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Center for Economic Development Education and Research

Columbia/Snake River System and Oregon Coastal Cargo Ports

Marine Transportation System (MTS) Study

Prepared by:

Pacific Northwest Waterways Association

PB Ports and Marine

BST Associates

With support from:

Oregon Economic and Community Development Department

June 2005

MTS investment stimulates trade, creates jobs

This region's MTS creates strong national, regional and local economies

The Columbia River is the nation's Number 1 wheat and barley export gateway. The Columbia/Snake River System is the U.S. West Coast's biggest exporter of mineral bulks and the river ports and Oregon coastal cargo ports combine to be the largest exporter of forest and paper products on the West Coast. General cargo and automobiles are imported to and exported from more than 40 states.

More than 45,000 people in Oregon, Washington and Idaho have jobs that are dependent on the MTS. Thousands more are employed outside the region in the production, processing and distribution of products moving on the region's MTS.

This region is poised for growth.

By 2020, with appropriate investment in the region's MTS, marine cargo volume will grow between 30 and 75 percent, and MTS-related employment will grow by 30 percent.

MTS funding is necessary to maintain trade and prepare for growth

To preserve existing trade and capitalize on potential trade growth, MTS funding is needed to maintain existing projects, rehabilitate aging infrastructure, eliminate bottlenecks, and increase efficiency and capacity for navigation channels, ports, harbors, railways and roadways.

Navigation needs more funding now

Over the next five years, the Columbia River channel deepening, Columbia River jetty repair, Columbia and Snake River lock repairs, and Coos Bay harbor improvements will require nearly $238 million.

Navigation maintenance along all segments of the Columbia/Snake River System and at the Ports of Coos Bay and Newport needs to be funded annually.

The majority of this funding needs to come from the federal government, although a significant portion is covered by harbor maintenance and inland waterway user fees and, for new construction of deep-draft channels, local project sponsors.

Rail improvements are needed to accommodate trade growth at Coos Bay, where nearly $7 million is needed. Feasibility studies for unit train rail facilities should be funded at the Ports of Lewiston, ID, Pasco, WA, and Morrow and Umatilla, OR. Funding will be from a mix of federal, state, local and private sources.

Rail needs more funding in the mid-term

Over the next 6-10 years, rail improvements at ten projects along the I-5 trade corridor and a third main line in southwest Washington will require $360 million. $44 million is needed to expand capacity of I-5 in north Portland. These projects will facilitate trade growth. Funding will be from federal, state, local and private sources.

Roadways need the most funding beyond ten years

The major project that dominates MTS planning beyond ten years is replacement of the I-5 Bridge over the Columbia River between Portland and Vancouver. It is expected to cost $1 billion. Replacing the BNSF rail bridge swing span will cost $56.5 million. Funding for these projects will be from federal, state, local and private sources.

MTS costs will grow dramatically over time.

It is important to begin now to set the stage for increasing the federal and regional investment in MTS infrastructure. It is necessary to maintain existing trade and to prepare the region for forthcoming trade growth to enhance the economic vitality of the Pacific Northwest.

Over $2 billion in MTS projects are needed in the next ten-plus years. $398 million is needed in the next five years. $572 million is needed in years 6-10. $1.14 billion will be needed in just over ten years.

For the complete report, visit:

www.pnwa.net/ceder

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<u>Executive Summary</u>
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Prepared for:

CEDER
(Center for Economic Development and Research)

by:

PB Ports and Marine,
A Division of Parsons Brinckerhoff
Portland, Oregon

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CEDER is a 501(c)(3) non-profit corporation dedicated to educating and informing political and business leaders, media, and the general public about the economic, social, political, historical and natural environment of the Pacific Northwest to assist them in setting regional and national policy.

This report was supported, in part, by generous grants from:

The Oregon Economic and Community Development Department (OECDD), State of Oregon

Marine Information Services of North America (MISNA), with funding provided by the Maritime Administration (MARAD), U.S. Department of Transportation

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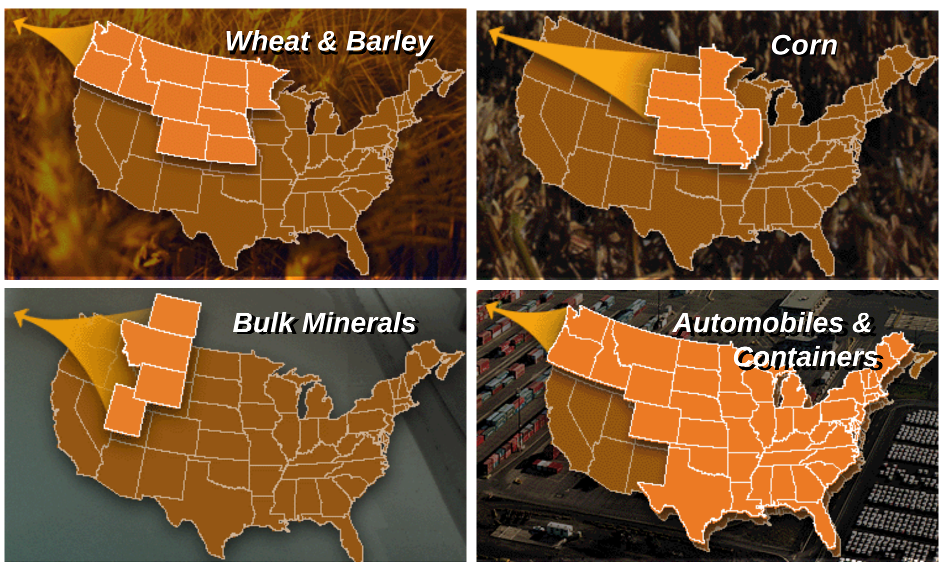
Columbia/Snake River System
and Oregon Coastal Cargo Ports
Marine Transportation System Study

Executive Summary

The Columbia/Snake River System and Oregon Coastal Cargo Ports region is a uniquely valuable regional and national transportation resource because, unlike any other location on the West Coast, it integrates transportation options via deep water shipping, upriver barging, two water-grade rail mainlines and the interstate highway system into a multimodal, low-cost and high-capacity Marine Transportation System (MTS).

These ports provide a critical regional and national gateway linking the agricultural, mineral and goods production across the Northwest, Midwest and Mountain states to the growing markets in the Pacific. The Columbia River is the leading export gateway for U.S. wheat and barley exports. The region is the leading bulk cargo and forest products trade gateway on the West Coast. Total trade through the Columbia/Snake River System and Oregon Coastal Cargo Ports amounted to $15 billion in value in 2003.

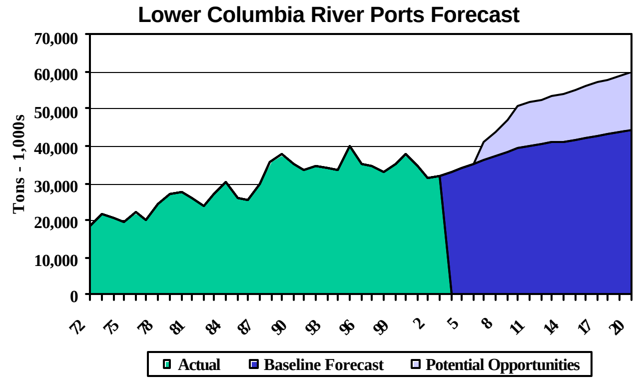


Marine activities in the Lower Columbia River generated 40,000 jobs in 2000 and income of $1.8 billion. That will grow to more than 52,000 total jobs in 2020 if baseline and potential market opportunities come to fruition. The Columbia/Snake River inland waterway region generated 2,600 total jobs in 2000 and income of $80 million. The inland region is expected to generate 2,900 total jobs and $88 million in income in 2020. The Oregon Coast region generated 3,100 total jobs in 2000, with income of $154 million. The Oregon Coast region is expected to generate more than 1,300 direct jobs and nearly 4,400 total jobs in 2020 and a total income of $212 million.

Regional Cargo Trade Outlook

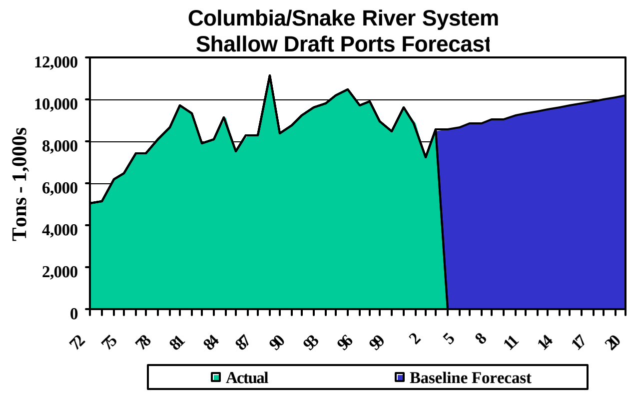
Lower Columbia River Deep Draft Ports

Marine traffic passing the entrance of the Columbia River is projected to increase by 35% from 32 million tons in 2003 to 43 million tons by 2020. Containers should nearly double in volume. Grain, autos and break bulk cargo are all expected to increase by about 40 percent. If all potential market opportunities come to fruition, particularly auto imports, dry bulk and grain exports, and liquefied natural gas (LNG) imports, marine cargo would grow by 85% and reach 60 million tons by 2020.



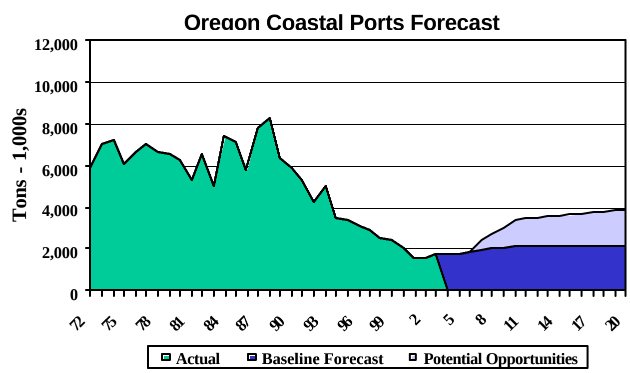
Columbia/Snake River Inland Ports

Traffic on the Columbia/Snake river barge system grew from 5.0 million tons in 1972 to 8.5 million tons in 2003, with peaks above 10 million tons in 1988 and in the mid-1990s. The baseline forecast projects that traffic will grow about 20%, reaching 10.2 million tons by 2020. Grain and containers are the major growth commodities. Although not a subject of this study, the volume of passengers carried on cruise ships on the inland waterway has been growing dramatically. These vessels benefit from the same infrastructure maintenance and improvements as maritime cargo. They also contribute economic benefits to the port communities on the river system.



Oregon Coast Deep Draft Ports

Oregon Coast ports experienced a decline in waterborne traffic since the late 1980s, but the worst appears to be over. The baseline forecast expects growth in the existing product base, from 1.7 to 2.1 million tons by 2020. In addition, new opportunities such as the proposed liquefied natural gas (LNG) terminal at Coos Bay could increase cargo volumes to 3.9 million tons by 2020.



Toward An Integrated, Multi-modal Marine Transportation System

The Columbia/Snake River System and Oregon Coastal Cargo Ports MTS envisions an integrated deep water navigation, inland navigation, rail, roadway and port system that facilitates superior transportation operating efficiency for the export/import trade flowing through the region. Meeting the growing and shifting challenges of freight transportation and multimodal logistics requires additional investment to ensure that the MTS system keeps regional and national shippers competitive in the global market.

While most proposed projects will provide efficiency and operating benefits to exporters, importers and carriers on a stand-alone basis, taken together the projects create a highly-efficient operating environment which will improve export and import competitiveness of this trade corridor at the national, regional and local levels alike.

The deep water, inland waterway, rail and roadway transportation assets in the region create an integrated, multi-modal freight transportation system that is the lifeline of the region's waterborne international trade. At key crossroads, these transportation corridors converge to facilitate the transfer of goods from one mode to another. Several key corridors and transfer points in the region stand out as critically important when considering future MTS investments:

- **The Portland-Vancouver area** where inland waterway navigation, the BNSF and UP railroads, I-84 and I-5 meet deep water.
- **The I-5 corridor between Portland and Longview** where rail and truck freight bound for Columbia River export must contend with domestic freight and passenger traffic for vital rail and highway capacity.
- **The Mid Columbia and Snake River navigation system** which feeds waterborne trade from the region's hinterlands to downriver deep water ports.
- **The inland port system** stretching from Boardman, Oregon to Lewiston, Idaho which provides truck-to-barge and rail-to-barge transfer capability for regional shippers and economic development opportunities for the Inland Empire sub region.
- **The road, rail and navigation system converging at Coos Bay** which provides waterborne trade access and unique economic development opportunities for Southern Oregon.

This MTS study identifies proposed navigation, rail and highway projects that remove bottlenecks, add efficiency and enhance capacity along these corridors and at these key network crossroads. Taken together, the MTS projects will collectively deliver the most overall benefit to trade for the Columbia/Snake River System and Oregon Coastal Cargo Ports, the region and the nation. The MTS projects are selected to ensure that the region's transportation infrastructure constitutes a multimodal system, the components of which are properly located and sized to accommodate the regional and national marine trade that moves through the region.

Summary of Total MTS Infrastructure Needs

(Thousands of Dollars)

PROJECT TYPE & LOCATION	ON-GOING MAINTENANCE PROJECTS*	NEW PROJECTS			
		Near Term 1-5 Years	Mid Term 6-10 Years	Long Term 10+ Years	Total
By Infrastructure Type					
Navigation	$37,700	$237,600	28,000I	$56,500	**$322,100**
Rail	N/I	$9,400	$467,800	N/I	**$477,200**
Roadway	N/I	$151,100	$77,000	$1,086,000	**$1,314,100**
Total	**$37,700**	**$398,100**	**$572,800**	**$1,142,500**	**$2,133,400**
By Port Region					
Lower Columbia River	$20,000	$181,850	$531,800	$1,142,500	**$1,856,150**
Mid Columbia & Snake Rivers	$9,400	$52,950	N/I	N/I	**$52,950**
Oregon Coast	$8,300	$163,300	$41,000	N/I	**$204,300**
Total	**$37,700**	**$398,100**	**$572,800**	**$1,142,500**	**$2,133,400**

*Average annual cost
N/I – Not identified at this time, although maintenance and development needs are anticipated

MTS Infrastructure Needs for National & Regional Markets

National and regional MTS projects for the Columbia/Snake River System and Oregon Coastal Cargo Ports include 11 new navigation, rail and roadway projects plus on-going maintenance of four critical navigation projects. In the next five years, the projects emphasize navigation capacity improvement and maintenance programs. In the six- to ten-year timeframe, the currently identified projects focus primarily on rail capacity improvements to facilitate rising marine-related trade volumes of national and regional origin/destination. Beyond ten years, major improvements to the I-5 and BNSF Columbia River crossings are currently identified.

