RAIL MASTER PLAN

Prepared for:

Port of Benton and City of Richland

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List of Abbreviations

10NWA	10 N. Washington Ave LLC
ASM	Alternative Safety Measure
BN	BNSF Railway
CERB	Community Economic Revitalization Board
CWCP	Central Washington Corn Processors
DDGS	Dried Distillers Grains with Solubles
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
ELD	Electronic Logging Mandate
FAST Act	Fixing America's Surface Transportation Act
FASTLANE	Fostering Advancements in Shipping and Transportation for the Long-term Achievement of National Efficiencies
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FRAP	Freight Rail Assistance Program
FRIB	Freight Rail Investment Bank
FY	Fiscal Year
JRA	Joint Rail Authority
LID	Local Improvement District
LIGO	Laser Interferometer Gravitational-wave Observatory
MHz	megahertz
MP	Milepost
MPH	Miles per Hour
NP	Northern Pacific Railroad
NSRT	Nationwide Significant Risk Threshold
PNNL	Pacific Northwest National Laboratory
QZRI	Quiet Zone Risk Index
RIWH	Risk Index Without Horns
RRIF	Railroad Rehabilitation and Improvement Financing
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SSM	Supplementary Safety Measures
STB	Surface Transportation Board

TCRY	Tri-City Railroad Company
TEA-21	Transportation Equity Act for the 21st Century
TIGER	Transportation Investment Generating Economic Recovery Grant Program
TRIDEC	Tri-City Development County
UP	Union Pacific Railroad
WSDOT	Washington State Department of Transportation

1. INTRODUCTION AND PURPOSE

To identify needs and guide investments in their rail system, the Port of Benton (**Port**) and City of Richland (**City**) have commissioned this Rail Master Plan (**Plan**).

Originally built as part of the "Southern Connection" to the Hanford Site, the Port of Benton's rail line is an important transportation asset for Richland, Washington, and the surrounding region. With the advantage of equal and competitive access to both the Union Pacific Railroad (**UP**) and BNSF Railway (**BN**), and with connections to large areas of available industrial property, rail activity on the line is increasing and the prospects for continued economic development along the line are strong.

The purpose of the Plan is to:

- Establish the vision for the Port's and City's rail system and support the goal to improve freight rail transportation.
- Provide an assessment of existing conditions and identify trends, markets, and needs.
- Analyze and prioritize rail corridors, programs, and proposed projects.
- Identify options to finance and fund proposed future improvements.
- Provide a high-level analysis of possible Richland Quiet Zones and inland container port sites.

In addition to this **Section 1**, the Plan is organized as follows:

- **Section 2** describes the existing physical, operating, and market conditions on the rail line.
- **Section 3** provides information on available industrial properties on the line, specifically the City's Horn Rapids Industrial Park, and the "Transfer Area" property that was recently deeded to the Port and City through TRIDEC by the Department of Energy.
- **Section 4** examines possible future rail uses and developments along the rail line.
- **Section 5** describes the projects identified needed to maintain and expand the Port and City rail infrastructure.
- **Section 6** provides information on the requirements and possible locations for an inland container port.
- **Section 7** describes the process and improvements needed to establish a Quiet Zone along the Port's rail line.
- **Section 8** discusses possible mechanisms to finance rail line maintenance and the expansion of the local rail network.

2. EXISTING CONDITIONS

2.1. Plan Sponsors

City of Richland

Richland was a small farm town until the US Army purchased it during World War II and turned it into a bedroom community for the nearby Hanford nuclear site. The population grew from 300 in 1943 to 25,000 at the end of the war. The government started privatizing property around Richland in 1957 and the City of Richland was chartered in 1958. Today, Richland is a leading center of production and research for nuclear energy and related technology, including the Battelle-operated Pacific Northwest National Laboratory (**PNNL**). Home to a large potato processing facility for Lamb Weston, Richland is also a major value-added agricultural center and a growing center for wine production. Richland had an estimated population of 54,248 in 2015.[1]

Port of Benton

A general election in 1958 created the Port of Benton, a municipal corporation and taxing district encompassing two-thirds of Benton County and the communities of Richland, Benton City, and Prosser. Since its creation, the Port has acquired numerous properties and developed multiple industrial and commercial centers. It is unique among Washington public ports by owning and operating two airports, one located in Richland and the other in Prosser. It is also one of the few nuclear ports in the U.S. The Port acquired its rail line from the government in 1998.

2.2. Port and City Rail Tracks

The Port owns the 15 miles of track from the end of the Department of Energy (**DOE**) rail line at Horn Rapids Road in Richland to the Richland Junction by Center Parkway in Kennewick (see **Figure 1**). This includes the Richland Rail Yard and the underlying property and right of way. The length of the Port's main line track is approximately 11 miles; there are additional four miles of yard and siding track. There are 10 at-grade crossings and four bridges along the line.

The City owns the Horn Rapids Spur, which is approximately two miles long. The spur, which connects to the Port's rail line about one-half mile north of the Richland Rail Yard, serves the City's Horn Rapids Industrial Park.

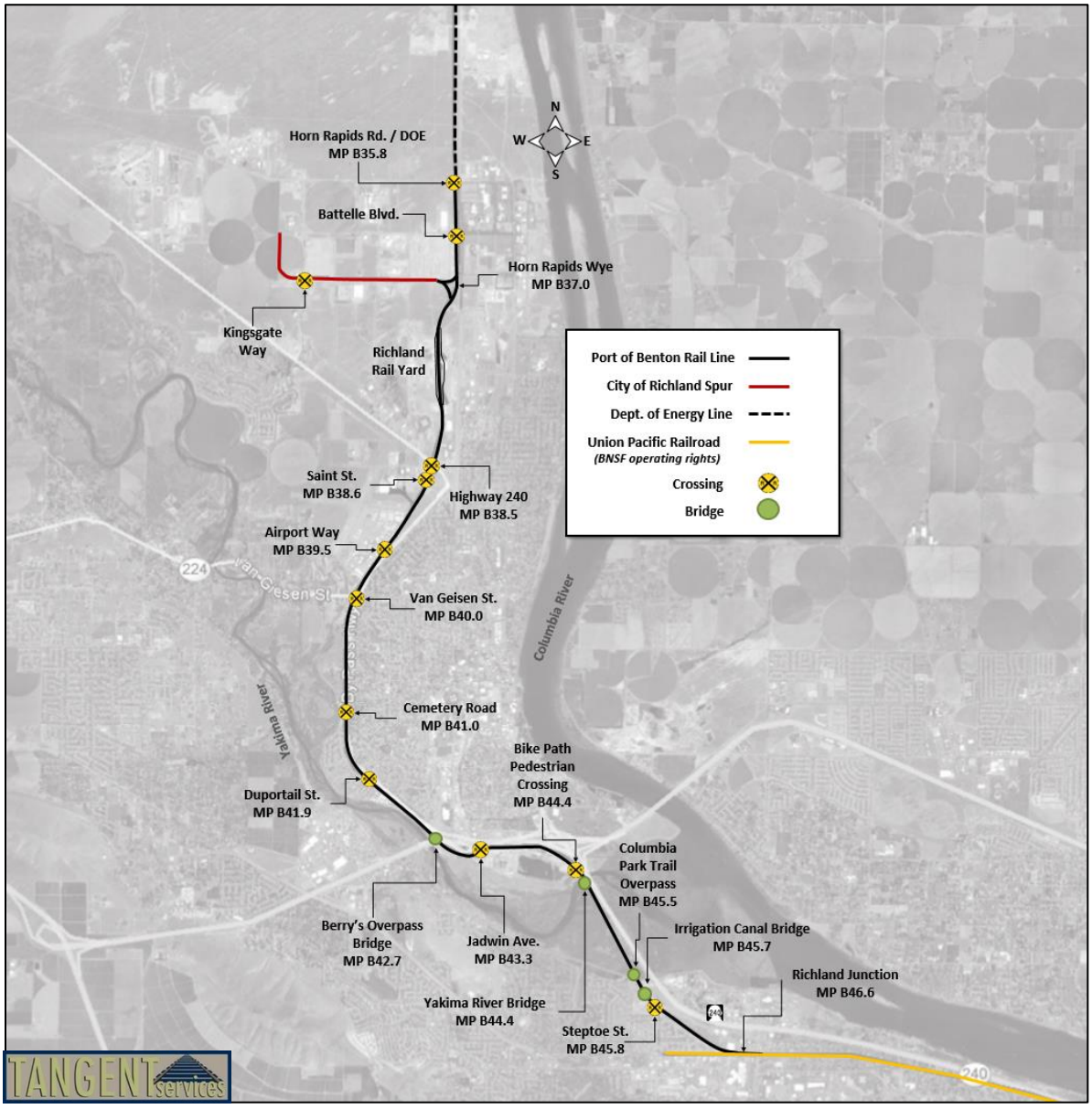
2.3. Rail Line History and Carriers

Before 1950, the Hanford Engineering Works (now called the Hanford Site) was served by a single 46-mile rail line from the north, operated by the Chicago, Milwaukee, St. Paul and Pacific Railroad (also known as the "Milwaukee Road"). During World War II, to meet rapidly growing defense industry needs, the federal government started planning a connection to Hanford from the south which could

[1] U.S. Census Bureau, American Factfinder, 2015 Population Estimate (as of July 1, 2015) for Richland, WA.

be accessed by both the UP and the Northern Pacific Railroad (**NP**). In 1947, the government entered an agreement with the UP and NP that established non-exclusive trackage rights on the proposed "Southern Connection" for the two railroads.[2] By a separate agreement, also dated 1947, UP granted NP operating rights over UP trackage between Kennewick and Richland Junction, allowing NP trains to reach the Southern Connection. The government completed construction of the Southern Connection in 1950 at a cost of $2 million, which was repaid by the railroads over a term of 25 years.[3]

Figure 1: Port of Benton Rail Line



[2] The agreement was amended in 1948 to change cost recovery-related provisions.

[3] A good historical summary of the Southern Connection can be found on HistoryLink.org at http://www.historylink.org/File/10804 (by Jim Kershner, posted 06/25/2014). Accessed 09/15/2016.

In 1961, the government, UP, and NP entered an agreement that established the contractual right of the railroads to directly serve private industries that had located or might in the future locate along the Southern Connection.

The Milwaukie Road continued to serve Hanford from the north until its final bankruptcy in 1980. In 1981, the Milwaukie Road tracks were removed and the right of way deeded to the State of Washington. The Southern Connection is now the only rail connection to the Hanford Site.

In 1998, the government conveyed ownership of the Southern Connection (south of Horn Rapids Road) to the Port. The 1947 and 1961 agreements and the associated operating rights of UP and BN (NP's successor) survived the transfer. At that time, the Port entered an operations and maintenance agreement with Livingston Rebuild Center, Inc.; that agreement was assigned to Tri-City Railroad (**TCRY**) in 1999.

In 2000, TCRY sought and obtained STB authority to operate as a common carrier on the line and entered agreements with UP and BN to provide rail service in exchange for fee. Both the UP and BN retained their right operate directly over the line, however.

The Port leased the track and associated property to TCRY in 2002. The lease prohibited TCRY from acting to "amend modify terminate or invalidate" the Port's existing agreements with UP and BN.

In 2009, BN terminated its haulage agreement with TCRY and resumed operations over the line. The UP has continued its hauling relationship with TCRY to this day.

The City constructed Horn Rapids Spur, an industrial track, in 1999, and has track use agreements with BN and UP. TCRY also operates over the City's spur as an agent of UP.

2.4. Railroad Operations

Operations on the Port's rail line are controlled by a Comprehensive Operational Plan (**COP**). The TCRY, BN, and UP have agreed the COP consists of the following TCRY-issued documents: General Orders, System Special Instruction No. 8, and Timetable 1st Subdivision No. 8.

BNSF Railway

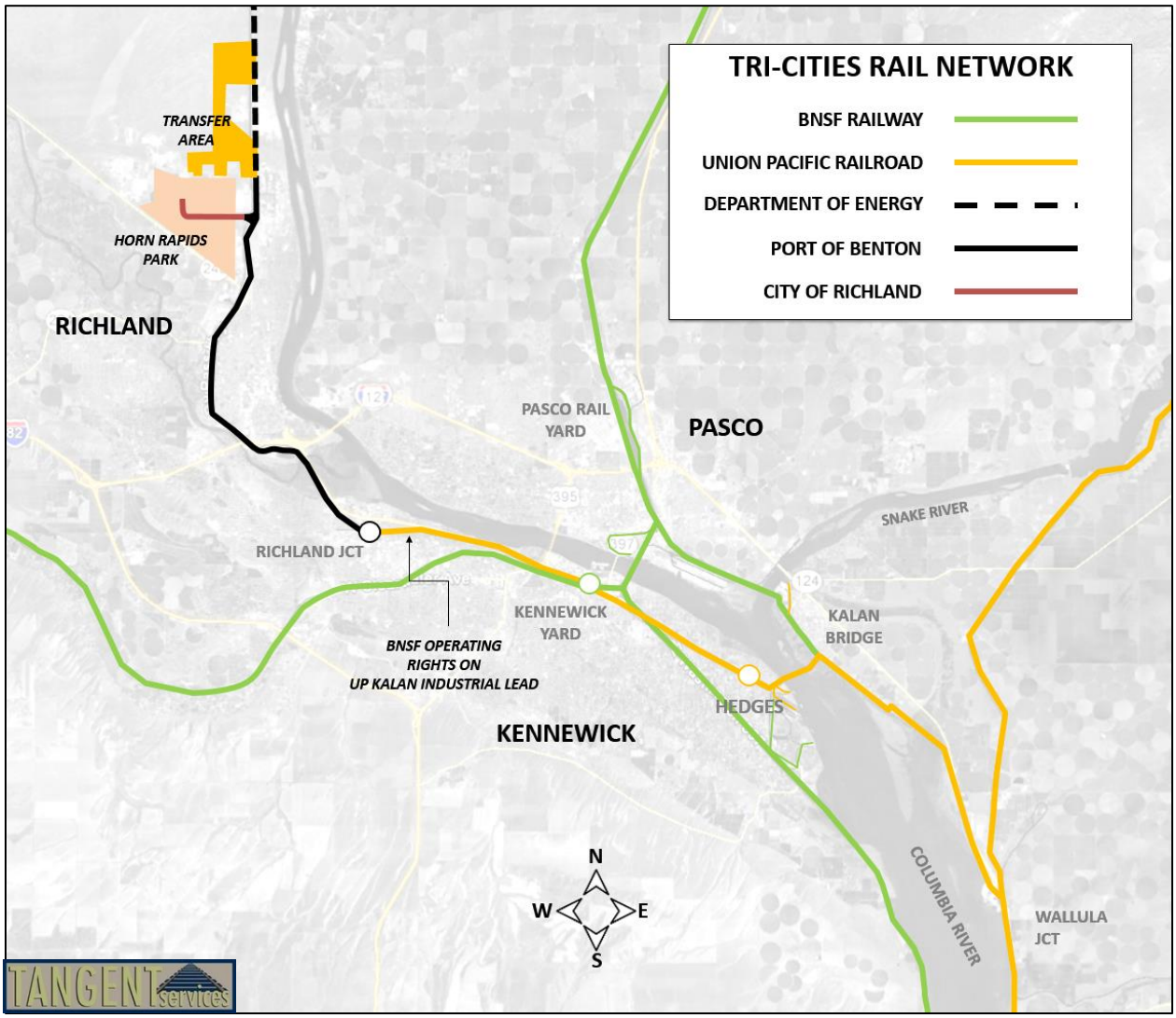
Local BN operations are based at Pasco Yard. A road switching crew serves the Horn Rapids Industrial Park and industries on the Port-owned track five days per week. BN handles grain, bentonite clay, empty reefer cars, and oil for customers including Henningsen Cold Storage, Lamb Weston, Preferred Freezer Services, and DelHur Industries with the road switcher service. BN directly serves Central Washington Corn Processors (**CWCP**) unit trains with main line crews from Pasco or can augment unit train service with their road switcher if necessary. CWCP receives unit trains of animal feed from the BN Yakima and Lakeside subdivision at Pasco yard. These unit trains typically stop in the Pasco Yard for new crews before proceeding onto UP's Kalan Industrial Lead (to which the BN has operating rights) and then onto the Port track at Richland Junction.

Union Pacific Railroad

To connect with the Port rail line, UP trains travel on track between UP's main rail yard located at Hinkle (Hermiston), Oregon, to Wallula Junction. The 19-mile UP Kalan Industrial Lead extends from Wallula to the connection with the Port's trackage at Richland Junction.

UP operations in the Tri-Cities region are based out of Wallula. UP has two switching crews working five days per week. UP currently contracts with TCRY to switch their business on the Port and City rail lines. UP interchanges five times per week with TCRY at Hedges, WA. Most of the volume is refrigerated and frozen processed foods and cooking oil for Lamb Weston, Henningsen Cold Storage, and Preferred Freezer Services. UP also recently delivered a unit train of feed grain to the CWCP rail loop facility.

Figure 2: Local Rail Network



Tri-City and Olympia Railroad

TCRY is a privately-owned short line railroad. It operates out of the Richland Yard where the crews are based, locomotives are serviced, and railcars are maintained. TCRY has five running locomotives; three of these are GP4-2 units and two are Port-owned SW 1500 units. There are four additional locomotives that are used for parts. TCRY also has one regulator and one tamper, both Port-owned, for track maintenance.

TCRY typically runs a two-man crew from 6:00 am to 2:30 pm, Monday through Friday. It will, however, run two crews if needed and have flexible operating hours depending on the customers' requirements. TCRY has a total of six operating employees capable of performing all jobs. Total employment for TCRY in Richland is 12 people.[4]

2.5. Rail Line Infrastructure

Track

The Port owns about 15 miles of rail track consisting of about 11 miles of main line (including the Horn Rapids Wye) and about another four miles of non-main track (Richland Yard track, a siding at Richland Junction, and other auxiliary trackage).

The entire track consists of combinations of 90 pound per linear yard ("90#") to 115# rail. From Richland Junction From about MP B42.0 and Richland Junction (MP B46.6), the rail is 115#. The remainder of the main line is 90# except at the crossings, some of which having upgraded rail. Most of the rail lengths are 39 foot sections. All 90# and 115# existing rail is joint bolted together and staggered so joints on the left-side rail are not in the same location as joints on the right-side rail.

The track speed on the Port line is restricted to 20 MPH for safety considerations. Track speed is further restricted to 10 MPH in the Richland Yard, also due operational safety considerations.[5]

Table 1: Track Speed Restrictions

MP B46.6 (Richland Jct.) to MP B38.6 (Saint St.)	20 MPH
MP B38.6 (Saint St.) to MP B35.8 (Horn Rapids Rd.)	10 MPH
Trains & engines through turn-outs	10 MPH
On tracks other than Industrial tracks or sidings	10 MPH
City Lead	10 MPH
Kingsgate Crossing	5 MPH

The City's Horn Rapids Spur is a slightly less than two miles in length. The City also owns a two-ended, 3,400-foot lead track that connects to Preferred Freezer Services tracks.

[4] This information for TCRY is from a 2012 and has not been updated.

[5] Speed restrictions per the TCRY Timetable dated September 14, 2015.

Note: This plan uses the historic DOE line mile posts which start on the Hanford Site (north to south) whereas recent TCRY timetables use a mile posts that match those for the UP's Kalan Lead which begins in Wallula, OR (south to north). A concordance for the different mile post systems is provided in **Attachment "H"**.

Rail Crossings

There are 10 at-grade crossings on the Port's rail line (this includes a pedestrian crossing) and one crossing on the City's spur. The Horn Rapids Road crossing is owned by the DOE. These crossings are listed in **Table 2**.

Table 2: At-Grade Crossings

Street	Railroad Milepost	Devices	Surface
Steptoe St.	B45.8	Crossbucks, gate arms, flashing lights	Concrete
Riverfront Trail (Pedestrian crossing)	B44.4	None	Asphalt
Jadwin Ave.	B43.3	Crossbucks, gate arms, flashing lights	Asphalt
Duportail Street	B41.9	Crossbucks, gate arms, flashing lights	Concrete
Cemetery Road	B41.0	Crossbucks, flashing lights	Asphalt
Van Giesen St.	B40.0	Crossbucks, gate arms, flashing lights (3 masts)	Rubber
Airport Way	B39.5	Crossbucks, gate arms, flashing lights	Asphalt
Saint St.	B38.6	Crossbucks, yield sign	Asphalt
Highway 240	B38.5	Crossbucks, gate arms, flashing lights	Concrete
Battelle Blvd.	B36.3	Crossbucks, gate arms, lights	Concrete
Horn Rapids Rd. (DOE)	B35.8	Crossbucks, gate arms, lights	Concrete
Kingsgate Way (City)		Crossbucks, flashing lights	Concrete

Bridges

There are four bridges on the Port rail line: Irrigation Canal Bridge (MP B45.7); Columbia Park Trail Bridge (MP B45.5); Yakima River Bridge (MP B44.4); and Berry's Overpass Bridge (MP B42.7).

- The **Irrigation Canal Bridge** crosses an irrigation canal for the Columbia Irrigation District. It is a deck plate girder-type single span.
- The **Columbia Park Trail Bridge** was replaced in 2015 with the help of $2.2 million of Washington State capital funds. The project included new bridge ties, replacement of wood bents, and replacement of approach rail. The improvements ensure the bridge can carry modern train loads into the foreseeable future and will reduce the risk of fire damage.
- The **Yakima River Bridge** has five clear spans and one approach on steel bents. The previous wooden trestle bridge was destroyed by fire in 2001 and rebuilt in a little more than a month. Drawings of the Yakima Bridge indicate a vertical clearance of 21' over rail at center, and

about 20’ 6” at four feet from center.[6] The interchange standard for double-stack container cars (Plate H) shows a vertical height of 20’ 3” over rail. **A survey of the bridge to assure there is enough vertical clearance for stacking two high-cube double-stack containers in platform wells on railcars is recommended.**

- The **Berry’s Overpass Bridge,** a WSDOT-constructed concrete span, spans I-182/Highway 12.

Figure 3: Rail Bridge Photos

Irrigation Canal Bridge

Columbia Park Trail Bridge

Yakima River Bridge

Berry’s Overpass Bridge

2.6. Local Rail Users

The Port’s rail line is a critical asset for the community and local shippers, providing important transportation infrastructure to support economic development.

The following rail users are located on the Port of Benton line:

[6] Source: Port of Benton, December 2016.

- **Lamb Weston** and **Henningsen Cold Storage** are located on Saint Street adjacent to the Richland Airport. The Port owns the railroad spur off the mainline and the two tenants own the tracks serving their properties. Inbound oil for food processing is handled for Lamb Weston and outbound refrigerated jumbo boxcars are handled for both shippers.
- Located in the Richland Rail Yard, **West Coast Warehouse** brings in salt by rail and trucks it to the Lamb Weston facility for use in food processing.

Rail users located off the City's Horn Rapids Spur include:

- **10 N. Washington Ave LLC (10NWA)** is a TCRY affiliate. It is located on a 33-acre site with a spur and loop track approximately 3,800 feet in length. 10NWA owns approximately 19 acres of the site. The remaining 14 acres are owned by CWCP.
- **Perma-Fix Environmental Services**, which provides nuclear and industrial waste management services, has a facility on Battelle Boulevard. It completed a rail connection to the City spur in 2011 which passes through the 10NWA property.[7]
- In 2015, **Preferred Freezer Services** opened a 455,000-square foot automated frozen product warehouse on 80 acres of land acquired from the City. The facility handles 10 to 12 railcars a day.
- In 2016, **CWCP** completed construction of a grain transload facility with an 8,500-foot loop track, rail receiving facilities, and both vertical and flat storage.
- The **Port of Benton** owns a 9,060-square foot refrigerated intermodal transload facility.
- **DelHur Industries** has a 15-acre site with 1,100 feet of track available for transloading bulk materials. It also has a 100-ton truck scale at the same site.[8]

Rail Traffic Volume

CWCP reports that it is currently handling about 4,000 railcars annually, and believes the local feed market will support a volume up to about 5,000 railcars.[9] Preferred Freezer Services reports that it is currently loads 70 to 84 outbound railcars each week (equivalent to 3,640 to 4,368 railcars annually).[10] Activity by other rail users along the line, e.g., Henningsen Cold Storage, is believed to be minimal. For the purposes of this study, the annual volume of the other users is assumed to be 750 railcars (between 500 and 1,000).

