relative train-induced motor vehicle delay at the Corridor's grade crossings.

FINDINGS

Unit trains, because of their greater length and slower speeds, create greater delay than a local train. Because unit trains travel the corridor an average of only 3 times per week, their influence on total train-related delay per day is small compared to the influence of the more frequent local trains.

Table 1 ranks the public crossings according to the cumulative total motor vehicle delay expected during a typical day as a result of train activity. The total daily delay at any given crossing location varies depending on the volume of motor vehicles and the amount of delay caused by the train crossings that occur during the day.

Table 2 ranks the public crossings according to the cumulative amount of motor vehicle delay caused by a single local train or unit train. Table 2 considers and attempts to compare the total delay a group of drivers would experience if they arrived at a crossing while a train was passing.

Table 1 considers the total driver delay over an entire day. Table 2 considers the driver delay during a single event, when a local or unit train passes through a given crossing.

Appendices A and B show the detailed crossing-specific data and delay calculation results for tables 1 and 2 respectively.

Public Crossing Rankings based on Total Daily Delay (*in vehicle-hours per day*) due to Local and Unit Trains Blockage*

Portland and Western Railroad (MP 18.05 to 72.88)

Table 1.

U.S. DOT No.	Crossing's Street Name	Railroad Milepost	Current Conditions[1]	Post Connect Oregon Improvements[2]	10-year Growth @ 8%/yr[3]
057895G	Johnsons Landing Road (Dike Rd.)	18.05	35	31	34
101854W	*High School Rd.*	19.38	6	5	5
057900B	Santosh St.	19.61	21	20	19
057901H	*Maple St.*	19.67	13	8	8
057902P	*Columbia Ave.*	19.90	5	4	4
916564S	Crown Zellerbach Rd.	20.31	24	22	24
057910G	*West Lane Rd.*	21.48	14	13	13
057911N	Columbia Mem. Gardens (Cemetery Rd)	21.94	38	39	38
057921U	*Old Portland Rd. (Berg Rd.)*	23.98	34	37	37
057924P	*Old Portland Rd. (Bennet Rd.)*	24.78	10	7	7
057927K	*Millard Rd.*	25.92	17	15	17
057930T	*Gable Rd.*	26.67	1	1	1
057932G	*Columbia Blvd.*	27.54	3	3	3
057938X	*St. Helens St.*	27.65	2	2	2
057941F	Wyeth St.	27.94	39	38	39
057943U	*Deer Island Rd.*	28.42	7	6	6
057946P	*I St.*	29.75	16	14	14
057947W	*E St.*	30.03	26	23	25
057948D	Pacific St.	30.58	30	28	30
057969W	*Goble Landing (Lake St.)*	39.41	31	31	31
057974T	Graham Rd.	41.85	32	34	33
057975A	6th St.	45.54	40	41	42
057976G	5th St.	45.60	22	35	34
057977N	4th St.	45.65	19	29	28
057978V	3rd St.	45.71	12	21	21
057979C	2nd St.	45.76	11	18	18
057980W	1st St.	45.82	9	15	15
057981D	2nd St.	45.88	4	9	9
916561W	*Veterans Way*	46.19	8	12	12
916559V	Dike Rd.	48.48	23	31	36
057993X	Mayger Fill Rd.	55.80	15	26	26
057996T	Kallunki Rd.	58.02	28	24	22
058002C	Hermo Rd.	59.32	20	11	11
058003J	Beaver Dike Rd.	59.57	33	27	27
058006E	Depot St.	62.20	18	10	10
058010U	Pt. Adams Rd. (Midland Rd)	64.30	41	40	40
058012H	*Marshland Rd. (Co. Rd. 198)*	66.60	36	30	29
058016K	*Marshland Dist. Rd. #4119*	68.41	37	35	32
058017S	*Woodson Rd.*	68.51	28	24	22
058020A	*Old Mill Rd. (Westport Ramp Rd.)*	71.11	24	17	16
058021G	*Westport Ferry Rd. (Westport Dock Rd.)*	71.27	27	19	20
058022N	Driscoll Slough Rd.	72.88	42	41	41

The rankings are based on afternoon peak hour volume information collected in August 2008 for the crossings in *italics* and volume information provided by ODOT Rail for the remaining crossings.

* Relative ranking of public crossings (1 = greatest total delay per day)

[1] Current Conditions: Current traffic and train operations (as of August 2008)

[2] Post Connect Oregon Improvement: Railroad improvements that accommodate faster train speeds

[3] 10-year Growth @8%/yr: Anticipated increase in local and unit train lengths and/or frequency

Public Crossing Rankings based on Delay per Single Crossing Event (*in vehicle-hours*) due to Local and Unit Trains Blockage*

Portland and Western Railroad (MP 18.05 to 72.88)

Table 2.

U.S. DOT No.	Crossing's Street Name	Railroad Milepost	Current Conditions[1]		Post Connect Oregon Improvements[2]		10-year Growth @ 8%/yr[3]	
			Local Train	Unit Train	Local Train	Unit Train	Local Train	Unit Train
057895G	Johnsons Landing Road (Dike Rd.)	18.05	36	27	35	27	36	27
101854W	*High School Rd.*	19.38	7	5	5	5	5	5
057900B	Santosh St.	19.61	26	14	22	16	22	16
057901H	*Maple St.*	19.67	15	9	10	8	11	8
057902P	*Columbia Ave.*	19.90	5	4	4	4	4	4
916564S	Crown Zellerbach Rd.	20.31	29	18	25	18	25	18
057910G	*West Lane Rd.*	21.48	18	11	14	10	14	10
057911N	Columbia Mem. Gardens (Cemetery Rd)	21.94	40	29	39	29	38	29
057921U	*Old Portland Rd. (Berg Rd.)*	23.98	36	26	35	25	35	25
057924P	*Old Portland Rd. (Bennet Rd.)*	24.78	12	7	7	7	9	7
057927K	*Millard Rd.*	25.92	24	16	18	14	19	14
057930T	*Gable Rd.*	26.67	1	1	1	1	1	1
057932G	*Columbia Blvd.*	27.54	4	3	3	3	3	3
057938X	*St. Helens St.*	27.65	3	2	2	2	2	2
057941F	Wyeth St.	27.94	38	30	38	30	38	30
057943U	*Deer Island Rd.*	28.42	8	6	6	6	6	6
057946P	*I St.*	29.75	19	12	15	11	17	11
057947W	*E St.*	30.03	30	19	26	19	27	19
057948D	Pacific St.	30.58	33	25	29	22	31	22
057969W	*Goble Landing (Lake St.)*	39.41	34	22	31	22	31	22
057974T	Graham Rd.	41.85	35	23	33	24	33	24
057975A	6th St.	45.54	38	31	41	31	42	31
057976G	5th St.	45.60	25	24	33	25	33	25
057977N	4th St.	45.65	21	21	31	21	30	21
057978V	3rd St.	45.71	11	15	23	17	23	17
057979C	2nd St.	45.76	9	13	21	13	21	13
057980W	1st St.	45.82	6	10	20	12	18	12
057981D	2nd St.	45.88	2	8	12	9	12	9
916561W	*Veterans Way*	46.19	10	16	18	14	19	14
916559V	Dike Rd.	48.48	28	27	35	27	36	27
057993X	Mayger Fill Rd.	55.80	19	20	29	20	29	20
057996T	Kallunki Rd.	58.02	22	**	16	**	15	**
058002C	Hermo Rd.	59.32	14	**	9	**	8	**
058003J	Beaver Dike Rd.	59.57	27	**	23	**	24	**
058006E	Depot St.	62.20	13	**	8	**	7	**
058010U	Pt. Adams Rd. (Midland Rd)	64.30	40	**	39	**	40	**
058012H	*Marshland Rd. (Co. Rd. 198)*	66.60	31	**	27	**	25	**
058016K	*Marshland Dist. Rd. #4119*	68.41	32	**	28	**	28	**
058017S	*Woodson Rd.*	68.51	22	**	16	**	15	**
058020A	*Old Mill Rd. (Westport Ramp Rd.)*	71.11	16	**	11	**	10	**
058021G	*Westport Ferry Rd. (Westport Dock Rd.)*	71.27	17	**	13	**	13	**
058022N	Driscoll Slough Rd.	72.88	42	**	41	**	41	**

The rankings are based on afternoon peak hour volume information collected in August 2008 for the crossings in *italics* and volume information provided by ODOT Rail for the remaining crossings.