Summary of MTS Infrastructure Needs - National & Regional Projects

Project	Location	Project Type	System Importance	Basis of Need	Cost
On-Going Maintenance					
1. Columbia & Willamette Rivers Maintenance Dredging	Lower Columbia & Willamette Rivers	Navigation	National	Maintain Existing Trade	$20,000,000 (annually.)
2. Snake River Maintenance Dredging	Snake River	Navigation	Regional	Maintain Existing Trade	$4-$6,000,000 (every3 yrs.)
3. Coos Bay Maintenance Dredging	Coos Bay	Navigation	Regional	Maintain Existing Trade	$6,500,000 (every 2 yrs.)
4. Mid Columbia & Snake Rivers Navigation Lock Maintenance	Mid Columbia & Snake Rivers	Navigation	Regional	Maintain Existing Trade	$3-$4,000,000 (annually.)
Near-Term (1-5 Years)					
5. Columbia River Channel Deepening	Lower Columbia River	Navigation	National	Maintain Existing Trade & Trade Growth	$148,400,000
6. Columbia River Jetty Repair	Mouth of Columbia River	Navigation	National	Maintain Existing Trade	$14,000,000
7. Mid Columbia & Snake Rivers Navigation Lock Repair & Retrofit	Mid Columbia River	Navigation	Regional	Maintain Existing Trade	$51,400,000
8. Coos Bay Harbor Improvements (2 projects)	Coos Bay	Navigation	Regional	Maintain Existing Trade & Trade Growth	$23,500,000
9. Coos Bay North Bay Industrial Rail Lead	Coos Bay	Rail	Regional	Trade Growth	$6,800,000
10. Upriver Unit Train Facility Feasibility Studies	Morrow, Umatilla, Pasco, Lewiston	Rail	Regional	Trade Growth	$250,000
Mid-Term (6-10 Years)					
11. I-5 Trade Corridor Rail Capacity Improvements (10 projects)	Portland-Vancouver	Rail	National	Trade Growth	$170,000,000
12. Kelso-Martins Bluff Third Main Line	Kalama-Longview	Rail	National	Trade Growth	$190,000,000
13. I-5 Delta Park to Lombard in North Portland	Portland	Highway	Regional	Trade Growth	$44,000,000
Long-Term (10+ Years)					
14. I-5 Columbia River Crossing	Portland-Vancouver	Highway	Regional	Trade Growth	$1,000,000,000
15. BNSF Rail Bridge Navigation Lift Span	Portland-Vancouver	Navigation	Regional	Maintain Existing Trade	$56,500,000

MTS Infrastructure Needs for Local Markets

Twenty-two MTS projects are of local importance in supporting marine trade and transportation in the Columbia/Snake River System and Oregon Coastal Cargo Ports region. These projects include three navigation, ten rail and nine roadway projects.

MTS Infrastructure Needs - Local Projects

Project	Location	Project Type	System Importance	Basis of Need	Cost
On-Going Maintenance					
Newport Harbor Maintenance Dredging	Newport	Navigation	Local	Maintain Existing Trade	$1,800,000 (every 2 yrs.)
Near-Term (1-5 Years)					
Pasco Processing Center Road Connection to SR395	Pasco	Road	Local	Trade Growth	$300,000
US20 Pioneer Mountain to Eddyville	Newport	Road	Local	Trade Growth	$133,000,000
Umatilla Terminal Access Road Improvements	Umatilla	Road	Local	Trade Growth	$1,000,000
Columbia Blvd.& Lombard St. Improvements at MLK	Portland	Road	Local	Trade Growth	$16,800,000
Scappoose Bay Marine Park Channel Deepening	Port of St. Helens	Navigation	Local	Trade Growth	$300,000
Mid-Term (6-10 Years)					
New Port of Vancouver Northern Rail Access	Vancouver	Rail	Local	Trade Growth	$60,000,000 to $80,000,000
Yaquina Bay Jetty Repair	Newport	Navigation	Local	Maintain Existing Trade	$28,000,000
Repair/Replace Coos River Rail Bridge	Coos Bay	Rail	Local	Maintain Existing Trade	$10,000,000+
Kalama Grain Terminal Trackage Improvements	Kalama	Rail	Local	Trade Growth	$2,500,000
Leadbetter St. Extension & Rail Overcrossing	Portland	Rail	Local	Trade Growth	$10,800,000
North Rivergate A&B Rail Yard Expansion	Portland	Rail	Local	Trade Growth	$4,500,000
Coos Bay North Bay Marine Terminal Rail infrastructure	Coos Bay	Rail	Local	Trade Growth	$3,000,000
West 26th Roadway Extension	Vancouver	Road	Local	Trade Growth	$20,000,000
Fruit Valley Road, Phase 3	Vancouver	Road	Local	Trade Growth	$10,000,000
Port Westward Industrial Rail Loop	Port of St. Helens	Rail	Local		$1,800,000
Multnomah Plywood Industrial P Park Rail siding	Port of St. Helens	Rail	Local		$250,000
Railroad Avenue/Pole Yard Rail Upgrade	Port of St. Helens	Rail	Local		$150,000
Columbia City Rail Siding Upgrade	Port of St. Helens	Rail	Local		$150,000
Chapman Landing Access Road Improvement	Port of St. Helens	Road	Local	Trade Growth	$3,000,000
Long-Term (10+ Years)					
Fourth Plain Expansion	Vancouver	Road	Local	Trade Growth	$30,000,000

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Columbia/Snake River System and Oregon Coastal Cargo Ports Marine Transportation System Study

Why a Marine Transportation System for the Columbia/Snake River and Oregon Coastal Cargo Ports?

Exporters, importers and transportation providers increasingly demand a highly integrated multimodal freight transportation system to meet the stringent requirements of today's supply chain logistics and just-in-time delivery needs. By eliminating time consuming and costly inefficiencies from the system, the region's and the nation's trade is more competitive in the global market and environmental and social benefits are increased at home

A Marine Transportation System (MTS) plan for the Columbia/Snake River System and Oregon Coastal Cargo Ports promotes regional transportation infrastructure investments that are coordinated and developed with this integrated multimodal concept in mind. The elements of the Marine Transportation System to be integrated include:

- **Navigation infrastructure** – Deep draft and inland navigation channels, anchorages, turning basins, upriver dam locks, and jetties to accommodate increasingly larger ships and growing inland barge movements.
- **Rail infrastructure** – Mainline and shortline trackage, industrial lead trackage, staging, storage and bypass tracks, higher speed rail junctions, and bridges, tunnels and grade separations to accommodate unit trains and other rail operations connected to ports.
- **Roadway infrastructure** – Federal and state highways, local roadway connections, grade separations, bridges, and tunnels to accommodate truck and vehicle traffic serving ports.

Each of the transportation modes in the MTS contributes in valuable ways to the trade moving to, from and through the region:

- **Deep water navigation** is the common denominator of the MTS, benefiting cargo and trade movement to and from local, regional and national markets.
- **The roadway system** supports locally and regionally generated trade, where population and economic growth have resulted in congestion issues and freight mobility has become critical.
- **Inland navigation** supports trade in important regional industries – primarily to and from the Inland Empire – with clean, cost-effective barge transportation.
- **Rail transportation** is critical for regional and national cargo and trade flows, supporting growth and vitality in the national economy.

All modes are critical; all are part of an integrated transportation system; and the goal of the MTS is to ensure that the region continues to "fire on all four cylinders".

The integrated multimodal development of MTS infrastructure benefits companies throughout the region and across the nation that trade in agricultural products, forest products, manufactured goods, automobiles, containerized products and bulk materials moving to, from and through the

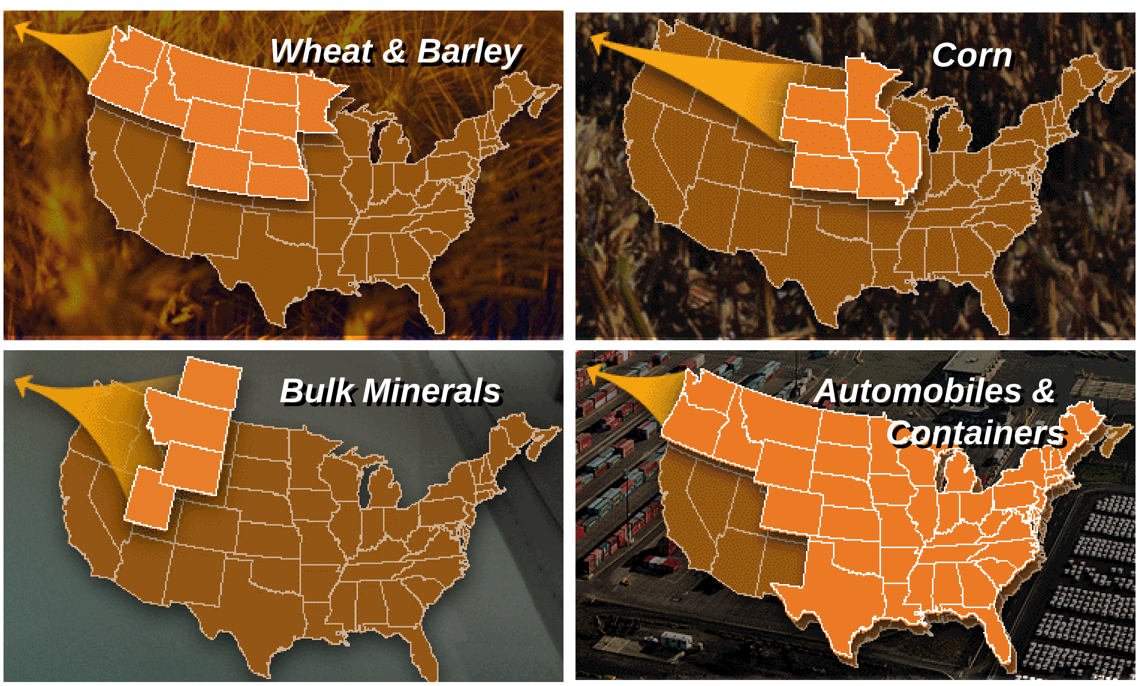
Columbia/Snake River System and Oregon Coastal Cargo Ports region. In addition, increased transportation system efficiencies benefit environmental and social goals by reducing congestion, highway maintenance requirements, and air pollution.

Regional and National Significance of the Columbia/Snake River System and Oregon Coastal Cargo Ports

Geography, history and development have combined to make the Columbia/Snake River System and Oregon Coastal Cargo Ports region a natural marine transportation gateway to off-shore markets for the Pacific Northwest and key industries across the entire northern tier of the country. This system is a uniquely valuable regional and national transportation resource because, unlike any other location on the West Coast, it integrates transportation options via deep water shipping, river barging, two water-grade rail mainlines and the interstate highway system into a multimodal, low-cost and high-capacity Marine Transportation System (MTS). Total trade through the Columbia/Snake River System and Oregon Coastal Cargo Ports amounted to $15 billion in value in 2003.

The Columbia/Snake River System and Oregon Coastal Cargo Ports region is a critical regional and national gateway linking agricultural, mineral and goods production across the Northwest, Midwest and Mountain states to growing markets in the Pacific Rim. With water grade rail routes through the Cascade Mountains, this system is the least-cost barge and rail route for this traffic to reach deep water shipping, where ocean transit to Asia is one day faster than from California and 10 days faster than from the U.S. Gulf.

Regional and National Markets Served by the Columbia/Snake River System & Oregon Coastal Cargo Ports



Source: Port of Portland

This MTS system is particularly important to the global competitiveness of one of America's strategic industries – grain production. The Columbia River is the leading export gateway for U.S. wheat and barley. Pacific Northwest grains are competitive in Asia largely by virtue of the low-cost rail and barge routings available via the Columbia River corridor. Likewise, by focusing on unit train rail routings through the Columbia River for Midwest grains, as an alternative to rail or barge routings through the Gulf, U.S. grain producers can be more competitive with Australia, Argentina and Brazil in Asian markets.

Columbia/Snake River System Grain Rankings

Commodity	Ranking	Percent of Exports
Wheat	#1 in U.S.	37% of U.S.
Barley	#1 in U.S.	97% of U.S.

Source: Department of the Army, Corps of Engineers, Institute for Water Resources, 2003 Waterborne Commerce Statistics

The Columbia/Snake River System and Oregon Coastal Cargo Ports region is the leading bulk cargo and forest products trade gateway on the West Coast. The MTS projects proposed are specifically designed to facilitate the efficient movement of these important U.S. exports. The efficient flow of export cargoes via this gateway has a positive impact on the US balance of trade

Economic Importance of Maritime Trade

Trade is very important to the Pacific Northwest. In 2004, Washington ranked third and Oregon ranked tenth in the dollar value of exports per capita. In Washington State, the Governor's office estimates that one in three jobs is related to trade. The following economic impact estimates include jobs created by cargo handling activities and inland transportation (barge operations on the Columbia/Snake River system as well as truck and rail transportation). Summaries are presented for each region below. More detail is available in Appendix A.

Lower Columbia Region

Marine activities in the Lower Columbia River region generated 40,000 jobs in 2000 and income of $1.8 billion, including direct, indirect and induced effects within the region. The Lower Columbia River region is expected to generate more than 52,000 total jobs in 2020, if baseline and potential market opportunities come to fruition. This would represent an increase of nearly 5,000 direct family wage jobs and an overall increase of more than 12,000 jobs in the region. Total income would be $2.5 billion, representing an increase of more than $700 million.

Columbia/Snake River Inland Waterway Region

The Columbia/Snake River region generated 2,600 total jobs in 2000 due to waterborne cargo activity and income of $80 million, including direct, indirect and induced effects. The Columbia/Snake River region is expected to generate 2,900 total jobs in 2020, if baseline forecasts come to fruition. This would represent an increase of nearly 100 direct family wage jobs and an overall increase of 250 jobs in the region. Total income would be $88 million, representing an increase of more than $7 million.

Oregon Coast Region

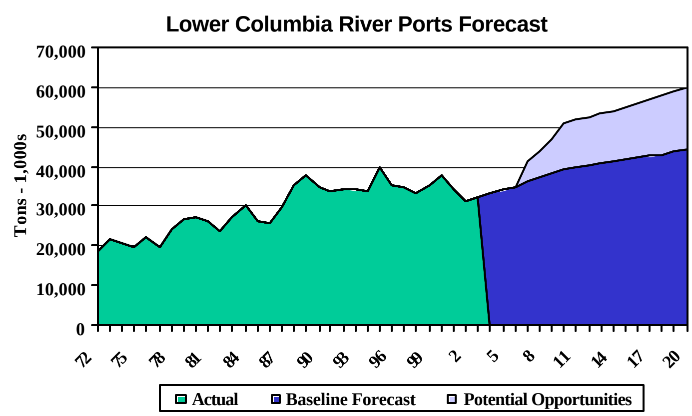
The Oregon Coast region generated 3,100 total jobs in 2000 due to waterborne cargo activity, with income of $154 million, including direct, indirect and induced effects. The Oregon Coast region is expected to generate more than 1,300 direct jobs and nearly 4,400 total jobs in 2020, if baseline forecasts and potential market opportunities come to fruition. This would represent an increase of nearly 350 direct family wage jobs and an overall increase of 1,300 jobs in the region. Total income would be $212 million, representing an increase of more than $58 million.

Regional Cargo Trade Outlook

The opportunities for increased trade via Pacific Northwest ports appear to be favorable for several reasons. World economic output, which drives trade, is expected to remain strong and stable in the long-term. Most of the growth in output is occurring in countries bordering the Trans-Pacific, particularly China, India, Vietnam and other Asian countries as well as in the United States. The value of the US dollar has declined, which increases the demand for US exports. All of these factors account for favorable market conditions for ports on the Columbia/Snake River system and the Oregon Coast. Cargo forecasts are summarized below and presented in greater detail in Appendix B.

Lower Columbia River Deep Draft Ports

Marine traffic passing the entrance of the Columbia River increased from 18 million tons in 1972 to 32 million tons in 2003, which amounts to annualized growth of 1.8%.