In total, the current one-way railcar volume on the Port/City rail line is approximately 8,750 railcars each year.

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[7] Perma-Fix Environmental Services press release, April 21, 2011. Retrieved on September 29, 2012, from http://www.perma-fix.com/news.aspx?newsframe=http://ir.stockpr.com/perma-fix/company-news/detail/3793/perma-fix-announces-completion-of-rail-line-connecting-doe-hanford-site-and-perma-fix-northwest-richland-facility

[8] DelHur Industries web site. Retrieved on October2, 2012, from http://www.delhur.com/richland.html.

[9] Interview with Dennis Kyllo, CWCP, November 8, 2016

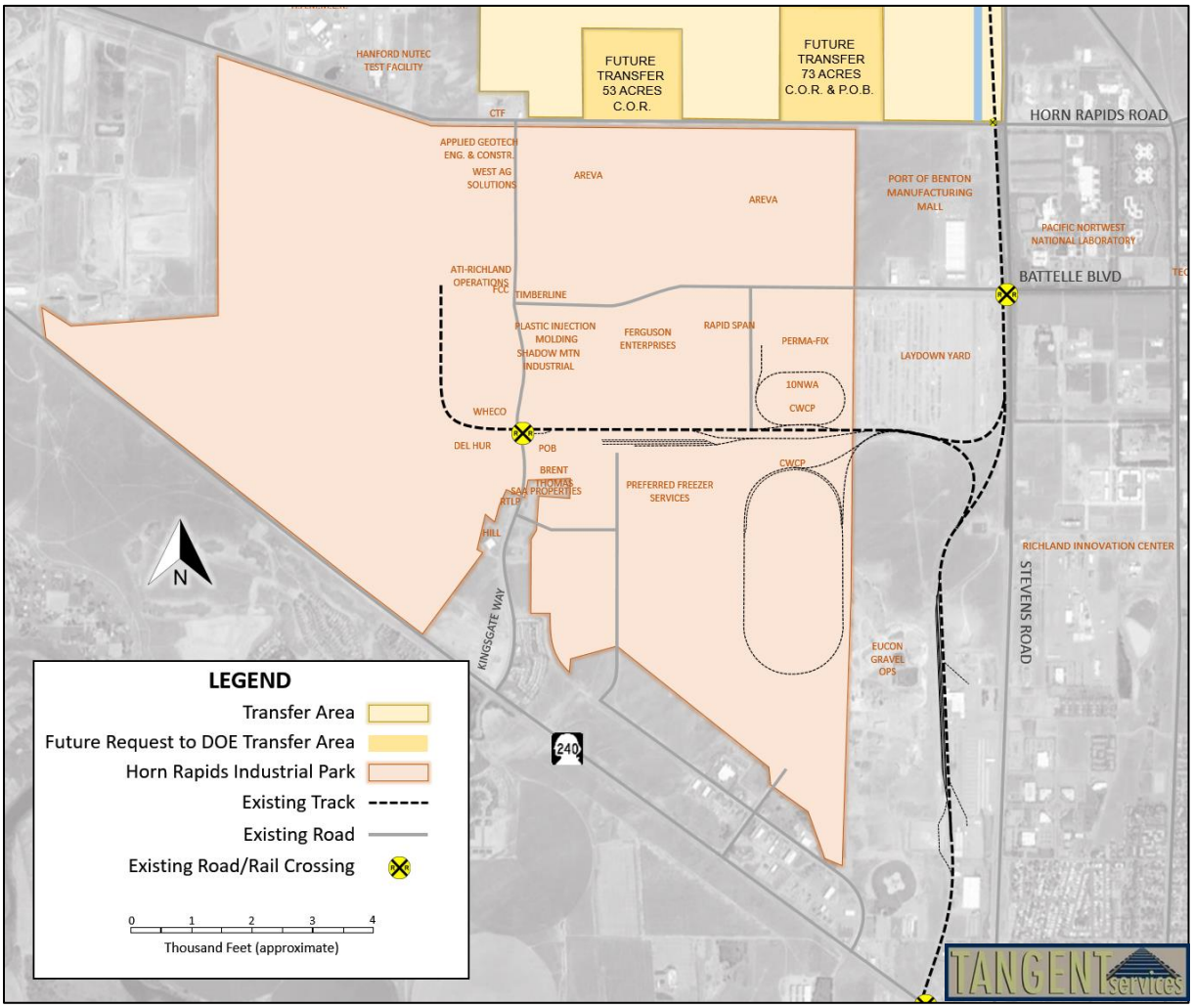
[10] PFS volumes courtesy of BST Associates, who surveyed PFS for their market study for the Port2016.

3. INDUSTRIAL PROPERTIES

3.1. Horn Rapids Industrial Park

The 2,466-acre Horn Rapids industrial and business center is located about seven miles northwest of the Richland city center. The triangular property is bounded by Horn Rapids Road, SR 240, and the Port's Manufacturing Mall (Kelly Ave). A total of 1,689 acres of the property has an industrial land use designation in the Horn Rapids Industrial Park. There are about 20 businesses located in the park, including Areva, Perma-Fix, Ferguson Enterprises, Rapid Span, Preferred Freezer Services, and CWCP. Approximately 500 acres remain available for development.

Figure 4: Horn Rapids Industrial Park



3.2. Transfer Area

In September 2015, DOE transferred 1,641 acres of land north of Horn Rapids Road to the Tri-City Development Council (**TRIDEC**). In February 2016, TRIDEC transferred 1,341 acres of this land to the

Port and the City. The Port received 760 acres and the City received 581 acres. TRIDEC transferred 300 acres for a prospective solar energy facility to Energy Northwest (Parcel "4"). The Port and City have also identified approximately 650 acres of DOE land adjoining the Transfer Area that are possible future land transfers.

Figure 5: Transfer Area

Interlocal Agreement

The City and Port have an interlocal cooperative agreement (2015) for coordinated economic activities for the Transfer Area. This agreement includes commitments to jointly pursue the expansion of the Urban Growth Boundary, joint master planning, joint marketing, and the reservation of 200 to 500 acres for a "Mega Property" opportunity.

DOE Rail Line and Transfer Area Easements

The DOE rail line runs north from Horn Rapids Road, including through portions of the Transfer Area where DOE has reserved an exclusive easement with a width of 100 feet, 50 feet from each side of the railroad track centerline.

To facilitate competitive rail service from the south for the Transfer Area, with connectivity to both the UP and BN, the Port has begun the process working with DOE and TRIDEC to acquire the DOE line, or trackage rights on the DOE line, north of Horn Rapids Road to, at minimum, the northern extent of the Transfer Area.

The DOE has also reserved a 185-foot-wide electrical utility and access road easement in the northern area of the Transfer Area, and, for the BPA, a 100-foot-wide powerline easement, generally in the southern area of the Transfer Area.

Transfer Area Authorized Uses and Restrictions

The deed from DOE authorizes the following uses of the land:

1. Warehousing and distribution (e.g., manufactured parts and materials distribution, food and agriculture; refrigerated warehousing and storage; material handling, packaging and crating; and logistics);
2. Research and development (e.g., scientific research; software; data security; computation; energy technology; environmental; and biotechnology);
3. Technology manufacturing (e.g., defense manufacturing; sensor manufacturing; medical device manufacturing; food processing; machinery manufacturing; advanced materials manufacturing; and carbon fiber manufacturing);
4. Food processing and agriculture (e.g., wine processing; food processing; agricultural products; and craft beer production);
5. Back office (e.g., call centers; administrative processing; data processing; information technology; remote sensing; professional services; and training); and
6. Energy (e.g., solar energy production; smart grid; and biofuels manufacturing).

The deed also contains various restrictions, including vibration restrictions that could potentially affect rail development in the Transfer Area. The purpose of the vibration restrictions is to prevent, reduce, or otherwise minimize potential adverse impacts to the PNNL and the Laser Interferometer Gravitational Wave Observatory (**LIGO**).

The Port and City should investigate whether potential rail operations or rail-dependent industry will meet the vibration restrictions and standards described in the deed as an initial step in any proposed development.

4. POTENTIAL RAIL USES

This section examines potential rail-related uses for the Port and City properties in the Horn Rapids Industrial Park and the Transfer Area. The uses described are representative of some potential future developments, but are not intended to be inclusive of all possible future rail-related uses. They are chosen to help describe the characteristics and requirements of future rail uses upon which the development of rail infrastructure is predicated.

The plan examines six different types of potential rail uses:

- Storage and Rail Distribution Center
- Vegetable Food Processing
- Biofuels Manufacturing
- Vegetable Oil Crushing
- Cold Storage Warehouse
- Inland Container Port
- Container-Dependent Industry

Table 3 summarizes the characteristics of the respective potential rail uses.

Table 3: Typical Characteristics for Potential Rail Uses

Rail Use	Acres	Rail Volume (One-way)	Rail Type	Truck Volume (One-way)	Jobs	Example
Storage and Rail Distribution Center	180	3,500	Unit & Manifest	10,000	150	Railex, Burbank WA
Vegetable Food Processing	50	1,000	Manifest	??	500	Lamb Weston, Richland, WA & Boardman, OR
Biofuels Manufacturing	20	5,400	Unit (inbound) & Manifest (outbound)	4,800	35	Pacific Ethanol, Boardman, WA
Vegetable Oil Crushing	25	4,900	Unit (inbound) & Manifest (outbound)	4,000	50	Pacific Coast Canola, Warden, WA
Cold Storage Warehouse	40	4,000	Manifest	??	150	Preferred Freezer Services, Richland, WA
Intermodal Container Transfer Facility – Start Up	40	26,000[1]	Unit	26,000	20	Greer Inland Port, Greer, SC
Intermodal Container Transfer Facility – Full Build Out	100	87,500[1]	Unit	87,500	35	Greer Inland Port, Greer, SC

[1] Number of containers. Assume 11 container per five-well articulated intermodal railcar.

4.1. Storage and Rail Distribution Center

One potential rail use is a storage and distribution center like the Railex Distribution Center in Burbank, WA. The Railex facility is used for the storage and rail distribution of wines, fruits, vegetables, and other perishable and temperature sensitive cargo. The facility uses a 9,000-foot loop track and has a 225,000-square foot perishable food distribution facility located on the loop exterior

and a 500,000-square foot wine distribution center located on the loop interior. The entire facility sits on 180 acres with about 125 acres inside the loop. There is room in the loop interior for additional tracks and distribution operations. The facility, which employs 100 workers, currently handles three trains per week (apples, onions, wine, potatoes) and about 3,500 railcars annually. [11,12]

Figure 6: Railex Facility

Graphic Source: Final Environmental Assessment Proposed Conveyance of Land at the Hanford Site (2015)

In January 2017, UP announced it had acquired Railex's refrigerated and cold storage facilities, including those at Burbank. Railex's wine services business was not part of the purchase.

4.2. Vegetable Food Processing

A rail use involving a vegetable processing plant would receive raw material (such as potatoes) by truck and ship out processed foods by truck and rail. The facility could also receive production inputs by rail, such as oil for a French-Fry plant. The typical lot size for the plant would be 25 to 50 acres. The facility would generate manifest rail traffic and would require daily switching. These plants can employ 500 or more workers. Nearby examples of this type of expansion opportunity are the Lamb Weston plants in Richland, WA, and Boardman, OR.

[11] Pihl, Kristi. "Railex opens $20 million Wallula wine distribution center." tri-cityherald.com. 25 April 2013. n.d. Web. 28 Sept. 2016.

[12] Hillhouse, Vicki. "Walla Walla Valley to keep on truckin' …." Union-Bulletin.com. 15 Oct. 2016. Web. 28 Sept. 2016.

Figure 7: Lamb Weston in Boardman, WA

Photo: Paladino web site

4.3. Biofuels Manufacturing

The example of a biofuels manufacturing rail use is the Pacific Ethanol plan in Boardman, OR. The annual production capacity of the Boardman plant is 40 million gallons, which would about require 40 unit trains (4,000 covered hopper railcars) per year of corn feedstock. The actual production and feedstock requirements vary year-to-year depending on market conditions, however. While the Boardman plant's ethanol output is shipped by barge, in Richland the loadout would likely be transported by rail, possibly in a unit train configuration. At full production, a 40 million-gallon plant would generate about 1,400 rail tank cars of ethanol. It would also produce a byproduct – dried distillers grain with solubles (**DDGS**) – which could be shipped by rail (about 1,200 covered hopper railcars/year), but would likely be distributed by truck to area feedlots. The Boardman plant sits on about 20 acres, but this area does not include the rail tracks owned by the Port of Morrow used to handle the corn trains. The plant employs 35 workers.

4.4. Vegetable Oil Crushing

The example for a vegetable oil crushing rail use is the Pacific Coast Canola crushing facility in Warden, WA. The scale of the Warden plant is similar to the scale of the Pacific Ethanol plant in Boardman. The plant has the capacity to produce 40 million gallons of canola oil annually. At full production, the plant would consume about 350,000 tons of feedstock each year – the equivalent of about 35 covered hopper unit trains. The canola oil output, if distributed by rail, would fill about 1,400 rail tank cars. The plant would also generate about 250,000 tons of canola meal, which can be used as animal feed.

The Warden plant has a linear track that can hold a full unit train, plus additional working tracks. The plant sits on about 25 acres, excluding the tracks. The plant employs 50 workers.[13]

4.5. Cold Storage Warehouse

An example of a potential cold storage warehouse is the Preferred Freezer Services facility, which opened in 2015. The 455,000-square-foot building, which sits on 40 acres, employs 150 workers on-site. The building has six rail doors.[14] Preferred Freezer Services also owns an adjacent 40 acres on which it plans to expand.

Figure 8: Preferred Freezer Services

Photo Source: Bob Brawdy -Tri-City Herald

4.6. Inland Container Port

An inland container port would perform the transfer of container equipment between trucks and trains for transport to and from marine terminals – in this case, container terminals in Seattle and Tacoma. In addition to transshipment, an inland container port could also provide logistics, storage, consolidation, maintenance, and customs services.

Interest in inland container ports has increased in recent years due to several factors. For seaports, the transport of regional containers by rail promises to relieve congestion on highways, local port roads, and at marine terminal gates. An inland port could also free up space at marine terminals. For shippers, inland container ports might reduce costs by reducing drayage distance, truck turn times, and driver shortages.

[13] Pihl, Kristi. "Warden canola plant fills gap for area farmers." tri-cityherald.com. 17 Nov. 2016. Web. 28 Sept. 2016.

[14] Folsom, Geoff. "Massive Richland freezer is journey through automated world." tri-cityherald.com. 13 Nov. 2016. Web. 28 Sept. 2016.

Interest in inland container ports is also being driven by changes in the trucking industry. As noted by BST Associates in their recent study for the Port, the "trucking industry is facing several changes that will likely tighten the supply of drivers and increase costs over time. These changes will likely impact both intermodal drayage and long-haul operators."

> The biggest concern for the trucking industry is the federal electronic logging mandate (**ELD**) which will require truckers to utilize electronic logs (as opposed to paper logs) to document driver hours. The law, which is scheduled to take effect at the end of 2017, could reduce driver productivity. Werner, a major carrier with more than 7,000 trucks, measured productivity losses at 3% to 5% after initiating ELD. Smaller operators may be impacted even more, with some estimating as much as a 15% drop in productivity.
>
> Hours of service regulations are the second major industry concern. These regulations limit the number of hours a truck driver may spend behind the wheel per day and per week, which may reduce truck drivers' earnings and impact overall supply chain efficiency.
>
> An overarching long-term concern is the growing shortage of drivers. The American Trucking Associations (ATA) estimated a national shortage of 48,000 drivers in 2015, with projections that the shortage could increase to 175,000 by 2025.
>
> Seasonality also impacts the availability of trucks. Because the harvest overlaps for the most important local crops, trucks and drivers are in short supply during harvest season. This impacts the agriculture industry all along the supply chain, from growers trying to move their harvest from farm to warehouse, to processors trying to move the finished product to market.[15]

The use of inland container ports, connected via short-haul intermodal, has proven viable in the PNW and elsewhere. Northwest Container Services has offered overnight container train service between Portland and Seattle/Tacoma since 1986. Northwest Container Services also provides intermodal container service between Seattle/Tacoma and Boardman, OR. The Boardman service was recently expanded in response to the loss of direct container service in Portland. On the U.S. East Coast, inland container ports have been successfully established in South Carolina and Virginia. These inland ports are about 200 miles from the coastal deep-water marine terminals.

Inland Container Port Characteristics

The acreage needed for an inland container port depends on volume and a number other factors, such as the type of container lift equipment used and whether the containers are stored on chassis or on the ground.

[15] BST Associates, *Port of Benton Rail Line Market Analysis*, 2016.

Initially, an inland port might handle one round-trip train per week. Assuming a 7,200-foot train could carry 250 containers, this would equate to 26,000 rail lifts per year (500 rail lifts per week x 52 weeks).[16] The footprint for a startup facility might be only 20 acres.

In the long run, however, scale will be critically linked to the success of any inland port operation. At full buildout, the Plan assumes a fully-supported inland container port will need a footprint of 100 acres or more.[17]

At full buildout, assuming one inbound/one outbound train each day and 350 days of operation in a year, the facility would handle 87,500 inbound containers (presumably loaded import containers or empty containers) and 87,500 outbound containers (presumably loaded export containers), for a total facility volume of 175,000 rail lifts. A footprint of approximately 100 acres would be needed to handle this activity. [18]

Information from the Northwest Seaport Alliance suggests there are 225,000 to 250,000 export loads within a 125-mile radius of Richland. Thus, at full buildout, the facility might handle 35 to 40 percent of the available export market.

Inland Port Greer Example

Figure 9: Greer Inland Port, South Carolina

Photo Source: South Carolina Ports

A possible template for inland container port in Richland is Inland Port Greer, a truck/rail container transfer facility operated by the South Carolina Ports Authority in Greer, S.C. The Greer facility, which sits on 40 acres, handled 103,000 rail moves in 2016.[19] Overnight express shuttle rail service between the Port of Charleston and Greer is provided five days per week inbound and six days per week outbound by the Norfolk Southern. Trackage includes two 2,600-foot working tracks and three 2,600-foot storage tracks. There are 520 container slots in the yard and three gantry cranes to work the trains and container stacks. Recent volumes have exceeded design capacity and the port authority has announced plans to expand the facility from 40 acres to 70 acres. There are 100 acres available for full build-out.

[16] A minimum train length of 5,000 feet or more will likely be needed to keep line-haul costs manageable. A "rail lift" is the movement of a container on or off a railcar.

[17] A rule-of-thumb of one acre for every 2,000 lifts is discussed in Section 6.1.

[18] Per NWSA, there are 225,000 to 250,000 export loads within a 125-mile radius of Richland. Thus, at full buildout, the facility might handle 35 to 40 percent of the available export market.

[19] " SC Ports Authority Announces Record Container Volume in 2016." www.cspa.com. n.d. Web. 09 Jan. 2017. <www.scspa.com/news/sc-ports-authority-announces-record-container-volume-2016/ >

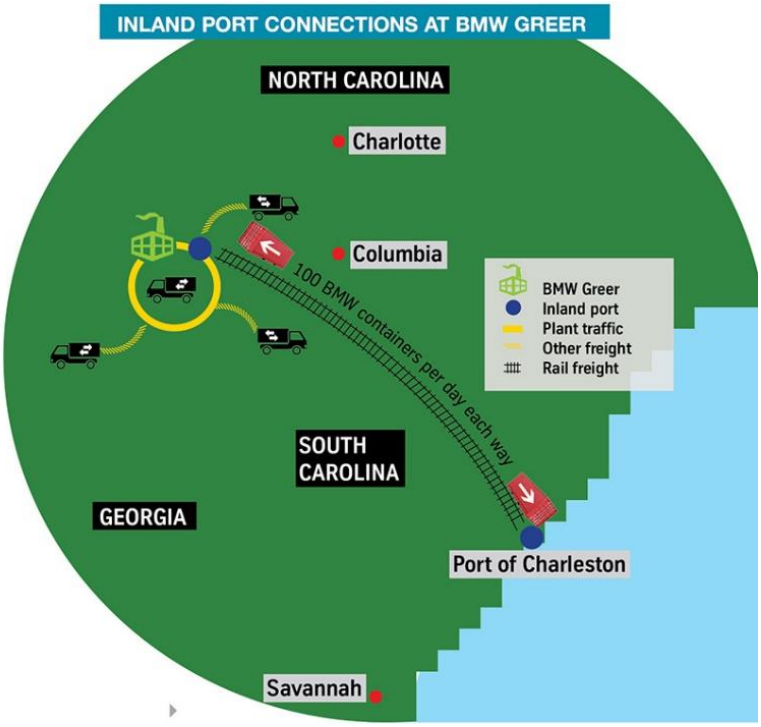
4.7. Container-Dependent Industry

The addition of an inland port in Richland would make the area more attractive to manufacturers and other businesses that depend upon importing and exporting product in containers.

Container Import Example

For example, BMW's largest manufacturing plant in the world by volume is located near the Greer Inland Port. Through the Greer facility, the BMW plant receives import containers of engines, transmissions and other parts, and ships export containers of semi-knockdown kits. The Greer Inland Port has been credited with the location or expansion of other container-reliant businesses to the Greer area, including Toray, Eastman Chemical, Adidas, Dollar Tree, Rite-Aid, and Michelin.[20]

Figure 10: BMW Greer Graphic



Graphic Source: Automotive Logistics[21]

An inland port in Richland would, at the outset, be dominated by the outbound (westbound) haul of full export containers whereas the inbound (eastbound) haul will be primarily empty containers. The inland port and related rail service should make Richland more attractive to import-dependent businesses. These import-dependent businesses would, in turn, make the inland port more viable by bringing more balance to the flow of full containers.

[20] www.thestate.com. "'Gateway to the world': South Carolina Inland Port Fuels Upstate growth." thestate. n.d. Web. 8 Jan. 2017.

[21] Automotive Logistics. "BMW and Greer: A port far from any storms - Automotive Logistics." Automotive Logistics. 30 Sept. 2016. Web. 27 Dec. 2016.

Container Export Example

An inland port could also be a magnet for exporting businesses and operations. For example, a grain transloader (hopper railcar to container) might be incented to locate in Richland by the steady availability of empty containers and the reliable connection to deep-water export terminals. Between five and seven million metric tons of containerized grain and animal feed (DDGS, corn, soybeans, and wheat) are exported from U.S. West Coast ports each year (about 1 million tons each year from Seattle and Tacoma terminals). Grain exporters in the Midwest often have difficulty obtaining empty containers as this equipment is concentrated in port areas and inland distribution centers. A grain transloader might be attracted to Richland by the network rail connectivity and land resources that would make it possible to receive and transload full unit trains of grain. The inland container facility could provide a steady flow of empty containers and an efficient mechanism to ship full containers to Puget Sound deep-water container terminals provided by the inland port.

5. PROJECTS

The Plan identifies and describes potential projects that are needed to maintain and expand the Port's and City's rail infrastructure. The list of potential projects is based on input from stakeholders and an assessment of current conditions, future trends, and future rail use opportunities.