* Relative ranking of public crossings (1 = greatest delay per crossing event)

** Unit trains do not pass through the crossing

[1] Current Conditions: Current traffic and train operations (as of August 2008)

[2] Post Connect Oregon Improvement: Railroad improvements that accommodate faster train speeds

[3] 10-year Growth @8%/yr: Anticipated increase in local and unit train lengths and/or frequency

Appendix “A”
Delay per Day at Public Crossings

Lower Columbia Corridor Rail Study - Delay at Public Crossings (Vehicle-hours/day)

S. No.	U.S. DOT No.	Street Name	AADT	Capacity (veh/hr)	Demand (veh/hr)*	Current Conditions (As of August 2008)					Post Connect Oregon Improvements		10-Year Growth @ 8%/yr				Current Conditions (As of August 2008)				Post Connect Oregon Improvements			10-year Growth @ 8%/yr		
						3,600 ft Local Trains Per Day	Local Trains Blockage Duration (hr)	6,600 ft Unit Trains Per Day	Loaded Unit Trains Blockage Duration (hr)	Empty Unit Trains Blockage Duration (hr)	Local Trains Blockage Duration (hr)	Unit Trains Blockage Duration (hr)	6,000 ft Local Trains Per Day	6,600 ft Unit Trains Per Day	Local Trains Blockage Duration (hr)	Unit Trains Blockage Duration (hr)	Delay due to Local Trains (D1)	Delay due to Loaded Unit Trains (D2)	Delay due to Empty Unit Trains (D3)	Total Delay (D1+D2+D3)	Delay due to Local Trains (D4)	Delay due to Unit Trains (D5)	Total Delay (D4+D5)	Delay due to Local Trains (D6)	Delay due to Unit Trains (D7)	Total Delay (D6+D7)
1	057895G	Johnsons Landing Road (Dike Rd.)	100	1575	6	6	0.04	0.21	0.14	0.06	0.04	0.06	7.7	0.5	0.06	0.06	0.024	0.006	0.001	0.031	0.024	0.002	0.026	0.068	0.005	0.073
2	101854W	High School Rd.	4050	1925	225	4	0.04	0.21	0.14	0.06	0.04	0.06	5.2	0.5	0.06	0.06	0.739	0.516	0.101	1.356	0.739	0.101	0.840	2.082	0.218	2.300
3	057900B	Santosh St.	978	1450	54	4	0.03	0.21	0.13	0.05	0.03	0.05	5.2	0.5	0.05	0.05	0.091	0.099	0.016	0.205	0.091	0.016	0.107	0.316	0.034	0.350
4	057901H	Maple St.	1840	1925	102	4	0.04	0.21	0.14	0.06	0.04	0.06	5.2	0.5	0.06	0.06	0.313	0.219	0.043	0.575	0.313	0.043	0.356	0.882	0.092	0.974
5	057902P	Columbia Ave.	4850	1925	269	4	0.04	0.21	0.14	0.06	0.04	0.06	5.2	0.5	0.06	0.06	0.909	0.634	0.124	1.668	0.909	0.124	1.033	2.560	0.268	2.828
6	916564S	Crown Zellerbach Rd.	425	1925	24	4	0.04	0.21	0.14	0.06	0.04	0.06	5.2	0.5	0.06	0.06	0.069	0.048	0.009	0.127	0.069	0.009	0.079	0.195	0.020	0.216
7	057910G	West Lane Rd.	1050	1575	58	4	0.04	0.21	0.14	0.06	0.04	0.06	5.2	0.5	0.06	0.06	0.175	0.122	0.024	0.321	0.175	0.024	0.199	0.493	0.052	0.545
8	057911N	Columbia Mem. Gardens (Cemetery Rd)	99	1085	6	4	0.03	0.21	0.13	0.05	0.03	0.05	5.2	0.5	0.05	0.05	0.009	0.010	0.002	0.020	0.009	0.002	0.010	0.031	0.003	0.034
9	057921U	Old Portland Rd. (Berg Rd.)	200	1085	11	4	0.03	0.21	0.13	0.05	0.03	0.05	5.2	0.5	0.05	0.05	0.018	0.020	0.003	0.041	0.018	0.003	0.021	0.062	0.007	0.069
10	057924P	Old Portland Rd. (Bennet Rd.)	2650	1575	147	4	0.04	0.21	0.14	0.06	0.04	0.06	5.2	0.5	0.06	0.06	0.469	0.327	0.064	0.860	0.469	0.064	0.533	1.322	0.139	1.460
11	057927K	Millard Rd.	750	1925	42	4	0.04	0.21	0.14	0.06	0.04	0.06	5.2	0.5	0.06	0.06	0.124	0.086	0.017	0.227	0.124	0.017	0.140	0.348	0.036	0.384
12	057930T	Gable Rd.	8950	1925	497	4	0.04	0.21	0.14	0.06	0.04	0.06	5.2	0.5	0.06	0.06	1.946	1.357	0.266	3.569	1.946	0.266	2.211	5.477	0.574	6.051
13	057932G	Columbia Blvd.	6050	1575	336	4	0.04	0.21	0.14	0.06	0.04	0.06	5.16	0.46	0.06	0.06	1.233	0.862	0.169	2.263	1.233	0.169	1.401	3.477	0.364	3.842
14	057938X	St. Helens St.	6700	1925	372	4	0.04	0.21	0.14	0.06	0.04	0.06	5.16	0.46	0.06	0.06	1.339	0.934	0.183	2.456	1.339	0.183	1.522	3.770	0.395	4.165
15	057941F	Wyeth St.	63	1575	4	4	0.04	0.21	0.14	0.06	0.04	0.06	5.16	0.46	0.06	0.06	0.010	0.007	0.001	0.019	0.010	0.001	0.012	0.029	0.003	0.032
16	057943U	Deer Island Rd.	3450	1575	192	4	0.04	0.21	0.14	0.06	0.04	0.06	5.16	0.46	0.06	0.06	0.630	0.440	0.086	1.156	0.630	0.086	0.716	1.776	0.186	1.962
17	057946P	I St.	1000	1575	56	4	0.04	0.21	0.14	0.06	0.04	0.06	5.16	0.46	0.06	0.06	0.166	0.116	0.023	0.305	0.166	0.023	0.189	0.469	0.049	0.518
18	057947W	E St.	400	1575	22	4	0.04	0.21	0.14	0.06	0.04	0.06	5.16	0.46	0.06	0.06	0.065	0.045	0.009	0.119	0.065	0.009	0.074	0.183	0.019	0.203
19	057948D	Pacific St.	175	1575	10	4	0.04	0.21	0.14	0.06	0.04	0.06	5.16	0.46	0.06	0.06	0.028	0.020	0.004	0.052	0.028	0.004	0.032	0.080	0.008	0.088
20	057969W	Goble Landing (Lake St.)	250	1085	14	4	0.03	0.21	0.13	0.05	0.03	0.05	5.16	0.46	0.05	0.05	0.022	0.024	0.004	0.051	0.022	0.004	0.026	0.078	0.008	0.087
21	057974T	Graham Rd.	220	1085	12	4	0.03	0.21	0.13	0.05	0.03	0.05	5.16	0.46	0.05	0.05	0.020	0.022	0.003	0.045	0.020	0.003	0.023	0.069	0.007	0.076
22	057975A	6th St.	24	1085	1	4	0.07	0.21	0.13	0.13	0.03	0.05	5.16	0.46	0.05	0.05	0.013	0.002	0.002	0.018	0.002	0.000	0.003	0.007	0.001	0.008
23	057976G	5th St.	210	1085	12	4	0.07	0.21	0.13	0.13	0.03	0.05	5.16	0.46	0.05	0.05	0.118	0.021	0.021	0.159	0.019	0.003	0.022	0.066	0.007	0.073
24	057977N	4th St.	283	1085	16	4	0.07	0.21	0.13	0.13	0.03	0.05	5.16	0.46	0.05	0.05	0.159	0.028	0.028	0.215	0.025	0.004	0.030	0.089	0.010	0.098
25	057978V	3rd St.	900	1085	50	4	0.07	0.21	0.13	0.13	0.03	0.05	5.16	0.46	0.05	0.05	0.523	0.091	0.091	0.706	0.084	0.015	0.098	0.292	0.032	0.323
26	057979C	2nd St.	1043	1085	58	4	0.07	0.21	0.13	0.13	0.03	0.05	5.16	0.46	0.05	0.05	0.611	0.107	0.107	0.824	0.098	0.017	0.115	0.341	0.037	0.377
27	057980W	1st St.	1255	1085	70	4	0.07	0.21	0.13	0.13	0.03	0.05	5.16	0.46	0.05	0.05	0.744	0.130	0.130	1.003	0.119	0.021	0.140	0.415	0.045	0.459
28	057981D	2nd St.	2188	1085	122	4	0.07	0.21	0.13	0.13	0.03	0.05	5.16	0.46	0.05	0.05	1.366	0.238	0.238	1.843	0.219	0.038	0.257	0.762	0.082	0.844
29	916561W	Veterans Way	750	1925	42	6	0.08	0.21	0.14	0.14	0.04	0.06	7.74	0.46	0.06	0.06	0.831	0.086	0.086	1.004	0.185	0.017	0.202	0.522	0.036	0.558
30	916559V	Dike Rd.	99	1575	6	6	0.08	0.21	0.14	0.14	0.04	0.06	7.74	0.46	0.06	0.06	0.107	0.011	0.011	0.129	0.024	0.002	0.026	0.067	0.005	0.072
31	057993X	Mayger Fill Rd.	300	1400	17	6	0.07	0.21	0.13	0.13	0.03	0.05	7.74	0.46	0.05	0.05	0.253	0.029	0.029	0.311	0.040	0.005	0.045	0.141	0.010	0.151
32	057996T	Kallunki Rd.	250	1400	14	2	0.07				0.07		2.58		0.12		0.070			0.070	0.070		0.070	0.244		0.244
33	058002C	Hermo Rd.	750	1400	42	2	0.07				0.07		2.58		0.12		0.214			0.214	0.214		0.214	0.747		0.747
34	058003J	Beaver Dike Rd.	150	1400	8	2	0.07				0.07		2.58		0.12		0.042			0.042	0.042		0.042	0.146		0.146
35	058006E	Depot St.	756	1400	42	2	0.07				0.07		2.58		0.12		0.216			0.216	0.216		0.216	0.753		0.753
36	058010U	Pt. Adams Rd. (Midland Rd)	12	1575	1	2	0.08				0.08		2.58		0.13		0.004			0.004	0.004		0.004	0.014		0.014
37	058012H	Marshland Rd. (Co. Rd. 198)	100	1400	6	2	0.07				0.07		2.58		0.12		0.028			0.028	0.028		0.028	0.097		0.097
38	058016K	Marshland Dist. Rd. #4119	80	1400	4	2	0.07				0.07		2.58		0.12		0.022			0.022	0.022		0.022	0.078		0.078
39	058017S	Woodson Rd.	250	1400	14	2	0.07				0.07		2.58		0.12		0.070			0.070	0.070		0.070	0.244		0.244
40	058020A	Old Mill Rd. (Westport Ramp Rd.)	450	1400	25	2	0.07				0.07		2.58		0.12		0.127			0.127	0.127		0.127	0.443		0.443
41	058021G	Westport Ferry Rd. (Westport Dock Rd.)	300	1575	17	2	0.08				0.08		2.58		0.13		0.109			0.109	0.109		0.109	0.344		0.344
42	058022N	Driscoll Slough Rd.	10	1400	1	2	0.07				0.07		2.6		0.12		0.003			0.003	0.003		0.003	0.010		0.010