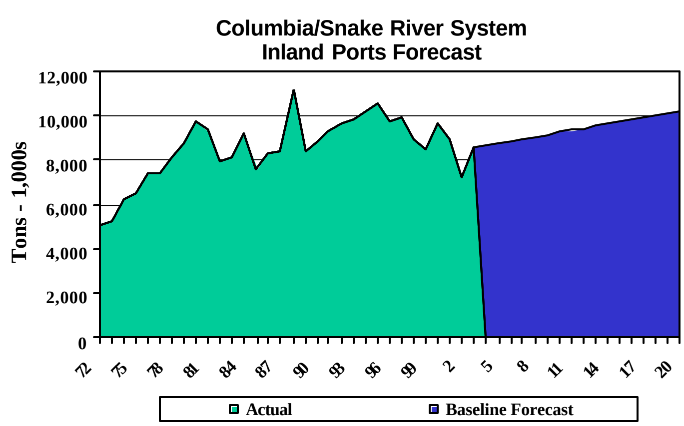


Under the baseline forecast, marine traffic is projected to continue to grow at the historic rate, to 43 million tons. This amounts to a 35 percent increase by 2020. There are several key components of trade growth to 2020 in the baseline forecast. Containers should nearly double in volume. Grain, autos and break bulk cargo are all expected to increase by about 40 percent.

If all potential market opportunities, particularly auto imports, dry bulk and grain exports, and liquefied natural gas (LNG) imports, come to fruition, marine cargo would grow at an average annual rate of 3.8% and reach 60 million tons by 2020, or an 85 percent increase over 2003.

Columbia/Snake River Inland Ports

Traffic on the Columbia/Snake River barge system grew from 5.0 million tons in 1972 to 8.5 million tons in 2003, or at 1.8% per year. Traffic peaked in 1988 at 11.2 million tons and again in the mid-1990s at 10.5 million tons. However, volumes generally declined between 1995 and 2003 due to weak markets overseas,



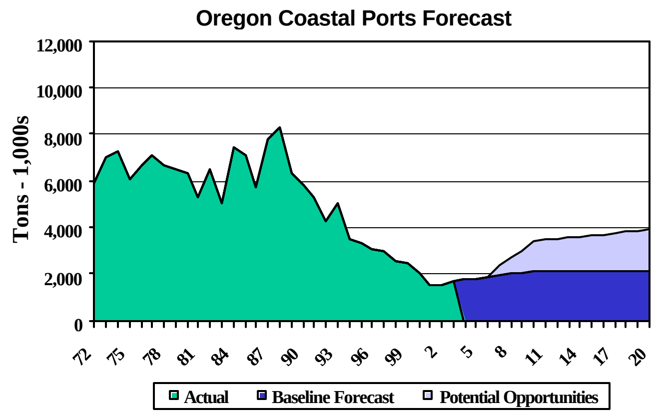
the strength of the U.S. dollar and competition from railroads.

The baseline forecast projects that traffic will grow modestly, reaching 10.2 million tons by 2020, which amounts to growth of 1.1% per year. Grain and containers are the major growth commodities on the inland waterway.

Although not a subject of this study, the volume of passengers carried on cruise ships on the inland waterway has been growing dramatically. These vessels benefit from the same infrastructure maintenance and improvements as maritime cargo. They also contribute economic benefits to the port communities on the river system.

Oregon Coast Deep Draft Ports

Oregon Coast ports have experienced a continuous decline in waterborne traffic from more than 8.0 million tons in the late 1980s to 1.7 million tons in 2003. This decline was caused by declining forest products manufacture and a shift from overseas markets accessed by water to inland markets accessed by truck and rail.



However, the worst appears to be over. The baseline forecast expects modest growth in the existing product base, with growth to 2.1 million tons by 2020. In addition, new opportunities such as the proposed liquefied natural gas (LNG) terminal at Coos Bay could increase cargo volumes to 3.9 million tons by 2020.

Drivers of New MTS Infrastructure Needs

New or improved MTS infrastructure is required at locations throughout the Columbia/Snake River System and Oregon Coastal Cargo Ports region for many reasons. They include trade growth as addressed above, new logistical concepts, new transportation technology, system congestion, operating conflicts, port security requirements, and the need to repair or replace deteriorating infrastructure that has performed beyond its design life. Even in the absence of trade growth, new infrastructure is often needed simply to keep up with changing technologies, remain competitive in world markets and maintain existing trade volumes.

Some of the key drivers of new MTS infrastructure needs in the region are:

- **Trade growth** – As discussed above, the region's waterborne trade is growing and expected to grow further. Waterborne trade volumes through the region could increase by as much as 76% by 2020, from 42.2 million tons in 2003 to 74.1 million tons. While much of this trade originates or terminates in the region, a very large portion moves to and from states throughout the Mountain States, Midwest and East Coast. Increased trade for the region and the nation means more ships, trains and trucks operating in the regional transportation system, resulting in the need for increased navigation, marine terminal, rail and roadway capacity.

- **Larger ships** – Economies of scale in marine shipping have driven ship sizes and unit train lengths to be much larger over time, requiring very large cargo volumes to be transferred in a short period of time. The marine cargoes handled in the region are increasingly shipped in Panamax and, in the case of containers, post-Panamax vessels, whereas much of the region's cargo was handled in Handysize and Handymax vessels in the past. Based on a review of ships on order, this trend toward larger vessels will continue. These larger ships require channel improvements, longer and deeper berths, larger marine terminals and higher-capacity rail and roadway systems to support their operations.

Typical Vessel Types & Sizes
Calling the Columbia/Snake River System & Oregon Coastal Cargo Ports

Vessel Type	Typical Draft	Typical Length
Post-Panamax Container Ships	45 feet	900-1,000 feet
Panamax Container Ships	40-43 feet	750-950 feet
Pure Car Carriers	30-35 feet	550-650 feet
Panamax Bulk Carriers (50-65,000 dwt)	40-45 feet	650-750 feet
Handymax Bulk Carriers (35-50,000 dwt)	35-40 feet	500-650 feet
Handysize Bulk Carriers (up to 35,000 dwt)	30-35 feet	500-650 feet

- **Longer unit trains** – Just as ships are larger, unit trains have also become longer. While train lengths of 100 railcars were typical several years ago, 110-car trains are typical today and trains of 130 railcars are anticipated in the future. Panamax ships today may need to transfer 50-60,000 tons of cargo—the equivalent of 5-6 unit trains, each 1½ miles in length—within a 24-hour time frame. Accommodating the rail loop trackage, storage and transfer facilities for this scale of grain or bulk cargo operation typically necessitates upland sites of over 100 acres and as large as 130 acres for a single tenant.

- **Heavier rail cars** – The major railroads are increasing their use of newer and heavier railcars that weigh a maximum of 286,000 pounds and carry 111 tons of freight, compared with the old industry standard of 263,000-pound cars capable of hauling 100 tons. These cars are becoming the standard for the industry and the region's shippers are demanding their use. However, these cars cause significantly more wear and tear on rail tracks and bridges and many lines cannot handle these larger cars because they have lightweight rail in place, shallow or poor ballast, and/or deferred tie maintenance.

- **New intermodal logistical concepts** – Whether it is just-in-time inventory concepts, unit train productivity or short sea shipping, new intermodal logistical concepts continue to challenge the Marine Transportation System of the region. At key locations throughout the system, new types of infrastructure or higher system productivity is needed to support these new logistical concepts and "shorten" the supply chain. Short sea shipping opportunities for the Columbia/Snake River System are discussed in Appendix C.

- **Domestic freight and passenger growth** – While import, export and waterborne trade are growing, domestic freight, rail passenger traffic and highway passenger traffic are also growing and creating demands on the shared transportation system. The combined growth and operating requirements of waterborne freight, domestic freight and passenger traffic are forcing the development of additional infrastructure capacity to support marine trade and transportation. The impact of this combined growth is particularly significant in the I-5 corridor affecting the ports of Longview, Kalama, Vancouver and Portland.

- **System bottlenecks** – At key nodes in the Marine Transportation System, major navigation, rail or highway arterials come together to move freight throughout the region. Some of these nodes are rapidly reaching capacity and becoming system bottlenecks. In particular, rail and highway access across the Columbia River in the Vancouver-Portland area affects north-south and east-west freight mobility for ports throughout the entire region.

- **Aging infrastructure** – Throughout the region, transportation infrastructure that was built several decades ago is reaching the end of its design life and is in need of major upgrading or replacement. In addition to the physical condition of this aging infrastructure, its functionality is also often obsolete because of technological changes in transportation. The structural elements of older dams, locks, bridges, roads and rail lines are particularly susceptible to deterioration and obsolescence.

Toward An Integrated Marine Transportation System

The Columbia/Snake River System and Oregon Coastal Cargo Ports MTS envisions an integrated deep water navigation, inland navigation, rail, roadway and port system that facilitates superior transportation operating efficiency for the export/import trade flowing through the region. While most proposed projects will provide efficiency and operating benefits to exporters, importers and carriers on a stand-alone basis, taken together the projects are intended to create a highly-efficient operating environment which will improve export and import competitiveness at the national, regional and local levels alike.

Existing MTS Investment & Asset Base

Port authorities, railroads, private terminal operators, state and local governments, and the federal government have made a multi-billion dollar investment in MTS infrastructure in the Columbia/Snake River System and Oregon Coastal Cargo Ports region, yet additional investment is needed. According to the 2001 MARAD Public Ports Finance Survey, the deepwater ports in the region alone, account for $574 million in plant property and equipment investment. Even accounting for the fact that much of the roadway and rail infrastructure in the Marine Transportation System serves multiple purposes – including domestic freight and passenger traffic – the region's investment in MTS infrastructure is very large.

Despite the magnitude of the existing MTS investment and asset base, meeting the growing and shifting challenges of freight transportation and multimodal logistics requires additional investment to ensure that the MTS system keeps regional and national shippers competitive in the global market.

MTS Investment Requirements

The Columbia/Snake River System and Oregon Coastal Cargo Ports MTS identifies the need for 40 infrastructure projects throughout the region over the next 10 or more years, 34 of which are new or major rehabilitation projects and six of which are on-going maintenance programs.

The total cost of the new projects is over $2.0 billion, including navigation, rail and roadway projects to support marine transportation and trade. Another $300-$350 million dollars in direct marine terminal and port security investments by port authorities is anticipated over the next 10 or more years, but not analyzed in this MTS study.

Funding requirements are anticipated to increase over time. Ongoing navigation maintenance amounts to about $38 million per year. Near-term projects, those expected to be needed in one-to-five years, amount to nearly $400 million. Nearly $600 million is likely to be needed in five-to-ten years. Over $1 billion in projects have been identified for just beyond ten years.

Funding needs vary by mode over time. The greatest identified MTS investment requirements over the next five years are for navigation, at $238 million. Rail infrastructure will require the greatest investment in the five-to-ten year time frame, anticipated to be $468 million over those years. Roadway improvements will require the most significant investment beyond ten years, with costs projected at more than $1.3 billion.

While investment needs are concentrated in the Lower Columbia River area, investment is needed in all parts of the region, including Mid Columbia and Snake River ports and Oregon

Coastal cargo ports. Beyond ten years, major improvements to the I-5 and BNSF Columbia River bridges are needed, totaling $1.1 billion.

Summary of Total MTS Infrastructure Needs

(Thousands of Dollars)

PROJECT TYPE & LOCATION	ON-GOING MAINTENANCE PROJECTS*	NEW PROJECTS			
		Near Term 1-5 Years	Mid Term 6-10 Years	Long Term 10+ Years	Total
By Infrastructure Type					
Navigation	$37,700	$237,600	28,000	$56,500	**$322,100**
Rail	N/I	$9,400	$467,800	N/I	**$477,200**
Roadway	N/I	$151,100	$77,000	$1,086,000	**$1,314,100**
Total	**$37,700**	**$398,100**	**$572,800**	**$1,142,500**	**$2,133,400**
By Port Region					
Lower Columbia River	$20,000	$181,850	$531,800	$1,142,500	**$1,826,150**
Mid Columbia & Snake Rivers	$9,400	$52,950	N/I	N/I	**$52,950**
Oregon Coast	$8,300	$163,300	$41,000	N/I	**$204,300**
Total	**$37,700**	**$398,100**	**$572,800**	**$1,112,500**	**$2,133,400**

*Average annual cost
N/I – Not identified at this time, although maintenance and development needs are anticipated

Regional Multi-Modal Integration

Prioritizing MTS investment necessitates a regional multi-modal approach that views the region as a system, leverages linkages among existing and proposed projects, and recognizes the unique value of individual projects to localities and sub regions within the system.

The deep water, inland waterway, rail and roadway transportation assets in the region create an integrated, multi-modal freight transportation system that is the lifeline of the region's waterborne international trade. At key crossroads in the region, these transportation corridors converge to facilitate the transfer of goods from one mode to another – whether it is upriver, along the Oregon Coast or in the Lower Columbia River area. Several key corridors and transfer points in the region stand out as critically important when considering future MTS investments:

- **The Portland-Vancouver area** where inland waterway navigation, the BNSF and UP railroads, I-84 and I-5 meet deep water.
- **The I-5 corridor between Portland and Longview** where rail and truck freight bound for Lower Columbia River ports must contend with domestic freight and passenger traffic for vital rail and highway capacity.
- **The Mid Columbia and Snake River navigation system** which feeds waterborne trade from the region's hinterlands to downriver deep water ports.
- **The inland port system from Boardman to Lewiston** which provides truck-to-barge and rail-to-barge transfer capability for regional shippers and economic development opportunities for the Inland Empire sub region.

- **The road, rail and navigation system converging at Coos Bay** which provides waterborne trade access and unique economic development opportunities for the Southern Oregon sub region.

Future MTS funding is prioritized in this report and emphasizes navigation, rail and highway projects that remove bottlenecks, add efficiencies and enhance capacity along system corridors and key network crossroads. Taken together, the MTS projects will collectively deliver the most overall benefit to trade in the Columbia/Snake River System and Oregon Coastal Cargo Ports, the region and the nation. The projects are selected to ensure that the region's transportation infrastructure constitutes a multimodal system, the components of which are properly located and sized to accommodate the regional and national marine trade that moves through the region.

In organizing regional MTS projects into an integrated multi-modal program, the following criteria were considered:

- **System importance –** Projects were evaluated primarily as to whether they contribute to the development of the region's transportation infrastructure as a *system* and whether they accommodate national, regional or local marine trade. In doing so, several factors were evaluated including the geographic scope of the project users' and beneficiaries' locations; whether the projects benefit a single user, few users or multiple users in that geographic context; whether they benefit a single port or multiple ports in the region; and whether they are needed to complete the regional coverage of the system or, conversely, they potentially duplicate similar capacity in the region.
- **Basis of need –** Projects were also evaluated as to whether they are needed to maintain current trade volumes (e.g., by keeping up with changing transportation technology or by offsetting domestic and passenger usage of transportation capacity), to accommodate trade growth (e.g., by adding new transportation capacity) or both. Both preserving the region's ability to maintain existing trade and adding capacity for trade growth are important to the long-term economic health of the region. Maintenance must be done on an immediate, short-term basis to preserve the integrity of the system. New capacity may be developed over time.

National & Regional MTS Infrastructure Needs

Important national and regional MTS projects for the Columbia/Snake River System and Oregon Coastal Cargo Ports include 11 new navigation, rail and roadway projects totaling over $2.0 billion plus $38 million per year for on-going maintenance of four critical navigation links. In the next five years, the projects emphasize navigation capacity improvement and maintenance programs that are critically needed to retain existing marine trade volumes and accommodate trade growth. In the six- to ten-year timeframe, the currently identified projects focus on rail capacity improvements to facilitate rising marine-related trade volumes of national and regional origin/destination. Beyond ten years, major improvements to the I-5 and BNSF Columbia River crossings are currently identified, to accommodate trade growth in the region. These projects are summarized in the table below, followed by a more detailed discussion of each project.