5.1. Focus and Objectives

The primary focus of the Plan is the maintenance of the existing rail infrastructure and the expansion of the rail network within the Horn Rapids Industrial Park and the Transfer Area. The following objectives were given priority by the Plan:

- Maintain the existing rail infrastructure.
- Provide rail access to major portions of the Horn Rapids Industrial Park and the Transfer Area.
- Allow for free-flowing car and truck circulation in, out, and within development areas. Avoid potential road/rail conflicts by minimizing the number of at-grade crossings.
- Align future rail right-of-way to preserve large contiguous parcels wherever possible.
- Provide sufficient infrastructure: siding, storage, and support track capacity to accommodate potential growth of rail-related uses.
- Preserve the large "Mega Property" site in the Transfer Area as envisioned in the City and Port's interlocal cooperative agreement.
- Preserve the southeast area of Transfer Area for non-rail-related uses, i.e., a technology park like the PNNL.

5.2. Project Need

The general categories of project need are: rail line maintenance, line haul capacity, storage capacity, efficient rail network expansion, and road/rail crossings.

Maintenance. Much of the Port's rail infrastructure is now more than 60 years old and require continual work to maintain safety and operating standards. Currently, while the age and condition of the track is not a major operational constraint, the main line track speed is restricted to 20 MPH. In the long run, the track will need to be upgraded with heavier rail, better ballast, tie replacements, etc.

Line-Haul Capacity. Between Richland Junction and the Richland Rail Yard, the Port's rail line is essentially single track except for one 1,800-foot siding located on the line immediately north Richland Junction. Given the current level of activity on the track, the limited siding and passing track capacity is not a major operational constraint. However, with the potential increase in the frequency of trains, the coordination of one-way transits along the line may become more difficult, potentially causing more delay in train arrivals and departures.

Storage Capacity. The Richland Rail Yard has four tracks that, combined, are approximately 16,000 feet long that can be used for staging and storage. This storage capacity is sufficient

to handle manifest rail activity along the line. These tracks are leased to TCRY, which provides hauling for UP but not for BN. Except for the CWCP facility, there is no location on which to store an intact unit train (6,000' or more) off the main line.

Generally, Class I railroads desire unit train facilities that provide two or more storage tracks for each loading/unloading track to operationally accommodate switching, surges, and bunching of trains. These unit train tracks are essential to maintaining the fluidity of train movement along the main lines.

Network Expansion. With the opening of the Transfer Area for development by the City and Port, new rail track will be needed to access the property. It is also anticipated that the Horn Rapids spur will need to be extended to access the western portion of the Horn Rapids Industrial Park.

Crossings. A number of the existing at-grade crossings would benefit from a surface upgrade or repair. At certain points along the existing and future track, road/rail conflict could be eliminated with grade separation. Finally, the addition of safety measures at certain crossings could make a portion of the line eligible for Quiet Zone designation.

5.3. Project Costs

The cost estimates provided by the Plan have a low level of certainty and only indicate probable cost of construction. No engineering fieldwork was performed.

The following "rule of thumb" cost factors were used to prepare the cost estimates

- $150 per foot of new track.
- $75,000 to $90,000 per switch.
- $1,500 per track foot to surface crossings ($48,000 for a typical crossing).
- $375,000 for signals per crossing at grade.
- $8 per track foot to surface (includes rock/ballast), line, and dress track.
- $40 per track foot to replace ties (80% replacement spaced at one tie every 22 inches).
- $75 per track foot to replace 90# rail with #136 rail.[22]

A 30 percent contingency has been applied to construction projects to account for unanticipated permitting, right-of-way, site work, and utility relocation issues. Track construction costs are for bottom of ballast to top of rail with no subgrade work included. Design costs are not included.

[22] The cost to replace with 115# rail is not known.

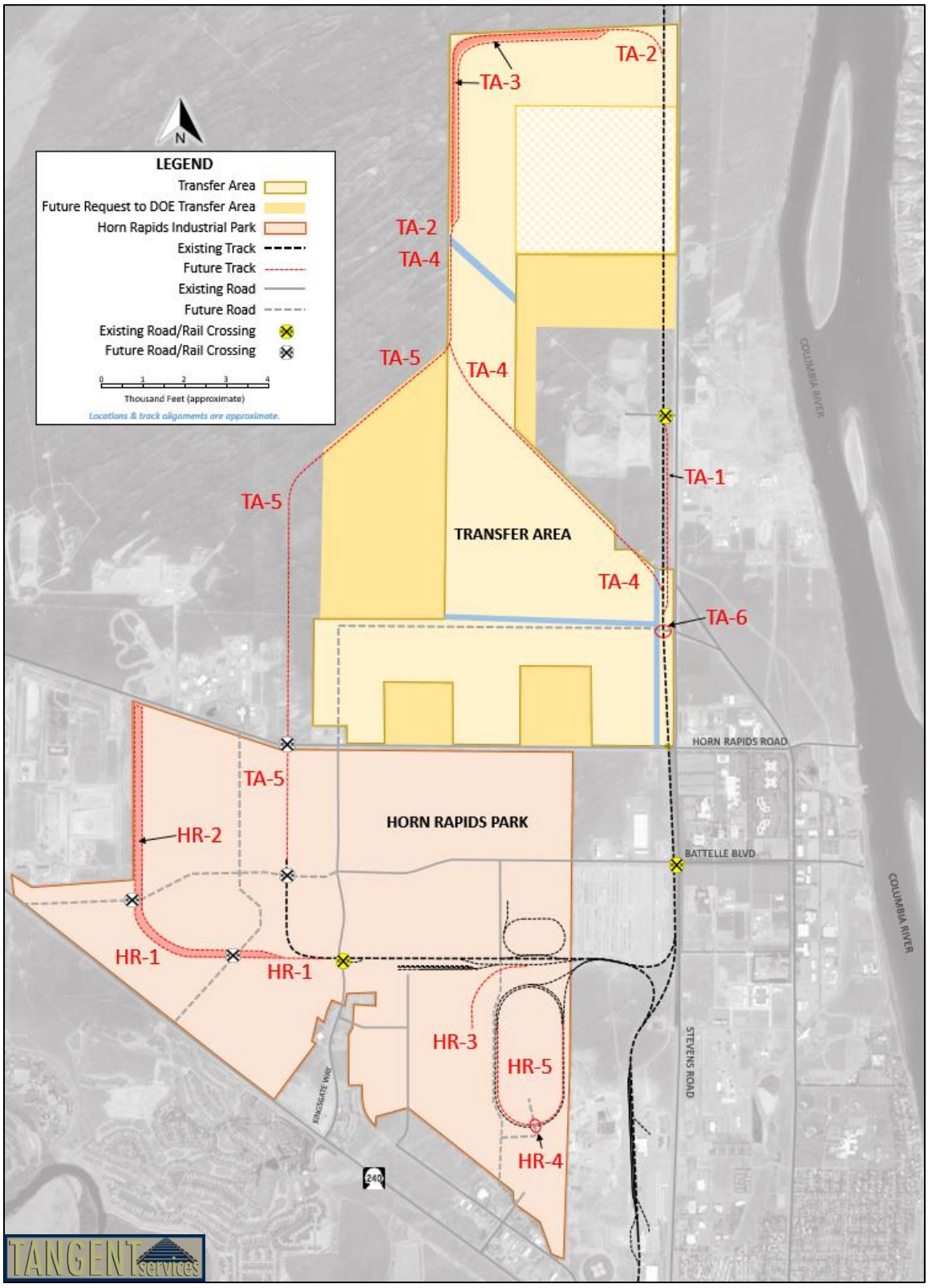
5.4. Project List

Table 4 provides a list of projects identified by the Plan and **Figure 11** shows their locations.

Table 4: Rail Plan Project List

Project No.	Project Name	Project Need	Estimated Cost
EXISTING TRACK (ET)			
ET-1 *ET-1a*	Track Resurfacing Program *Resurface Curve near Berry's Bridge*	Maintain	$8 per track foot
ET-2	Tie Replacement Program	Maintain	$40 per track foot
ET-3	Rail Upgrade Program	Maintain	$75 per track foot ($136# rail)
ET-4	At-Grade Crossing Upgrades	Crossings	$655,200
ET-5	Richland Quiet Zone	Crossings	Scenario #1: $3,601,000 Scenario #2: $1,228,500
ET-6	Cemetery Road Siding	Line-Haul Capacity	$1,209,000
ET-7	SR-224 (Van Giesen St.) Grade Separation	Crossings	$50,000,000
HORN RAPIDS (HR)			
HR-1	Horn Rapids Spur Extension	Network Expansion	$1,969,500
HR-2	Horn Rapids Rail Yard	Storage Capacity	$4,563,000
HR-3	Spur to 80-acre Parcel	Network Expansion	$604,500
HR-4	Rail Loop Grade Separation	Crossings	$3,500,000
HR-5	Second Rail Loop Track	Storage Capacity	$1,638,000
TRANSFER AREA (TA)			
TA-1	Transfer Area Passing Track	Line-Haul Capacity	$624,000
TA-2	North Transfer Area Lead	Network Expansion	$2,067,000
TA-3	Transfer Area Rail Yard	Storage Capacity	$4,563,000
TA-4	South Transfer Area Lead	Network Expansion	$2,281,000
TA-5	West Transfer Area Lead	Network Expansion	$3,611,400
TA-6	George Washington Way Grade Separation	Crossings	$50,000,000
CONNECTING SYSTEM (CS)			
CS-1	Edison Street Siding	Storage Capacity	$1,696,500

Figure 11: Project Location Map #1



See ***Figure 12: Project Location Map #2*** *(p. 29) for the location of Projects* ***ET-1a, ET-6, ET-7, and CS-1****.*

5.5. Project Descriptions

ET-1: Track Resurfacing Program

In its 2015 report to the Port, Rick Franklin Corporation makes the following recommendation regarding surfacing:

> We recommend that surfacing be done to every curve, as the ones that still meet the standard are slowly wearing and need work regardless. From our conversation with the Tri-Cities Railroad Company representative, we found that they are not able to put a large emphasis on surfacing due to the layout of the railroad and train schedule. A railroad of this size should be surfaced annually at a minimum. With the amount of rail cars ran over the track structure, bi-annual surfacing is strongly recommended. This would include switches, curves, and tangent track. Sidings generally do not need to be surfaced regularly unless defective conditions are otherwise noted.[23]

A 2013 track assessment by TBY, Inc., makes a similar recommendation: surfacing of the track with industry standard ballast should be scheduled as a long-term project. The project will eventually "force out" the smooth river rock and replace with angular material.

Project tasks would include:

1. Add 2-inch minimum lift of angular ballast to the entire corridor.
2. Use conventional tamping/lining track equipment to raise track to correct profile, tamp and squeeze ties, and shift track left or right to correct alignment.
3. Use ballast regulator track equipment to reconstruct side slopes and broom, thus recreating typical track cross-section.

The track resurfacing program would ideally be done in conjunction with tie replacement: determine if tie replacement is necessary, and install, spike, and gage new ties as required (See **Project ET-2**, below).

Estimated Cost: $8 per track foot. A project to resurface the Port's main line and the Horn Rapids Spur would cost an estimated $702,874 (with contingency).

See *Attachment "A": Crossties, Surface & Lining* for more information.

ET-1a: Resurface Curve near Berry's Bridge

The Franklin, TBY, and Pinkepank reports all call attention to the need to resurface and realign the curve near Berry's Bridge (**Figure 12**):

> There was a specific location identified near Berry's Bridge that needed to be addressed as a surfacing issue. This is section that had previously had rock spread over the original ballast.

[23] Franklin Report, page 1.

> As we saw the original ballast under the new rock, we had concluded that the TCRY had spread the rock to increase shoulder support, not that it was intended to solve a surfacing issue. Further information provided by the Port of Benton revealed that this was a section that had previously been redone, but had not received the proper care when installed. To be properly repaired, the track must be tamped to utilize the new rock added to the structure. In our opinion, this did not happen. To properly fix this issue with rock, the track should be given a minimum of a two inch lift to allow the new rock to be installed under the bottom of the ties, thus providing support.[24]

The Port is currently scoping a project to remove and replace ballast, realign, and replace ties over 2,000 feet of track at the curve near Berry's Bridge.

Estimated Cost: $8 per track foot.

ET-2: Tie Replacement Program

The Franklin report expressed concern regarding the condition of the crossties and suggested a tie replacement program:

> We found that between *60% and 70%* of the cross ties of this railroad have a very short time left before they will be classified as defective. It is hard to estimate the lifespan left in these ties, but a good estimate is that a multitude of problems will most likely arise in the next three to five years from these ties that are currently satisfactory degrading to unsatisfactory levels. Due to the desert conditions of this region, it may be as many as ten years, but that is the very outer limits in our opinion, and not very likely.
>
> If a tie replacement project were to take place, we suggest a goal of 80% tie replacement. This would mean an average of roughly 2,500 cross ties per mile, regardless of rail size, and about 47,000 crossties railroad wide. When considering tie replacement, very rarely does a program require 100% tie replacement, as it is neither efficient nor effective. A tie replacement program of this magnitude would provide a lifespan of 30 to 40 years of service with the correct grade of ties used. It is also important to mention that the bi-annual surfacing schedule advised in this report is crucial to this number. If the proper maintenance surfacing is not performed; the lifespan of this track and tie condition will be severely shortened.[25]

The TBY report expressed similar concern about the ties and recommended a continual tie replacement program.

Estimated Cost: $40 per track foot. A project to replace the ties on the Port's main line (10.89 miles) would cost an estimated $2,989,958 (with contingency).

[24] Franklin Report, page 2.

[25] Franklin, page 5.

See *Attachment "A": Crossties, Surface & Lining* for more information.

ET-3: Rail Upgrade Program

The sections of 90# rail along the line are below industry standard with respect to weight. However, this rail is in generally good condition and there is no immediate need to upgrade those sections to a heavier weight rail. Nonetheless, over time and with increased use of the line, the lighter weight rail will wear out and will need to be replaced with 112# or greater depending on availability and the price if steel.[26]

The recommended option for replacing existing 90# rail from MP 42.2 to MP 35.8 with 136#. An alternative to 136# rail may be to install 115# used rail that might be obtained from sections of unused DOE track no longer in service on the Hanford Site.

Estimated Cost: The cost to replace 90# rail with new 136# rail is $75 per track foot (no contingency applied). The estimated cost to replace rail in the MP 42.2 to MP 35.8 using 136# rail is $4,801,680 (with contingency). The cost to replace 90# rail with used 115# rail is unknown.

See *Attachment "B": Rail Corridor Requiring Rail Replacement* for more information.

ET-4: At-Grade Crossing Upgrades

The 2012 Port of Benton Rail Plan report noted the following potential repairs and upgrades to at-grade crossings:[27]

- Steptoe Street: TCRY recommended adding a warning device coming up the hill.
- Riverfront Trail (pedestrian): TCRY recommended a zigzag pattern for the path and fencing to channel bikes and pedestrians, forcing them to look both directions and to slow movement.
- Jadwin Avenue: Upgrade the surface to concrete panels.
- Cemetery Road: Upgrade the surface to concrete panels and gates. This is considered a low priority due to low traffic.
- Van Giesen Street: Upgrade the surface to concrete panels. The roadbed is fine but the panels are worn. TCRY believed the high traffic crossing has a poor design and is inadequate for growth. TCRY recommended a redesign.
- Airport Way: Upgrade the surface to concrete panels. This is a heavily used crossing and the existing asphalt and small rail are deteriorating. An FRA rail defect was noted on the north side of the crossing.
- Saint Street: This is a low traffic, low priority crossing. Potential upgrades are concrete panels and gate arms.
- Highway 240: Panels are cracked and need repair/replacement. High traffic volume with a lot of truck traffic. TCRY recommended lowering the speed limit.

[26] Rail weight of 112# or greater are acceptable for UP and BN applications.

[27] Tangent Services, 2012, page 16.

Estimated Cost: $1,500 per track foot to resurface. A typical 32-foot crossing would cost $48,000 to upgrade to concrete panels (no contingency applied). The estimated project cost to upgrade (replace or repair) the six crossings in need is $655,200 (with contingency).

See *Attachment "C": Rail Corridor Requiring Crossing Upgrades – Concrete Road Crossing* for more information.

ET-5: Richland Quiet Zone

Under the Train Horn Rule (49 CFR Part 222), locomotive engineers must begin to sound train horns at least 15 seconds, and no more than 20 seconds, in advance of all public grade crossings. The final rule provides an opportunity for localities to mitigate the effects of train horn noise by establishing "Quit Zones." The establishment of Quiet Zones typically involve the installation of safety measures at public grade crossings. Potential improvements related to the establishing a quiet zone along the Port rail line are described in Section 7.

Estimated Cost: Installing four-quadrant gates at an existing signalized crossing costs and estimated $552,000 (with contingency). Adding a median and safety bollards to a crossing costs an estimated $195,000 to $240,000 (with contingency). Section 7 provides estimates for two different Quiet Zone scenarios.

See *Attachment "C": Rail Corridor Requiring Crossing Upgrades – Concrete Road Crossing* for more information.

ET-6: Cemetery Road Siding

There is currently only one rail siding, located at Richland Junction, on the Port rail line. As the number of train arrivals and departures increases, there might be a need for additional siding capacity. A siding between Cemetery Road and Van Giesen Street Siding would help to increase line-haul capacity and improve train fluidity (**Figure 12**). This siding could be up to 5,000 feet long — not long enough to handle most unit trains, but sufficient for a unit train to meet manifest road switching trains.[28]

Estimated Cost: $1,209,000. Assumes 5,000 feet of track, two switches, and contingency.

See *Attachment "D": Rail Corridor Requiring Typical Track Section Upgrades* for more information.

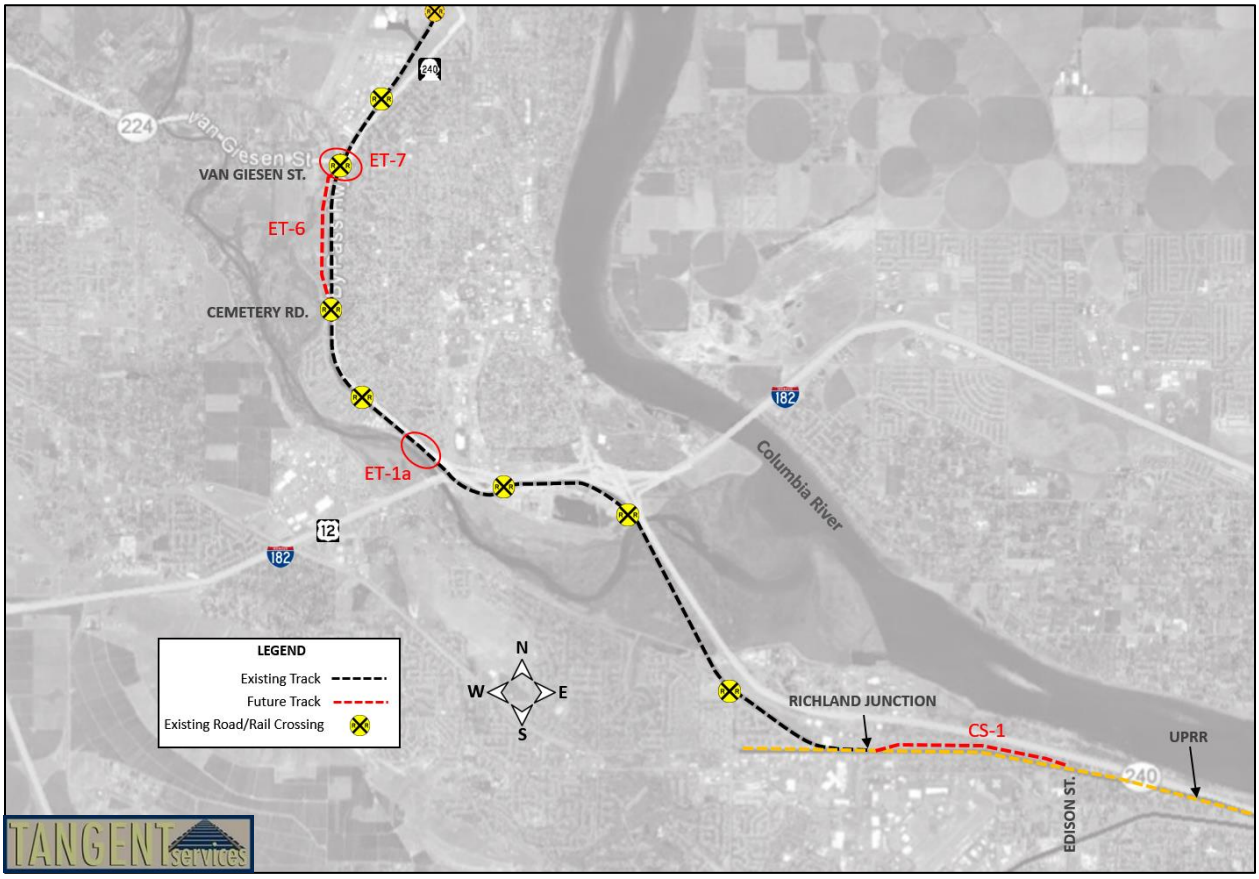
ET-7: SR-224 (Van Giesen St.) Grade Separation

This project envisions grade separating Van Giesen Street over SR-240 and the Port's rail line (**Figure** 12). Stakeholders have expressed concern about this road/rail crossing as any delays there can impact traffic flow throughout the Tri-Cities. If this project were built, it would also be possible to lengthen the Cemetery Rd. to Van Giesen St. Siding (Project ET-6) to accommodate full unit trains.

[28] A typical unit train of grain has 110 railcars at 65 feet per car and two engines at 100 feet per engine, thus requiring 7,350 feet minimum clear distance.

Estimated Cost: $35,000,000 - $50,000,000.[29]

Figure 12: Project Location Map #2



HR-1: Horn Rapids Spur Extension

There are more than 500 acres of developable property in the western portion of Horn Rapids Industrial Park than could be rail-served with the extension of the Horn Rapids Spur. The total length of the extension could be approximately 8,500 to 9,500 feet, depending on alignment (**Figure 13**). The Horn Rapids Park master plan drawing shows proposed roads crossing the alignment of the spur extension: Battelle Boulevard (east-west) and Lowe Boulevard (north-south).

Estimated Cost: $1,969,000. Includes 9,500 feet of track, one switch (with contingency). The estimated cost is $3,049,000 if two signalized crossings are included in the project (with contingency).

See *Attachment "D": Rail Corridor Requiring Typical Track Section Upgrades* for more information.

[29] The City of Richland had this grade separation in past Six Year Transportation Improvement Plans, the project does not appear in the most recent iteration of the plan (2016 to 2021).