* Calculated from KAI 2008 counts for 20 selected crossings; otherwise calculated from available ODOT AADT

Appendix “B”
Delay per Crossing Event
at Public Crossings

Lower Columbia Corridor Rail Study - Delay at Public Crossings (Vehicle-hours/Crossing Event)

S. No.	U.S. DOT No.	Street Name	AADT	Capacity (veh/hr)	Demand (veh/hr)*	Current Conditions (As of August 2008)					Post Connect Oregon Improvements		10-Year Growth @ 8%/yr				Current Conditions (As of August 2008)			Post Connect Oregon Improvements		10-year Growth @ 8%/yr	
						3,600 ft Local Trains Per Day	Local Trains Blockage Duration (hr)	6,600 ft Unit Trains Per Day	Loaded Unit Trains Blockage Duration (hr)	Empty Unit Trains Blockage Duration (hr)	Local Trains Blockage Duration (hr)	Unit Trains Blockage Duration (hr)	6,000 ft Local Trains Per Day	6,600 ft Unit Trains Per Day	Local Trains Blockage Duration (hr)	Unit Trains Blockage Duration (hr)	Delay due to Local Trains (D1)	Delay due to Loaded Unit Trains (D2)	Delay due to Empty Unit Trains (D3)	Delay due to Local Trains (D4)	Delay due to Unit Trains (D5)	Delay due to Local Trains (D6)	Delay due to Unit Trains (D7)
1	057895G	Johnsons Landing Road (Dike Rd.)	100	1575	6	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.004	0.052	0.010	0.004	0.010	0.009	0.010
2	101854W	High School Rd.	4050	1925	225	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.185	2.407	0.471	0.185	0.471	0.403	0.471
3	057900B	Santosh St.	978	1450	54	1.0	0.03	1.00	0.13	0.05	0.03	0.05	1.0	1.0	0.05	0.05	0.023	0.461	0.074	0.023	0.074	0.061	0.074
4	057901H	Maple St.	1840	1925	102	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.078	1.020	0.200	0.078	0.200	0.171	0.200
5	057902P	Columbia Ave.	4850	1925	269	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.227	2.960	0.579	0.227	0.579	0.496	0.579
6	916564S	Crown Zellerbach Rd.	425	1925	24	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.017	0.226	0.044	0.017	0.044	0.038	0.044
7	057910G	West Lane Rd.	1050	1575	58	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.044	0.570	0.112	0.044	0.112	0.096	0.112
8	057911N	Columbia Mem. Gardens (Cemetery Rd)	99	1085	6	1.0	0.03	1.00	0.13	0.05	0.03	0.05	1.0	1.0	0.05	0.05	0.002	0.045	0.007	0.002	0.007	0.006	0.007
9	057921U	Old Portland Rd. (Berg Rd.)	200	1085	11	1.0	0.03	1.00	0.13	0.05	0.03	0.05	1.0	1.0	0.05	0.05	0.004	0.091	0.015	0.004	0.015	0.012	0.015
10	057924P	Old Portland Rd. (Bennet Rd.)	2650	1575	147	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.117	1.528	0.299	0.117	0.299	0.256	0.299
11	057927K	Millard Rd.	750	1925	42	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.031	0.402	0.079	0.031	0.079	0.067	0.079
12	057930T	Gable Rd.	8950	1925	497	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.486	6.334	1.240	0.486	1.240	1.062	1.240
13	057932G	Columbia Blvd.	6050	1575	336	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.308	4.021	0.787	0.308	0.787	0.674	0.787
14	057938X	St. Helens St.	6700	1925	372	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.335	4.360	0.853	0.335	0.853	0.731	0.853
15	057941F	Wyeth St.	63	1575	4	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.003	0.033	0.006	0.003	0.006	0.006	0.006
16	057943U	Deer Island Rd.	3450	1575	192	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.157	2.053	0.402	0.157	0.402	0.344	0.402
17	057946P	I St.	1000	1575	56	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.042	0.542	0.106	0.042	0.106	0.091	0.106
18	057947W	E St.	400	1575	22	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.016	0.212	0.042	0.016	0.042	0.036	0.042
19	057948D	Pacific St.	175	1575	10	1.0	0.04	1.00	0.14	0.06	0.04	0.06	1.0	1.0	0.06	0.06	0.007	0.092	0.018	0.007	0.018	0.015	0.018
20	057969W	Goble Landing (Lake St.)	250	1085	14	1.0	0.03	1.00	0.13	0.05	0.03	0.05	1.0	1.0	0.05	0.05	0.006	0.114	0.018	0.006	0.018	0.015	0.018
21	057974T	Graham Rd.	220	1085	12	1.0	0.03	1.00	0.13	0.05	0.03	0.05	1.0	1.0	0.05	0.05	0.005	0.100	0.016	0.005	0.016	0.013	0.016
22	057975A	6th St.	24	1085	1	1.0	0.07	1.00	0.13	0.13	0.03	0.05	1.0	1.0	0.05	0.05	0.003	0.011	0.011	0.001	0.002	0.001	0.002
23	057976G	5th St.	210	1085	12	1.0	0.07	1.00	0.13	0.13	0.03	0.05	1.0	1.0	0.05	0.05	0.029	0.096	0.096	0.005	0.015	0.013	0.015
24	057977N	4th St.	283	1085	16	1.0	0.07	1.00	0.13	0.13	0.03	0.05	1.0	1.0	0.05	0.05	0.040	0.130	0.130	0.006	0.021	0.017	0.021
25	057978V	3rd St.	900	1085	50	1.0	0.07	1.00	0.13	0.13	0.03	0.05	1.0	1.0	0.05	0.05	0.131	0.426	0.426	0.021	0.068	0.057	0.068
26	057979C	2nd St.	1043	1085	58	1.0	0.07	1.00	0.13	0.13	0.03	0.05	1.0	1.0	0.05	0.05	0.153	0.497	0.497	0.024	0.080	0.066	0.080
27	057980W	1st St.	1255	1085	70	1.0	0.07	1.00	0.13	0.13	0.03	0.05	1.0	1.0	0.05	0.05	0.186	0.605	0.605	0.030	0.097	0.080	0.097
28	057981D	2nd St.	2188	1085	122	1.0	0.07	1.00	0.13	0.13	0.03	0.05	1.0	1.0	0.05	0.05	0.342	1.112	1.112	0.055	0.178	0.148	0.178
29	916561W	Veterans Way	750	1925	42	1.0	0.08	1.00	0.14	0.14	0.04	0.06	1.0	1.0	0.06	0.06	0.139	0.402	0.402	0.031	0.079	0.067	0.079
30	916559V	Dike Rd.	99	1575	6	1.0	0.08	1.00	0.14	0.14	0.04	0.06	1.0	1.0	0.06	0.06	0.018	0.052	0.052	0.004	0.010	0.009	0.010
31	057993X	Mayger Fill Rd.	300	1400	17	1.0	0.07	1.00	0.13	0.13	0.03	0.05	1.0	1.0	0.05	0.05	0.042	0.137	0.137	0.007	0.022	0.018	0.022
32	057996T	Kallunki Rd.	250	1400	14	1.0	0.07				0.07		1.0		0.12		0.035			0.035		0.095	
33	058002C	Hermo Rd.	750	1400	42	1.0	0.07				0.07		1.0		0.12		0.107			0.107		0.289	
34	058003J	Beaver Dike Rd.	150	1400	8	1.0	0.07				0.07		1.0		0.12		0.021			0.021		0.056	
35	058006E	Depot St.	756	1400	42	1.0	0.07				0.07		1.0		0.12		0.108			0.108		0.292	
36	058010U	Pt. Adams Rd. (Midland Rd)	12	1575	1	1.0	0.08				0.08		1.0		0.13		0.002			0.002		0.005	
37	058012H	Marshland Rd. (Co. Rd. 198)	100	1400	6	1.0	0.07				0.07		1.0		0.12		0.014			0.014		0.038	
38	058016K	Marshland Dist. Rd. #4119	80	1400	4	1.0	0.07				0.07		1.0		0.12		0.011			0.011		0.030	
39	058017S	Woodson Rd.	250	1400	14	1.0	0.07				0.07		1.0		0.12		0.035			0.035		0.095	
40	058020A	Old Mill Rd. (Westport Ramp Rd.)	450	1400	25	1.0	0.07				0.07		1.0		0.12		0.064			0.064		0.172	
41	058021G	Westport Ferry Rd. (Westport Dock Rd.)	300	1575	17	1.0	0.08				0.08		1.0		0.13		0.054			0.054		0.133	
42	058022N	Driscoll Slough Rd.	10	1400	1	1.0	0.07				0.07		1.0		0.12		0.001			0.001		0.004	