Summary of MTS Infrastructure Needs - National & Regional Projects

Project	Location	Project Type	System Importance	Basis of Need	Cost
On-Going Maintenance					
1. Columbia & Willamette Rivers Maintenance Dredging	Lower Columbia & Willamette Rivers	Navigation	National	Maintain Existing Trade	$20,000,000 annually
2. Snake River Maintenance Dredging	Snake River	Navigation	Regional	Maintain Existing Trade	$4-$6,000,000 (every 3 years)
3. Coos Bay Maintenance Dredging	Coos Bay	Navigation	Regional	Maintain Existing Trade	$6,500,000 (every 2 years)
4. Mid Columbia & Snake Rivers Navigation Lock Maintenance	Mid Columbia & Snake Rivers	Navigation	Regional	Maintain Existing Trade	$3- $4,000,000 annually
Near-Term (1-5 Years)					
5. Columbia River Channel Deepening	Lower Columbia River	Navigation	National	Maintain Existing Trade & Trade Growth	$148,400,000
6. Columbia River Jetty Repair	Mouth of Columbia River	Navigation	National	Maintain Existing Trade	$14,000,000
7. Mid Columbia & Snake Rivers Navigation Lock Repair & Retrofit	Mid Columbia River	Navigation	Regional	Maintain Existing Trade	$51,400,000
8. Coos Bay Harbor Improvements (2 projects)	Coos Bay	Navigation	Regional	Maintain Existing Trade & Trade Growth	$23,500,000
9. Coos Bay North Bay Industrial Rail Lead	Coos Bay	Rail	Regional	Trade Growth	$6,800,000
10. Upriver Unit Train Facility Feasibility Studies	Morrow, Umatilla, Pasco, Lewiston	Rail	Regional	Trade Growth	$250,000
Mid-Term (6-10 Years)					
11. I-5 Trade Corridor Rail Capacity Improvements (10 projects)	Portland-Vancouver	Rail	National	Trade Growth	$170,000,000
12. Kelso-Martins Bluff Third Main Line	Kalama-Longview	Rail	National	Trade Growth	$190,000,000
13. I-5 Delta Park to Lombard in North Portland	Portland	Highway	Regional	Trade Growth	$44,000,000
Long-Term (10+ Years)					
14. I-5 Columbia River Crossing	Portland-Vancouver	Highway	Regional	Trade Growth	$1,000,000,000
15. BNSF Rail Bridge Navigation Lift Span	Portland-Vancouver	Navigation	Regional	Maintain Existing Trade	$56,500,000

National & Regional MTS Projects – On-Going Maintenance

Four key navigation links throughout the region require annual maintenance funding that averages $38 million per year. All of these are navigation projects needed to retain existing trade and maintain the ancillary benefits of waterborne transportation for the region.

Columbia & Willamette Rivers Maintenance Dredging

The Columbia and Lower Willamette channel project requires regular dredging to maintain authorized depths. Although funded by a national user fee, maintenance is the responsibility of the federal government and requires annual appropriations. Factors in addition to funding may affect the ability of the government to perform required maintenance. For instance, the Lower Willamette River has not been dredged for several years due to ongoing Superfund remediation.

Snake River Maintenance Dredging

Routine channel maintenance is required to provide a 14-foot depth throughout the designated federal navigation channel in the project area, and to restore access to selected port berthing areas. Sediment is deposited in the navigation channel primarily during spring runoff periods. Because channel maintenance has not occurred since 1998-1999, shoaling in the navigation channel has become critical in some locations, and is now as shallow as 8.5 feet and 10.6 feet near the Ports of Clarkston and Lewiston, respectively. Also, the total surface area of the navigation channel having depths less than 14 feet in the Snake/Clearwater rivers confluence area has risen from approximately 38 acres in 2003 to approximately 52 acres in 2004.

Coos Bay Harbor Maintenance

Coos Bay Maintenance Dredging is needed to maintain the existing harbor at its federally-authorized depth in order to retain existing waterborne trade volumes. Because of Coos Bay's southern Oregon coastal location and its rail and highway connections to the I-5 corridor and beyond, the navigation projects at Coos Bay benefit a large part of the region that does not otherwise benefit from Columbia and Snake River corridor improvements

Mid Columbia & Snake Rivers Navigation Lock Maintenance

Navigation locks on the Mid Columbia and Snake Rivers are required for any vessel to navigate the river. These locks require annual maintenance. The Walla Walla District, U.S. Army Corps of Engineers is responsible for maintenance of McNary Dam and Snake River dam locks. The Portland District is responsible for the remaining Columbia River locks. Each district usually schedules lock closures for a few days each year to perform inspection and maintenance.

National & Regional MTS Projects – 1-5 years

Six key projects throughout the region totaling approximately $244 million are identified as national or regional MTS projects in the next 1-5 years. Most of these are navigation improvements needed to retain existing trade and accommodate future trade growth.

Columbia River Channel Deepening

Deepening of the Columbia River shipping channel from Portland/Vancouver to the mouth of the Columbia River has long been recognized as a strategic investment that will benefit the entire region. Given the interconnectedness of downriver deep water ports and upriver inland ports by barge and other modes, this project will improve the competitiveness of virtually every port in the Columbia-Snake river system. Channel deepening is needed to maintain existing trade by keeping pace with larger ship sizes and to accommodate trade growth on larger ships. The project has been endorsed by a very broad array of governmental, civic and business organizations including virtually all Lower Columbia River deep draft ports and Columbia/Snake

River upriver ports. Deepening has received Congressional authorization and funding commitments from Oregon and Washington to meet local cost sharing requirements. Federal funding of approximately $75 million is needed to complete the project.

Columbia River Jetty Repair

The jetties that protect and ensure that the mouth of the Columbia River is safe for navigation have been steadily deteriorating over the last several decades and are currently in urgent need of repair. Of primary concern are critical portions of the North Jetty (Washington) and the South Jetty (Oregon), which could breach during a large storm event, thus allowing sand to be transported and deposited directly into the navigation channel. Such an event would impact commercial and recreational navigation at the mouth of the river and require emergency measures to repair the jetty and restore the channel depth.

The initial 4.5-mile section of The South Jetty at the mouth of the Columbia River was completed in 1896, with a 2.4-mile extension completed in 1914. Eight subsequent repairs have also been completed (last one in 1982). Jetty stone placement at the South Jetty, to date, totals approximately 8.7 million tons. Approximately 0.8 mile of the outer tip of the jetty has eroded since initial construction and is no longer functional. The 2.5-mile long North Jetty was completed in 1917, to help stabilize shoaling at the mouth of the river. Two subsequent repairs have been made, with the last one completed in 1965. Jetty stone placement at the North Jetty, to date, totals approximately 3.4 million tons. Approximately 0.2 mile of the tip of the North Jetty has eroded since initial construction and is no longer functional.

Mid Columbia & Snake Rivers Navigation Lock Repair & Retrofit

Four hydroelectric dams are on the Columbia River between the Portland-Vancouver area and the Snake River junction: Bonneville; The Dalles; John Day; and McNary. The youngest of these – John Day – was completed in 1971. All dams need investment for upgrades, repair and/or safety. In some instances, studies are needed before improvements can be implemented. Requirements are:

- Bonneville – North lock wall stabilization and replacement of spillway power distribution equipment ($6.65M)
- The Dalles – Navigation lock upgrade ($0.3M)
- John Day – Lock and foundation leaks, new lock gate ($20.3M
- McNary – Rehab of lock electrical system ($4.0 M); future restoration of downstream lock gate ($7.0 M)

Four hydroelectric dams are on the lower Snake River between Lewiston-Clarkston and the river's confluence with the Columbia at Pasco, Washington: Ice Harbor, Lower Monumental; Little Goose, and Lower Granite. The youngest of these – Lower Granite – came on line in 1975. Near term required repairs include:

- Ice Harbor – Replacement of upstream lock gate ($3.5M)
- Lower Monumental – Replacement of upstream and downstream lock gates ($11.1M)
- Little Goose – Rehabilitation of downstream gate ($3.5M)
- Lower Granite – Minor maintenance and upgrades ($1.0_M)

Coos Bay Harbor Improvements

The Coos Bay Harbor Improvements involve two separate projects – jetty repair ($18.7M) and a new Lower Bay turning basin ($4+M) – that are critical to maintaining existing forest products trade and accommodating trade growth, including a proposed liquefied natural gas (LNG) import terminal. The jetty repair is needed to maintain the existing harbor entrance in order to maintain existing waterborne trade volumes. The new turning basin will accommodate navigation operations in the Lower Bay – where no turning basin currently exists – for an existing forest products terminal, a proposed LNG import terminal and future tenants of the Port's 113-acre North Bay Marine Industrial Park, which was recently master planned for marine cargo and industrial uses. Because of Coos Bay's southern Oregon coastal location and its rail and highway connections to the I-5 corridor and beyond, improvements at Coos Bay will benefit a large part of the region that does not otherwise benefit from Columbia and Snake River corridor improvements. The projects are supported by the Port of Coos Bay and the Oregon Economic and Community Development Department.

Coos Bay North Bay Industrial Rail Lead

This four-mile rail project will extend rail service to Coos Bay's North Bay Marine Industrial Park. The rail line will accommodate trade growth in southwest Oregon by providing service for a new sawmill with multimodal ocean barge, rail and highway access, as well as other future marine industrial tenants and marine cargo projects. As with navigation, rail improvements at Coos Bay will benefit a large part of the region. The project is supported by the Port of Coos Bay, ODOT and the Central Oregon & Pacific Railroad (CORP).

Upriver Unit Train Facility Feasibility Studies

Four upriver ports – Morrow, Umatilla, Pasco and Lewiston – have identified the potential need for unit train rail facilities to support rail-barge movements of grain to downriver export elevators or to shuttle cargo to downriver or other deep water ports as a supplement to barge. Because of the integrated nature of upriver and downriver ports, these logistical concepts present the potential for new regional transportation benefits, especially for trade growth as downriver rail and highway capacity becomes more fully utilized. Before construction of the proposed projects is undertaken, feasibility assessments are recommended to test the engineering and economic viability of the concepts at the four ports and to address regional benefits. The projects have been endorsed by the Oregon Shortline Association and Oregon Rail Users League (Morrow); the Port of Umatilla and the ODOT Rail Division (Umatilla); the Port of Pasco and Franklin County CERT (Pasco); and the Port of Lewiston (Lewiston).

National & Regional MTS Projects – 6-10 Years

Three major transportation improvements totaling $404 million – two rail projects and one highway project – are currently identified as national or regional MTS projects for the 6-10 year time frame. These projects will be needed primarily to accommodate trade growth as capacity in each area is reached in the next several years.

I-5 Trade Corridor Rail Capacity Improvements

This group of 10 rail capacity projects in the Portland-Vancouver area is recognized as a strategic freight transportation improvement program that will benefit the entire region and facilitate higher trade volumes and greater efficiency for port-related traffic. Virtually all rail-related traffic handled at Columbia River deep water ports on the Burlington Northern Santa Fe, Union Pacific and Portland & Western railroads must pass through the Portland-Vancouver rail system, including the ports of Portland, St. Helens, Vancouver, Kalama and Longview. The combination of domestic rail freight growth, rail passenger growth and port-related rail freight growth transiting the Portland-Vancouver area has begun to put severe pressure on the region's rail capacity at this key system crossroad, causing bottlenecks and delays. The 10 projects, which should be viewed as an integrated capacity improvement program, are:

- Vancouver Yard Bypass ($55.0M)
- Increased Track Speeds Across the Movable River Spans ($8.0M)
- Revised Crossovers at UP/BNSF North Portland Junction ($9.2M)
- Ramsey Yard & Barnes Yard Rail Improvements ($25.1M)
- UP Kenton Mainline Improvements ($25.4M)
- UP Graham Line Connection to Southbound Brooklyn Line ($11.0M)
- Increased Track Speeds Between UP Willsburg Junction & Albina Yard ($8.8M)
- Extension of Two Main Tracks from Willsburg Junction to Clackamas ($17.3M)
- Upgraded River Lead Through Albina Yard ($3.0M)
- Added Controlled Siding on UP Graham Line West of Troutdale ($6.9M)

The program has been endorsed by the Port of Portland, Port of Vancouver, ODOT, WSDOT, Metro (Portland), RTC (Vancouver), City of Portland, City of Vancouver, BNSF, UP and Amtrak.

Kelso-Martins Bluff Third Main Line

This project calls for construction of a third rail main line along a 19-mile corridor between Woodland and Kelso, WA, including a new Toteff Road overpass or underpass at the Port of Kalama. The project will add rail capacity and efficiency for regional trade growth at the ports of Kalama and Longview for east-west traffic and Kalama, Vancouver and Portland for north-south traffic. As with the I-5 Trade Corridor Rail Improvements, growth in domestic rail freight, rail passenger traffic and port-related rail freight has begun to put significant pressure on the region's rail capacity in this corridor. In addition, local unit grain train handling conflicts with main line traffic and insufficient rail storage capacity is available to support grain trains. The Kelso-Martins Bluff Third Main Line will alleviate projected capacity problems and provide facilities for more efficient unit grain train operations at downriver ports. The project is supported by the Port of Kalama and WSDOT.

I-5 Delta Park to Lombard in North Portland

Interstate highway capacity on I-5 southbound between the Columbia River Bridge and Lombard in North Portland is limited due to its poor lane capacity and configuration. Much of the region's truck traffic to and from the ports of Portland, St. Helens, Vancouver, Kalama and Longview must pass over this stretch of the interstate highway system where bottlenecks and delays occur. Consequently, the existing capacity to handle much of the region's highway-related marine trade is limited and future capacity for trade growth is significantly constrained. The project is endorsed by the Portland/ Vancouver I-5 Transportation and Trade Partnership, including the Port of Portland, Port of Vancouver, ODOT, WSDOT, Metro (Portland), RTC (Vancouver), City of Portland, City of Vancouver, Tri-Met and C-Tran.

National & Regional MTS Projects – 10+ years

Two key transportation projects are currently identified as MTS funding requirements for the 10+ year time frame – the I-5 Columbia River Crossing, and a revised lift span on the BNSF rail bridge to accommodate navigation.

I-5 Columbia River Crossing

Interstate highway capacity on I-5 at the Columbia River Bridge is severely limited by a number of factors including poor lane capacity, narrow lanes and lift span operations to accommodate navigation. Much of the region's truck traffic to and from the ports of Portland, St. Helens, Vancouver, Kalama and Longview must pass over the Interstate Bridge where bottlenecks and delays occur. As a result of this bottleneck, the efficiency of handling existing waterborne trade by highway is reduced and capacity for trade growth is severely limited. Alternatives for a new interstate bridge crossing have been under study for some time to provide a high capacity long-term solution at this critical regional crossroad. The project is endorsed by the Portland/Vancouver I-5 Transportation and Trade Partnership, including the Port of Portland, Port of Vancouver, ODOT, WSDOT, Metro (Portland), RTC (Vancouver), City of Portland, City of Vancouver, Tri-Met and C-Tran.

BNSF Rail Bridge Navigation Lift Span

The BNSF railroad bridge across the Columbia River is located 5,000 feet downstream from the I-5 Interstate Bridge. The rail bridge includes a swing span near the Washington side of the river while the Interstate Bridge includes a lift span near the Washington side and a high fixed span near the center of the river. Current navigation operations require barge tows to execute an "S" turn between the fixed span of the I-5 Bridge and the swing span of the rail bridge to avoid stopping freeway traffic while the lift span is opened. The current configuration of bridge spans and operations creates a safety issue for navigation or, alternatively, a congestion issue for freeway traffic. This project would construct a new lift span in the BNSF bridge toward the center of the river to allow safer navigation operations as well as a third track to add rail capacity. The Portland/Vancouver I-5 Transportation and Trade Partnership endorses the project and the U.S. Coast Guard conducted a Truman-Hobbs Act investigation; however, the U.S. Coast Guard Administrator declined Truman-Hobbs funding for the project.