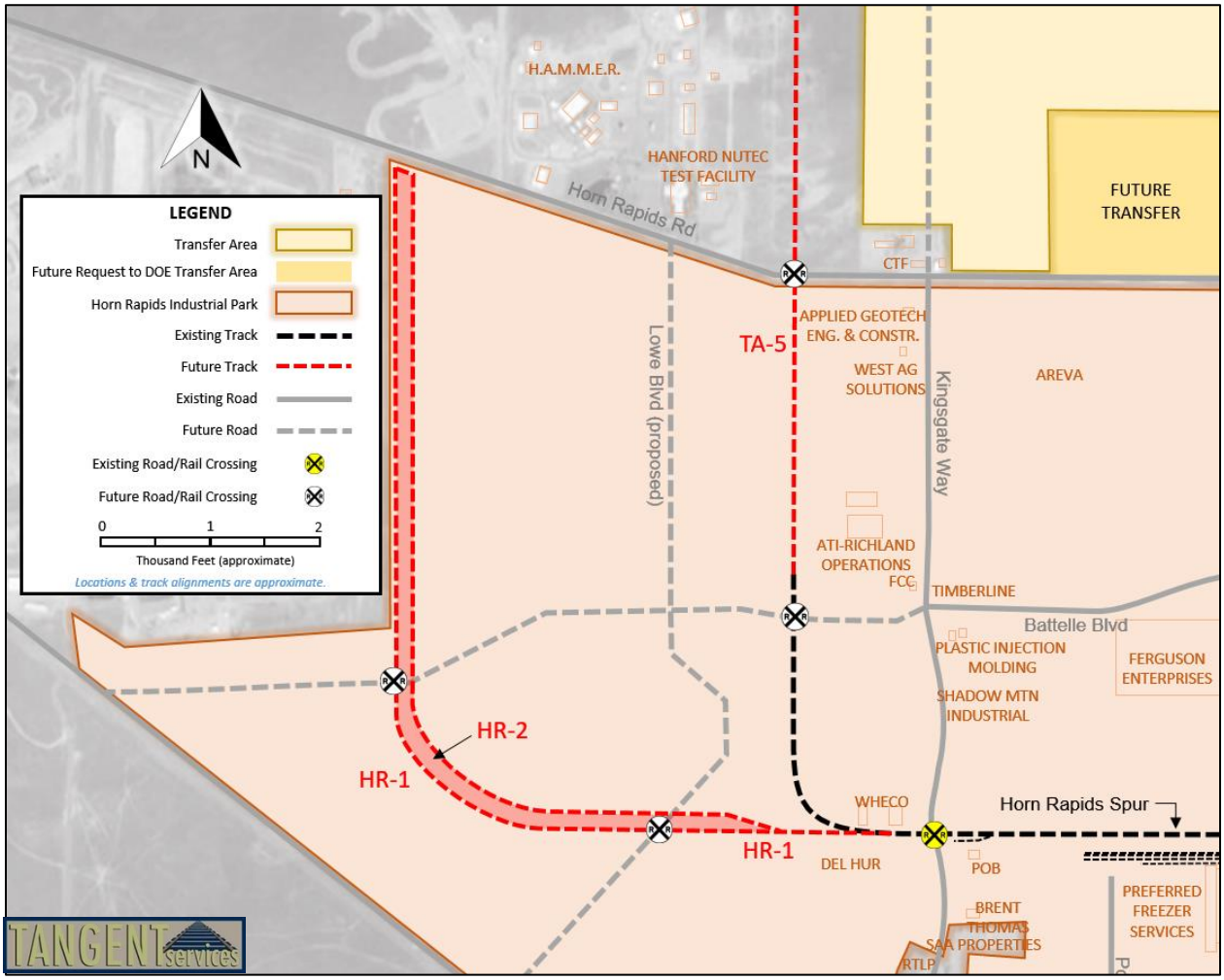
HR-2: Horn Rapids Rail Yard

This project would construct a rail yard from the Horn Rapids Spur Extension (HR-1) (**Figure 13**). The rail yard would include tracks capable of handling intact unit trains up to 8,000 to 8,500 feet long. A minimum width of 200 feet is recommended so that up to eight parallel tracks can be constructed. The construction of rail yard on this alignment would preclude the construction of future at-grade crossings along Battelle Boulevard and Lowe Boulevard. Tracks for unit trains would enable the location of a unit train-capable development, such as an inland container port, in the northwest portion of the park.

Estimated Cost: $4,563,000 for two 8,500-foot tracks with two switches each and three crossovers (with contingency). This would be a first phase of development of a year with up to eight tracks.

See *Attachment "D": Rail Corridor Requiring Typical Track Section Upgrades* for more information.

Figure 13: Horn Rapids Park Projects - West



HR-3: Spur to 80-acre Parcel

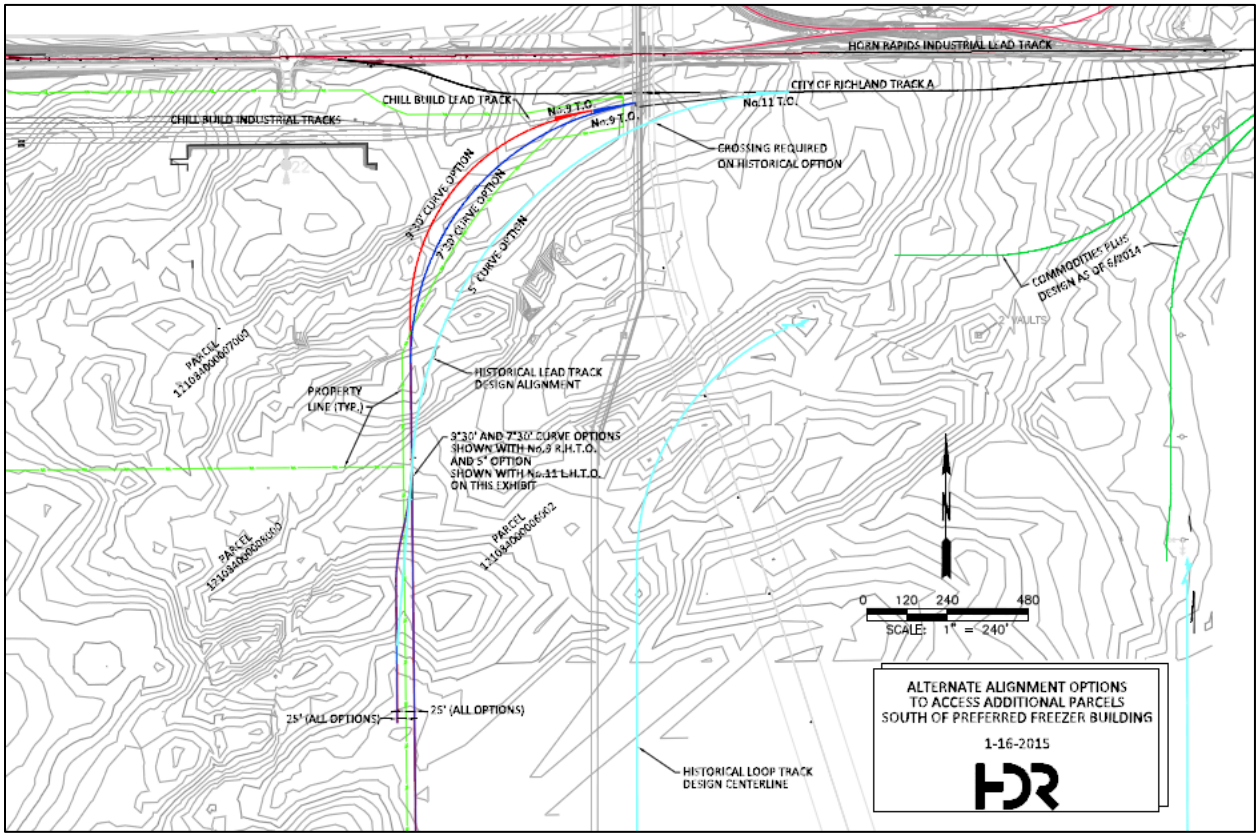
This project would construct a rail lead to the 80-acre property to the west of the CWCP rail loop and to the south of Preferred Freezer Services (**Figure 15**). The total area of developable property is more than 100 acres when property to the south of the 80-acre parcel is also included.

The lead would follow the alignment shown previously on a drawing by HDR (dated 1-16-2015) that comes off the City of Richland Track A to the west of the switch to the Preferred Freezer tracks. In addition to providing access to the property to the south of Preferred Freezer Service, the track would also provide access to Preferred Freezer's expansion property immediately south of the existing warehouse.

Estimated Cost: $604,500. This assumes 2,500 feet of track and one switch (with contingency).

See *Attachment "D": Rail Corridor Requiring Typical Track Section Upgrades* for more information.

Figure 14: Spur to 80-acre Parcel



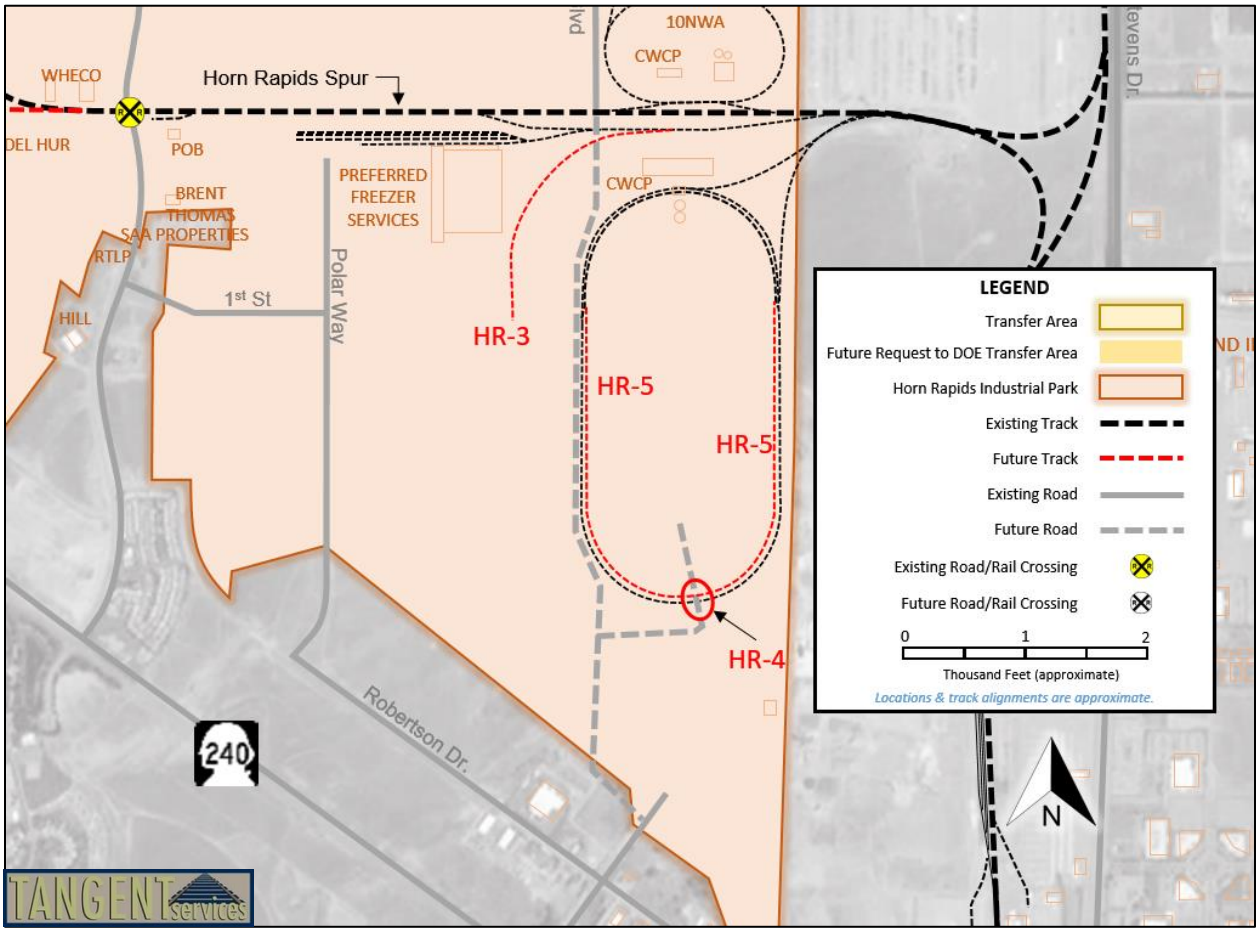
HR-4: Rail Loop Grade Separation

The CWCP Loop Grade Separation project would provide vehicular access to the interior of the loop (**Figure 15**). The project would be a tunnel under the track(s) and would be located on the southern portion on the loop (at about 5:00). It less expensive to take trucks under the track with vertical clearance of 17 to 17.5 feet. Arc culverts used for truck tunnels meet Cooper E-80 loadings.

Cost Estimate: $3.5 million.

See *Attachment "E": Rail Corridor Requiring Structural Plate Over/Under Crossing* for more information.

Figure 15: Horn Rapids Park Projects – East



HR-5: Second Rail Loop Track

This project would construct a second full loop track alongside the existing CWCP loop track (**Figure** 15). The second track could be used in conjunction with existing CWCP operations, or could be used to serve another unit train-based operation on the loop. For example, it has been suggested by stakeholders interviewed for the Plan that the second track could be used to handle intermodal trains for an inland port terminal. In this scenario, the inside track would be used to handle CWCP trains as this is the track on which CWCP's high-speed dumper pit is located. The outside track could then be used to land and work intermodal trains.

Project Cost: $1,638,000. This assumes another 6,000 feet of track (approximate length) would be added to the existing interior track (located on the northern end of the loop) to complete a second loop track, along with four switches (with contingency).

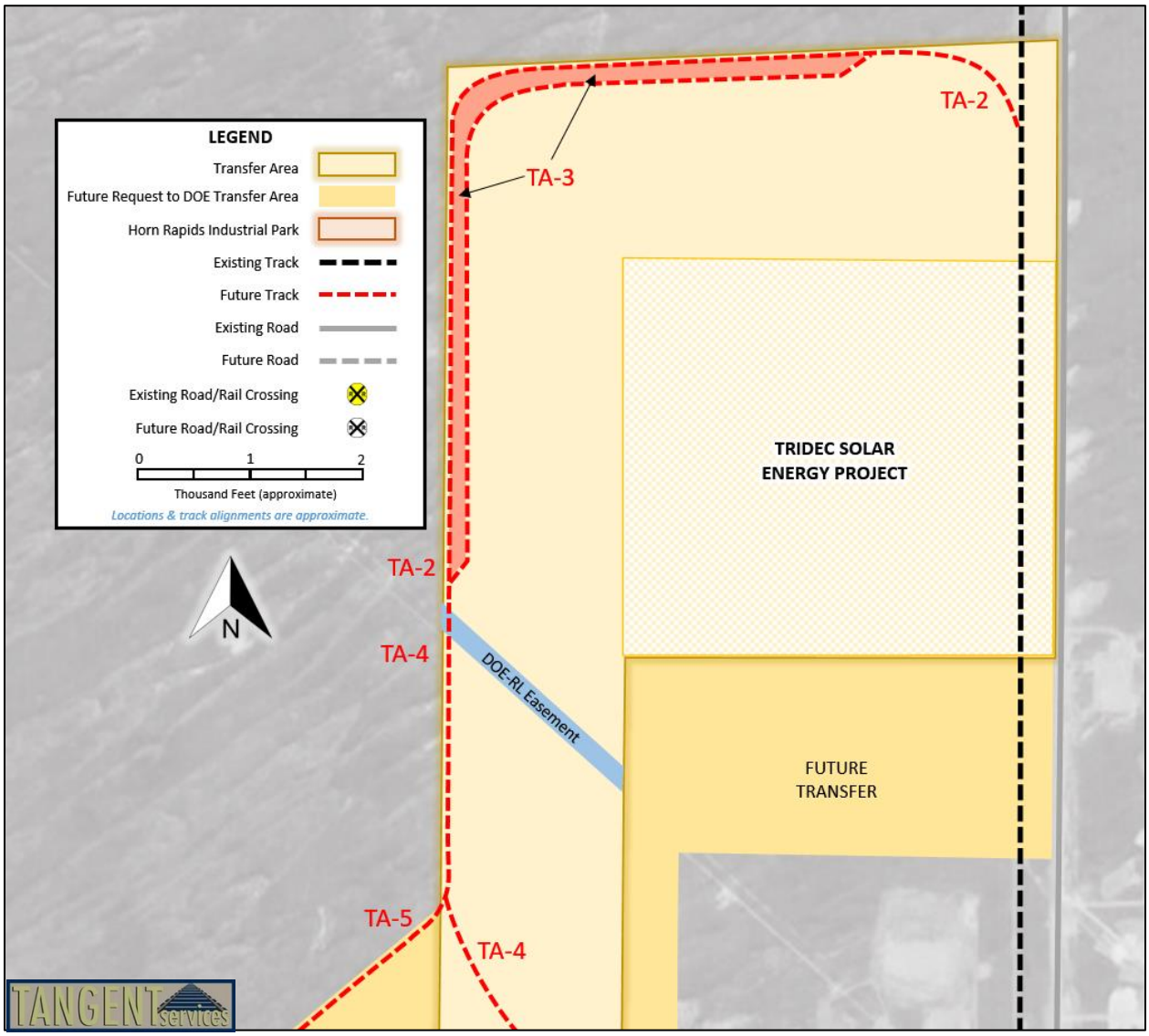
See *Attachment "D": Rail Corridor Requiring Typical Track Section Upgrades* for more information.

TA-1: Transfer Area Passing Track

This project would construct a passing track/siding along the DOE line to the north of Horn Rapids Road (**Figure 17**). The siding could be used to clear the main to allow trains to stage and pass, and could also be used to store and/or assemble manifest trains.

Estimated Cost: $624,000. This assumes a 2,000-foot track with two switches (with contingency).

Figure 16: Transfer Area Projects – North



TA-2: North Transfer Area Lead

This project would construct a lead from the DOE line on the northern perimeter of the Transfer Area. While the length of the track will be determined by business need, i.e., the location of development,

a total length of approximately 10,000 feet would extend the track along the western perimeter of Parcel "2" from the main line switch to the DOE utility corridor easement (**Figure 16**).

Estimated Cost: $2,067,000. This assumes a 10,000-foot track with one switch (with contingency).

See *Attachment "D": Rail Corridor Requiring Typical Track Section Upgrades* for more information.

TA-3: Transfer Area Rail Yard

This project would construct a rail yard capable of handling 8,500-foot unit trains the North Transfer Area Lead (TA-2) along the northeast perimeter of the Transfer Area (Parcel "2") (**Figure 16**). A minimum width of 200 feet is recommended for the yard so that up to eight parallel tracks can be constructed.

Estimated Cost: $4,563,000 for two 8,500-foot tracks with two switches each and three crossovers (with contingency). This would be a first phase of development of a year with up to eight tracks.

See *Attachment "D": Rail Corridor Requiring Typical Track Section Upgrades* for more information.

TA-4 & TA-5: South and West Transfer Area Leads

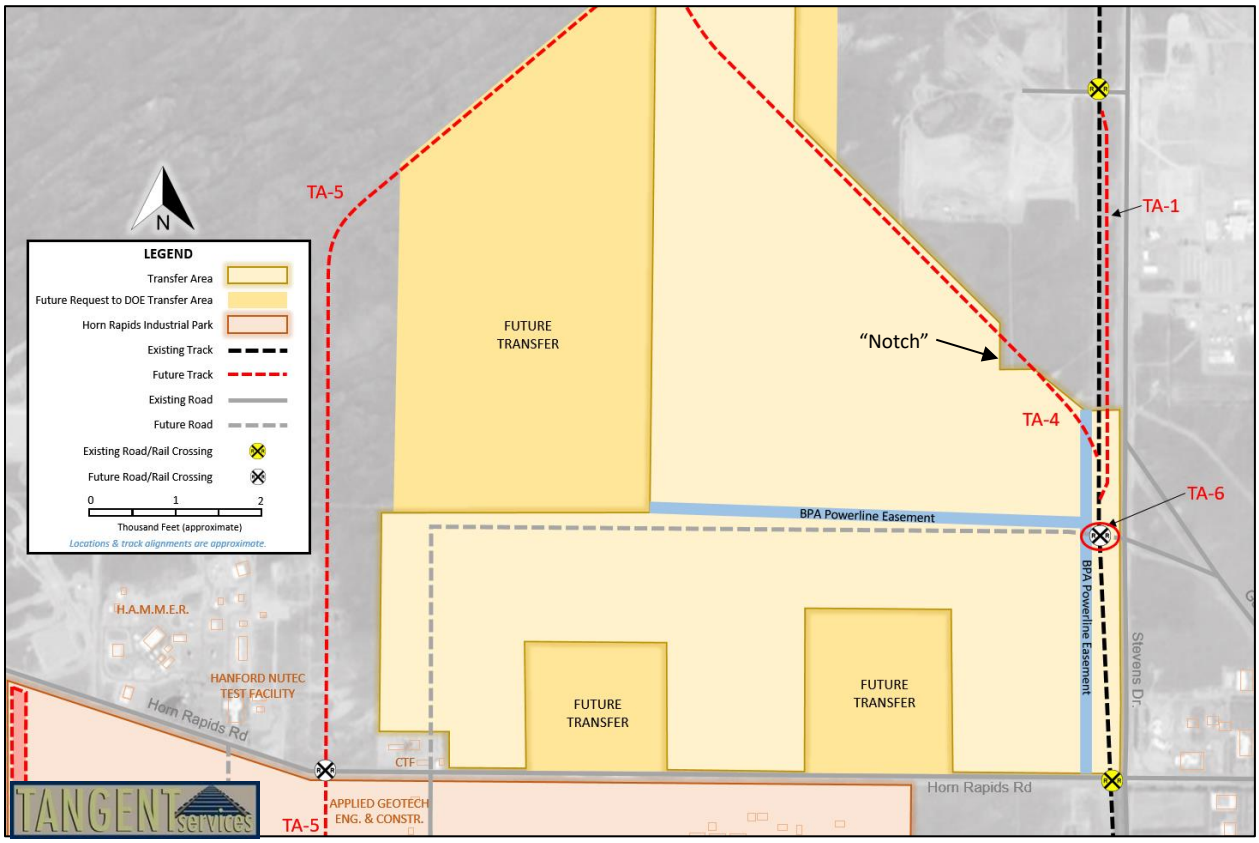
The **South Transfer Area Lead (TA-4)** would construct a track from the southern end of the Northern Lead (TA-2) and the Transfer Area Rail Yard (TA-3) travelling southeast along the northern perimeters of Parcel "1" and "3" and connecting back to the main line at a point north of the George Washington Way alignment (**Figure 17**). To keep the track tangent and preserve developable property, an easement across DOE land would be needed (see "Notch" on **Figure 17**).

The **West Transfer Area Lead (TA-5)** would construct a track from the southern end of the Northern Lead (TA-2) and the Transfer Area Rail Yard (TA-3) to the current end of the Horn Rapids Spur (crossing Horn Rapids Road) (**Figure 13** & **Figure 17**). Most of the land over which this project would be built is currently owned by DOE. The City has preserved a rail right-of-way from the end of the existing Horn Rapids Spur to Horn Rapids Road.

Estimated Cost: The TA-4 track would be approximately 10,500 feet long and would cost an estimated $2,281,000 (with two switches and contingency). The TA-5 track would be approximately 14,500 feet long and would cost an estimated $3,611,400 (assumes a signalized crossing at Horn Rapids Road and two switches, and contingency).

See *Attachment "D": Rail Corridor Requiring Typical Track Section Upgrades* for more information.

Figure 17: Transfer Area Projects - South



TA-6: George Washington Way Grade Separation

This project would construct a grade separation along George Washington Way alignment over Stevens Drive and the DOE rail line into Transfer Area (**Figure 17**).

Estimated Cost: Unknown, but is likely to exceed $30,000,000.

CS-1: Edison Street Unit Train Siding

This project would construct a 7,500-foot siding along the UP track to the east of Richland Junction between Edison St. and N. Columbia Center Blvd. (**Figure 12**). The new siding could be used to chamber unit trains, reducing delay and increasing capacity on the Port main line. The improvement might prove useful if the number of unit trains were to increase appreciably, as would happen if, for example, an inland container port was developed along the line.

It is possible to extend the siding to 8,500 feet to just short of Richland Junction by bridging N. Columbia Center Blvd. There are existing supports already in place for this bridge.