*Calculated from KAI 2008 counts for 20 selected crossings; otherwise calculated from available ODOT AADT

Appendix E: Stakeholder Issues Matrix

Lower Columbia River Rail Corridor Safety Study--Draft Stakeholder Issues Summary (9/16/08)

REVIEW DRAFT
SUMMARY OF STAKEHOLDER ISSUES**

	Safety & Emergency Response												Rail Operations (Freight and Passenger)									Highway/Local Road Operations (All Modes)						Local Planning, Regulatory and Circulation						Community & Environ-mental	Business & Industry			Economic Development			Project Implementation & Funding			Non-Project Issues
	Provide safety upgrades at more crossings	Ensure ability to meet fire and medical emergency response time goals and honor mutual aid agreements	Ensure law enforcement agencies' ability to meet response time goals	Educate public (focus on young people) about rail safety (Operation Life Saver)	Ensure safety for school access (bus, bike, pedestrian and vehicle)	Develop or update plan and precautions for hazmat on rail	Educate public about federal requirements for homs, and general RR rights/responsibilities	Develop or update derailment response plans	Improve safety-related communications between P&W and responders	Minimize duration that community is exposed to hazardous rail cargo	Make sure that increased emergency response resource needs are met	Increase velocity, capacity and reliability of rail	Maintain highway capacity, safety and reliability	Address trespasser issues	More separation of vehicles from trains in Rainier	Ensure adequate maintenance and inspection of rail	Improve Clatsop County rail segment to Class 2	Close public crossings, as possible	Close private crossings, as possible	Install automatic gates and lights interconnected to US 30 traffic lights	Minimize vehicle delay (including school and transit bus) at grade crossings	Address impact of more/longer trains on vehicle diversion, ped/bike mobility and safety	Address back-up of vehicle traffic into traffic lanes (safety and mobility)	Improve safety for hazmat trucks crossing rail	Develop local through-streets parallel to US 30	More signals on truck routes (Clatskanie, Beaver Falls)	Plan for higher speed freight and passenger trains over next 20 years	Support existing and plan for future transit (bus and rail)	Plan for future grade separations	Develop vision for future multimodal corridor & associated development	Identify and preserve industrial land along rail corridor	Maintain or improve cross-track connectivity	Reduce Noise/Examine Quiet Zone potential	Maintain or improve access to business or industrial sites for customers and shippers/suppliers	Ensure good rail service to existing and smaller rail users	Reduce train-related diversion through commercial parking lots	Promote industrial development along rail corridor by providing rail access	Shift freight from highway to rail	Take advantage of existing funding offers (Rainier/ODOT Rail)	Obtain funding for needed safety and mobility improvements	Seek contributions from all parties, including railroads, to mitigate impacts	Begin to identify uses for ConnectOregon III funds	Widen beach access trestle in Columbia City
Federal Government																																								
Homeland Security (Chris Greenhill)		⊙	⊙			⊙				⊙																														
State of Oregon																																								
ODOT Rail (Charles Kettenring, C. David Lanning)	⊙			⊙								⊙								⊙							⊙		⊙		⊙		⊙					⊙			
Odot Highway (D.Kim, R.Kroop, K.Freitag, M.Danielson, T.Wilson)	⊙	⊙	⊙		⊙							⊙	⊙							⊙	⊙	⊙	⊙	⊙			⊙	⊙	⊙	⊙	⊙	⊙					⊙			
Office of the Governor (Mark Ellsworth)	⊙											⊙	⊙		⊙						⊙									⊙									⊙		
Oregon State Police (Sgt. Larry Lucas)	⊙		⊙			⊙								⊙									⊙	⊙																
Railroad																																								
Portland & Western (Dale Hansen, Mike Lundell, Mark Warner, Diane Young)	⊙			⊙			⊙					⊙		⊙	⊙	⊙	⊙	⊙	⊙																	⊙			⊙			
Washington State																																								
Cowlitz-Wahkiakum Council of Governments, WA (Rosemary Siipoloa)	⊙	⊙	⊙			⊙						⊙																				⊙				⊙			
Columbia County Government																																								
County of Columbia (Tony Hyde, Rita Bernard, Janet Wright, Lonny Welter)	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙					⊙									⊙	⊙					⊙		⊙	⊙	⊙						⊙	⊙			
Scappoose (Jon Hanken)	⊙	⊙	⊙	⊙			⊙						⊙									⊙	⊙					⊙		⊙	⊙	⊙	⊙				⊙	⊙	⊙			
St. Helens (Jacob Graichen)	⊙												⊙	⊙								⊙	⊙																⊙			
Rainier (Lars Gare)	⊙												⊙									⊙	⊙										⊙					⊙			
Clatskanie (Greg Hinkelman)	⊙											⊙	⊙									⊙	⊙					⊙										⊙			
Columbia City (Leahnette Rivers)	⊙	⊙	⊙			⊙		⊙					⊙									⊙	⊙						⊙					⊙				⊙			
Columbia County Rider (Henry Heimuller)	⊙				⊙																	⊙		⊙					⊙								⊙					
Columbia County Emergency Services																																								
Columbia County Emergency Management (Vicki Harguth)	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙												⊙																⊙			
Columbia River Fire & Rescue (Jay Tappan)		⊙	⊙			⊙			⊙													⊙																			
Scappoose Fire District (Mike Greisen)		⊙							⊙													⊙													⊙						
Rainier Police Department (Ralph Painter)		⊙	⊙												⊙							⊙													⊙						
Columbia County Schools																																								
Rainier School District (Kathy Murphy)					⊙																	⊙																			
Clatskanie Schools (Frank Walling)					⊙																	⊙																			
Columbia County Business/Industry																																								
Columbia County Economic Development (Janet Wright)	⊙	⊙	⊙	⊙	⊙		⊙					⊙										⊙						⊙									⊙	⊙	⊙	⊙	⊙		
South Columbia County Chamber of Commerce (Dan Garrison)												⊙										⊙					⊙	⊙						⊙			⊙	⊙				
Teevin Brothers (Paul Langner)				⊙								⊙						⊙				⊙												⊙			⊙					
United Pacific Forest Products (Adam Taylor)		⊙	⊙									⊙																						⊙	⊙							
Stimson Mill (Mark Nickerson)																						⊙												⊙			⊙					
Boise Paper Solutions (Kim Cernak)																						⊙												⊙			⊙					
Foss Maritime (Tim Stewart)																						⊙												⊙			⊙					
REDCO (Terry Deaton)																						⊙						⊙									⊙		⊙			
River's Bend Marina (Jan Hamer)				⊙																		⊙												⊙			⊙				⊙	
Siva Weilert, Larry Huang		⊙																				⊙												⊙			⊙				⊙	
Dyno Nobel (Greg Godfrey, Chuck Davidson)												⊙										⊙														⊙						
Columbia County Community Groups																																								
Columbia County Citizen Transportation Advisory Committee	⊙																					⊙						⊙								⊙						
Clatsop County Government																																								
Clatsop County Public Works (Ed Wegner, Ron Ash)												⊙																												⊙		
Clatsop County Emergency Services																																								
Clatsop County Sheriff (Paul Williams, Gene Strong)		⊙	⊙												⊙																										
Knappa Fire District (Paul Olheiser)		⊙	⊙					⊙			⊙																														
Clatsop County Schools																																								
Superintendant Ed Sera (provided crossing information)					⊙																	⊙																			
Clatsop County Business/Industry																																								
Port of Astoria (Jack Crider)												⊙					⊙																		⊙			⊙	⊙				
Floyd Holcom (Consultant to County)	⊙											⊙	⊙																					⊙				⊙		⊙		
Total Count	17	15	14	8	8	7	5	4	3	2	1	14	9	3	3	2	2	2	1	2	27	7	3	2	1	1	8	4	4	4	4	2	5	9	4	2	16	13	4	2	2	1	3

Note: Issues are presented from left-to-right, beginning with comments of highest frequency. Absence of an "⊙" in any box does not necessarily mean that a given stakeholder isn't concerned about an issue; it simply means the stakeholder did not specifically mention it during the interview.