Local MTS Infrastructure Needs

In addition to the national and regional MTS projects presented in the previous section, 22 MTS projects are of local importance in supporting marine trade and transportation in the Columbia/Snake River System and Oregon Coastal Cargo Ports region. These projects are listed below. They include three navigation projects, ten rail projects and nine roadway projects. A complete list of local MTS projects is shown below.

MTS Infrastructure Needs - Local Projects

Project	Location	Project Type	System Importance	Basis of Need	Cost
On-Going Maintenance					
Newport Harbor Maintenance Dredging	Newport	Navigation	Local	Maintain Existing Trade	$1,800,000
Near-Term (1-5 Years)					
Pasco Processing Center Road Connection to SR395	Pasco	Road	Local	Trade Growth	$300,000
US20 Pioneer Mountain to Eddyville	Newport	Road	Local	Trade Growth	$133,000,000
Umatilla Terminal Access Road Improvements	Umatilla	Road	Local	Trade Growth	$1,000,000
Columbia Blvd.& Lombard St. Improvements at MLK	Portland	Road	Local	Trade Growth	$16,800,000
Scappoose Bay Marine Park Channel Deepening	Port of St. Helens	Navigation	Local	Trade Growth	$300,000
Mid-Term (6-10 Years)					
Repair/Replace Coos River Rail Bridge	Coos Bay	Rail	Local	Maintain Existing Trade	$10,000,000+
Yaquina Bay Jetty Repair	Newport	Navigation	Local	Maintain Existing Trade	$28,000,000
Kalama Grain Terminal Trackage Improvements	Kalama	Rail	Local	Trade Growth	$2,500,000
Leadbetter St. Extension & Rail Overcrossing	Portland	Rail	Local	Trade Growth	$10,800,000
North Rivergate A&B Rail Yard Expansion	Portland	Rail	Local	Trade Growth	$4,500,000
Coos Bay North Bay Marine Terminal Rail infrastructure	Coos Bay	Rail	Local	Trade Growth	$3,000,000
New Port of Vancouver Northern Rail Access	Vancouver	Rail	Local	Trade Growth	$60,000,000 to $80,000,000
West 26th Roadway Extension	Vancouver	Road	Local	Trade Growth	$20,000,000
Fruit Valley Road, Phase 3	Vancouver	Road	Local	Trade Growth	$10,000,000
Port Westward Industrial Rail Loop	Port of St. Helens	Rail	Local		$1,800,000
Multnomah Plywood Industrial P Park Rail siding	Port of St. Helens	Rail	Local		$250,000
Railroad Avenue/Pole Yard Rail Upgrade	Port of St. Helens	Rail	Local		$150,000
Columbia City Rail Siding Upgrade	Port of St. Helens	Rail	Local		$150,000
Chapman Landing Access Road Improvement	Port of St. Helens	Road	Local	Trade Growth	$3,000,000
Long-Term (10+ Years)					
Fourth Plain Expansion	Vancouver	Road	Local	Trade Growth	$30,000,000
Columbia Blvd. Northbound Ramps to I-5	Portland	Road	Local	Trade Growth	$56,000,000

Columbia Snake River System
and Oregon Coastal Cargo Ports
Marine Transportation System Study

Appendix A

Economic Importance of Maritime Trade

Prepared for
CEDER, the Center for Economic Development Education and Research
by
BST Associates

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Columbia Snake River System
and Oregon Coastal Cargo Ports
Marine Transportation System Study

Economic Importance of Maritime Trade

Trade is very important to the Pacific Northwest. In 2004, Washington ranked third and Oregon ranked tenth in the dollar value of exports per capita. In Washington State, the Governor's office estimates that one in three jobs is related to trade. The following economic impact estimates include jobs created by cargo handling activities and inland transportation (barge operations on the Columbia/Snake River system as well as truck and rail transportation).

Economic Impacts

The economic impact at ports focuses on activity in the port industry:

- Cargo handling activities (stevedore/longshore vessel loading and unloading and storage activity, and, port charges),
- Inland water transportation (barge operations on the Columbia/Snake River system) and,
- Inland transportation (truck and rail loading and movement).

The intent of the economic impact assessment is to identify and quantify the all economic activities essential to the movement of goods in the foreign and domestic trades via the port regions for the following categories:

- Employment - measured in year-round full-time equivalent jobs (FTEs).
- Wages and income - include wages, salaries, proprietors' income and non-wage compensation (such as pensions, insurance, and health benefits).

Definitions and Methodology

Definitions

Direct impacts are the economic activities directly caused by the movement of cargo flows through the Port, or the operations of port tenants and users. These activities represent the "first round" of spending, employment, and wages. Rounds of inter-industry purchases generate indirect and induced impacts. Indirect impacts represent purchases by the industry of goods and services, such as the payment for outside contractors or for accounting or legal services. Induced impacts refer to the household purchases based on the employment earnings from direct and indirect economic activities. As wages are paid out, workers' families spend their income on a wide array of goods and services, much of which are supplied by the local economy.

Total impacts incorporate the sum of direct, indirect, and induced impacts.

Methodology

The Ports of Portland and Vancouver have recently undertaken economic impact studies. The results of these studies were used for the Lower Columbia and Oregon Coast regions at a specific commodity basis to provide an estimate of the economic impacts in these regions.

The economic impacts of the shallow draft Columbia/Snake River system was developed by BST Associates to estimate the impacts associated with existing and future cargo movements. BST Associates estimated the revenues associated with transportation services (truck transportation to/from the port, port charges and barge transportation along the system). Payroll was estimated based upon data from the Census of Transportation for Washington and Oregon. Average wages per job were used to estimate the number of jobs. RIMS multipliers were used to estimate indirect and induced impacts.

Findings

The economic impacts associated with marine cargo activities are presented in this section.

Lower Columbia Region

The Lower Columbia River region had over 15,000 direct and 40,000 total jobs in 2000 due to marine cargo activity. The direct payroll of port activity was estimated at $576 million. This generated an income of $1.8 billion, including direct, indirect and induced effects.

The Lower Columbia River region is expected to generate more than 20,000 direct jobs and 52,000 total jobs in 2020, if baseline and potential market opportunities come to fruition. This would represent an increase of nearly 5,000 direct family wage jobs and an overall increase of more than 12,000 jobs in the region. The projected direct payroll would be $808 million (in 2004 dollars), representing an increase of $230 million in wages. Total income would be $2.5 billion, representing an increase of more than $700 million.

Table 1 – Lower Columbia River Region Economic Impacts

	Jobs		Income ($mil 2004)	
Year	**Direct**	**Total**	**Direct**	**Total**
2000	15,632	40,098	$576	$1,809
2020				
Baseline Forecasts	18,610	45,690	$705.4	$2,215.1
Potential Opportunities	1,985	6,633	$102.4	$321.6
Total Impacts	20,595	52,323	$807.8	$2,536.7
Increase	4,963	12,225	$231.8	$728.1

Source: BST Associates, using data from Ports of Portland and Vancouver prepared by Martin Associates

Columbia/Snake River Shallow Draft Region

The Columbia/Snake River region had over 1,100 direct and 2,600 total jobs in 2000 due to waterborne cargo activity. The direct payroll associated with this activity was $39 million, which generated an income of $80 million, including direct, indirect and induced effects.

The Columbia/Snake River region is expected to generate more than 1,200 direct jobs and nearly 2,900 total jobs in 2020, if baseline forecasts come to fruition. This would represent an increase of nearly 100 direct family wage jobs and an overall increase of 250 jobs in the region. The projected direct payroll would be $42 million (in 2004 dollars), representing an increase of $4 million in wages. Total income would be $88 million, representing an increase of more than $7 million.

Table 2 –Columbia/Snake River Region Economic Impacts

	Jobs		Income ($mil current)	
Year	**Direct**	**Total**	**Direct**	**Total**
2000	1,134	2,640	$39	$80
2020				
Baseline Forecasts	1,242	2,890	$42.4	$87.9
Potential Opportunities	-	-	$0.0	$0.0
Total Impacts	1,242	2,890	$42.4	$87.9
Increase	108	250	$3.7	$7.6

Source: BST Associates, using data from Ports of Portland and Vancouver prepared by Martin Associates

Oregon Coast Region

The Oregon Coast region had over 900 direct and 3,100 total jobs in 2000 due to waterborne cargo activity. The direct payroll associated with this activity was $49 million, which generated an income of $154 million, including direct, indirect and induced effects.

The Oregon Coast region is expected to generate more than 1,300 direct jobs and nearly 4,400 total jobs in 2020, if baseline forecasts and potential market opportunities come to fruition. This would represent an increase of nearly 350 direct family wage jobs and an overall increase of 1,200 jobs in the region. The projected direct payroll would be $67 million (in 2004 dollars), representing an increase of $18 million in wages. Total income would be $212 million, representing an increase of more than $58 million.

Table 3 – Oregon Coast Region Economic Impacts

	Jobs		Income ($mil current)	
Year	**Direct**	**Total**	**Direct**	**Total**
2000	948	3,169	$49	$154
2020				
Baseline Forecasts	1,062	3,548	$54.8	$172.0
Potential Opportunities	246	820	$12.7	$39.8
Total Impacts	1,308	4,369	$67.4	$211.8
Increase	359	1,200	$18.5	$58.2

Source: BST Associates, using data from Ports of Portland and Vancouver prepared by Martin Associates

Columbia Snake River System
and Oregon Coastal Cargo Ports
Marine Transportation System Study

Appendix B

Marine Cargo Forecasts

Prepared for

CEDER, the Center for Economic Development Education and Research

by

BST Associates

June 2005

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Oregon Economic and Community Development Department, State of Oregon

Columbia Snake River System
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Marine Transportation System Study

Marine Cargo Forecasts

The following section provides a forecast of marine cargoes expected to transit the CEDER Port regions:

- Lower Columbia Region (includes the deep draft Ports of Portland, Vancouver, Kalama, Longview, St Helens and Astoria),
- Oregon Coast (includes the deep draft ports of Coos Bay and Newport)
- Columbia/Snake Up-River Region (includes all shallow draft ports located upriver of Vancouver on the Columbia, Snake and Clearwater rivers).

The key macroeconomic trends that drive trade on the North American West Coast are briefly reviewed in this section followed by baseline forecasts and an estimation of potential market opportunities.

Factors Impacting Waterborne Trade

World trade is driven by economic output, exchange rates, trade agreements and the increasingly inter-related world economy.

World Output

World output, as measured by the combined gross domestic product of all countries, grew at 3.3% per year between 1985 and 1994 and then ranged between 2.4% and 4.2% per year through 2004[1]. In the longer-term, world output is expected to average 3.0% from 2010 to 2025[2]. The advanced economies (U.S., Europe, Japan, and Canada, among others) currently account for nearly 70% of world output. These countries are expected to see output increase from the low levels experienced in 2001 and 2002 to about 3.0% annually from the present to 2025. The United States, which accounted for approximately 32% of world output in 2002, is expected to continue to outperform Europe and Japan.

Developing countries, including Asian countries (except Japan), have experienced the most rapid growth, at between 5% and 7% per year. These countries are expected to continue to grow within the historical range of growth. China's long-term economic growth is expected to be the highest among major economies. Global Insight's latest forecast for China projects a trend growth rate of 6% over the period from 2005 to 2025. What makes this growth rate even more impressive is the fact that it is based on an average population growth rate of only 0.5% per year. This means that, by 2025, many of China's coastal provinces will be as affluent as today's Hong

[1] Source: International Monetary Fund (IMF)

[2] Source: Global Insight

Kong and Singapore and the country's GDP will probably surpass that of Japan. Prospects for other Asian economies are for growth rates in the 4 to 5% range for the study period.

Most of the growth in world economic output is expected to be in the Trans-pacific region, which creates an opportunity for Pacific Northwest Ports.

Exchange Rates

Exchange rates also have a significant effect on trade flows. For example, there is a close negative correlation between wheat exports via the Columbia River and exchange rates. Between 1995 and 2001, the US dollar gained value against other exchange rates, resulting in a substantial decline in wheat exports.

Exchange rates can also impact potential opportunities to handle Canadian cargoes. As the US dollar increased in value against the Canadian dollar, it became more expensive to move Canadian cargoes via US ports. For example, when the potash facility in Portland was completed the value of the Canadian dollar was around $0.75US. In the intervening years, the Canadian dollar declined to less than $0.64US in 2002 (annual average).

The US dollar is expected to continue to weaken against other currencies. Global Insights predicts that over the longer term, Canada's strong economic and fiscal performance will move the Canadian dollar upward. Likewise, other currencies should also rise against the US dollar. In particular, the Chinese renminbi is expected to increase in the longer run, as China allows the rate to float but in the near term China will likely keep the renminbi pegged to the dollar.

A lower value of the U.S. dollar will increase export opportunities for Pacific Northwest ports.

World Trade

The relationship between growth in output and trade (via all modes, including air, overland and by water) has changed in recent years. In previous years, trade (in dollar value) averaged approximately 2.5 times the growth in output. As an example, if output increased at 3%, then trade increased at 7.5%. Trade was growing more rapidly than output as a result of globalization, reduction in tariffs and non-tariff barriers, and increased logistics productivity.

However, in the past five years, trade has grown much more rapidly than output because there has been a dramatic shift in production from North America and Europe to Asia (primarily to China). This has caused double-digit growth in trade, even though consumption was lagging. While subsequent growth in trade is expected to diminish, it will continue to be rapid.

Waterborne trade has not grown as rapidly as trade by air and overland (with Canada and Mexico). Between 1970 and 2000, world waterborne trade grew from 2.6 billion tons[3] to 5.9 billion tons, or at 2.8% per year on average. The growth rate was higher for dry bulks (3.6%) and other dry cargo (4.4%, consisting of general cargo and automobiles, among other handling groups) and slightly lower for tanker traffic (1.3% annual growth).

[3] All tons are reported in metric tons, which equal 2,204.6 pounds.

Summary

The opportunities for Pacific Northwest ports appear to be favorable for several reasons:

- First, world economic output is expected to remain strong and stable in the long-term,
- Second, most of the growth in output is occurring in countries bordering the Trans-Pacific,
- Third, exchange rates are expected to favor exports, which benefits the Columbia/Snake River and Oregon Coastal port regions,
- Fourth, trade is growing more rapidly than output.

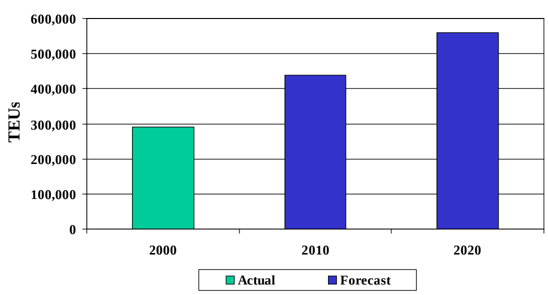
Cargo Forecasts

Columbia River Port Region

This section presents forecasts for the Lower Columbia River Region.