Estimated Cost: $1,696,500. This assumes 7,500 feet of track and two switches (with contingency). The cost of an 8,500-foot siding (with bridge) is not known.

See *Attachment "D": Rail Corridor Requiring Typical Track Section Upgrades* for more information.

5.6. Project Timing and Prioritization

Near-Term (0 to 5 Years)

Work on near-term projects should start as soon as possible to preserve and maintain the existing rail line. Projects such as tie replacement and surfacing should be implemented on a programmatic basis. Other projects such as rail and crossing upgrades should be implemented to remedy current or future condition deficiencies.

- ET-1 Track Resurfacing Program
- ET-1a Resurface Curve near Berry's Bridge.
- ET-2 Tie Replacement Program
- ET-3 Rail Upgrade Program
- ET-4 At-Grade Crossing Upgrades

Medium-Term (0 to 10 Years)

Medium-term projects generally will be triggered by development initiatives that are likely to occur within the next ten years. The Plan assumes these developments will be primarily within the Horn Rapids Industrial Park.

- ET-5 Richland Quiet Zone
- ET-6 Cemetery Road Siding
- HR-1 Horn Rapids Spur Extension
- HR-2 Horn Rapids Rail Yard
- HR-3 Spur to 80-acre Parcel
- HR-4 Rail Loop Grade Separation
- HR-5 Second Rail Loop Track
- CS-1 Edison Street Siding

Long-Term (10 Years and Beyond)

Long-term projects are those that require a much higher level of planning, entitlement work, and/or funding. These projects, many of which are related to the development of the Transfer Area, would likely be undertaken after more easily achieved medium-term projects have been implemented.

- ET-7 SR-224 (Van Giesen St.) Grade Separation
- TA-1 Transfer Area Passing Track
- TA-2 North Transfer Area Lead
- TA-3 Transfer Area Rail Yard
- TA-4 South Transfer Area Lead
- TA-5 West Transfer Area Lead
- TA-6 George Washington Way Grade Separation

6. INLAND CONTAINER PORT SITES

The Port and City have been contacted by assorted parties interested in an inland container port located in Richland. This section provides some of the guidelines and requirements for the development of an inland container port, and examines three potential sites on Port and City property.

6.1. Guidelines and Requirements

Unit train facilities have specific land and track requirements that must be anticipated when planning for future development. For an inland container port, this Plan assumes the following:

- Unlike the loop configuration often used by grain and bulk unit train terminals, intermodal terminals are usually long and narrow, running parallel to a main line or major lead/spur track.
- Arrival/departure tracks must be long enough to receive intact trains and should be double-ended (switches at both ends).
- A clear point length of at least 8,200 feet for arrival/departure tracks is desired, but a length of 7,500 feet may be enough to meet actual operation requirements.
- Arrival/departure tracks should be spaced at least 25 feet apart to allow inspection and car department crew vans and equipment to conduct a train inspection from either side of the track without needing to flag the adjacent track.
- There must be enough supporting storage track available to serve as buffer for train arrival/departure imbalances. This typically means support storage tracks equaling 1.5 to 2.5 times the length of the working tracks.
- All public or private crossings that the unit train will block during loading/unloading must be permanently closed.
- Ideally, the working tracks should be long enough to work intact trains (as is the case at the Northwest Container Services facility in Boardman, OR), but, in practice, many intermodal terminals double-over or even triple-over trains when they are yarded.

The overall size of the intermodal facility footprint will depend on volume. Tioga Group, in a 2008 study, sets a general guideline of 2,000 annual lifts per acre for inland terminals, but notes that well-designed and well-operated facilities can do better than this.[30] This rule-of-thumb suggests 87.5 acres is needed for a facility handling 175,000 rail lifts annually.

The initial size of the terminal can be smaller, especially with respect to the container storage area, but it is highly desirable that the terminal be expandable to accommodate future growth. This Plan targets a 100-acre facility at full buildout.

[30] The Tioga Group, Inc., *Inland Port Feasibility Study, Project No. 06-023, Final Report*, for Southern California Association of Governments, August 2008, p. 48.

6.2. Possible Locations for an Inland Container Port

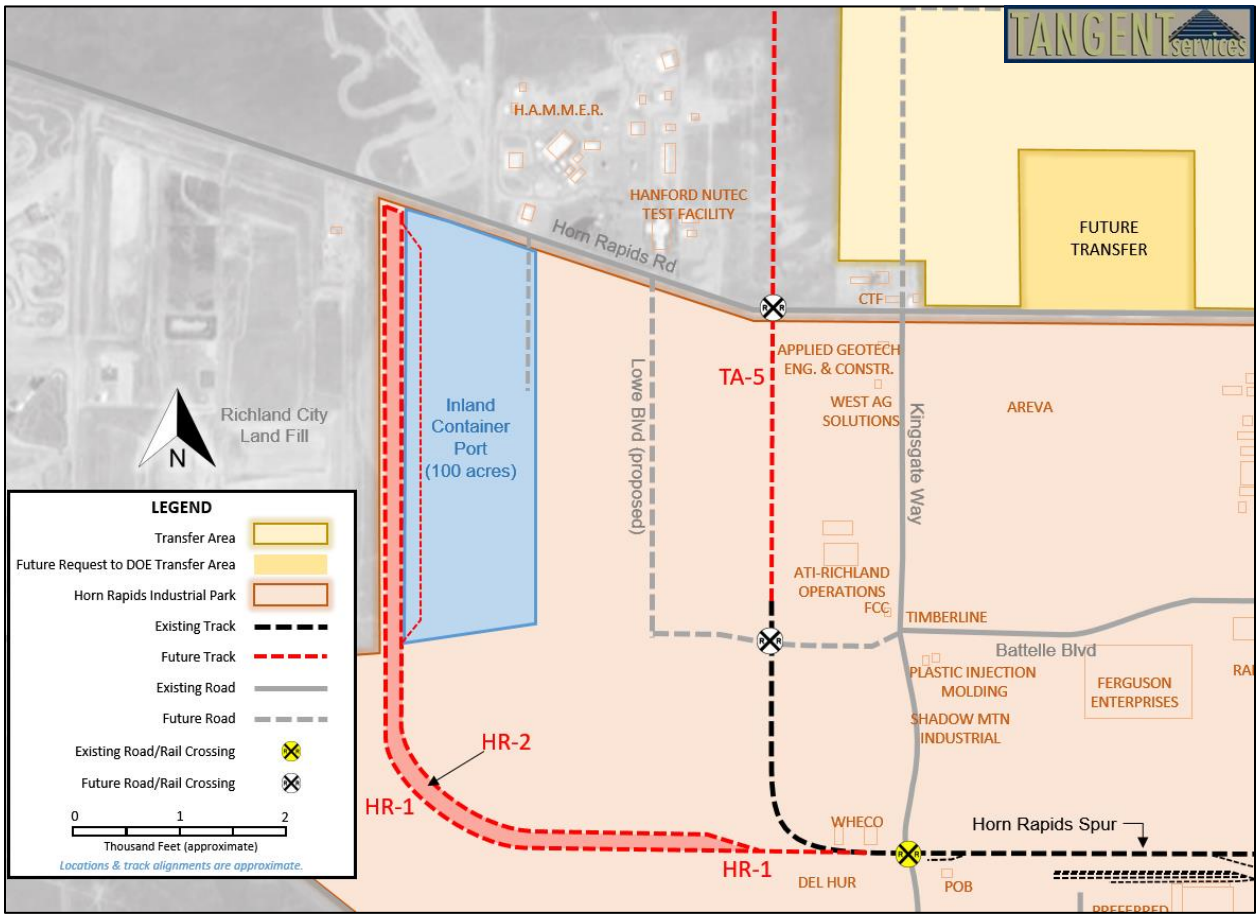
The Plan examines three possible sites for an inland container port terminal: one site in the Horn Rapids Industrial Park, one site in the Transfer Area, and one smaller site alongside the existing CWCP loop.

Horn Rapids Site

The potential inland container port site in the Horn Rapids Industrial Park is in the northwest portion of the park, on a north-south axis, near the Richland City Landfill (**Figure 18**). The site would be served by the Horn Rapids Spur Extension (Project HR-1) and the Horn Rapids Rail Yard (Project HR-2). The total clear length of the spur extension is approximately 9,000 to 10,000 feet from the Kingsgate Way crossing. Truck access to the terminal would be from the north via Horn Rapids Road.

Assuming a generally rectangular footprint, it would be possible to have tangent working tracks within the terminal that are 3,000 to 3,500-feet long. The adjacent rail yard would be able to accommodate arrival, departure, and storage tracks of 7,500 feet or more. The rail yard and working tracks would need to be carefully designed to allow for doubling-over trains without blocking the existing Kingsgate Way crossing.

Figure 18: Inland Container Port – Horn Rapids Site

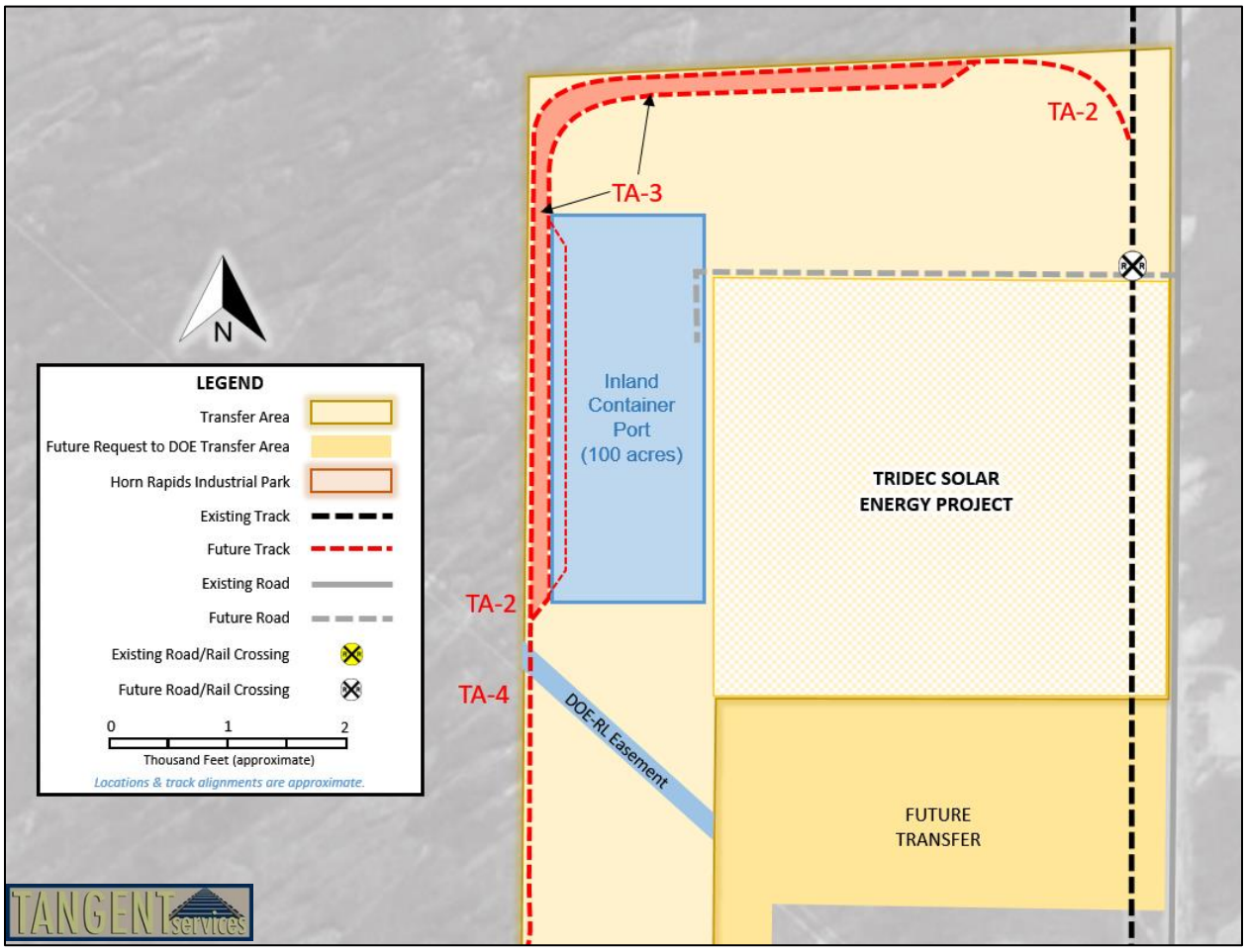


Transfer Area Site

The potential inland container port site in the Transfer Area site is in the northern portion of the property, on a north-south axis, to the west of the TRIDEC solar energy project site (**Figure 19**). A second potential site in the Transfer Area, near the intersection of Stevens Road and Horn Rapids Road, was also considered but rejected as this area is being reserved for a potential science park development.

The potential site would be served by the North Transfer Area Lead (Project TA-2) and the Transfer Area Rail Yard (Project TA-3). The total length of the lead extension is approximately 9,000 to 10,000 feet from main line switch, and it would be possible to construct arrival, departure, and storage tracks capable of handling 7,500-foot or longer intact unit trains in the adjacent rail yard. Truck access to the terminal would be from a new, approximately 4,000-foot road off Stevens Drive.

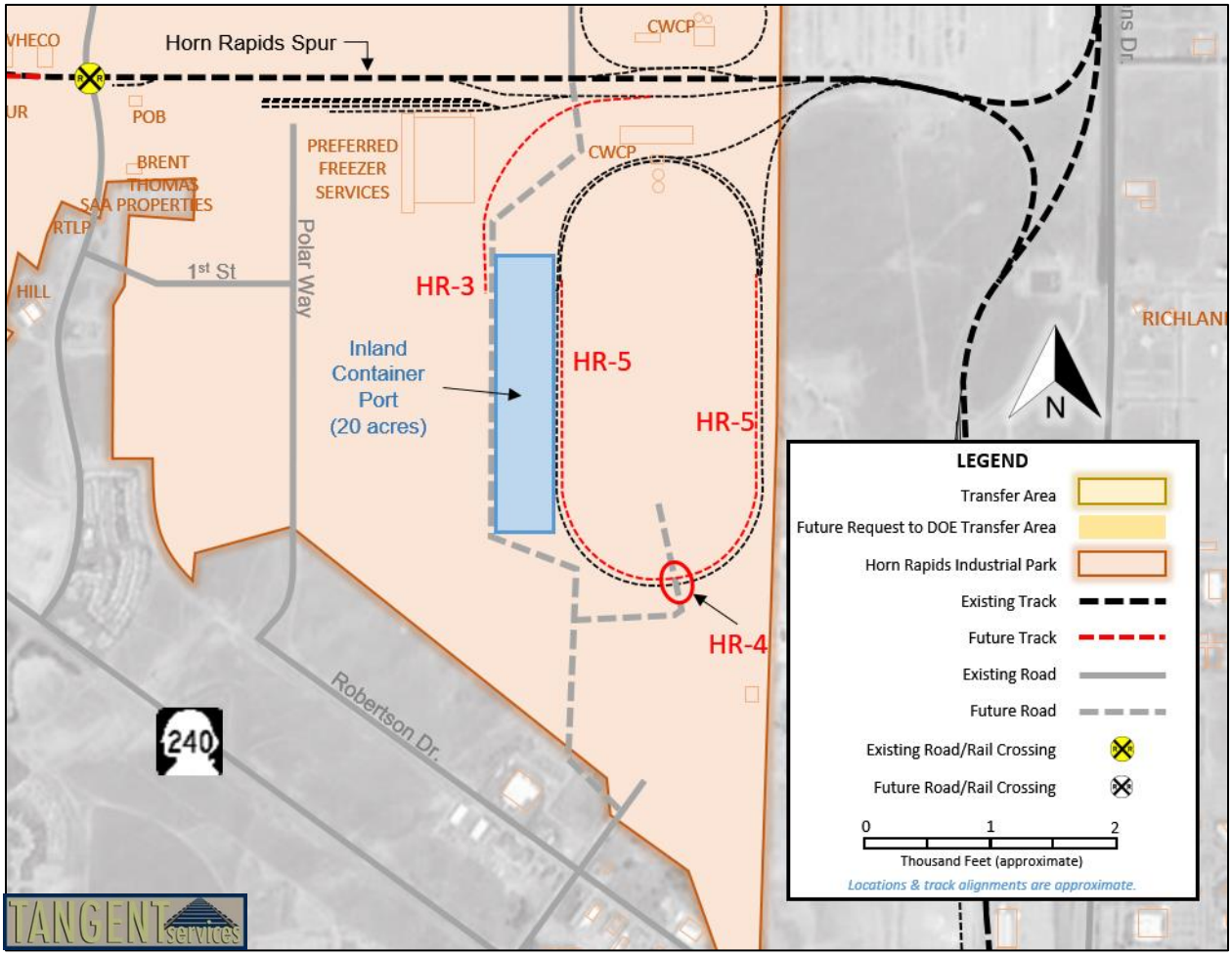
Figure 19: Inland Container Port – Transfer Area Site



Rail Loop Site

The third potential inland container port site has a smaller footprint than the first two potential sites – about 20 acres – and is located adjacent to the CWCP rail loop (**Figure 20**). The Second Rail Loop Track (Project HR-5) would be needed so that both a grain and intermodal train could be on the rail loop facility at the same time. The outer loop track would be used to work the intermodal train, while the inner loop track would be used to work the grain train. The inner loop track could also be used as an intermodal train arrival/departure track provided it was not needed for a grain train and another train was not blocking the lead switch and crossover points. Additional container yard within the loop could be constructed provided the Rail Loop Grade Separation (Project HR-4) was also constructed. A single working track of approximately 1,900 feet would be available, assuming the western tangent track on the loop was used.

Figure 20: Inland Port – Rail Loop Site



7. QUIET ZONE ANALYSIS

The Train Horn Rule (**Rule**), issued by the Federal Rail Administration (**FRA**) in 2005, set nationwide standards for the sounding of train horns at public highway-rail grade crossings. The Rule also established a process for communities to obtain relief from the routine sounding of train horns by providing criteria for the establishment of "Quiet Zones."

The Rule describes three different approaches for public authorities (city, county, or state) to establish a Quiet Zone:[31]

1. Install one or more FRA pre-approved supplementary safety measures ("**SSM**") at each public crossing.
2. Reduce Quiet Zone risk below certain thresholds by installing SSMs at some but not all public crossings.
3. Install Alternative Safety Measures ("**ASM**") to reduce risk in a Quiet Zone. ASMs are typically improvements that do not fully meet Rule requirements to be SSMs. Use of ASMs must be submitted in writing to the FRA for approval.

7.1. Quiet Zone Using Pre-Approved SSMs

A local agency may designate a Quiet Zone when one or more FRA pre-approved SSMs are installed at each public crossing in the Quiet Zone. Quiet Zones established in this manner do not require an application to the FRA and are not subject to an annual risk review by the FRA.

Supplementary Safety Measures

FRA-approved SSMs include:

- **Four-quadrant gates** at a crossing sufficient to fully block highway traffic from entering the crossing when the gates are lowered, including at least one gate for each direction of traffic on each approach.
- Two-quadrant gates with **medians or channelization devices** on both highway approaches to a public grade crossing denying to the highway user the option of circumventing the approach lane gates by switching into the opposing (oncoming) traffic lane and driving around the lowered gates to cross the tracks.[32]
- One-way streets equipped with gates that fully block the street.
- Temporary or permanent closure of a public crossing.

Another means of potentially eliminating the sounding of train horns is the installation of wayside horns. A wayside horn may be installed at grade crossings that have flashing lights, gates, constant warning time devices (except in rare circumstances), and power out indicators. The wayside horn is

[31] Under the rule, public authorities having jurisdiction over traffic enforcement can establish Quiet Zones.

[32] These devices must extend at least 100 feet from the gate arm, or if an intersection, at least 60 feet from gate arm and have a mountable medium.

positioned at the crossing and will sound when the warning devices are activated. The sound is directed down the roadway, which greatly reduces the noise footprint of the audible warning.

Wayside horns are not considered an SSM under the Rule, but can be used within Quiet Zones.

Process to Establish a Quiet Zone

The process to establish a Quiet Zone using pre-approved SSMs is generally as follows:

1. Determine which crossings will be included in the Quiet Zone. All public crossings in the Quiet Zone must have, at a minimum, an automatic warning system consisting of flashing lights and gates. The warning systems must be equipped with constant warning time devices and power out indicators. The Quiet Zone must be at least one-half mile in length.
2. Identify any private and pedestrian crossings within the proposed Quiet Zone and perform a diagnostic team review.[33]
3. Update the U.S. DOT Crossing Inventory Form to reflect current physical and operating conditions.[34]
4. Provide a Notice of Intent to all the railroads that operate over crossings in the proposed Quiet Zone, the State agency responsible for highway safety, and the State agency responsible for crossing safety.
5. Complete the installation of SSMs and any required private/pedestrian crossing improvements determined by the diagnostic team.
6. Ensure that the required signage at each public, private, and pedestrian crossing is installed in accordance to regulation.
7. Establish the Quiet Zone by providing a Notice of Quiet Zone Establishment to all the parties. The Quiet Zone can take effect no earlier than 21 days after the date on which the Notice of Quiet Zone Establishment is mailed.

7.2. Quiet Zones Established Using Risk Analysis

Public authorities can also designate a Quiet Zone without application to the FRA by reducing the "Quiet Zone Risk Index" ("**QZRI**") to a level that is below the national average ("Nationwide Significant Risk Threshold" or "**NSRT**"). The public authority can use the FRA Quiet Zone Calculator to demonstrate that risk on the proposed Quiet Zone is currently below the national threshold or can be reduced sufficiently with the installation of one or more SSMs.[35] Under this method of designation, SSMs are not needed on all public crossings, although all public crossings must have, at minimum,

[33] A diagnostic team is composed of railroad personnel, public safety or law enforcement, engineering personnel from the State agency responsible for grade crossing safety, and other concerned parties to evaluate conditions at the proposed quiet zone grade crossings.

[34] A review of the inventory forms for crossings on the Port of Benton line has revealed that much of the inventory information for these crossings is outdated or incorrect and in need of correction.

[35] The Quiet Zone Calculator is a tool created by the FRA to allow local jurisdictions to research the feasibility of creating a quiet zone in their community. The Quiet Zone Calculator allows users to access the FRA maintained National Grade Crossing Inventory and FRA Highway-Rail grade crossing accident records, select a series of crossings, test proposed safety implementation plans that are in compliance with the Final Rule, and generate summary reports for FRA review. The tool allows users to create multiple scenarios for new quiet zones.

gates and flashing lights. Quiet Zones established on this basis are subject to an annual risk review by the FRA.

A local agency can also designate a Quiet Zone without application to the FRA by reducing the QZRI to a level that is below the Risk Index Without Horns ("**RIWH**"). Quiet Zones established on this basis are not subject to an annual risk review by the FRA.

The process for establishing a Quiet Zone using risk reduction is the same as the process using pre-approved SSMs, except that a risk analysis must be performed using the FRA Quiet Zone Calculator.

Richland Quiet Zone Risk Analyses

Preliminary risk analyses by Tangent Services using the FRA Quiet Zone Calculator indicated that the QZRI of a proposed Richland Quiet Zone might be below the NSRT, provided Cemetery Road and Saint Street were signalized.[36] This is due to the relative slow speed of trains, the low traffic volume at some crossings, and the fact that no accidents have been recorded by the FRA at the crossings over the past five years. Qualifying for a Quiet Zone in this manner is likely the least costly approach, but a Quiet Zone so established would be subject to annual risk reviews.

FRA Quiet Zone Calculator runs by Tangent Services further indicated that the QZRI of a proposed Richland Quiet Zone might fall below the RIWH if SSMs were installed on two of the higher traffic crossings. A Quiet Zone so established would not be subject to annual risk reviews.