Source: HDR Engineering Stakeholder Interviews, 2008

Appendix F: Conceptual Cost Estimate Worksheets

Lower Columbia River Rail Corridor/Rail Safety Study Highway-Related Conceptual Cost Estimate Detail (February 2009) HDR

Notes	Project	Pavement	6' Sidewalks	RR Crossing Panels	Bridge	Embankment	Retaining Wall	Contingency, Mobilization, CE, PE	Project Cost (excl. R/W or signals)
1	2 lane road - add turn bays - not in CL	$758,400						$379,200.00	**$1,137,600**
2	4 lane grade separation over US30 & RR tracks - St Helens	$176,000	$30,000		$2,240,000	$225,000	$1,050,000	$1,860,500.00	**$5,581,500**
3	bike/ped overpass - ADA compliant - not in CL	$54,600			$350,000	$28,000	$3,630,900	$2,031,750.00	**$6,095,250**
4	repairing/resurface grade crossing for 2-lane road	$6,720		$18,000				$12,360.00	**$37,080**
5	repairing/resurface grade crossing for 4-lane road	$13,440		$30,000				$21,720.00	**$65,160**
6	pedestrian grade crossing		$6,000	$24,000				$15,000.00	**$45,000**
Escape Bay	75 feet at $165/ft.	$12,375						$6,187.50	**$18,563**
High School Way	100 ft NBRT	$16,500						$8,250.00	**$24,750**
Maple St.	Flatten grade-50 ft. pavement	$35,200						$17,600.00	**$52,800**
Columbia Ave.	110 NBRT Lane	$18,150						$9,075.00	**$27,225**
Gable Rd	210 SBLT queue	$36,960						$18,480.00	**$55,440**
Columbia Blvd	215 SBLT queue	$37,840						$18,920.00	**$56,760**
Columbia Blvd	65 Ft NBRT queue	$11,440						$5,720.00	**$17,160**
Deer Island Rd.	SBLT 150 Ft	$24,750						$12,375.00	**$37,125**
								$0.00	**$0**
								$0.00	**$0**
								$0.00	**$0**

1	Assume 300 ft length left turn and right turn X $176/linear foot for left turn and $165/linear foot for right turn; for individual NBRT/SBLT queues, 235 foot taper and acceleration lane included
2	Bridge (4 lane grade separation): $175/sq ft X 64 ft wide X 200 length
2	Assume $11/sf X 250 ft length X 64 ft wide each end ramp for pavement cost
3	Pavement would be 10' by (455+455) X $5/sf
3	Bridge: square foot cost estimated at $175/sq ft X 10 ft. width for multi-use X 200 length (ROW of RR & US30)
6	6' wide walks X 100 ft length X $5/sf X 2 walks
6	Crossing panels 20 ft (10' panels) X $600/panel X 2 sets
	Earthwork: assume guardrail will be used and 2:1 slopes
	Retaining wall: assuming walls along entire embankment length will keep ROW purchases to a minimum
	No roadway signal, RR signal or ROW costs included

PNWR - Astoria Branch - Dibblee Siding					
Preliminary Cost Estimate			**MP: 48.75 - 50.35**		**8,500' Siding**
Item	**Description**	**Units**	**Unit Cost**	**Quantity**	**Total Cost**
	Trackwork				
1	F&I No. 11 Turnouts (136 RE)	EA	$125,000	2	$250,000
2	F&I Timber Crossing Surface (24')	EA	$4,000	1	$4,000
3	Construct track - with 10' cuts & fills	Mile	$1,400,000	2	$2,240,000
				Sub Total	**$2,494,000**
	Train Control/Signals				
4	None				
				Sub Total	**$0**
	Structures				
5	None				
				Sub Total	**$0**
	Other				
6	Environmental Allowance - 3%				$74,820
7	Construction Management - 4%				$99,760
8	Design Engineering Allowance - 7%				$174,580
9	Contingencies - 25%				$623,500
			Total Cost Estimate		**$3,466,660**

Planning Level Construction Cost Opinion
Relocation of PNWR St. Helens Yard

Item	Units	Unit Cost	Quantity	Estimated Cost
New Yard				
No. 9 Turnout	EA.	$ 75,000	9	$ 675,000.00
Remove Track	T.F.	$ 15	200	$ 3,000.00
Construct Track	T.F.	$ 135	8,750	$ 1,181,250.00
Walkway Ballast*	C.Y.	$ 5	750	$ 3,750.00
Sub-ballast (assumed 8" deep w/ extra for access road)	C.Y.	$ 25	5,400	$ 135,000.00
				$ 1,998,000.00
Old Yard				
Remove & Salvage Track	T.F.	$ 15	8,750	$ 131,250.00
Remove & Salvage Turnouts	EA.	$ 5,000	9	$ 45,000.00
Replace Turnout w/ track	T.F.	$ 135	250	$ 33,750.00
Connect Port Lead to Main Track				$ -
Construct Track1	T.F.	$ 135	750	$ 101,250.00
No. 9 Turnout	EA.	$ 75,000	1	$ 75,000.00
				$ 386,250.00
Civil Quantities				
Clearing/Grubbing*	Ac.	$ 5,000	2	$ 7,500
Earthwork*	C.Y.	$ 15	3,000	$ 45,000
				$ 52,500
Other				
Chain-link fence along highway side of yard	L.F.	$28	3,000	$ 84,000.00
Office Trailer*	L.S.	$ 50,000	1	$ 50,000
				$ 134,000
			Subtotal	$ 2,570,750
			Engineering & Surveying @ 8%	$ 205,660
			Construction Administration @ 5%	$ 128,538
			Construction Contingency Factor @ 30%	$ 771,225
			Total Construction Cost Estimate	**$ 3,676,173**

Notes: Assumes that private contractor will perform all work
* Indicates placeholder item. No basis for estimation at this time
Assumes new yard to be same configuration as existing yard
Assumes that current locomotive tie-up track and office will also be relocated
Assumes all new track materials

Costs Not Included: Real estate acquisition, permitting, environmental remediation, utility relocation, yard air, yard lighting, signal systems, grade crossings

Lower Columbia River Rail Corridor/Safety Study

Conceptual Cost Estimate Detail Worksheets

Rail Cost Estimates

February 2009

The comparative cost used to estimate the cost of a signalized crossing on Portland & Western Railroad Astoria Line in Columbia County was based on the bid price for Veterans Way in Rainier, OR, in October 2002, with an annual increase in the cost of labor and material of 6 percent.

Additional project cost estimates (conceptual) were based on Hall Blvd. project, January 2006, provided courtesy of Alan Sovey, ODOT Rail Division.

4. **Bid Prices** August 2003 CORY ST.

BID ITEM NO.	DESCRIPTION	EST QTY	UNIT	UNIT PRICE	AMOUNT
00700-1	Performance and Payment Bond	1	LS	$ 1,000.00	$1,000.00
00800-1	Railroad protective insurance liability	1	LS	$ 500.00	$ 500.00
01500-1	Mobilization	1	LS	$ 7,000.00	$7,000.00
02300-1	Crossing Sub-excavation and Backfill	1	M^3	$ 56.50	$ 56.50
02300-2	Excavation	1965	M^3	$ 33.75	$66,318.75
02300-3	Excavation at Existing Crossing	140	M^3	$ 34.75	$4,865.00
02600-1	Install 300mm Pipe	10	LM	$ 145.00	$1,450.00
02722-1	Sub-ballast	68	M^3	$ 53.00	$3,604.00
03484-1	Furnish and Install Concrete Grade Crossing Panels, Complete	28	TM	$ 630.00	$17,640.00
05660-1	Reconstruct Track	55	TM	$ 590.00	$32,450.00
05660-2	Raise Existing Track	104	TM	$ 41.00	$4,264.00
05660-3	Surface, Line, And Dress	61	TM	$ 23.00	$1,403.00
06132-1	Crosstie Replacement in Raise	65	EA	$ 78.50	$5,102.50
13200-1	Install Crossing Signal System At Cory Street	1	LS	$ 127,169.00	$127,169.00
13200-2	Signal Support for Track Forces Working in Conjunction with this	80	HR	$ 25.00	$2,000.00
13200-3	Retire Existing Crossing Signal Warning System at Hornecker	1	LS	$ 4,000.00	$4,000.00
				Total Bid for Bid Items :	$278,822.75

Two Hundred Seventy Eight Thousand Eight Hundred Twenty Two Dollars and Seventy Five Cents

SECTION 00400

BID FORM

TO: MR. CHARLES KETTENRING
PORTLAND & WESTERN RAILROAD
650 HAWTHORNE AVENUE SE
SUITE 220
SALEM, OR 97301

RE: PORTLAND & WESTERN RAILROAD
6TH AVENUE GRADE CROSSING IMPROVEMENT PROJECT
CONSTRUCTION AND ASSOCIATED WORK
RAINIER, OREGON

Gentlemen:

The undersigned Bidder, having examined the plans and specifications and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project, including the availability of materials and labor, hereby proposes to furnish all labor, equipment, tools, supplies, insurance, taxes, materials except as identified in Section 01100 as Owner supplied, and all other necessary incidentals to construct the project in accordance with the Contract Documents, within the time set forth therein, and at the following unit prices:

October 2002 6th Ave Rainier OR.

ITEM NO.	ITEM	ESTIMATED QUANTITY	UNIT	UNIT BID PRICE	AMOUNT BID
01500-1	Mobilization	1	LS	$ 1,700.00	$ 1,700.00
02220-1	Remove Existing Asphalt Pavement Crossing	958	FT^2	$ 1.00	$ 958.00
02300-1	Ditching And Drainage Grading	1120	LF	$ 2.00	$ 2,240.00
02300-2	Crossing Sub-excavation and Backfill	0	CY	$ 24.00	$ 0.00
02722-1	Construct Signal House Pad	27	CY	$ 45.00	$ 1,215.00
03484-1	Furnish and Install Concrete Grade Crossing Panels, Complete	90	TF	$ 200.00	$ 18,000.00
05660-1	Reconstruct Track with 136 RE CWR	180	TF	$ 155.00	$ 27,900.00
05660-2	Raise Existing Track	112	TF	$ 16.00	$ 1,792.00
05660-3	Surface, Line, And Dress	304	TF	$ 3.00	$ 912.00
13200-1	Install Crossing Signal System At 6th Ave.	1	LS	$ 124,000.00	$ 124,000.00
				TOTAL BID:	**$178,717.00**

Payment for Bid items shall constitute total compensation for all labor, equipment, tools and incidentals necessary to complete the work as specified and shown on the Drawings. No additional compensation will be made for unauthorized work, which is outside of the limits of this Contract. Any material removed without authorization shall be replaced at no added cost to the Owner. Any existing facilities damaged by the Contractor will be restored to their original condition or replaced as approved by the Engineer at no added cost to the Owner. The method of measurement and the basis of payment for Bid items will be in accordance with these Specifications.