Containers

Figure 1 – Lower Columbia Ports Container Forecast



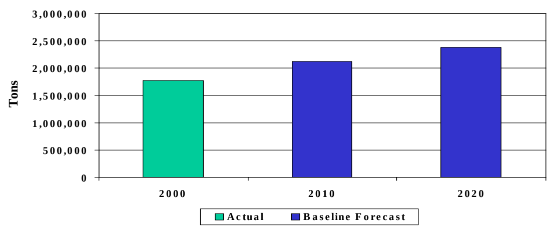
Container traffic via the Lower Columbia region has consisted primarily of exports from the Pacific Northwest (forest and agricultural products from Oregon, Washington and Idaho), although in recent years imports (consumer goods and inputs for manufacturers) have begun to increase. The deepening of the Columbia River and development of distribution centers, both of which are underway, improve the opportunity for future growth. In addition, congestion in other west coast ports is driving carriers and shippers to seek new gateways.

The baseline forecast projects container throughput increasing from around 300,000 TEUs in 2000 to 550,000 TEUs in 2020. The expected growth rate of 3.4% is approximately half the rate of growth expected at other west coast ports.

Breakbulk

Breakbulk cargoes generally consist of forest and metal products that are hand-stowed or palletized. Most of the products in this category that can be containerized already have been. Exceptions include steel products (large sheets, coils etc.) that are not containerizable. Other products (such as newsprint from Longview) move in large enough volumes or on particular

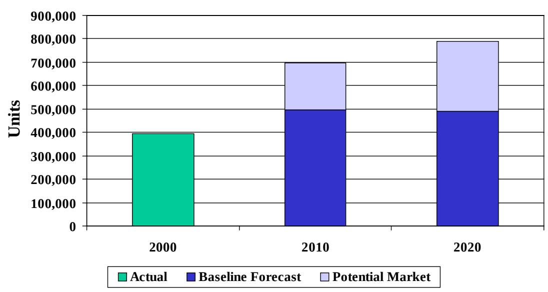
Figure 2 – Lower Columbia Ports Breakbulk Forecast



trade routes such that breakbulk is less costly than containerized shipments. Breakbulk cargoes are expected to increase from approximately 1.7 million tons in 2000 to 2.4 million tons in 2020, or at 1.5% per year.

Autos

Figure 3 – Lower Columbia Ports Auto Forecast



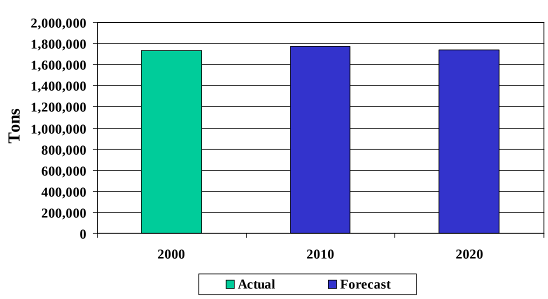
The Lower Columbia region has long been an efficient gateway for autos produced in Asia. Most of these imports (85% to 90%) move by rail to the inland U.S. The baseline forecasts expect continued stable growth at around the rate of population growth.

However, the baseline forecasts may be superceded by the addition of new manufacturers (from China), logistics consolidations between manufacturers, and shifts between regions, particularly from California.

Including the baseline forecasts and potential market opportunities, the Lower Columbia region could increase auto traffic from approximately 400,000 units in 2000 to nearly 800,000 units in 2020, which would result in average annual growth of 3.5%.

Logs

Figure 4 – Lower Columbia Ports Log Forecast

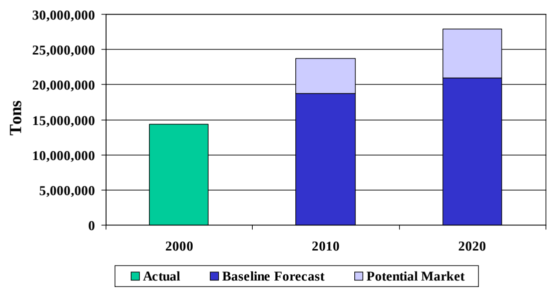


Log exports have declined over the recent past do to reduced timber harvests and increased domestic utilization of raw logs. However, log imports and domestic shipments of logs have increased in the recent past.

The forecast calls for log traffic to remain at its current level of 1.7 million tons. Imports and domestic traffic are expected to offset declines in exports.

Grain

Figure 5 – Lower Columbia Ports Grain Forecast

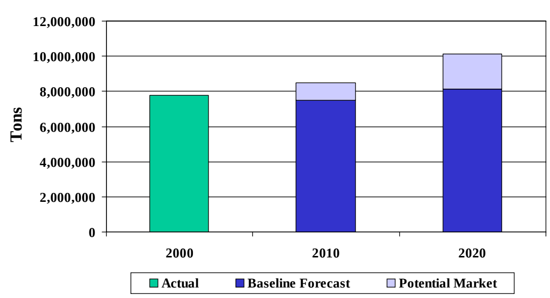


The Lower Columbia River ports handle approximately 40% of U.S. wheat and barley exports and around 10% of corn exports. In the past three years, grain exports have grown significantly due to the lower value of the dollar and attractive shipping rates to Asia from the PNW relative to the U.S. Gulf. In the longer term, the prospects appear favorable due to continued growth in Asian markets as consumption of meat increases with income. China, in particular, is expected to increase grain purchases from the U.S.

Under baseline condition, grain exports are projected to grow from 15 million tons in 2000 to 21 million tons in 2020, or at 1.9% per year. However, there is an opportunity for another feed grain export facility in the Lower Columbia, which could bring grain exports up to 28 million tons in 2020.

Other Dry Bulks

Figure 6 – Lower Columbia Ports Other Dry Bulk Forecast

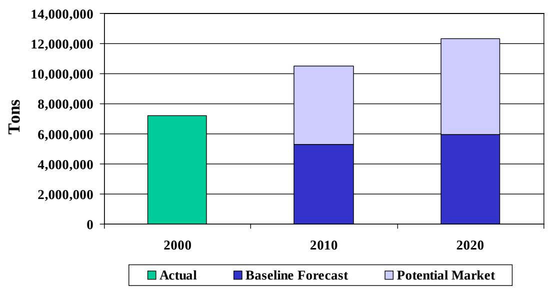


Other dry bulks moving through the Lower Columbia River region include exports of potash, soda ash, petroleum coke, ores/concentrates and bentonite clay and imports of cement, limestone and gypsum, among other products.

The baseline forecast calls for an increase in other dry bulks from 7.8 million tons in 2000 to 8.1 million in 2020. However, there are potential additional market opportunities due to the combination of strong growth in Asia (particularly China), the lower vale of the dollar and shifts from other regions due to congestion and redevelopment. For example, potash exports from Canada are increasing at the present time as it becomes relatively less expensive to operate in the PNW than in Vancouver BC. In addition, copper concentrates are now beginning to flow from a Montana mine to China after several years of closure due to strong demand and attractive export prices. Potential opportunities could generate an additional 2 million tons above the baseline forecast by 2020.

Liquid Bulks

Figure 7 – Lower Columbia Ports Liquid Bulk Forecast

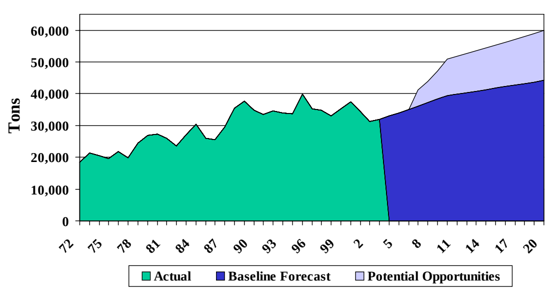


The Lower Columbia ports receive petroleum products and inputs for manufacturing (chemicals for production of a variety of products and crude oil for production of asphalt). In 2000, inbound liquid bulks were higher than normal due to the closure of the Olympic Pipeline[4]. Under the baseline forecast, liquid bulks are expected to grow at approximately the rate of population growth and reach 6 million tons in 2020.

New market opportunities focus on liquid natural gas (LNG) as a result of higher natural gas prices, lower LNG costs, rising gas import demand, and the desire of gas producers to monetize their gas reserves[5]. Two proposals in the Lower Columbia (at Port Westward and Warrenton) are currently under consideration. If one of these projects moves forward, liquid bulk imports could increase by an addition 5 to 6 million tons.

Summary

Figure 8 – Lower Columbia Ports Summary Forecast



Marine traffic passing the entrance of the Columbia River increased from 18 million tons in 1972 to 32 million tons in 2003, which amounts to annualized growth of 1.8%.

Under the baseline forecast, marine traffic is projected continue to grow at the historic rate of growth.

If all potential market opportunities come to fruition, marine cargo would grow at an average annual rate of 3.8% and reach 60 million tons by 2020.

[4] Service by the Olympic Pipeline has been restored.

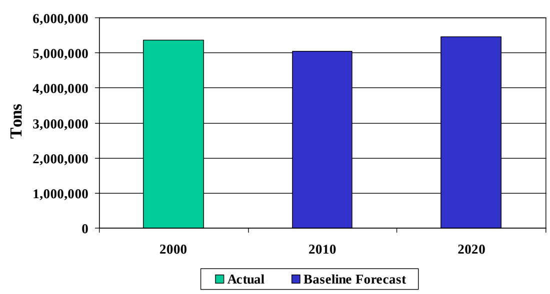
[5] Source: Energy Information Administration

Columbia/Snake River System Inland Ports

This section presents forecasts for the shallow draft ports upriver of Vancouver on the Columbia, Snake and Clearwater Rivers.

Grain

Figure 9 – Columbia/Snake River Inland Ports Grain Forecast

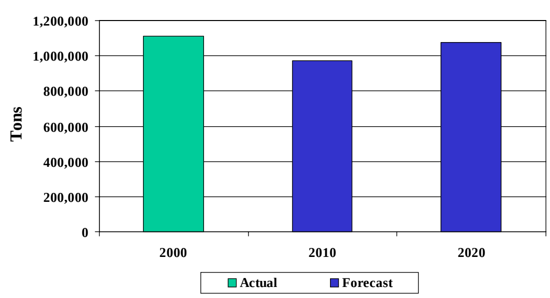


Wheat and barley are the primary products flowing on the Columbia/Snake River system. In 2000, 5.3 million tons of wheat and barley was barged down the river system. Approximately 62% of this grain originated on the Clearwater and Snake rivers and the remainder originated at barge terminals on the Columbia River. Grain traffic on the system reached a peak in 2000 and then fell substantially in 2001 and 2002 as a result of weak overseas markets and competition from railroads before beginning to rebound in 2003.

The baseline forecast calls for grain to experience continue modest growth, reaching 5.5 million tons in 2020.

Forest Products

Figure 10 – Columbia/Snake River Inland Ports Forest Product Forecast

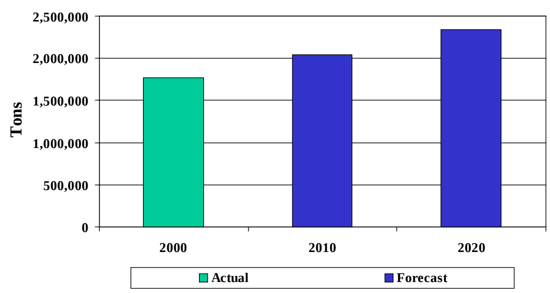


In 2000, 1.1 million tons of forest products transited the Columbia/Snake River system, including manufactured products (pulp, paper and lumber moving in breakbulk or containerized form) as well as resources for domestic mills and export markets (logs and wood chips). As with grain, these products declined as manufacturers changed their sourcing and logistics patterns.

The baseline forecast calls slow growth from 2010 to 2020, with a rebound to the levels experienced in 2000 by 2020.

Liquid Bulks

Figure 11 – Columbia/Snake River Inland Ports Liquid Bulk Forecast

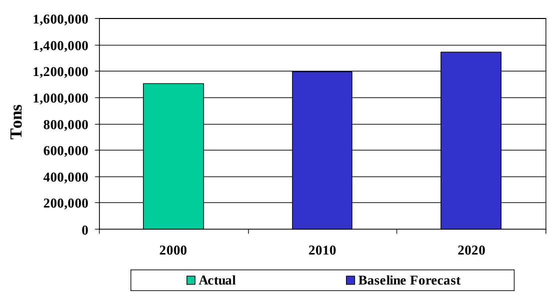


Petroleum products and liquid fertilizers are barged upriver to meet the needs of consumers and farmers. In 2000, there were approximately 1.8 million tons shipped upriver of Vancouver.

The baseline forecast calls for these shipments to reach 2.3 million tons in 2020, or at 1.4% per year.

Other

Figure 12 – Columbia/Snake River Inland Ports Other Product Forecast

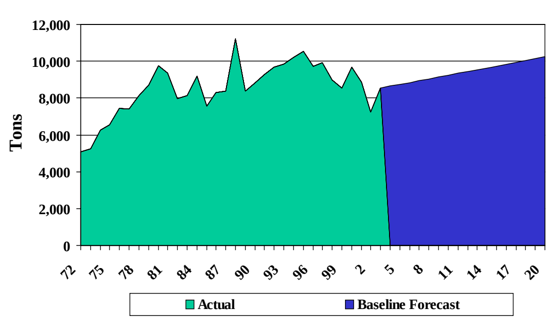


Other products include crude materials (stone, gravel), fertilizer (dry), and miscellaneous products (such as garbage in containers). In 2000, there were approximately 1.1 million tons of these products shipped on the river system.

The baseline forecast calls for these shipments to reach 1.3 million tons, or at 1.0% per year.

Summary

Figure 13 – Columbia/Snake River Inland Ports Summary Forecast



Traffic on the Columbia/Snake river barge system grew from 5.0 million tons in 1972 to 8.5 million tons in 2003, or at 1.8% per year. Traffic peaked in 1988 at 11.2 million tons and again in the mid-1990s at 10.5 million tons. However, volumes generally declined between 1995 and 2003 due to weak markets overseas, the strength of the U.S. dollar and competition from railroads.

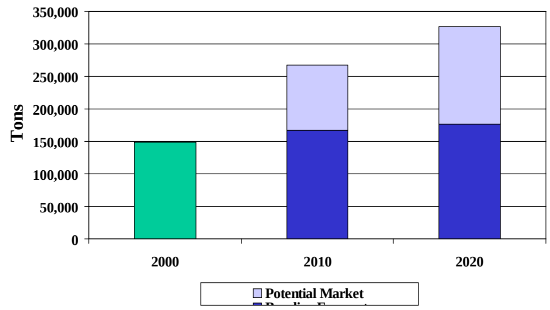
The baseline forecast projects that traffic will continue to grow modestly, reaching 10.2 million tons by 2020, which amounts to growth of 1.1% per year.

Oregon Coast Deep Draft Ports

This section reports briefly on the forecasts for the ports on the Oregon Coast.

Breakbulk

Figure 14 – Oregon Coast Ports Breakbulk Forecast

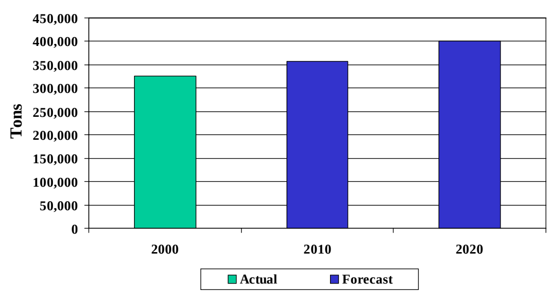


Breakbulk traffic via the Oregon Coast has primarily consisted of exports and domestic shipments forest products (lumber and other wood products). In 2000, approximately 150,000 tons of this product was shipped.

The baseline forecast calls for breakbulk shipments to reach 177,000 tons, or growth at 0.9% per year. However, a new mill is under construction in Coos Bay and another may be planned in the future. It is expected that these projects may generate an additional 150,000 tons of waterborne breakbulk shipments in 2020.