7.3. Quiet Zone Using Alternative Safety Measures

The public authority may also propose the use of ASMs to establish a Quiet Zone. The public authority must submit a plan to use ASMs to the FRA for approval.

An example of an ASM are medians that extend less than 100 feet from the gate arm, which would not meet the requirements of a pre-approved SSM. Shorter medians would therefore be a "modified SSM," or ASM, and therefore require application to and approval from the FRA to be used in a Quiet Zone.

The process establishing a Quiet Zone using ASMs is the same as the process using pre-approved SSMs except that an application to the FRA must be made. Copies of the application must be sent to the affected railroads and State agencies, who will have 60 days to provide comments to the FRA. FRA will provide a written decision on the application typically within three to four months after it is received.

[36] Using the FRA Quiet Zone Calculator, Tangent Services made assumptions regarding correct crossing inventory data without performing an in-depth analysis and filed study of the crossings. A more detailed study of the crossings is needed to update the crossing inventory data.

Vancouver Example

In 2013, the City of Vancouver, WA, used ASMs to create a Quiet Zone on three public crossings over the BN main line in East Vancouver. The City has initially planned to install four-quadrant gates, but a cost estimate of $1.8 million for the improvements made the project financially infeasible. The use of medians and channelization as SSMs was not possible due to the proximity of the crossings to the Evergreen Highway.

The City therefore proposed medians/channelization at reduced lengths to the FRA as ASMs, which the FRA reviewed and ultimately approved. The final project cost estimate for the medians/channelization was less than $800,000 – about one million dollars less than the four-quadrant gate alternative. The project was paid for with a Local Improvement District consisting of nearby parcel owners.

Figure 21: ASM Example - Vancouver, WA, SE 139th Ave.

Google Earth Streetview

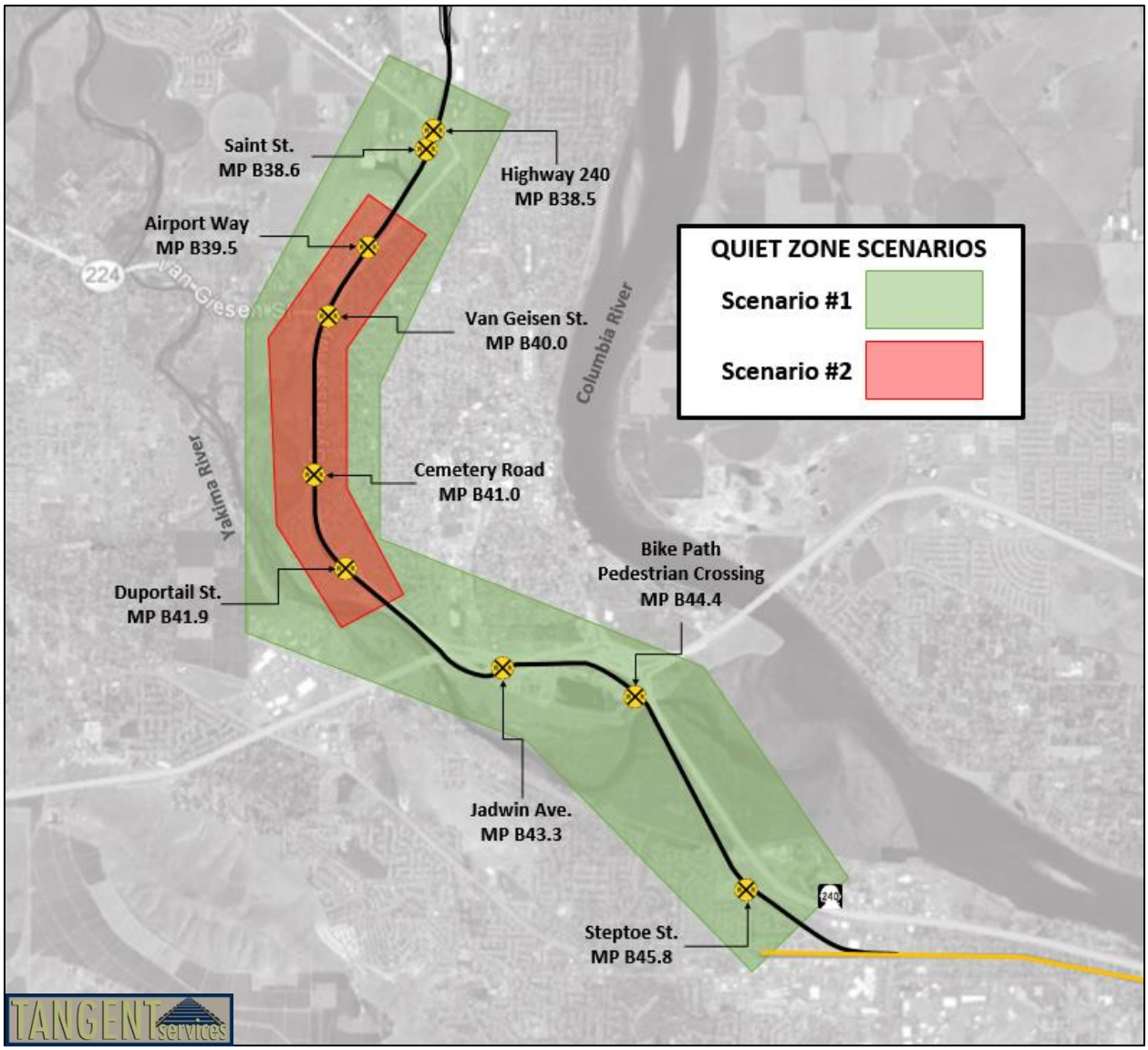
7.4. Richland Quiet Zone Analysis

Scenarios

This section examines the possibility of two different Quiet Zone scenarios:

- The “Quiet Zone #1” scenario includes the nine public crossings (including the pedestrian crossing) from Highway 240 to Steptoe Street.
- The “Quiet Zone #2” scenario includes the four public crossings from Airport Way to Duportail Street.

Figure 22: Quiet Zone Scenarios



The following assumptions are made with respect to each Quiet Zone scenario: 1) Quiet Zone designation will be achieved by installing one or more SSMs at every public highway-rail crossing; and 2) medians/channelization or four-quadrant gates will be installed.[37]

[37] It is also possible that Quiet Zones could be established by reducing risk by installing SSMs at selected (not all) crossings, but this analysis considers only the condition that SSMs are installed at all Quiet Zone crossings.

Table 5: Proposed Quiet Zone Improvements

Street	Railroad Milepost	Quiet Zone Scenario #1	Quiet Zone Scenario #2	Current Devices	Proposed Quiet Zone Improvement
Kingsgate Way				Flashing lights	
Horn Rapids Rd.	B35.8			2-quad gates	
Battelle Blvd.	B36.3			2-quad gates	
Highway 240	B38.5	X		2-quad gates	4-quad gates
Saint St.	B38.6	X		None	Signal gates with median & bollards
Airport Way	B39.5	X	X	2-quad gates	Median & bollards (set back signals mast)
Van Giesen St.	B40.0	X	X	2-quad gates	Median & bollards
Cemetery Road	B41.0	X	X	Flashing lights	Signal gates with median & bollards (set back signal mast)
Duportail Street	B41.9	X	X	2-quad gates	4-quad gates
Jadwin Ave.	B43.3	X		2-quad gates	4-quad gates
Riverfront Trail (Pedestrian)	B44.4	X		None	TBD
Steptoe St.	B45.8	X		2-quad gates	4-quad gates

The high-level assessment of Quiet Zone alternatives determined where median and bollards could be used in place of costlier four-quadrant gates. The Jadwin Avenue improvement is shown as four-quadrant gates; however, a more in-depth analysis of the Quiet Zone may show that a median and bollard design can be used at this crossing. [38]

Cost Estimates

Construction costs for each Quiet Zone improvement were estimated by TBY, Inc. A contingency of 30 percent was then added to arrive at a total estimated cost of $3.6 million for Scenario #1 and $1.2 million for Scenario #2. Four-quadrants gate were assumed for Jadwin Avenue; if medians and bollards are installed there, it would reduce the estimated cost of Scenario # 1 from $3.6 million to approximately $3.3 million.

[38] Medians or channelization devices must extend at least 100 feet from the gate arm or, if there is an intersection within this 100-foot zone, the median or channelization devices must extend at least 60 feet from the gate arm. Intersections within 60 feet of the gate arm must be closed or relocated.

Table 6: Quiet Zone Cost Estimates

Street	Quiet Zone Scenario #1	Quiet Zone Scenario #2	Proposed Quiet Zone Improvement	Scenario #1 Cost	Scenario #2 Cost
Highway 240	X		4-quad gates	$425,000	
Saint St.	X		Signal gates with median & bollards	$550,000	
Airport Way	X	X	Median & bollards (set back signals & mast)	$185,000	$185,000
Van Giesen St.	X	X	Median & bollards	$150,000	$150,000
Cemetery Road	X	X	Signal gates with median & bollards (set back of signal masts)	$185,000	$185,000
Duportail Street	X	X	4-quad gates	$425,000	$425,000
Jadwin Ave.	X		4-quad gates	$425,000	
Riverfront Trail (Pedestrian)	X		TBD	TBD	
Steptoe St.	X		4-quad gates	$425,000	
Total Construction Cost				**$2,770,000**	**$945,000**
Contingency – 30%				$831,000	$283,500
Total Estimated Cost				**$3,601,000**	**$1,228,500**

Ongoing Maintenance Costs

In addition to the cost of the improvements, there is likely to be additional ongoing maintenance costs for crossings in the Quiet Zone. Quiet Zone agreements between public authorities and railroads often include provisions for the local agency to pay any incremental maintenance and replacement costs. On its website, UP places the annual maintenance cost of a crossing with active warning devices at $4,000 to $10,000.

Ongoing Quiet Zone costs for the local agency may also include increased liability insurance premiums.

7.5. Quiet Zone Liability

Potential liability is an issue that warrants investigation by the City and Port prior to the establishment of a Quiet Zone. The question is this: if there is an accident in a Quiet Zone established by the City, who, if anyone, is liable of the injured party claims that the accident was caused whole or in part by the railroad's failure to sound a horn? While evidence supports the position that Quiet Zones reduce the risk of accidents at public crossings (through the installation of SSMs), it is possible that Quiet Zones increase the liability exposure of railroads and public authorities should an accident occur in a Quiet Zone.

The FRA expects that the courts will determine Quiet Zone liability issues based on the facts of each case, the FRA's regulatory intent, and the nature of this rule and its Federal requirements. As noted in the FRA's "Guide to the Quiet Zone Establishment Process:"

> The courts will ultimately determine who will be held liable if a collision occurs at a grade crossing located within a quiet zone, based upon the facts of each case, as a collision may have been caused by factors other than the absence of an audible warning. FRA's rule is intended to remove failure to sound the horn as a cause of action in lawsuits involving collisions that have occurred at grade crossings within duly established quiet zones.[39]

The Train Horn Rule expressly preempts any state law, rule, regulation, etc., governing the sounding of horns at public crossings. The Rule is intended to remove "failure to sound the locomotive horn" as a cause of action in lawsuits involving collisions at grade crossings located within Quiet Zones.

[39] FRA, Guide to The Quiet Zone Establishment Process2013, p. 5., 2013.

8. FINANCING

A range of financing tools will be needed to implement the rail improvements envisioned by this Plan. The combined elements of the Plan should be viewed as a long-term program than can be funded and achieved incrementally over the course of decades. The range of potential funding sources includes the public sector – federal, state, and local — and the private sector, such as contributions from railroads or developers. Internal funding from revenue agreements is also possible. There are likely to be multiple sources of funding for large projects.

8.1. Federal Funding

There are only a few Federal funding sources available for freight railroad projects. Two of the major funding sources, TIGER and FASTLANE, are very competitive grant programs that require at least a portion of the cost of the project to be matched by the project owner. Many other Federal rail programs are unfunded (such as the FRA's Rail Line Relocation and Improvement Capital Grant Program) or are focused on passenger rail, and are therefore excluded from this discussion.

TIGER Grants

The Transportation Investment Generating Economic Recovery or "TIGER Discretionary Grants" program was first created in the 2009 Recovery Act. Since 2009, Congress has dedicated more than $5.1 billion over eight rounds to fund projects that have a significant impact on the nation, a region, or a metropolitan area. Per the most recent TIGER round, funds may cover up to 80 percent of projects costs in urban areas and 100 percent of project costs in rural areas. Twenty percent of the TIGER funds are required to be used for projected located in rural areas. For projects located in urban areas, the minimum award is $5 million (the minimum total project cost for a project located in an urban area must be $6.25 million to meet match requirements). TIGER grants may not be less than $1 million for projects in rural areas.

Census maps appear to show that the Port's rail line up to Horn Rapids Road is within an urban area, but that Horn Rapids Industrial Park and the Transfer Area are not in an urban area (**Figure 23**).[40] This suggests that rail projects in the Horn Rapids Industrial Park or the Transfer Area would be eligible as rural projects under TIGER.

The TIGER grant program highly competitive; only about 5 percent of all applications are successful. Freight-related projects accounted for only 27 percent of the total $500 million of awards available in the eighth round of funding announce in 2016. In prior rounds, freight-related projects received as much as 53 percent to 33 percent of the funding.

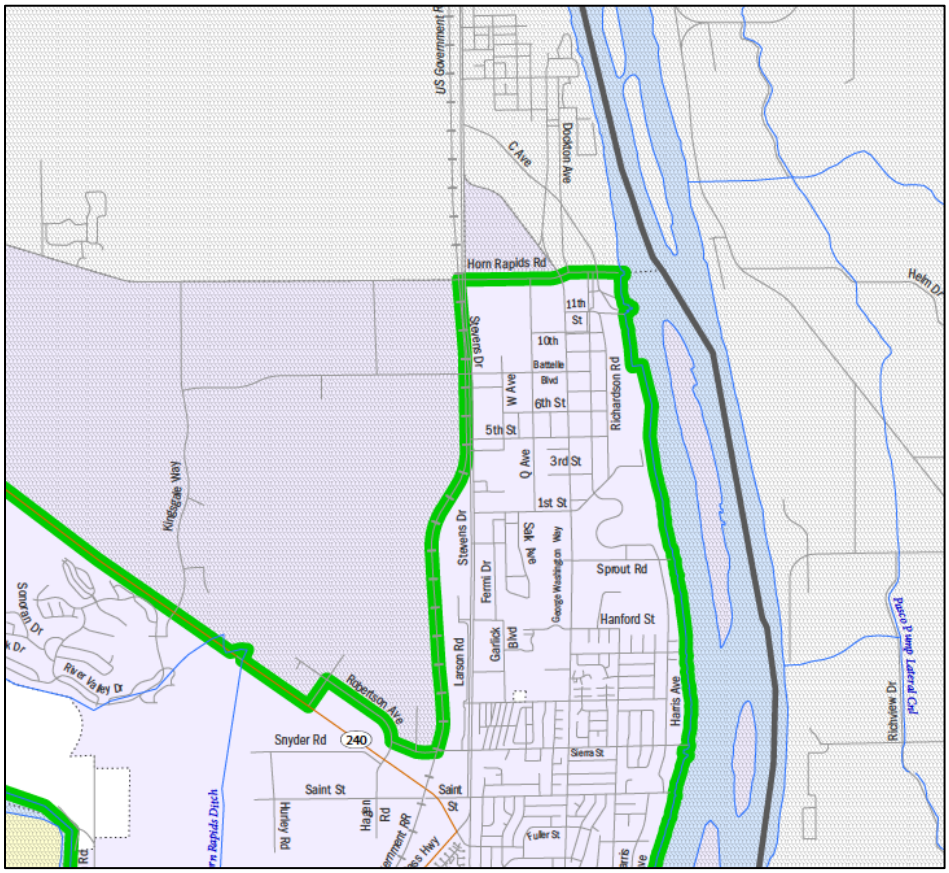
On average, there have been about two projects in Washington receiving awards each round (15 awards over eight rounds). Only one of these awards has been to a freight rail project: Port of Vancouver's West Vancouver Freight Access project ($10 million, 2010). In Oregon, two freight rail

[40] Map of Kennewick-Pasco Urban Area: http://www2.census.gov/geo/maps/dc10map/UAUC_RefMap/ua/ua44479_kennewick--pasco_wa/DC10UA44479.pdf

projects (both rural) have received awards: the Coos Bay Rail Line rehabilitation ($13.6 million, 2010) and the Siskiyou Summit Railroad Revitalization ($7 million, 2012).

Web site: https://www.transportation.gov/tiger.

Figure 23: Urban / Rural Map



The green line is the Census Dept.'s urban / rural area demarcation.

FASTLANE Grants

The Fixing America's Surface Transportation Act (**FAST Act**) established the Fostering Advancements in Shipping and Transportation for the Long-term Achievement of National Efficiencies (**FASTLANE**) grants program to provide Federal financial assistance to projects of national or regional significance and authorized the program at $4.5 billion for fiscal years (FY) 2016 through 2020.

The USDOT makes awards under the FASTLANE program to both large and small projects. For large projects, the FAST Act specifies that FASTLANE grants must be at least $25 million. For small projects, the grants must be at least $5 million.

For both large and small projects, maximum FASTLANE awards may not exceed 60 percent of future eligible project costs. Ten percent of available funds are reserved for small projects. At least

25 percent of the funds provided for FASTLANE grants must be used for projects located in rural areas (urban versus rural defined the same as in the TIGER grant program).

Intermodal or rail freight projects are eligible. Grade separation projects are also eligible.

The FY 2016 FASTLANE grants were announced in July, 2016. Two grade separation projects in Washington received awards: $5 million for a $38 million grade separation in Tukwila and $45 million for a $140 million grade separation in Seattle. In Oregon, $11 million was awarded to a $20 million project to rehabilitate tunnels on the rail line serving Coos Bay. Other awards included funding for intermodal port projects in Georgia, Massachusetts, and Maine, as well as $25 million to a $47 million logistics park project in Iowa.

Web site: https://www.transportation.gov/buildamerica/FASTLANEgrants.

FHWA Section 130 Railway - Highways Crossing Program

The Federal Highway Administration (FHWA) Section 130 Railway-Highways Crossing Program provides federal support for projects that improve safety at public highway-rail at-grade crossings, including crossings of roadway, bicycle, and pedestrian facilities. Funds may be used to install or upgrade warning devices, eliminate at-grade crossings through grade separation, or consolidate or close at-grade crossings. The federal share of these funds is 90 percent and the local, or typically the railroad's share, is 10 percent. The national maximum funding for the program is $230 million in FY 2017. Funds are allocated to each state by a formula that is partly based on number of crossings in the state, with the state acting as a pass-through and managing the funds. In Washington, the Utilities and Transportation Commission is responsible for rail safety and selects projects for grade crossing protection, which are then implemented by WSDOT. In Washington, funding is prioritized for improvements to crossings with known safety issues.

Web site: http://safety.fhwa.dot.gov/xings/.

Railroad Rehabilitation & Improvement Financing Program

The Railroad Rehabilitation & Improvement Financing (**RRIF**) program was established by the Transportation Equity Act for the 21st Century (**TEA-21**) and amended by the SAFETEA-LU. Under this program, the FRA Administrator is authorized to provide direct loans and loan guarantees up to $35.0 billion. Up to $7.0 billion is reserved for projects benefiting freight railroads other than Class I carriers.

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. Direct loans can fund up to 100 percent of a railroad project with repayment periods of up to 35 years and interest rates equal to the cost of borrowing to the government. Eligible borrowers include railroads, state and local governments, and government-sponsored authorities and corporations.

The RRIF vastly under-subscribed. Of the $35 billion it has at its disposal, just $1 billion has been spent since 1998.

RRIF borrowers must pay a credit risk premium that is held by the government over the life of the loan. If the applicant can produce collateral equal to 120 percent of the loan amount and an independent financial analyst working for the FRA returns a favorable finding of on ability to repay, the risk premium is usually one or two percent. If the collateral is at 80 percent, the credit risk premium can rise to 15 or 20 percent of the loan amount. This often discourages applicants from pursuing loans.

The program has been criticized for the length of time is takes to complete the application process.

Example: In 2013, the Port of Vancouver, WA, applied for a RRIF loan to help fund its $230 million West Vancouver Freight Access project. The Port worked with the FRA over the period of a year or so on the application. The Port, however, eventually abandoned the loan application as it was unable to come to terms that were mutually agreeable. The primary issue involved collateral requirements.

Web site: http://www.fra.dot.gov/Page/P0128.

8.2. State Funding

Legislative Appropriation

Ports and other public agencies have been successful in obtaining direct appropriations from the Washington State Legislature to fund rail projects. Direct appropriations to rail projects in the 2015-17 budget included:

- $20.9 million to the Northern Columbia Basin Railroad to enhance and improve rail access to industries in the northern Columbia Basin area near Moses Lake.
- $2 million to the Port of Warden to construct a mile of new storage siding track along the Columbia Basin line.
- $10 million for the Connell rail interchange project to upgrade and improve a key interchange in eastern Washington, where a Columbia Basin Railroad line intersects with BN's Lakeside Subdivision line that runs between Spokane and Pasco.

Other rail-related projects receiving direct appropriations in past funding cycles include $2.2 million to the Port of Benton to replace the Columbia Parkway bridge and $3.2 million to the Port of Pasco to build a rail spur to the Heritage Industrial Park and to expand the Big Pasco Industrial Park rail track system.

Freight Rail Investment Bank (FRIB)

"FRIB" is a loan program administered by WSDOT for smaller projects or as a small part of a larger project, where state funds would enable the project to be completed. The program is open to organizations in the public sector only, as loans to the private sector are outside the constitution of

the state. The objectives of the program are to support branch lines and light density rail lines, provide or improve rail access to ports, maintain adequate mainline capacity, and preserve or restore rail corridors and infrastructure. The loan maximum is $250,000, but could be higher depending on the amount of qualifying applications received and the caliber of proposed projects. Additionally, all applicants must provide a minimum 20 percent match.

Web Site: http://www.wsdot.wa.gov/Freight/Rail/GrantandLoanPrograms.htm.

Freight Rail Assistance Program (FRAP)

"FRAP" is a grant program administered by WSDOT directed toward larger projects where it is difficult to gain a contribution and where the rail location or the project is of strategic importance to the local community and the state. The program and is open to cities, county rail districts, counties, economic development councils, port districts, and privately or publicly owned railroads. The objectives of the program are to support branch lines and light density rail lines, provide or improve rail access to ports, maintain adequate mainline capacity, and preserve or restore rail corridors and infrastructure. Projects must be shown to maintain or improve the freight rail system in the state and benefit the state's interests.

Web Site: http://www.wsdot.wa.gov/Freight/Rail/GrantandLoanPrograms.htm.

Example: In August 2014, the Port of Walla Walla requested a FRAP grant of $650,000 and FRIB loan of $160,085 to help build a 1,000-foot lead track to establish dual Class I rail access to the 1,400-acre Wallula Gap Business Park. As part of the project, the Port of Walla Walla contributed $523,640 to acquire the trackage rights and right-of-way property. The total project cost estimate is $1,333,725. The Port was not successful in procuring the FRAP grant and asked that the grant request be converted to the loan program. In November 2014, WSDOT recommended a FRIB loan of $810,085 for the Port's project.

CERB Programs

Community Economic Revitalization Board (**CERB**) is a state board focused on economic development through job creation in partnership with local governments. The Board has the authority to finance public infrastructure improvements that encourage new private business development and expansion.