SECTION 00400

BID FORM

TO: MR. CHARLES KETTENRING
PORTLAND & WESTERN RAILROAD
650 HAWTHORNE AVENUE SE
SUITE 220
SALEM, OR 97301

RE: PORTLAND & WESTERN RAILROAD
6TH AVENUE GRADE CROSSING IMPROVEMENT PROJECT
CONSTRUCTION AND ASSOCIATED WORK
RAINIER, OREGON

Gentlemen:

The undersigned Bidder, having examined the plans and specifications and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project, including the availability of materials and labor, hereby proposes to furnish all labor, equipment, tools, supplies, insurance, taxes, materials except as identified in Section 01100 as Owner supplied, and all other necessary incidentals to construct the project in accordance with the Contract Documents, within the time set forth therein, and at the following unit prices:

ITEM NO.	ITEM	ESTIMATED QUANTITY	UNIT	UNIT BID PRICE	AMOUNT BID
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02722-1	Construct Signal House Pad	27	CY	$ 45.00	$ 1,215.00
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05660-1	Reconstruct Track with 136 RE CWR	180	TF	$ 155.00	$ 27,900.00
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13200-1	Install Crossing Signal System At 6th Ave.	1	LS	$ 124,000.00	$ 124,000.00
				TOTAL BID:	**$178,717.00**

Payment for Bid items shall constitute total compensation for all labor, equipment, tools and incidentals necessary to complete the work as specified and shown on the Drawings. No additional compensation will be made for unauthorized work, which is outside of the limits of this Contract. Any material removed without authorization shall be replaced at no added cost to the Owner. Any existing facilities damaged by the Contractor will be restored to their original condition or replaced as approved by the Engineer at no added cost to the Owner. The method of measurement and the basis of payment for Bid items will be in accordance with these Specifications.

PERFORMANCE AND PAYMENT BOND

The undersigned hereby states that he can furnish a Performance and Payment Bond in the full amount of the Contract. The undersigned, if he is requested, agrees to furnish the said Bond. The undersigned has not included the cost of this Bond in his base Bid. The additive cost of the Bond to the Contract is **$ 1,950.00.**

RAILROAD PROTECTIVE INSURANCE LIABILTY

The undersigned will maintain Railroad Protective Insurance Liability per Section 00800, Supplementary Conditions, Paragraph 4b, in the "Agreement for Contractor's Right of Entry." The undersigned has not included the cost of this insurance in his base Bid. The additive cost of the insurance to the Contract is **$ 1,950.00.**

LIST OF SUB-CONTRACTORS

The undersigned hereby states that he proposes to use the following sub-contractors:

	CONTRACTOR NAME	DISCIPLINE
1.	MJG, Inc.	Railroad Signal Construction
2.		
3.		
4.		

GENERAL

The undersigned Bidder hereby acknowledges receipt of these Contract Documents.

The undersigned Bidder agrees to substantially complete the project in accordance with the following schedule:

Contract Award and Notice to Proceed	September 26, 2002
Begin Construction	October 1st, 2002
Substantial Completion	**November 21st, 2002**
Project Completion	November 30th, 2002

The undersigned Bidder further agrees that this Bid may not be revoked or withdrawn after the time set for receipt of Bids, but shall remain open for acceptance for a period of seven (7) days following such time.

NAME OF BIDDER: RAILWORKS TRACK SYSTEMS

SIGNATURE OF AUTHORIZED PERSON _____

TITLE: _____

BUSINESS ADDRESS OF BIDDER _____

BUSINESS PHONE NUMBER: _____ DATE: _____

END OF SECTION

SECTION 00301
BID FORM

PROJECT IDENTIFICATION: CORY ST. GRADE CROSSING IMPROVEMENT PROJECT
CONSTRUCTION AND ASSOCIATED WORK
HILLSBORO, OREGON

THIS BID IS SUBMITTED TO: PORTLAND & WESTERN RAILROAD, herein after referred to as OWNER.

1. Enter Into Agreement

The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an Agreement with OWNER in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Bid Price and within the Bid Times indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

2. BIDDER Accepts

BIDDER accepts all of the terms and conditions of the Advertisement or Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 10 days {the period specified for Notice of Award} after the day of Bid opening. BIDDER will sign and deliver the required number of counterparts of the Agreement with the Bonds and other documents required by the Bidding Requirements within {15} days after the date of OWNER's Notice of Award.

3. BIDDER's Representations

In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:

a. BIDDER has examined and carefully studied the Bidding Documents and the following Addenda receipt of all which is hereby acknowledged: (List Addenda by Number and Date)

ADDENDA NO

b. BIDDER has visited the site and become familiar with and is satisfied as to the general, local and site conditions that may affect cost, progress, performance and furnishing of the Work.

c. BIDDER is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress, performance and furnishing of the Work.

d. BIDDER has obtained and carefully studied (or assumes responsibility for having done so) all such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise which may affect cost progress, performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by BIDDER and safety precautions and programs incident thereto.

e. BIDDER does not consider that any additional examinations, investigations, explorations, tests, studies or data are necessary for the determination of this Bid for performance and furnishing of the Work in accordance with the times, price and other terms and conditions of the Contract Documents.

f. BIDDER has correlated the information known to BIDDER, information and observations obtained from visits to the site, reports and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies and data with the Contract Documents.

g. BIDDER has given ENGINEER written notice of all conflicts, errors, ambiguities or discrepancies in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to BIDDER, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.

Where conflicts, errors, ambiguities or discrepancies have been discovered in or between Contract Documents and/or other related documents, and where said conflicts, etc., have not been resolved through the interpretations or clarifications by ENGINEER as described in the Instructions to Bidders, because of insufficient time or otherwise, BIDDER has included in the Bid the greater quantity or better quality of Work, or compliance with the more stringent requirement resulting in a greater cost.

h. This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other BIDDER to submit a false or sham Bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other BIDDER or over OWNER.

4. Bid Prices

BID ITEM NO.	DESCRIPTION	EST QTY	UNIT	UNIT PRICE	AMOUNT
00700-1	Performance and Payment Bond	1	LS	$ 1,000.00	$1,000.00
00800-1	Railroad protective insurance liability	1	LS	$ 500.00	$ 500.00
01500-1	Mobilization	1	LS	$ 7,000.00	$7,000.00
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02300-2	Excavation	1965	M^3	$ 33.75	$66,318.75
02300-3	Excavation at Existing Crossing	140	M^3	$ 34.75	$4,865.00
02600-1	Install 300mm Pipe	10	LM	$ 145.00	$1,450.00
02722-1	Sub-ballast	68	M^3	$ 53.00	$3,604.00
03484-1	Furnish and Install Concrete Grade Crossing Panels, Complete	28	TM	$ 630.00	$17,640.00

05660-1	Reconstruct Track	55	TM	$ 590.00	$32,450.00
05660-2	Raise Existing Track	104	TM	$ 41.00	$4,264.00
05660-3	Surface, Line, And Dress	61	TM	$ 23.00	$1,403.00
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13200-2	Signal Support for Track Forces Working in Conjunction with this	80	HR	$ 25.00	$2,000.00
13200-3	Retire Existing Crossing Signal Warning System at Hornecker	1	LS	$ 4,000.00	$4,000.00
				Total Bid for Bid Items :	$278,822.75

Two Hundred Seventy Eight Thousand Eight Hundred Twenty Two Dollars and Seventy Five Cents

BIDDER will complete the Work in accordance with the Contract Documents for the following price(s):

All specific cash allowances are included in the price(s) set forth above and have been computed in accordance with paragraph 11.02. of the General Conditions.

TOTAL BID FOR ALL UNIT PRICES Two Hundred Seventy Eight Thousand Eight Hundred Twenty Two Dollars and Seventy Five Cents ; ($278,822.75)

Unit Prices have been computed in accordance with paragraph 11.03B of the General Conditions.

BIDDER acknowledges that quantities are not guaranteed and final payment will be based on actual quantities determined as provided in the Contract Documents.

5. Completion

BIDDER agrees that the Work will be substantially completed and ready for final payment in accordance with paragraph 14.07B of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

BIDDER accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the times specified in the Agreement.

6. Attached Documents

The following documents are attached to and made a condition of this Bid:

8. Address for Communications

Eric Winters
HDR Engineering
1001 SW 5th Ave.
Portland OR, 97204
(503) 423-3700

9. Defined Terms

Terms used in this Bid which are defined in the General Conditions or Instructions will have the meanings indicated in the General Conditions or Instructions.

SUBMITTED on August 21st, 2003.