Logs

Figure 15 – Oregon Coast Ports Log Forecast

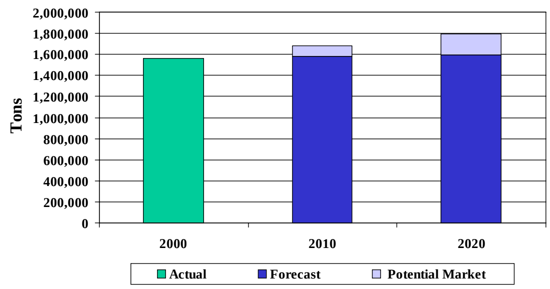


Log traffic on the Oregon Coast consists of log exports as well as log imports and domestic receipts. Log exports have declined during the past and are expected to continue to decline. Receipts of logs to feed area mills have and are expected to continue to increase modestly.

The baseline forecast calls for log traffic to increase from 325,000 tons in 2000 to 400,000 tons in 2020, or at an annual growth of 1.0%.

Dry Bulks

Figure 16 – Oregon Coast Ports Dry Bulk Forecast



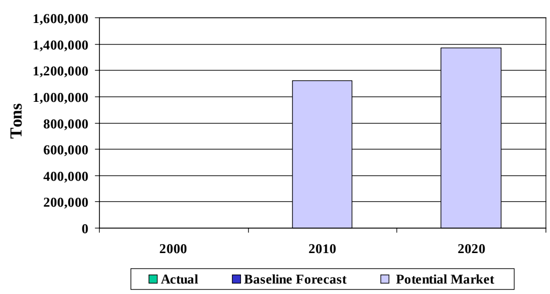
Dry bulks are primarily composed of wood chip exports. Over the past twenty years, wood chip exports have declined substantially due to the strength of the U.S dollar and competition from overseas providers.

The baseline forecast calls for a modest increase in wood chip exports, with growth from 1.5 million tons in 2000 to 1.6 million tons in 2020.

However, there is reason to believe that a shift in logistics patterns is occurring away from Northern California ports to Oregon Coast ports. This could lead to an opportunity to export an additional 200,000 tons by 2020.

Liquid Bulks

Figure 17 – Oregon Coast Ports Liquid Bulk Forecast

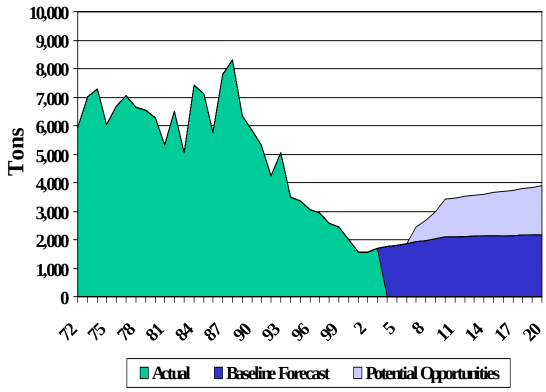


Oregon Coastal ports do not ship or receive liquid bulks by water at the present time.

However, there is also a proposed LNG terminal planned at Coos Bay, which would serve the local area and the area inland to the Willamette Valley. The current plans for this facility call for approximately 1.3 million tons of LNG.

Summary

Figure 18 – Oregon Coast Ports Summary Forecast



Oregon Coast ports have experienced a continuous decline in waterborne traffic from more than 8.0 million tons in the late 1980s to 1.7 million tons in 2003. This decline was caused by declining forest products manufacture and a shift from overseas markets accessed by water to inland markets accessed by truck and rail. However, the worst appears to be over. The baseline forecast expects modest growth in the existing product base, with growth to 2.1 million tons by 2020.

In addition, new opportunities such as the proposed LNG terminal could increase cargo volumes to 3.9 million tons by 2020.

Columbia Snake River System
and Oregon Coastal Cargo Ports
Marine Transportation System Study

Appendix C

Short Sea Shipping in the Columbia/Snake River System

Prepared for
CEDER, the Center for Economic Development Education and Research
by:
Pacific Northwest Waterways Association

June 2005

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with funding provided by the
Maritime Administration, U.S. Department of Transportation

Short Sea Shipping
in the Columbia Snake River System

Short sea shipping is an innovative intermodal concept that substitutes water transportation for the more traditional surface modes of truck and rail. It can be used as a link in delivering cargo to and from international trade ports or it can be an all-water alternative for domestic movements. The purpose of this report is to identify public policy issues and market factors that affect the potential for successful short sea shipping within and to and from the Columbia Snake River System.

Cargo transported over water typically moves at lower cost while consuming less fuel and emitting fewer airborne pollutants than rail or truck. The U.S. Maritime Administration reported the relative energy efficiencies of the three modes of transportation. In their study, one gallon of fuel could move one ton of cargo 59 miles by truck, 202 miles by rail or 514 miles by barge (Environmental Advantages of Inland Barge Transportation, Maritime Administration, U.S. Department of Transportation, August 1994). In Oregon, where triple trailers are permitted on selected roadways, the Oregon Department of Environmental Quality estimates that trucks can move one ton 163 miles using one gallon of fuel (Utilizing Inland Waterway, Coastal and Open Ocean Barging of Containerized Agricultural Products to Overcome Existing Service Deficiencies and Increased Transportation Costs, Draft Report, August, 2004) Similar relative fuel efficiencies have been reported in Europe. Air pollutants from tow boats on a ton-mile basis were shown to be 20-30 percent of the emissions from rail and five-to-fifteen percent of the emissions from trucks (Maritime Administration, August 1994). The opportunity to relieve congestion and reduce maintenance costs on highways and railways has focused even greater attention on waterborne alternatives.

Columbia Snake River Container Barging as a Model for Short Sea Shipping

After experiments began in 1972, the first regular container on barge service began in 1975, with a total of 125 containers. Growth was rapid, hitting more than 6,000 loaded containers in 1979 and surpassing 15,000 loaded twenty-foot-equivalents (TEU, a measure of containerized cargo equal to one standard container of 20 ft length, 8 ft width and 8.5 ft height) in 1988. Growth continued, peaking at more than 45,000 loaded TEU in 2000. These are all containers destined for the Port of Portland’s Terminal 6 for export on direct service ocean-going ships.

The domestic movement of solid waste from the Vancouver, Washington area to Boardman, Oregon began in 1991. Tidewater Barge Lines moves, on average, 14,000-16,000 TEU of containerized solid waste each year.

A typical container barge carries 80-100 TEU. The largest on the river carries 160 TEU. The longest move is 365 miles from Lewiston, Idaho to Portland, Oregon. Container barge ports at Umatilla and Boardman, Oregon and Pasco, Washington are 170 to 225 river miles and 27 to 35 hours from Portland’s container terminal.

According to the Oregon Department of Agriculture (August, 2004), rail rates for grain are nearly double barge rates and truck rates are about 3.5 times higher. The relationship between rates is similar for containerized cargo, though the differential is somewhat less.

Three major factors contributed to the start-up and continued success of container barging on the Columbia Snake River System: cooperation, commodity mix and geography.

Cooperation

The ports, barge lines, shippers and steamship lines were all committed to making container barging successful. The ports developed facilities, fostered early technological experiments in loading containers on barges, and marketed the river system for containers on barge.

The barge lines quickly entered the market. Over time, they encouraged additional market growth by operating upriver terminal facilities and developing specialized equipment, such as powering barges to handle refrigerated containers.

Shippers took some risk in experimenting to establish the service. The first move was just three containers. Shippers were soon encouraged by barge rates that allowed them to save $200-300 per container.

Steamship lines agreed to quote through rates to and from the inland ports and they were willing to position containers at those inland ports.

Perhaps the most important factor was that the container barges could be easily added to existing tows of grain or petroleum barges without adding significantly to the cost of the move. By itself, the container on barge system would not have been economically feasible.

Commodity Mix

The Columbia Snake River System had the right commodity mix to make container barging successful. Shippers of low value, non-time sensitive cargo could afford the extra couple days of transit time in exchange for the lower transportation cost. Further, the cargo was concentrated in very close proximity to the river system. Forest products in Lewiston, Idaho, potato products in Boardman, Oregon and hay cubes in Pasco were all produced less than a mile from the barge docks.

Geography

Five major geographic factors contributed to the success of container barging:

- The Columbia Snake River System feeds cargo west, in the direction of the ultimate destination of much of the cargo, the Far East. Barged containers are also exported to Europe in significant volumes.
- The cargo is concentrated, moving from a few inland locations to one major hub for steamship service in Portland and on to the Far East and Europe. Having one common-user ocean terminal in Portland is a great advantage. If the container on barge cargo needed to be split among two or more terminals, it would be much more difficult to aggregate the volumes needed to make economical use of ocean container terminal labor and equipment.

- The inland move is of intermediate distance (200-400 miles), which balances the cost and time factors to the shippers' advantage.
- The inland container ports created a new "alternative" or "off-line" hub, where the price advantages of barging were not competing directly with the major surface transportation hubs which could offer lower prices due to high volumes in certain corridors.
- The transpacific trade was large enough to offer a sufficient mix of ocean carriers that some steamship lines chose to cater to markets such as the agricultural and forest products that make up the majority of the container barge movements.

These elements combine to create a specialty market, where the container barge option best meets customer needs. And, as a specialty market, by definition, volumes are relatively low. Barged containers have made up about 25 percent of the Port of Portland's container volume over the last ten years, and less than one percent of the west coast container volume. In 2004, barged containers accounted for 22 percent of full containers exported from Portland's Terminal 6.

Other Regions as Models

Western Europe

Short sea shipping has been successful in Europe, where more than 40 percent of all freight is transported coastwise by water. This compares with seven percent in the U.S and 15 percent when coastwise and inland waterways are combined. High volumes of freight are transported between densely populated urban areas. For example, 160 million people reside within a 300 mile radius of Rotterdam in the Netherlands.

The National Ports and Waterways Institute credits European Union (EU) policy as a major factor in the success of short sea shipping. They say that accounting for external benefits or costs is a leading factor in formulation of EU transportation policies. External costs for trucking include increased costs of highway maintenance, increased air pollution, increased congestion, increased noise in urban and protected areas, and increased accidents and loss of life.

The European governments increased highway user charges to reflect these external costs and provided direct financial support to water transportation projects. The Institute cites an EU White Paper from 2001 which states, "These short sea lines will not develop spontaneously. They advocate national funding supporting operations and infrastructure to "encourage start-ups and give them an attractive commercial dimension."

The U.S. East Coast

Key factors of success in studies of east coast short sea shipping identified by the National Ports and Waterways Institute include use of roll on/roll off (Ro/Ro) vessels, what they called "exclusively freight ferries", hauling only truck trailers and containers mounted on chassis, between dedicated domestic cargo terminals (The Public Benefits of the Short-Sea Intermodal System, National Ports and Waterways Institute, University of New Orleans, November 2004).

They analyzed of two routes, a 200 mile short route between New York City and Boston and a 1,000 mile long route between New York City and Miami, with stops at Charleston and Norfolk.

They concluded that, based on financial and operational criteria only, it would be difficult to establish new and commercially viable coastal services on either the short or long routes.

When external costs were added to the analysis, short sea shipping appeared much more attractive. Water transportation reduced infrastructure maintenance and repair costs, air pollution, congestion, noise, accidents and dependency on foreign oil.

The Texas Gulf Coast

Researchers from the University of Texas investigated the “Feasibility of a Container-on-Barge Network Along the Texas Gulf Coast” (Transportation Research Record 1782, 2002). Looking at market forces rather than government policies, they found a few opportunities but did not expect them to overcome what they called “daunting” hindrances to forming a container-on-barge network. They include the lack of container equipment and infrastructure, low population density with only one large population center, a supply chain developed around short transportation times, high port development costs, rail competition and high operating costs.

Cascade Gateway

Cambridge Systematics prepared a “Cross Border Shortsea Shipping Study” for Transport Canada (May 2004). Two of their factors affecting short sea shipping were directly related to the international trade aspect of cross border shipping, trade and customs regulation and security issues. The others would be more generally applicable to the Columbia Snake region, port infrastructure, market and operational issues, institutional issues and cost.

They found that port and terminal operations at larger deepwater seaports are not amenable to short sea shipping operations for a variety of logistical, regulatory and financial reasons. Smaller ports are better suited to handle the equipment and volumes carried in short sea shipping.

The Canadian study found the biggest barrier to short sea shipping was the lack of a defined market. Existing short sea operators handle a limited commodity mix, typically high-weight, low-value cargo, such as wheat, grain or scrap metal. Cambridge Systematics found very few operators interested in investigating such markets.

Cost and reliability were identified as key market issues. Drayage to and from the ports plus the cost of labor for rehandling at each origin and destination port have the potential to offset any gains in per ton-mile cost savings of the waterborne option. The study reported that shippers are concerned that barge transit times will be less reliable that truck or rail because weather factors can affect ocean travel times, with, they say, speeds varying from two to eight knots per hour for a tug-barge combination.

Another key factor identified was trip frequency. Trucks can operate on demand. Rail carriers can offer daily or twice daily service. They found no short sea or coastal shippers in the U.S. offering daily service. Delivery schedules increasingly need to fit just-in-time delivery requirements.

The Harbor Maintenance Tax, which is applied to cargo moving in and out of federally maintained navigation channels in the U.S., was identified as a barrier, placing short sea and coastal shipping at a price disadvantage compared to other modes.

In analyzing the market case, the study demonstrated that bulk raw materials or semi-finished goods, such as raw logs, woodchips, paper, lumber, petroleum, bulk chemicals and sand and gravel currently move in short sea services. The shipments are generally large lots that do not need to be consolidated. They are not time sensitive. Shippers are typically located on the water, using their own private terminal, thus keeping labor costs down and eliminating the need for additional handling and inland distribution costs.

Successful general cargo short sea shipping tended to be short-haul feeders to smaller markets on islands (Vancouver, San Juan Islands) or longer hauls locations on the coast of Canada or to Alaska, where there is no other practical mode available.

Public Investment Issues

When considering public support for short sea shipping, there are two major areas for consideration. One is the application of funds and the other is in setting public contracting policy.

Financial support could be offered to jump-start a new service or to cover operating expenses. Given the condition of the federal budget in recent years, the priority for public funding should be in helping get a service started if economic analysis demonstrates that it would be self sustaining over the long term. The benefit of providing a long-term operating subsidy to a service that would not otherwise be economically feasible would be harder to justify.

Revising government contracting policy to consider external costs of trucking and rail when evaluating public bids would encourage more short sea shipping. It would increase the government's direct financial outlay, but may reduce other government expenditures on the external costs. This may be a less costly and more sustainable mechanism for supporting short sea shipping than offering a direct operating subsidy.

Applying the Models to the Columbia Snake River System

Three major classes of moves have been discussed as short sea shipping opportunities in the region:

- Feeder service for containerized cargo currently moving in domestic and international trade,
- Shifting current domestic cargo movements from road and rail to water, and
- Generating new domestic cargo movements utilizing the economic efficiencies of coastwise short sea shipping.

Container Feeder Service

Each year, more than 500,000 container TEUs, both full and empty, are transported to and from the Columbia Snake River region for shipment on ocean-going vessels. Thus region includes all of Oregon, Southwest Washington, and the areas in Eastern Washington and Idaho. Historically, between 50 and 60 percent of this movement is shipped via Portland's Terminal 6. The remaining 40 to 50 percent is trucked or railed to and from Seattle and Tacoma for shipment on vessels calling those ports. These surface movements to and from Puget Sound occur for a variety of reasons, for example, to use specific steamship lines or to meet a specific schedule to the foreign destination.