- The **Committed Private Partner Program** provides loans and grants for the construction of public infrastructure necessary for private business expansion. Applicants must commit to a cash match of at least 20 percent of the total project cost.
- The **Prospective Development Construction Program** provides rural communities with loans and grants for public infrastructure to enable future business development. Jurisdictions in rural counties and rural communities may apply for the Prospective Development program if an economic feasibility study demonstrates that private business development is likely to

occur because of the public improvements. Applicants must commit to a cash match of at least 50 percent of the total project cost.

For both CERB programs, the total loan/grant request cannot exceed $2 million. A grant request cannot exceed $300,000 or 50 percent of the CERB award, whichever is less. In a rural county (including Yakima County), the CERB cost per job created/retained must be $30,800 or less. The median hourly wage of the private sector jobs created must exceed the countywide median hourly wage.

Home to many high-paying jobs at the Hanford Site, Benton County has a median hourly wage of $23.15, which is third highest in the state behind only King and Snohomish counties (2015 data). This high wage rate makes it unlikely that a rail or transportation-related project will meet the eligibility requirements for CERB funding.

Web site: http://www.commerce.wa.gov/building-infrastructure/community-economic-revitalization-board/.

8.3. Local Funding

Local Government

Washington public ports often contribute to rail projects where there are demonstrable benefits to port-related properties and tenants. These contributions often are matching funds for public grants or loans. There are numerous examples of cities and counties contributing to rail-related projects, many of which involve grade separations.

Local Improvement District

Washington State passed legislation in 2009 that allows Local Improvement Districts (**LID**) to be used for safety improvements at rail crossings.[41] The law also requires that there must be an increase in property value greater than the cost of the LID.

The City of Vancouver used an LID to fund the creation of a quiet zone, which became operational in 2013. The Vancouver City Council received a written indication of approval from the majority of 467 parcel owners before approving the LID. The LID charges are in three tiers based on how much property owners will benefit from the quiet zone; lots closer to the railroad tracks pay more than lots further away. The cost of the project, which consisted of medians and channelization at three public crossings on the BN main line, was approximately $675,000. **More than 20,000** trains go through the quiet zone each year.[42]

[41] Revised Code of Washington 35.43.040: http://app.leg.wa.gov/RCW/default.aspx?cite=35.43.040.

[42] Stephanie Rice. "Quiet zones take effect at Vancouver train crossings." The Columbian. 16 Oct. 2013. Web. 31 Oct. 2016.

8.4. Private Funding

Railroad

Railroads typically do not participate in the funding of rail improvements that they do not own and control. However, railroads have contributed to industry track improvements in situations involving service to major customers or where an improvement benefits the railroad's network capacity and efficiency. Examples include:

- At the Port of Vancouver, BN made an in-kind, non-cash contribution to West Vancouver Freight Access Project in the form of donated right-of-way that was valued at $8.1 million. The railroad's willingness to contribute to this project stemmed in large part from the project's reconfiguration of the Port's rail entrance and unit train terminal access. That reconfiguration reduced conflicts and congestion on the north-south main line.
- The Port of Portland recently completed expansions to its South Rivergate and Ramsey rail yards. As part of the funding packages for these projects, both BN and UP agreed to repay loans from the State of Oregon totaling $9.4 million. The railroads' participation in the funding was due to the operational improvements and cost-reductions these projects provided in serving major rail customers in the Port of Portland's Rivergate area (e.g., Columbia Grain, Evraz Steel, and Canpotex).

Also, in the category of railroad participation, the Port of Benton has obtained a tentative commitment from BN to contribute to the project to realign, add ballast, and surface the curve near Berry's Bridge to accommodate heavier unit trains.

8.5. Revenue Agreements

Revenue agreements generate on-going revenues typically related to the rent or use of rail property. Internal revenues are most often used for administration, maintenance, and the replenishment of assets. Revenue agreements can be also structured to repay investments made on behalf of a railroad or tenant.

Lease of Railroad Property

Property leases are the most common sources of revenue public authorities owning railroads. Seven of the nine publicly-owned railroads in the State of Washington collect revenue by leasing railroad property.

A lease can transfer many of the benefits, risks, and responsibilities of ownership to the lessee. It is typically of longer duration and more difficult to terminate than a track use or operating agreement. Under a lease, the lessee (usually a short line railroad) is given commercial and operating rights to the rail property and, in return, makes rent payments to the public authority. The rent payments can be a fixed fee, or a fee based on revenue or volume, or a combination thereof. There is usually a minimum rent fee required. The short line railroad is usually responsible for maintaining the rail line

and for providing labor and equipment. The short line operator retains the revenues associated with the line's operation and is typically given exclusive use.

The Port's lease with TCRY generally follows the typical railroad lease model, with one notable exception being TCRY does not have exclusive use of the line.

Track Use Agreements

Another common revenue mechanism is a track use or operating agreement with a rail carrier. Under this arrangement, the rail carrier pays the railroad owner a fee for the right to operate on the line. The owner usually retains maintenance responsibility.

Track use agreements are generally more flexible than leases. They are usually shorter duration, more easily terminated by either party, and work well where track use is non-exclusive.

The Port's 1947 agreements with BN and UP provide the railroads the right to operate over the line and makes the Port responsible for maintenance. The agreements, however, do not provide any ongoing revenues to the Port.[43] The City's 2011 track use agreements with BN and UP provide compensation to the City in the form of a fixed annual fee.

In addition to fixed annual fees, as is used in the City's agreements, another potential method of compensation are payments tied to activity, e.g., a fee per railcar. A fee per railcar has the benefit of increasing revenues as maintenance costs increase due to use.[44]

Yet another potential method of compensation in a track use agreement is a proportional reimbursement of maintenance costs. Using this method, the owner's actual maintenance costs can be reimbursed proportionally by multiple track users based on traffic, e.g., railcar counts. For example, this method of compensation is used in an operating agreement involving Pacific Harbor Line, which operates over tracks owned by the Ports of Los Angeles and Long Beach.

Tariff

Public ports often assess charges for the use of common-user facilities based on a published tariff. For example, the Port of Tacoma charges the railroads a "Facility Charge" of $24 for each container handled at its intermodal yards. The Port of Pasco charges a $35 "wheelage" fee on each railcar using its Heritage Industrial Park rail spur. The Port of Pasco tariff also has a storage fee per linear foot of trackage.

Similarly, a tariff could be used to charge users of future common-user rail facilities on Port or City property. For example, if the Port or City were to construct one of the rail yard projects envisioned by the Plan, such as the Horn Rapids Rail Yard (Project HR-2), a tariff fee, payable by the railroads,

[43] Per the 1948 agreement, BN and UP paid rent equal to 1/25 of the Southern Connection construction cost over 25 years. Once these payments were complete, the railroads retained the right to operate on the line without further payment.

[44] If a fee per "car" is used, care should be taken to adjust the count for articulated intermodal cars, which have five platforms, e.g., one articulated railcar equals five cars for fee assessment.

could be assessed on each railcar entering and existing the yard. The charge for railcar storage – a per day fee after a certain number of "free days" – could also be assessed via a tariff.

Rail Fees in Leases

Charges based on rail activity can be incorporated into property leases. Using the Port of Tacoma again as an example: the Port has marine terminal leases wherein the tenant commits to an "Intermodal Minimum Guarantee" of a certain number containers moving to/from a Port rail yard through the terminal. If the guaranteed volume is met or exceeded (with associated tariff fees paid by the railroads), there is no additional lease fee. However, if the intermodal guarantee is not fulfilled, the tenant must pay the shortfall at the $24 per container tariff rate.

8.6. Other Issues

Ownership and Dual Class I Railroad Access

While exploring financing options for the development of rail infrastructure, the City and Port may receive proposals from private entities to fund projects. Although the private funding of Port and City trackage is acceptable and perhaps even desirable, the Port and City should retain ownership and ultimate control of all trackage and right of way that can be used for access by more than one rail user or railroad. The City and Port should avoid agreeing to exclusive use of any trackage that can potentially provide access to multiple users.

When negotiating agreements related to track use and rail-served properties, the City and Port should include provisions to ensure that joint rail access is preserved for both the BN and UP. For example, the City's ground lease for the CWCP facility contains the following language:[45]

> **Joint Rail Access.** No action shall be taken by Lessee to restrict the fair, equal, and competitive joint use or access right of the BNSF Railway and the Union Pacific Railroad, or their agents, to operate on the Premises with their equipment and employees.

Joint Rail Authority

As shown by information in this Plan, the rail interests of the City and Port are closely aligned:

- Developments in the City's Horn Rapid Industrial Park, using the Horn Rapids Spur, are driving growth on the Port's rail line.
- The City and Port already have a shared interest in the preservation and maintenance of the each other's trackage.
- Future expansion of rail-related industry on City and Port properties will create both the need and opportunity for even greater cooperation on rail issues.
- The City and Port already have an interlocal cooperative agreement for coordinated economic activities for the Transfer Area.

[45] The lease is with CWCP affiliate Central Washington Transfer Terminal, LLC.

Moreover, the Port and City have no means in place by which they can share the costs and revenues associated with the development and maintenance of joint rail facilities.

Given the above, the City and Port should consider establishing a **joint rail authority** (**JRA**) to preserve freight service, to further economic development, and to maintain and expand rail infrastructure. Under a JRA, the Port's and City's rail real estate and agreements could be transferred or assigned to the new authority. A JRA could enter and administer leases and agreements with private operators on Port and City tracks. Financial support for a JRA's operation could come from fees from leases of rail property, operating agreements, and tariffs. In theory, a JRA might enhance the ability of the City and Port to obtain external grants.

JRA Example: SEDA-COG Joint Rail Authority

An example of an existing JRA is the SEDA-COG Joint Rail Authority, formed in 1983 by eight counties in Central Pennsylvania. The eight counties own six short line railroads comprising 200 miles of track. Each county has two unpaid members on the JRA Board of Directors. The JRA, which has a staff of 2.5 persons, is supported by operating fees paid as a percentage of the operator's gross freight revenue. In 2014, rail traffic exceeded 26,000 carloads.

The SEDA-COG JRA owns the railroad real estate – the tracks, yards, bridges and buildings. It is also responsible for all capital projects, such as new sidings or bridge replacements. The JRA hires a private rail service operator who purchases the locomotives and hires the crews to serve the customers. The private operator is also charged with annual track maintenance and marketing of the railroad service.

SEDA-COG JRA web site: http://www.sedacograil.org/Pages/Home.aspx.

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Key Agreements

- 1947 - Contract for Railroad Service among U.S Atomic Energy Commission, Northern Pacific Railway Company, Oregon-Washington Railroad Navigation Company, and Union Pacific Railroad Company (1947 Agreement)
- 1948 - Supplement to 1947 Agreement
- 1961 - Agreement among U.S Atomic Energy Commission, Northern Pacific Railway Company, Oregon-Washington Railroad Navigation Company, and Union Pacific Railroad Company
- 1998 - Indenture between U.S Department of Energy and the Port of Benton
- 1998 - Contract for Operation and Maintenance of Railroad between Port of Benton and Livingston Rebuild Center Inc.
- 1998 - Consent to Assignment and Amendment of Contract and Lease among Livingston Rebuild Center Inc Tri-City Railroad Company LLC and Port of Benton
- 2002 - Railroad Lease between Port of Benton (lessor) and Tri-City Railroad Company L.L.C. (tenant)
- 2011 – Railroad Track Use Agreement between City of Richland and Union Pacific Railroad
- 2011 – Railroad Track Use Agreement between City of Richland and BNSF Railway
- 2015 - Quitclaim Deed between Department of Energy and Tri-City Development Council (TRIDEC)
- 2015 - Interlocal Cooperative Agreement for Department of Energy Land Transfer between the Port of Benton and the City of Richland
- 2016 - Quitclaim Deed TRIDEC to Port of Benton

Attachment "A"
Crossties, Surface & Lining

Projects ET-1, ET-1a, ET-2

A. Crossties

Crossties shall be made of a material to which rail can be securely fastened. Each 39-foot segment of track shall have –

1) A sufficient number of crossties which in combination provide effective support that will -
   i) Hold gage within the limits prescribed in §213.53(b) Track Safety Standards;
   ii) Maintain surface within the limits prescribed in §213.63 Track Safety Standards; and
   iii) Maintain alinement within the limits prescribed in §213.55 Track Safety Standards.
2) The minimum number and type of crossties specified in paragraphs (b)(4) of this section and described in paragraph (c) or (d), as applicable, of this section effectively distributed to support the entire segment; and
3) At least one non-defective crosstie of the type specified in paragraphs (c) and (d) of this section that is located at a joint location as specified in paragraph (e) of this section; and
4) The minimum number of crossties as indicated in the following table.

FRA Track Class	***Tangent track and curves -- 2 degrees***	***Turnouts and curved track over 2 degrees***
Class 1	*5*	*6*
Class 2	*8*	*9*
Class 3	*8*	*10*
Class 4 and 5	*12*	*14*

B. Ballast

The ballast in the rail corridor is both crushed stone and/or river run gravel. Quality ballast readily transmit and distribute the load of the track and railroad rolling equipment to the subgrade as well as restrain the track laterally, longitudinally, and vertically under dynamic loads imposed by railroad rolling equipment and thermal stress exerted by the rails. The ballast also provides drainage for the track with the underlying subgrade sloped towards the longitudinal ditch lines that are typically on both sides of the track in a rail corridor.

The ballast section, together with the crossties rail, and rail fasteners, combine to maintain proper track crosslevel, surface, and alignment of the track. Generally, there is economy of scale to preform out of face surfacing of track behind production tie installation programs, since extraction of scrap tie and installation of a new tie disturbs the consolidated ballast section holding the track alignment. In this manner, the preferred crushed stone or angular rock can displace any less desirable soiled gravel in order to attain preferred surfacing cycles to sustain proper crosslevel, surface, and alinement of the track.

For budgetary purposes, it is recommended to use an average 2 inch ballast raise for a rail corridor, taking into consideration the need for run-offs or adjustments at bridges, highway overpasses, platforms, and highway at-grade crossings.

Typical Alignment Variant

Typical Profile Variant

Tie Inserter/Extractor

Tamper – Lining & Surfacing Track

Track Regulator – Dressing Track

Attachment "B"
Rail Corridor Requiring Rail Replacement

Project ET-3

10. 00 - TRACK MATERIAL

10.01 Rail - 112 lb. to 141 lb. relay rail is required. Rail must meet or exceed AREMA Class I Specifications if greater than three hundred (300) per year are anticipated. If less than three hundred (300) cars per year are anticipated Class II rail can be used.

Class 1		
Rail Weight	**Max. Vert. Wear**	**Max. Hor. Wear**
141	5/16"	1/8"
133-136	1/4"	1/8"
131-132	3/16"	1/8"
119	5/32"	1/16"
112-115	1/8"	1/16"
Corrugation up to .010 allowed		
Class 2		
Rail Weight	**Max. Vert. Wear**	**Max. Hor. Wear**
141	7/16"	1/4"
133-136	3/8"	1/4"
131-132	1/4"	1/4"
119	1/4"	1/8"
112-115	3/16"	1/8"
Two dime sized engine burns per 39' corrugation up to .020 and 1/4" field size lip allowed		

10.02 Fastenings:

a) Angle or Joint Bars, new or certified, to match rail section used. Industry to provide compromise joint bars or compromise welds to match Union Pacific's (UP) rail section at 13-foot clearance point or location designated by UP representative (See UP **Standard Drawing No. 0904 and 0948**).

b) Tie Plates, new or secondhand, and double shouldered plates no smaller than 2 times the base of the rail. Track to be fully plated. The use of single shoulder tie plates is prohibited.

c) Track Bolts, new or secondhand, appropriately sized for the boltholes in the rail section with length sufficient for a full nut and heavy-duty spring washers (new) (See UP **Standard Drawing No. 0438, 0439, 0440, 0441 & 0442**).

d) Track Spikes, new 5/8" x 6" or 5/8" x 6 1/4" installed per UP **Standard Drawing No. 130005 and 0453.**

e) Rail Anchors, new or reformed, box anchored every other tie. All switch ties will be completely box anchored. For crossties that use elastic fasteners, rail anchors are not required (See UP **Standard Drawing No. 0460**).

f) Compromise Joint Bars or Compromise Field Welds shall be utilized when rails of dissimilar rail sections are connected. Turnouts will use the same rail section on the running rail, closure rails, and turnout components through the body of the turnout. It is the Industry's responsibility to furnish, install and maintain compromise joint bars connecting to UP owned track. All rail joints and welds should be kept out of grade crossings, where possible (See UP **Standard Drawing No. 0948**).

g) Insulated Joints/I Bonds to be furnished by Industry and shall be all new material. Insulated joints/I bonds will be installed by industry at locations designated by UP's authorized representative (See UP **Standard Drawing No. 0960**).
h) Field Welding will be done in accordance with current UPRR or AREMA procedures (See **Section 16.00**).

10.03 Timber Ties (See UP Standard Drawing No. 0210):

Light Traffic	**<1000 cars per year**	**7" x 9" x 8' Ties @ 20 Ties per 39 ft. rail (24" on center)**
Medium Traffic	**>1000 & <2000 cars per year**	**7" x 9" x 8'6" Ties @ 22 Ties per 39 ft. rail (21.25" on center)**
Heavy Traffic	**>2000 cars per year**	**7" x 9" x 8'6"' Ties @ 24 Ties per 39 ft. rail (19.5" on center)**

a) New creosoted Oak or Douglas fir ties only for new construction.
b) Only new creosoted Oak or Douglas fir switch ties will be used to accommodate turnout pattern.

10.04 Concrete Ties:

Light Traffic	**<1500 cars per year**	**8' 3", 600 lb. tie at 26" centers 8' 6", 525 lb. Tie at 24" centers 8' 6", 720 lb. tie at 28" centers**
Medium/Heavy Traffic	**>1500 cars per year**	**8' 3", 600 lb. tie at 24" centers 8' 6", 720 lb. tie at 26" centers**

a) Continuous Welded Rail is recommended for use with Concrete Ties.
b) Concrete switch ties may be used where concrete standard ties are used.
c) Concrete ties must be new ties produced in accordance with UP's Concrete Tie Specifications for Construction.
d) See UP **Standard Drawing No. 0204** as an example of a 720 lb. Tie.

10.05 Steel Ties (See UP Standard Drawing No. 0237, No. 0238 and No. 0241):

Levels of Traffic	**10 mm thickness**	**8' 6" ties @ 20 ties per 39 ft. rail @ 24" centers**

10.06 Composite Ties (See UP Standard Drawing No. 0210):

Light Traffic	**<1000 cars per year**	**6" x 8" x 8' Ties @ 20 ties per 39 ft. rail @ 24" centers**
Medium Traffic	**>1000 & <2000 cars per year**	**7" x 9" x 8' 6" Ties @ 22 ties per 39 ft. rail @ 21.25" centers**

Heavy Traffic	**>2000 cars per year**	**7" x 9" x 8'6"" Ties @ 24 ties per 39' rail @ 19.5" centers**

10.07 Turnout Components - All turnout components shall be new or certified reconditioned material. All turnout components in UP owned or maintained track shall be new material supplied by UP or a UP approved vendor. The Industry and/or its Contractor need to provide verification that the turnout(s) are from a UP approved vendor.

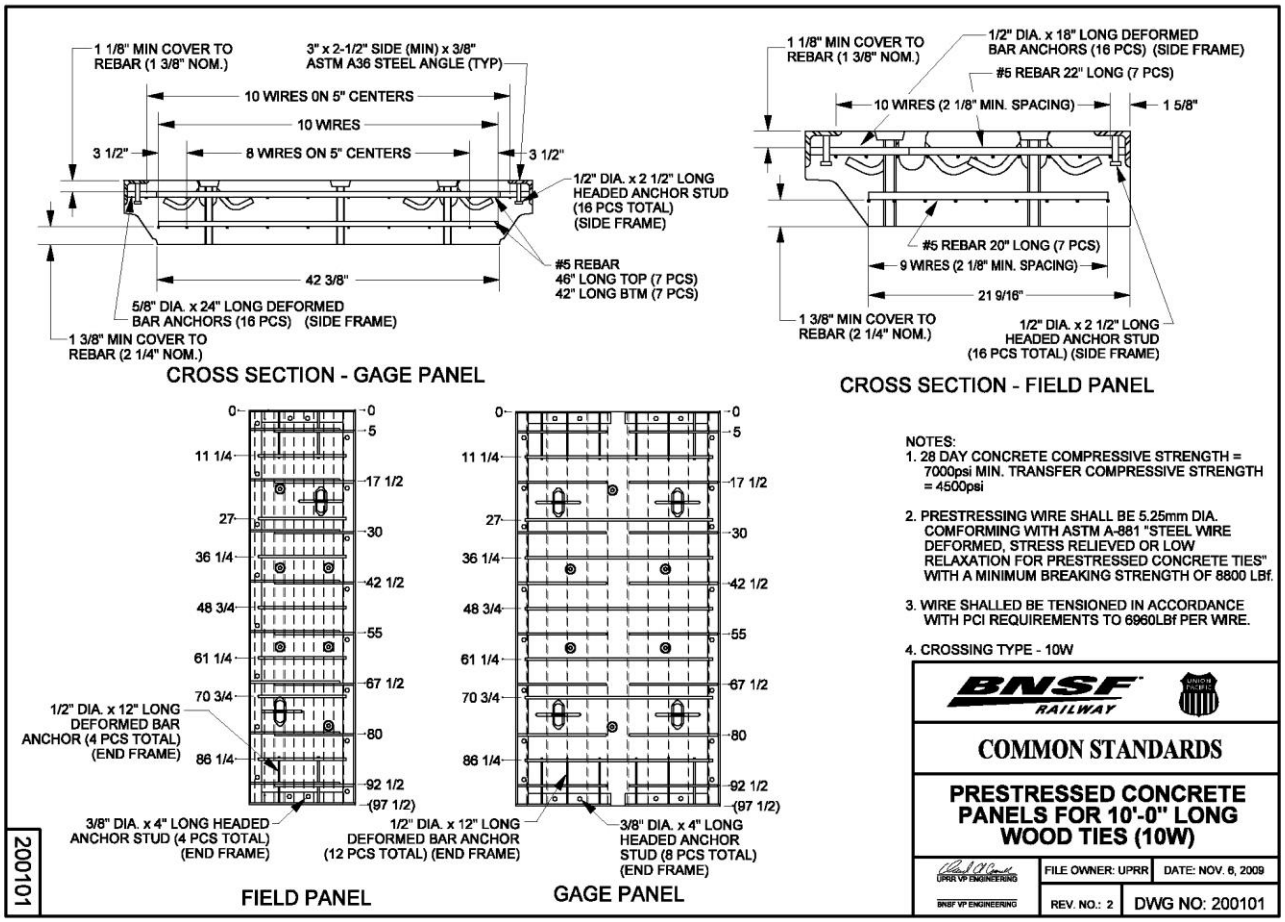
10.08 Turnout Assembly - The Industry and/or its Contractor need to verify with the Manager Track Maintenance or the Manager Industry & Public Projects that the turnout(s) to be installed on the UP owned portion of the track will be provided loose or assembled. Turnouts to be provided must meet provisions of the local collective bargaining agreements. If the assembly of the Turnouts is by the Industry's Contractor, the assembly in all cases must occur off of UP right of way.