If BIDDER is:

A Corporation

By QUALITY SIGNAL
(Corporation name)

CALIFORNIA
(State of incorporation)

By Bernard Bunny
(Name of person authorized to sign)

Vice President
(Title)

Business address: _____

_____

END OF SECTION

Green clear-out.
Hall Blvd., Progress

Mile Post FD - 753.30
DOT No. 749205R

Estimate date: 1/12/2006

MATERIAL

MANUFACTURER	MATERIAL	PART NUMBER	UNIT	QUANTITY	UNIT COST	COST
Safetran Systems	500 ohm HD Line Relay	ST 400023-17X	EA	2	$ 795.00	$ 1,590.00
1-800-328-3337	GCP 4000 2-Track box for single track use.	82A0-80465-00010	EA	1	$ 22,885.00	$ 22,885.00
	Wall mounted Surge Panel	80026-01	EA	1	$ 245.00	$ 245.00
	Mulltl-Frequency Shunt	62775-XXXX	EA	2	$ 563.00	$ 1,126.00
SAFT 480-563-9650	Saft SPL storage battery	SPL 380	Cell	10	$ 460.00	$ 4,600.00
Cragg Railcharger 612-623-8804	40 Amp. ETC Charger	40ETC-12V	EA	1	$ 590.00	$ 590.00
The Okonite Company	Case & Tower Wire #14	112-11-3024	FT	200	$ 0.34	$ 68.00
	Case & Tower Wire #10	112-11-3038	FT	300	$ 0.22	$ 66.00
Graybar Electric	Ground Rod Clamp		EA	4	$ 1.00	$ 4.00
	Duct Seal		LB	10	$ 5.00	$ 50.00
	1/4 in. Ring Eyelet #6	Panduit PV6-14R	EA	10	$ 0.45	$ 4.50
	1/4 in. Ring Eyelet #10	Panduit PV10-14R	EA	20	$ 0.25	$ 5.00
	1/4 in. Ring Eyelet #14	Panduit PV14-14R	EA	40	$ 0.20	$ 8.00
ERICO 1-800-447-7245	Bond Strand		FT	550	$ 0.60	$ 330.00

Shipping, handling		$ 6,248.30
Material Total		**$ 37,819.80**
Labor Total		**$ 15,000.00**
Signal Design Total		**$ 10,000.00**
CONTIGENCY OF 10%		$ 6,281.98
Project Total		**$ 69,101.78**

LABOR

DESIGN

Green clear-out.
Scholl Ferry Rd., Progress

Mile Post FD - 752.60
DOT No. 749204J

Estimate date: 1/12/2006

MATERIAL

MANUFACTURER	MATERIAL	PART NUMBER	UNIT	QUANTITY	UNIT COST	COST
Safetran Systems	500 ohm HD Line Relay	ST 400023-17X	EA	2	$ 795.00	$ 1,590.00
1-800-328-3337	GCP 4000 2-Track box for single track use.	82A0-80465-00010	EA	1	$ 22,885.00	$ 22,885.00
	Wall mounted Surge Panel	80026-01	EA	1	$ 245.00	$ 245.00
	Mullti-Frequency Shunt	62775-XXXX	EA	2	$ 563.00	$ 1,126.00
SAFT 480-563-9650	Saft SPL storage battery	SPL 380	Cell	10	$ 460.00	$ 4,600.00
Cragg Railcharger 612-623-8804	40 Amp. ETC Charger	40ETC-12V	EA	1	$ 590.00	$ 590.00
The Okonite Company	Case & Tower Wire #14	112-11-3024	FT	200	$ 0.34	$ 68.00
	Case & Tower Wire #10	112-11-3038	FT	300	$ 0.22	$ 66.00
Graybar Electric	Ground Rod Clamp		EA	4	$ 1.00	$ 4.00
	Duct Seal		LB	10	$ 5.00	$ 50.00
	1/4 in. Ring Eyelet #6	Panduit PV6-14R	EA	10	$ 0.45	$ 4.50
	1/4 in. Ring Eyelet #10	Panduit PV10-14R	EA	20	$ 0.25	$ 5.00
	1/4 in. Ring Eyelet #14	Panduit PV14-14R	EA	40	$ 0.20	$ 8.00
ERICO 1-800-447-7245	Bond Strand		FT	550	$ 0.60	$ 330.00

Shipping, handling		$ 6,248.30
Material Total		**$ 37,819.80**
LABOR		
Labor Total		**$ 15,000.00**
DESIGN		
Signal Design Total		**$ 10,000.00**
CONTIGENCY OF 10%		$ 6,281.98
Project Total		**$ 69,101.78**

Appendix G: Dibblee Point Siding Location Map

ASTORIA
#11
Google
©2008

PORTLAND DIVISION — A LINE SUBDIVISION

PA-24 LS-440 (4)

CONSTRUCTED 1898 — WILLBRIDGE → — ← ASTORIA — CONSTRUCTED 1898

.87 BR 58.9 BDPT 43'

.55 TUNNEL 3 189'

.31 BR 51.3 E/OTC 138' RINEARSON SLOUGH

.39 CH PUB XING 579986M LEWIS & CLARK BR

.88 BR A-46.0 BDPT 83'

2146+75.7 — 2199+55.7 — 2252+35.7 — 2305+15.7 — 2357+99.5 — 2410+90.8 — 2463+64.1 — 2516+44.4 — 2568+20.4 — 2622+12.7 — 2674+93.5 — 2727+75.5 — 2780+57.0 — 2833+52.1 — 2846+55.4 / 2846+32.9 — 2880+77.9 / 2880+69.7 — 2886+22.9 — 2939+05.0

60 — 55 — 50 — 45

TWC — TWC

F25 — F25 — F10 — F25

.79 PVT XING 910158A
.57 PUB XING 580044R
XBUCKS DIKE RD.
.53 24" CP 36'

.32 PUB XING 580022C
XBUCKS, HERMO RD.
.16 30" CP 45'
.11 PVT XING 580011V

.96 24" CP 36'

.69 24" CP 32'
.69 PVT XING 579986G
.58 24" CP 33'

.32 PVT XING 57997A
.31 24" CP 24'
.16 12" CP 21'
.10 24" CP 48'
.02 PUB XING 579967T
XBUCKS,CALLUNKI RD

.83 24" CP 52'

.71 PT SW #11-90
.62 24" CP 55'
.53 24" CP 52'

.34 30" CP 52'

.19 PVT XING 57995L
.06 24" CP 28'
.00 PVT XING 57994E

.97 30" CP 32'

.41 PT SW #9-90
.35 36" CP 48'

.20 24" CP 58'

.06 30" CP 48'

.81 PT SW #9-90
.80 PUB XING 57993X
.67 PVT XING 57992R
.58 4-72" CMP 70'

.37 24" CIP 56'

.61 1'x1' TP 20'

.33 18" CP 20'

.96 18" CP 21'

.64 18" CP 21'

.50 18" CP 18'
.31 36" CIP 63'

.10 24" CMP 60'

.90 12" CIP 16'

.29 PVT XING 57991J

.40 PVT XING 910157T

.73 PVT XING 57990C

.01 PVT XING 57988B

.38 PVT XING 579987U
.33 PVT XING 579985F
.11 PT SW #9-90
.02 PT SW #9-90
.00 PVT XING 57983S

.65 PVT XING 579982K
.53 PT SW #9-90

.19 PUB XING 101359H
XBUCKS, 6TH ST. W.
.17 72" CMP 74'

.88 PUB XING 579981D
18"x18" WB 52'
.82 PUB XING 57980W
.76 PUB XING 57999C
.71 PUB XING 57978V
.65 PUB XING 57977N
.60 PUB XING 57976G
.54 PUB XING 57975A
.47 24" CP 48'
.17 24" CP 69'
.01 30" CP 69'

0.00 0.20 — 0.00 — 0.03 — 0.01 — 0.00 0.20 0.00 0.20 0.00 — 0.01 — 0.20 0.00

~115.80

225' 100' 200' 150'

CAP 2304'

50' 37.5' 50' 50' 50' 50' 50' 50' 25' 45' 35' 45' 30' 50'

CAP 2595'

75' 50' 37.5' 50' 50' 50' 50' 50' 75' 45' 35' 45' 40' 50'

DIBBLEE SIDING - 8,500'
MP 48.75 TO 50.35

PORT WESTWARD
MP 57.8

MAYGER
MP 56.1

AVON
MP 46.8

C-60 3-00' — C-59A 4-00' — C-59 3-00' — C-58 4-00' — C-57 1-45' — C-56B 2-00' — C-56C 3-00' — C-56A 1-00' — C-56 0-45' — C-55B 3-00' — C-55 2-30' 1-30' 2-30' — C-54B 3-30' — C-54A 2-00' — C-54 2-30' — C-53D 3-00' — C-53C 3-00' — C-53B 3-00' — C-53A 3-00' — C-53 4-00' — C-52B 4-00' — C-52C 4-00' — C-52A 7-00' — C-52 2-45' — C-51A 3-00' — C-51 2-00' — C-49A 1-00' — C-49 2-00' — C-48 2-00' — C-47 0-30' — C-46B 2-00' — C-46A 2-00' — C-46 3-00' — C-45C 0-20' — C-45A 1-00' — C-45B 2-00' — C-45 3-00'

85B 39 — 131B 60 — 90B 48 — 90B 44 — 90B 48 — 90B 44 — 90B-48 — 90B 44 — 90B-48 — 112B 76 — 90B 49 — 90B-48 — 131B 60 — 90B-48 — 90B-49 — 90B-48 — 112B-68 — 90B 46 — 112--71 — 90B-48

TIES 91 — 238 TIES/MILE — 238 TIES/MILE — TIES 91

SURF 91 — SURF 91

01-01-95 P4402404

Appendix H: Quiet Zone Regulations

QUIET ZONE RULE SUMMARY

Overview

The Final Rule on "quiet zones" is intended to:

- Maintain a high level of public safety.
- Respond to the varied concerns of many communities that have sought relief from unwanted horn noise.
- Take into consideration the interests of localities with existing whistle bans.

The public authority responsible for traffic control or law enforcement at the highway-rail grade crossing is the only entity that can designate or apply for quiet zone status.