Yester Year's Rail Gang

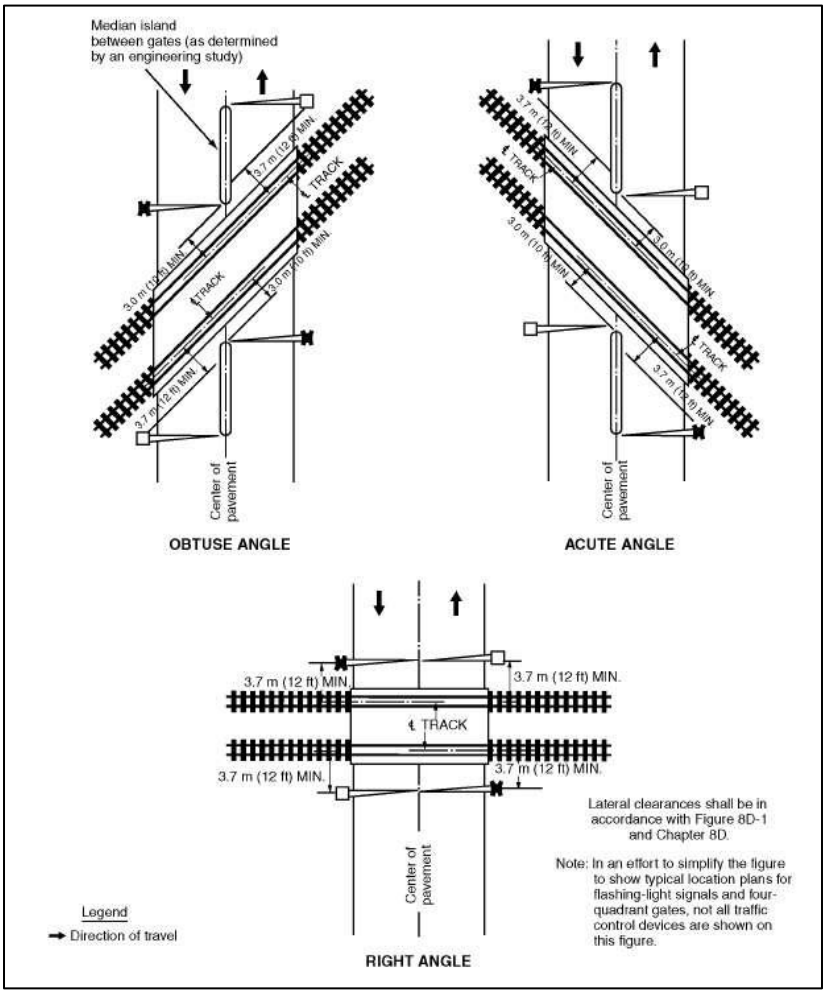
The Rail Gang uses a machine called a Wide Gauge Threader to take the old rail and move it toward the outside of the ties so that the new rail can be laid.

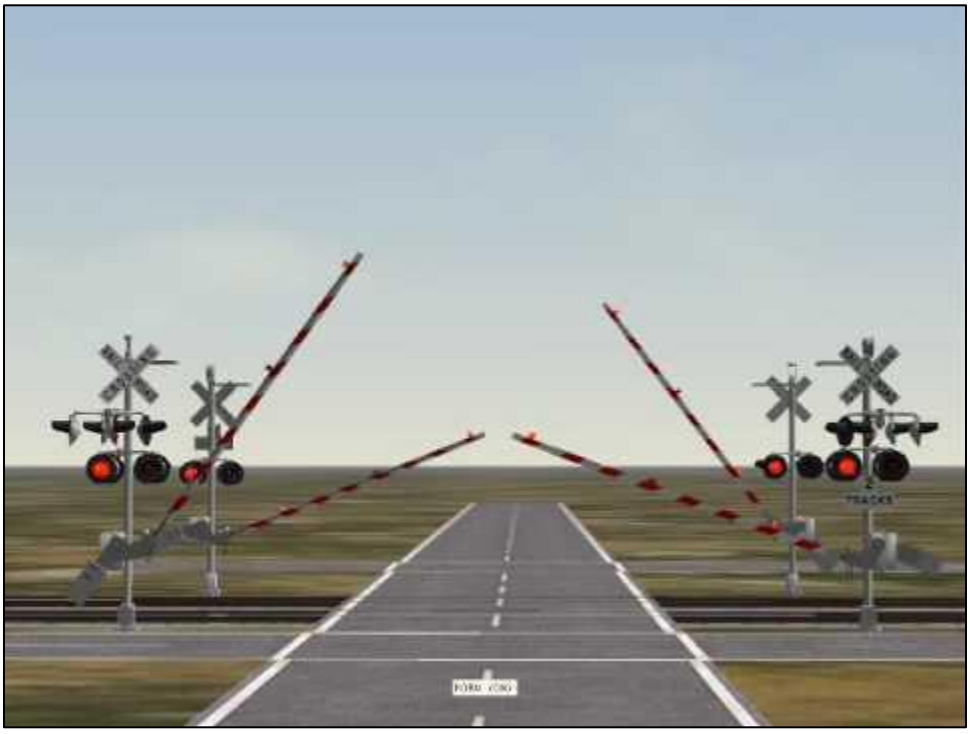
Attachment "C"
Rail Corridor Requiring Crossing Upgrades – Concrete Road Crossing

Projects ET-4 and ET-5

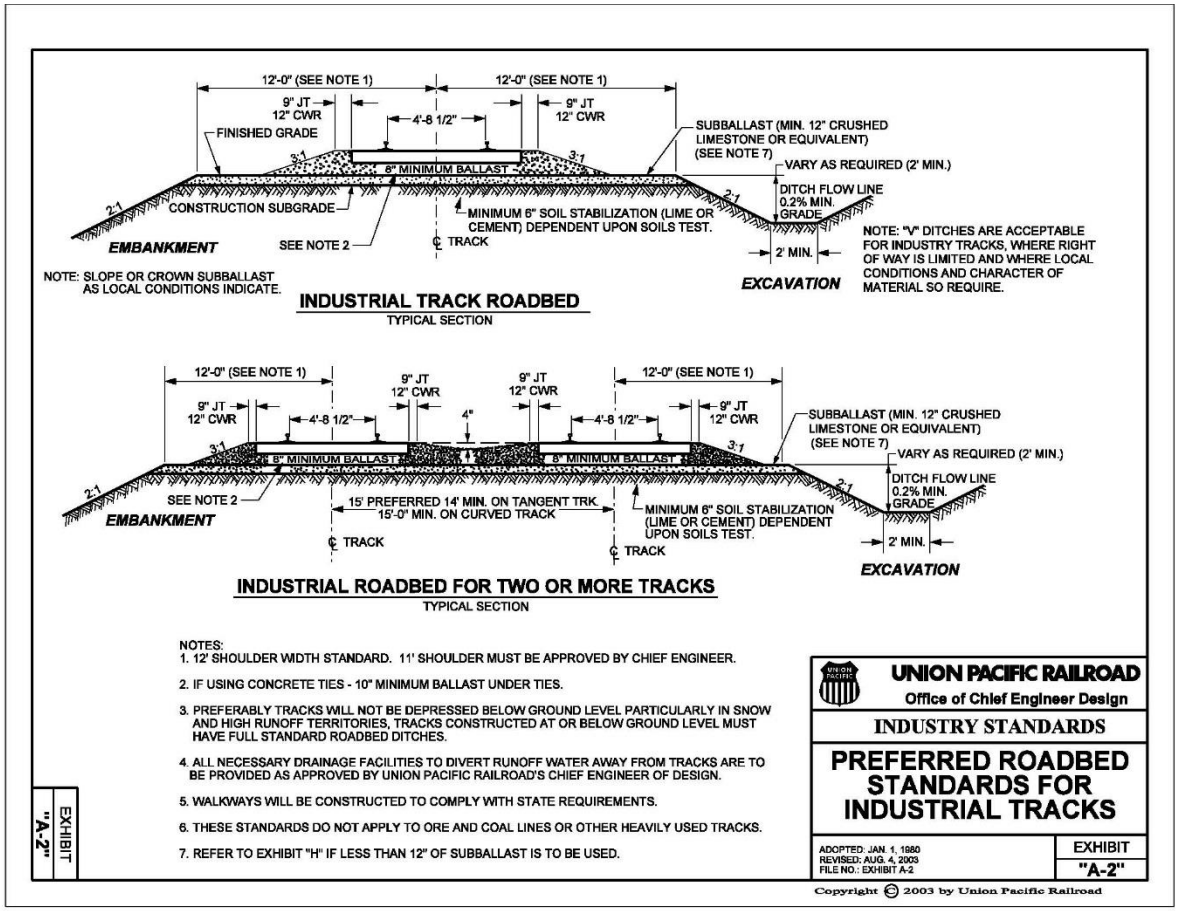


Speed Swing placing Concrete Panels





Attachment "D"
Rail Corridor Requiring Typical Track Section Upgrades



Attachment "E"
Rail Corridor Requiring Structural Plate Over/Under Crossing

Project HR-3

Attachment "F"
Crossing Improvements to Establish a Quiet Zone

Horn Rapids Road – MP 35.8

Existing –Cantilever & Gates

Design Median & Safety Bollards on West side of crossing to channel westbound vehicular traffic. Verify interconnection of Hwy. 240 traffic signals with railroad's crossing signal pre-emption. Conduct Diagnostic meeting with FRA, WashDOT, WUTC, City of Richland, Port of Benton to develop Quiet Zone (QZ)

Estimated Cost: $150,000

Not included in Quiet Zone scenarios.

Battelle Blvd. – MP 36.3

Existing – Gates & Flashers

Design Median & Safety Bollards on East side of crossing to channel westbound vehicular traffic. Verify interconnection of Hwy. 240 traffic signals with railroad's crossing signal pre-emption. Conduct Diagnostic meeting with FRA, WashDOT, WUTC, City of Richland, Port of Benton to develop Quiet Zone (QZ)

Estimated Cost: $150,000

Not included in Quiet Zone scenarios.

Highway 240 – MP 38.5

Existing –Cantilever & Gates

Design 4 Quadrant Gates for East & West side of crossing to channel vehicular traffic. Conduct Diagnostic meeting with FRA, WashDOT, WUTC, City of Richland, Port of Benton to develop Quiet Zone (QZ)

Estimated Cost: $425,000

Saint Street – MP 38.6

Existing – No Signals

Design Signal Gates with median & bollards to channel eastbound & westbound traffic. Conduct Diagnostic meeting with FRA, WashDOT, WUTC, City of Richland, Port of Benton to develop Quiet Zone (QZ)

Estimated Cost: $550,000

Airport Way – MP 39.5

Existing – Gates & Flashers

Design set back of signals & mast to support median & bollards to channel eastbound & westbound traffic. Verify interconnection of Hwy. 240 traffic signals with railroad's crossing signal pre-emption. Conduct Diagnostic meeting with FRA, WashDOT, WUTC, City of Richland, Port of Benton to develop Quiet Zone (QZ)

Estimated Cost: $185,000

Van Giesen Street / HWY 224 – MP 40.0

Existing –Cantilever & Gates

Design Median & Safety Bollards on East side of crossing to channel westbound vehicular traffic. Verify interconnection of Hwy. 240 traffic signals with railroad's crossing signal pre-emption. Conduct Diagnostic meeting with FRA, WashDOT, WUTC, City of Richland, Port of Benton to develop Quiet Zone (QZ)

Estimated Cost: $150,000

Cemetery Road – MP 41.0

Existing – Flashing Lights

Design set-back of signal masts and addition of signal gates with Median & Safety Bollards on East & West side of crossing to channel vehicular traffic. Verify interconnection of Hwy 240 traffic signals with Railroad's crossing signal pre-emption. Conduct Diagnostic meeting with FRA, WashDOT, WUTC, City of Richland, Port of Benton to develop Quiet Zone (QZ)

Estimated Cost: $185,000

Duportail Street – MP 41.9

Existing –Cantilever & Gates

Design 4 Quadrant Gates for East & West side of crossing to channel vehicular traffic. Verify interconnection of Hwy 240 traffic signals with Railroad's crossing signal pre-emption. Conduct Diagnostic meeting with FRA, WashDOT, WUTC, City of Richland, Port of Benton to develop Quiet Zone (QZ)

Estimated Cost: $425,000

Jadwin Ave – MP 43.3

Existing –Cantilever & Gates

Design 4 Quadrant Gates for East & West side of crossing to channel vehicular traffic. Conduct Diagnostic meeting with FRA, WashDOT, WUTC, City of Richland, Port of Benton to develop Quiet Zone (QZ)

Estimated Cost: $425,000

A more in depth analysis of the QZ may substitute a median & bollard design to channel traffic at this location.

Estimated Cost: $425,000

Steptoe Street – MP 45.8

Existing –Cantilever & Gates

Design 4 Quadrant Gates for East & West side of crossing to channel vehicular traffic. Conduct Diagnostic meeting with FRA, WashDOT, WUTC, City of Richland, Port of Benton to develop Quiet Zone (QZ)

Estimated Cost: $425,000

Attachment "H"
Mile Post Concordance

Stations	UP Kalan Lead	Historic DOE Line
Union Pacific	18.7	
Richland Jct.	18.8	46.6
Steptoe Street	19.6	45.8
Irrigation Canal Bridge	19.7	45.7
Columbia Park Trail Overpass	20.0	45.5
Yakima River Bridge	21.0	44.4
Pedestrian Bike Path	21.1	44.4
City Dock	21.5	
Jadwin Avenue	22.0	43.3
Berry's Overpass Bridge	22.6	42.7
Duportail Street	23.6	41.9
Cemetery Road	24.5	41.0
Van Giesen Street	25.5	40.0
Airport Way	26.0	39.5
Lamb Weston	26.5	
Saint Street	26.9	38.6
State Highway 240	27.0	38.5
TCRY Yard	27.4	
N Ladder	28.6	
City Track	W28.9	
Battelle Blvd.	29.2	36.3
Horn Rapids Road	29.7	35.8

Attachment "I"
Preliminary Cost Estimates

Construction costs do not include design, permitting, right-of-way, and utility relocation costs. Track construction costs are for bottom of ballast to top of rail with no subgrade work included. Includes a 30% contingency factor.

Rail Upgrades (ET-3)

Item #	Item	Quantity	Unit	Unit Price	Amount
1	Replace 90# with 136#	34848	TF	$ 75	$ 2,613,600
2	New Switches	12	EA	$ 90,000	$ 1,080,000
			Subtotal		$ 3,693,600
			Contingency	30%	$ 1,108,080
			Project Total		$ 4,801,680

At-Grade Crossing Upgrades (ET-4)

Item #	Item	Quantity	Unit	Unit Price	Amount
1	SR 240	64	TF	$ 1,500	$ 96,000
2	Saint Street	32	TF	$ 1,500	$ 48,000
3	Airport Way	50	TF	$ 1,500	$ 75,000
4	Van Geisen	110	TF	$ 1,500	$ 165,000
5	Cemetery Road	40	TF	$ 1,500	$ 60,000
6	Jadwin Ave	40	TF	$ 1,500	$ 60,000
			Subtotal		$ 504,000
			Contingency	30%	$ 151,200
			Project Total		$ 655,200

Richland Quiet Zone (ET-5)

Item #	Item / Street	Scenario # 1	Scenario # 2	Construction Cost	Notes
1	Highway 240	X		$ 425,000	4-quad gates
2	Saint St.	X		$ 550,000	Signal gates with median & bollards
3	Airport Way	X	X	$ 185,000	Median & bollards (set back signals & mast)
4	Van Giesen St.	X	X	$ 150,000	Median & bollards
5	Cemetery Road	X	X	$ 185,000	Signal gates w median & bollards (set back signal masts)
6	Duportail Street	X	X	$ 425,000	4-quad gates
7	Jadwin Ave.	X		$ 425,000	4-quad gates
8	Riverfront Trail (Pedestrian)	X		TBD	TBD
9	Steptoe St.	X		$ 425,000	4-quad gates
	Total Construction Cost Scenario #1			**$ 2,770,000**	
	with 30% contingency			**$ 3,601,000**	
	Total Construction Cost Scenario #2			**$ 945,000**	
	with 30% contingency			**$ 1,228,500**	

Cemetery Road Siding (ET-6)

Item #	Item	Quantity	Unit	Unit Price	Amount
1	New Track	5000	TF	$ 150	$ 750,000
2	Switch	2	EA	$ 90,000	$ 180,000
			Subtotal		$ 930,000
			Contingency	30%	$ 279,000
			Project Total		$ 1,209,000

Horn Rapids Spur Extension (HR-1)

Item #	Item	Quantity	Unit	Unit Price	Amount
1	New Track	9500	TF	$ 150	$ 1,425,000
2	Switch	1	EA	$ 90,000	$ 90,000
3	Crossing Signals	2	EA	$ 375,000	$ 750,000
4	Crossing Surface	2	EA	$ 48,000	$ 96,000
			Subtotal		$ 2,361,000
			Contingency	30%	$ 708,300
			Project Total		$ 3,069,300
					Total cost $1,969,500 without crossings.

Horn Rapids Rail Yard (HR-2)

Item #	Item	Quantity	Unit	Unit Price	Amount
1	New Track	17000	TF	$ 150	$ 2,550,000
2	Switch	4	EA	$ 90,000	$ 360,000
3	Crossover	3	EA	$ 200,000	$ 600,000
			Subtotal		$ 3,510,000
			Contingency	30%	$ 1,053,000
			Project Total		$ 4,563,000

Spur to 80-acre Parcel (HR-3)

Item #	Item	Quantity	Unit	Unit Price	Amount
1	New Track	2500	TF	$ 150	$ 375,000
2	Switch	1	EA	$ 90,000	$ 90,000
			Subtotal		$ 465,000
			Contingency	30%	$ 139,500
			Project Total		$ 604,500

Second Rail Loop Track (HR-5)

Item #	Item	Quantity	Unit	Unit Price	Amount
1	New Track	6000	TF	$ 150	$ 900,000
2	Switch	4	EA	$ 90,000	$ 360,000
			Subtotal		$ 1,260,000
			Contingency	30%	$ 378,000
			Project Total		$ 1,638,000

Transfer Area Passing Track (TA-1)

Item #	Item	Quantity	Unit	Unit Price	Amount
1	New Track	2000	TF	$ 150	$ 300,000
2	Switch	2	EA	$ 90,000	$ 180,000
			Subtotal		$ 480,000
			Contingency	30%	$ 144,000
			Project Total		$ 624,000

North Transfer Area Lead (TA-2)

Item #	Item	Quantity	Unit	Unit Price	Amount
1	New Track	10000	TF	$ 150	$ 1,500,000
2	Switch	1	EA	$ 90,000	$ 90,000
			Subtotal		$ 1,590,000
			Contingency	30%	$ 477,000
			Project Total		$ 2,067,000

Transfer Area Rail Yard (TA-3)

Item #	Item	Quantity	Unit	Unit Price	Amount
1	New Track	17000	TF	$ 150	$ 2,550,000
2	Switch	4	EA	$ 90,000	$ 360,000
3	Crossover	3	EA	$ 200,000	$ 600,000
			Subtotal		$ 3,510,000
			Contingency	30%	$ 1,053,000
			Project Total		$ 4,563,000

South Transfer Area Lead (TA-4)

Item #	Item	Quantity	Unit	Unit Price	Amount
1	New Track	10500	TF	$ 150	$ 1,575,000
2	Switch	2	EA	$ 90,000	$ 180,000
			Subtotal		$ 1,755,000
			Contingency	30%	$ 526,500
			Project Total		$ 2,281,500

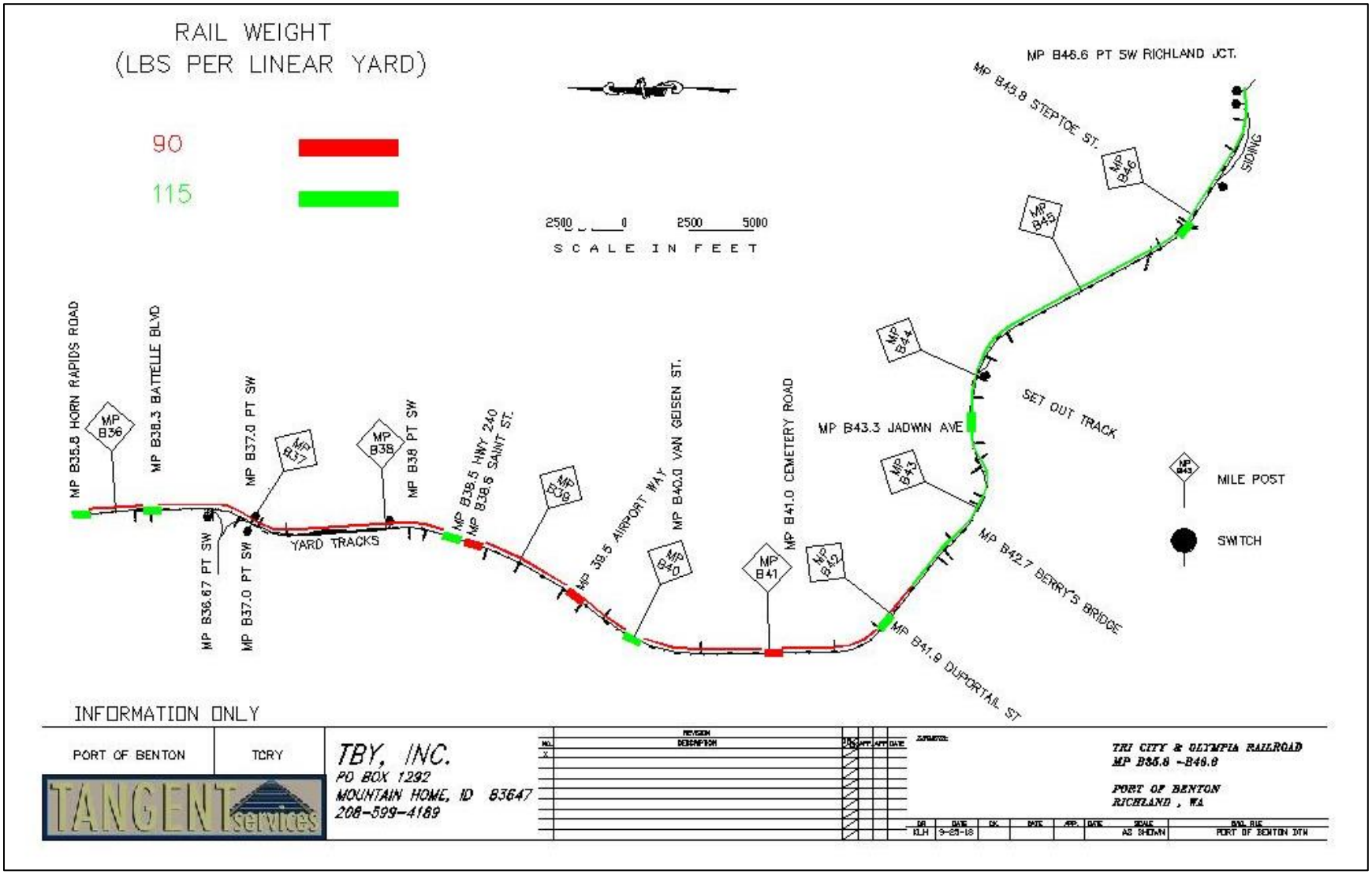
West Transfer Area Lead (TA-5)

Item #	Item	Quantity	Unit	Unit Price	Amount
1	New Track	14500	TF	$ 150	$ 2,175,000
2	Switch	2	EA	$ 90,000	$ 180,000
3	Crossing Signals	1	EA	$ 375,000	$ 375,000
4	Crossing Surface	1	EA	$ 48,000	$ 48,000
			Subtotal		$ 2,778,000
			Contingency	30%	$ 833,400
			Project Total		$ 3,611,400

Edison Street Unit Train Siding (CS-1)

Item #	Item	Quantity	Unit	Unit Price	Amount
1	New Track	7500	TF	$ 150	$ 1,125,000
2	Switch	2	EA	$ 90,000	$ 180,000
			Subtotal		$ 1,305,000
			Contingency	30%	$ 391,500
			Project Total		$ 1,696,500

Attachment "J": Rail Weight Map



Attachment "K": Crossings Map