Mandated by law, the Final Rule:[1]

- Defines engineering solutions known as "supplementary safety measures" (SSMs) for use without FRA approval.
- Provides explicit flexibility for the modification of SSMs to receive credit as "alternative safety measures" (ASMs) (for instance, shorter traffic channelization arrangements can be used with reasonable effectiveness estimates).
- Includes a provision that provides risk reduction credit for pre-existing SSMs and pre-existing modified SSMs that were implemented prior to December 18, 2003.
- Allows use of education and enforcement options, including photo enforcement, subject to verification of effectiveness.

Local public authorities may designate or request approval of quiet zones in which train horns may not be routinely sounded. The details for establishment of quiet zones differ depending on the type of quiet zone to be created (pre-rule or new) and the type of safety improvements implemented (if required).

Once a quiet zone is established (including the continuation of pre-rule quiet zones pending any required improvements), the railroad is barred from routine sounding of the horn at the affected highway-rail grade crossings.

FRA provides a Web-based tool for communities to use in performing "what if" calculations and preparing submissions necessary to create or retain quiet zones. The tool may be found on the FRA Website.

To ensure proper application of the risk index, the National Highway-Rail Crossing Inventory must be accurate and complete. In the absence of timely filings to the inventory by the states or railroads, local authorities may file updated inventory information, and railroads must cooperate in providing railroad-specific data.

FRA regional personnel are available to participate in diagnostic teams evaluating options for quiet zones.

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1 49 U.S.C. 20153.

Requirement to Sound the Locomotive Horn

Outside of quiet zones, railroads must sound the horn 15–20 seconds prior to a train's arrival at the highway-rail grade crossing but not more than one-quarter-mile in advance of the crossing.

Note: Most existing state laws and railroad rules required that the horn be sounded beginning at a point one-quarter-mile in advance of the highway-rail grade crossing and continued until the crossing is occupied by the locomotive. Under the quiet zone rule, for trains running at less than 45 miles per hour, this reduces the time and distance over which the horn is sounded, thereby reducing noise impacts on local communities.

The pattern for sounding the horn will remain as it currently exists today (two long, one short, one long repeated or prolonged until the locomotive occupies the highway-rail grade crossing).

Train operators may vary this pattern as necessary where highway-rail grade crossings are closely spaced; they will also be empowered (but not required) to sound the horn in the case of an emergency, even in a quiet zone.

The rule addresses use of the horn only with respect to highway-rail grade crossings. Railroads remain free to use the horn for other purposes as prescribed in railroad operating rules on file with FRA, and railroads must use the horn as specified in other FRA regulations (in support of roadway worker safety and in the case of malfunctions of highway-rail grade crossing active warning devices).

The rule prescribes both a minimum and a maximum volume level for the train horn. The minimum level is retained at 96 dB(A), and the new maximum will be 110 dB(A). This range is intended to permit railroads to address safety needs in their operating territory (this issue is addressed in the preamble text of the Final Rule).

The protocol for testing the locomotive horn is altered to place the sound-level meter at a height of 15 feet above the top of the rail rather than the previous 4 feet above the top of the rail. (Cab-mounted and low-mounted horns continue to have the sound-level meter placed 4 feet above the top of the rail.)

Note: The effect of this change is to permit center-mounted horns to be "turned down" in some cases. The previous test method was influenced by the "shadow effect" created by the body of the locomotive to indicate a lower sound level than would otherwise be expected several hundred feet in front of the locomotive (where the crossing and approaching motorists are located).

The effect of these changes is expected to reduce noise impacts for 3.4 million of the 9.3 million people currently affected by train horn noise.

Creation of Quiet Zones

The rule provides significant flexibility to communities to create quiet zones, both where there are existing whistle bans and in other communities that heretofore have had no opportunity to do so.

The Final Rule permits implementation of quiet zones in low-risk locales without requiring the addition of safety improvements.

- This concept utilizes a risk index approach that estimates expected safety outcomes (that is, the likelihood of a fatal or non-fatal casualty resulting from a collision at a highway-rail crossing).
- Risk may be averaged over crossings in a proposed quiet zone.
- Average risk within the proposed quiet zone is then compared with the average nationwide risk at gated crossings where the horn is sounded (the "National Significant Risk Threshold" (NSRT)). FRA will compute the NSRT annually.

The effect of this approach is that horns can remain silenced in more than half of pre-rule quiet zones without significant expense; many new quiet zones can be created without significant expense where flashing lights and gates are already in place at the highway-rail grade crossings.

If the risk index for a proposed new quiet zone exceeds the NSRT, supplementary or alternative safety measures must be used to reduce that risk (to fully compensate for the absence of the train horn or to reduce risk below the NSRT).

Maintenance of Pre-Rule Quiet Zones

Train horns will not sound in existing whistle ban areas if authorities state their intention to maintain pre-rule quiet zones and do whatever is required (see above) within five years of the effective date (June 24, 2005; eight years if the state agency provides at least some assistance to communities in that state).

To secure pre-rule quiet zone status, communities must provide proper notification to FRA and other affected parties by June 3, 2005 and file a plan with FRA by June 24, 2008 (if improvements are required).

Horns may continue to be silenced at pre-rule quiet zones if:

- The average risk at the crossings is less than the NSRT; or
- The average risk is less than twice the NSRT and no relevant collisions have occurred within the past five years; or
- The community undertakes actions to compensate for lack of the train horn as a warning device (or at least to reduce average risk to below the NSRT).

Creation of New Quiet Zones

New quiet zones may be created if all public highway-rail grade crossings are equipped with flashing lights and gates; and either:

- After adjusting for excess risk created by silencing the train horn, the average risk at the crossings is less than the NSRT; or
- SSMs are present at each public crossing; or
- Safety improvements are made that compensate for loss of the train horn as a warning device (or at least to reduce average risk to below the NSRT).

Detailed instructions for establishing or requesting recognition of a quiet zone are provided in the regulation.

Length of Quiet Zones

Generally, a quiet zone must be at least one-half-mile in length and may include one or more highway-rail grade crossings.

Pre-rule quiet zones may be retained at the length that existed as of October 9, 1996, even if less than one-half-mile. A pre-rule quiet zone that is greater than one-half-mile may be reduced in length to no less than one-half-mile and retain its pre-rule status. However, if its length is increased from pre-rule length by the addition of highway-rail grade crossings that are not pre-rule quiet zone crossings, pre-rule status will not be retained.

Supplementary and Alternative Safety Measures

SSMs are engineering improvements that clearly compensate for the absence of the train horn. If employed at every highway-rail grade crossing in the quiet zone, they automatically qualify the quiet zone (subject to reporting requirements). They also may be used to reduce the average risk in the corridor to fully compensate for the lack of a train or to below the NSRT.

- Temporary closure used with a partial zone.
- Permanent closure of a highway-rail grade crossing.
- Four-quadrant gates.
- Gates with traffic channelization arrangements (for example, non-mountable curb or mountable curb with delineators) at least 100 feet in length on each side the crossing (60 feet where there is an intersecting roadway) and no commercial driveways included.
- One-way street with gate across the roadway.

ASMs may be applied such that the combination of measures at one or more highway-rail grade crossings reduces the average risk by the required amount across the quiet zone (so-called "corridor approach").

- Any modified SSM (such as barrier gate and median; shorter channelization; raised median islands; longitudinal median separators); or
- Education and/or enforcement programs (including photo enforcement) with verification of effectiveness; or
- Engineering improvements, other than modified SSMs; or
- Combination of the above.

The rule provides that pre-existing SSMs and pre-existing modified SSMs will be counted toward risk reduction.

Recognition of the Automated Wayside Horn

The rule authorizes use of the automated wayside horn at any highway-rail grade crossing with flashing lights and gates (inside or outside a quiet zone) as a one-to-one substitute for the train horn.

Certain technical requirements apply, consistent with the successful demonstrations of this technology.

The Federal Highway Administration (FHWA) has issued an interim approval for the use of wayside horns as traffic control devices. Communities interested in employing this option should contact FHWA to ensure that they comply with the provisions of the interim approval.

Special Circumstances

A community or railroad that views the provisions of the rule inapplicable to local circumstances may request a waiver from the rule from FRA.

A railroad or community seeking a waiver must first consult with the other party and seek agreement on the form of relief. If agreement cannot be achieved, the party may still request the relief by a waiver, provided the FRA associate administrator determines that a joint waiver petition would not be likely to contribute significantly to public safety.

FRA grants waivers if in the public interest and consistent with the safety of highway and railroad users of the highway-rail grade crossings.

Other Provisions

The Final Rule addresses quiet zones that prohibit sounding of horns during the evening and/or nighttime hours. These are referred to as partial quiet zones.

The Final Rule requires diagnostic team reviews of pedestrian crossings located within proposed new quiet zones and new partial quiet zones.

The Final Rule requires quiet zone communities to retain automatic bells at public highway-rail grade crossings that are subject to pedestrian traffic.

The Final Rule extends "recognized state agency" status to state agencies that wish to participate in the quiet zone development process.

The Final Rule contains a 60-day comment period on quiet zone applications.

The Final Rule requires public authorities to provide notification of their intent to create a new quiet zone. During the 60-day period after the Notice of Intent is mailed, comments may be submitted to the public authority.

The Final Rule provides quiet zone risk reduction credit for certain pre-existing SSMs.

The Final Rule provides quiet zone risk reduction credit for pre-existing modified SSMs.

The Final Rule contains a new category of ASMs that addresses engineering improvements other than modified SSMs.