The volume of regional cargo diverted to the Puget Sound expands and contracts with changes in the level of Portland direct container service. Nonetheless, even when the level of Portland direct container service has been high, significant volumes of regional cargo have continued to move overland through the Puget Sound. This indicates a market that may be large enough to support short sea feeder service, regardless of the status of Portland direct service. A short sea container feeder service that shifts these overland movements to water would likely complement rather than compete with direct container service in Portland.

There are obstacles, however, to the use of short sea container feeders to service the Columbia Snake River region cargo. Geography is one such obstacle. The Puget Sound ports of Tacoma and Seattle are only 140 to 170 miles from Portland, making surface transport by truck and rail highly competitive. By comparison, the all-water route is 300 miles or more in distance and includes crossing the Columbia River bar. This added distance negates some of the per-ton-mile cost advantages of barging.

Another obstacle to short sea container feeders is modal interchange costs, or handling costs. These handling costs are minimized when containers are shipped directly via ocean vessel at Portland. They are also much lower, when compared to water feeders, for containers drayed by truck or rail to/from Puget Sound ports. In the case of upriver barge cargo, the additional handling costs would be particularly onerous as containers would need to be transshipped from river barges to short sea feeder vessels and then to ocean vessels. Once in Puget Sound, in contrast to Portland, where container service is concentrated at one common-user terminal, containers might need to be drayed between the feeder terminal to multiple terminals at either Tacoma or Seattle, further increasing the handling costs associated with feeder operations.

Despite these current obstacles to short sea container feeder service, it is in the public interest to explore and promote solutions by which these obstacles can be overcome and short sea container feeder service implemented. Shifting freight from an increasingly overburdened and congested surface transport system to the water transport system, which has ample capacity and is environmentally cleaner, makes sense. The full consideration of the external costs of surface transportation and the application of broader public policy goals makes public support of a short sea alternative desirable.

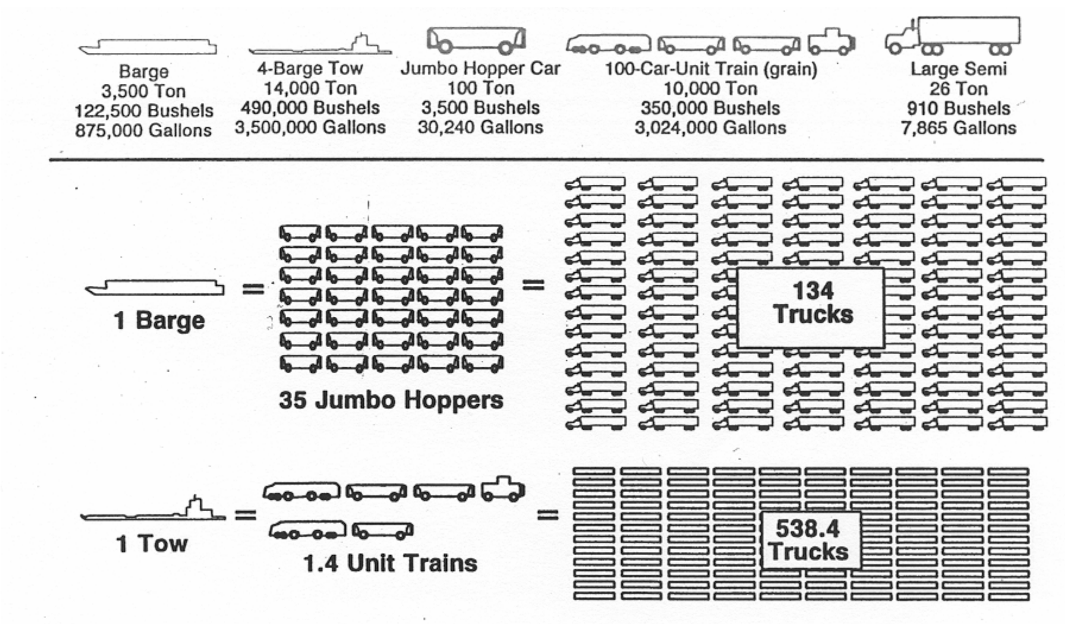
However, direct container service via Portland is the most beneficial alternative, both economically and environmentally. It would not be good public policy to support a feeder service that competes with, or potentially eliminates the more efficient direct ocean carrier service. Federal, state and local governments are already investing in maintaining and improving navigation channels, port facilities and surface transportation access for direct service to Columbia River ports.

With Portland's loss of two transpacific container services in 2004, the region has increased its interest and exploration of all-water alternatives to surface transportation. Among the options being explored is to reduce the operational costs of the all-water service. Building new, larger capacity barges that could be used in both the river and the ocean is being investigated by the Oregon Department of Agriculture.

Shifting from Roads to Water

The Columbia River is the number one wheat export gateway in the U.S. Nearly 50 percent of the wheat exported out of the river arrives at the export elevator by barge. The barging of wheat and other commodities on the Columbia and Snake Rivers is estimated to keep the equivalent of 700,000 trucks off the highways, primarily Interstate 84.

Comparing Columbia/Snake River Barge, Truck and Rail



One panamax vessel = 60,000 tons of grain = 4-5 barge tows = 600 rail cars = 2,400 semi trucks = 6 miles of trains = 95 miles of trucks on the highways (at 150 feet between trucks)

Shifting additional cargo off the highways onto barges can alleviate congestion, reduce highway maintenance costs and decrease air pollution. Highway congestion is a serious issue in the Portland-Vancouver Interstate 5 corridor. Hundreds of highway bridges throughout Oregon, including many in the Columbia River corridor, have been identified by the Oregon Department of Transportation as having structural problems in need of repair. Weight limits and other restrictions have been imposed. Air pollution and acid rain have been identified as problems in the Columbia Gorge National Scenic Area, along the river corridor east of Portland. Shifting cargo from highways to barges can contribute to solving all of these problems.

The Oregon Department of Agriculture is working with shippers, ports and tow boat companies to identify agricultural and forest products that may be shifted from road to water. They are investigating both movements within the Columbia Snake River System and shipments from the Columbia River to Pacific Ocean destinations along the U.S. west coast.

Applying the European model of taking external costs into account in setting transportation policy may be necessary to gain more success in shifting cargo from road to water. For example, Metro, a regional government agency in the Portland metropolitan area, is responsible for land use and transportation planning and for solid waste and landfills. Metro has contracted to send Portland area waste to the Columbia Ridge Landfill near Arlington, Oregon, 140 miles east of Portland on the Columbia River. Each year since 1990, over 600,000 tons of material has been trucked through the Columbia Gorge on Interstate 84 to this land fill.

The contract to transport containers of solid waste was awarded by bid, with a trucking company providing the low bid. That contract is up for renewal in 2009. Tow boat companies in the region believe that had external costs been considered, 600,000 tons of solid waste would likely be moving by water rather than by truck. They are encouraging the Metro to consider the total cost of the movement, including external costs such as highway maintenance, air pollution and congestion impacts when evaluating the next round of bids. To accomplish this move, a barge dock would need to be built in Arlington. A site has been identified and plans are being developed, but funding sources have not yet been committed.

New Coastwise Movements

For decades, there have been large domestic coastwise movements of petroleum products from northern California and Puget Sound to Portland by barge and ship. Three-to-four million tons per year of gasoline and other refined petroleum products move from Richmond in the San Francisco Bay area and Anacortes in northern Puget Sound to Portland. From tank farms on the Willamette River in Portland, roughly half of that volume is then distributed by special purpose petroleum barges to Pasco, Washington and Umatilla, Oregon on the Columbia River and to Wilma, Washington on the Snake River. The remainder is distributed by truck and pipeline within the Portland metropolitan area and surrounding region.

A potential new coastwise market is solid waste container traffic. Local interests have identified potential markets in Seattle, Hawaii and California, where city and regional garbage handlers will soon overwhelm the capacity of local landfills. Specifically, the Columbia Ridge landfill at Arlington, Oregon has ample capacity to take a considerable portion of the available volume from these other states if a short-sea shipping option were available.

This market is particularly attractive because the commodity is readily available, the landfill is happy to handle the new business, and at least some of the containers could be moved on existing barges. There may also be ties between the ownership of the Arlington, Oregon landfill and operators of collection services for the municipalities under consideration. That could make the barge option to Arlington even more attractive. As with the movement of solid waste from Portland, a barge dock would need to be built in or near Arlington.

A long-range investigation is underway by interested parties within the region for a coastwise container service from the congested southern California ports to Portland. Those involved think that such a service could be established on a weekly basis using articulated tug-barge (ATB) technology. The articulated tug-barge vessels being discussed are capable of delivering 700 forty-foot equivalent containers (FEUs) to Portland's Terminal 6.

These vessels have advantages over traditional tug & barge service in that they can carry more cargo, operate in much heavier seas and can navigate the Columbia River bar with fewer weather delays. Their fuel efficiency and speed are better. Compared with domestic movement by ship, they have favorable manning requirements and greater flexibility to operate in shallower drafts. Transloading containers to these ATB vessels could make a small contribution to relieving some of the rail and highway congestion problems at southern California ports and provide additional access for Northwest shippers to container carriers who do not serve Portland. This would be attractive if the new service adds capacity and cargo to the region and does not take cargo from carriers who now call or who have potential to call the Columbia River.

Other opportunities for coastwise short sea shipping include the movements of agricultural and forest products in bulk from the Columbia River to the southern Oregon coast and California markets. The geography of shipping coastwise to California is more favorable shipping containers over the ocean within the Pacific Northwest. One of the most important factors is that the cost advantages of shipping by water are preserved to a greater degree. The all-water distance is not considerably longer than the road distance. The longer north-south haul to California increases the likelihood that the cost per ton-mile benefits of water transit will overcome the higher handling costs associated with that mode. The most efficient operation would be for these bulk cargoes to be handled at just one destination facility located on the water to reduce the need for additional handling and an inland move from the destination port.

Development of specialized equipment for some of these moves, particularly handling waste from Seattle, would further increase efficiency. An ocean-going barge built to the constraining dimensions of the locks on the Columbia Snake River System would reduce handling as there would not be the need to transload cargo in the lower Columbia. The locks' limiting factor is their width of 86 feet. Most current ocean barges have a broader beam.

Conclusions

Market forces have generated demand and the industry has responded with the development of successful short sea shipping services in the Pacific Northwest. Container-on-barge service and barging of solid waste are two prominent examples within the Columbia Snake River System. The shipment of petroleum products from California and Puget Sound to Portland is the most prominent coastwise example.

Barging containers improved the efficiency of the Columbia Snake River international trade corridor and contributed to regional goals of increasing trade and maintaining reliable and frequent steamship service to and from world markets.

Barging of solid waste within the river system is a market-driven domestic movement that offers cost advantages, but also solves local land use issues and keeps thousands of trucks off the highways.

New short sea shipping opportunities exist for container feeder service and for the coastwise movement of domestic cargo. Short sea shipping can also be a useful tool to assist local, state, regional and federal governments meet other policy objectives. Waterborne transportation can help alleviate congestion, reduce pollution, decrease highway maintenance costs, reduce the loss of life and property, and solve land use problems. Both practical and theoretical models exist in Europe and the U.S. that can inform policy decisions to support waterborne commerce.

Care must be taken in making policy decisions to promote short sea shipping opportunities. When establishing public policy, it is important that policy makers understand the full set of impacts of their policy decisions.

Columbia Snake River System
and Oregon Coastal Cargo Ports
Marine Transportation System Study

Appendix D

Funding by Infrastructure Type

Prepared for
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Columbia Snake River System
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Funding by Infrastructure Type

Appendix D summarize MTS funding requirements by infrastructure type. All identified projects of national, regional and local value are listed including those federally authorized projects that require regular maintenance.

C.1 MTS Navigation Projects

Project	Location	System Importance	Basis of Need	Cost
On-Going Maintenance				
Lower Columbia & Willamette Rivers Maintenance Dredging	Lower Columbia & Willamette Rivers	National	Maintain Existing Trade	$20,000,000 (annually.)
Snake River Maintenance Dredging	Snake River	Regional	Maintain Existing Trade	$4-$6,000,000 (every 3 yrs.)
Coos Bay Maintenance Dredging	Coos Bay	Regional	Maintain Existing Trade	$6,500,000 (every 2 yrs.)
Mid Columbia River Lock Maintenance	Mid Columbia River	Regional	Maintain Existing Trade	$1,500,000 (annually.)
Snake River Lock Maintenance	Snake River	Regional	Maintain Existing Trade	$1,,900,000 (annually.)
Yaquina Bay Maintenance Dredging	Newport	Local	Maintain Existing Trade	$1,800,000 (every 2 yrs.)
Near-Term (1-5 Years)				
Columbia River Channel Deepening	Lower Columbia River	National	Maintain Existing Trade & Trade Growth	$148,400,000
Columbia River Jetty Repair	Mouth of Columbia River	National	Maintain Existing Trade	$14,000,000
Mid Columbia River Navigation Lock Repair & Retrofit	Mid Columbia River	Regional	Maintain Existing Trade	$33,300,000
Snake River Navigation Lock Repair & Retrofit	Snake River	Regional	Maintain Existing Trade	$18,100,000
Coos Bay Jetty Repair	Coos Bay Entrance	Regional	Maintain Existing Trade	Study $750,000 Construction $18,700,000
Lower Coos Bay Turning Basin	Coos Bay	Regional	Trade Growth	$4,000,000+
Yaquina Bay Jetty Repair	Newport	Local	Maintain Existing Trade	$28,000,000
Long-Term (10+ Years)				
BNSF Rail Bridge Navigation Lift Span	Portland-Vancouver	Regional	Maintain Existing Trade	$56,500,000

C.2 MTS Rail Projects

Project	Location	System Importance	Basis of Need	Cost
Near-Term (1-5 Years)				
Coos Bay North Bay Industrial Rail Lead	Coos Bay	Regional	Trade Growth	$6,800,000
Upriver Unit Train Facilities	Morrow, Umatilla, Pasco, Lewiston	Regional	Trade Growth	Feasibility $250,000 Construction $4-$6,000,000 each
Mid-Term (6-10 Years)				
I-5 Trade Corridor Rail Capacity Improvements	Portland-Vancouver	National	Trade Growth	$170,000,000
Kelso / Martins Bluff Third Main Line	Kalama-Longview	National	Trade Growth	$190,000,000
New Port of Vancouver Northern Rail Access	Vancouver	Local	Trade Growth	$60,000,000 to $80,000,000
Repair/Replace Coos River Rail Bridge	Coos Bay	Local	Maintain Existing Trade	$10,000,000+
Kalama Grain Terminal Trackage Improvements	Kalama	Local	Trade Growth	$2,500,000
Leadbetter St. Extension & Rail Overcrossing	Portland	Local	Trade Growth	$10,800,000
North Rivergate A&B Rail Yard Expansion	Portland	Local	Trade Growth	$4,500,000
Coos Bay North Bay Marine Terminal Rail infrastructure	Coos Bay	Local	Trade Growth	$3,000,000

C.3 MTS Roadway Projects

Project	Location	System Importance	Basis of Need	Cost
Near-Term (1-5 Years)				
Pasco Processing Center Road Connection to SR395	Pasco	Local	Trade Growth	$300,000
US20 Pioneer Mountain to Eddyville	Newport	Local	Trade Growth	$133,000,000
Umatilla Terminal Access Road Improvements	Umatilla	Local	Trade Growth	$1,000,000
Columbia Blvd.& Lombard St. Improvements at MLK	Portland	Local	Trade Growth	$16,800,000
Mid-Term (6-10 Years)				
I-5 Delta Park to Lombard in North Portland	Portland	Regional	Trade Growth	$44,000,000
Fruit Valley Road, Phase 3	Vancouver	Local	Trade Growth	$10,000,000
West 26th Roadway Extension	Vancouver	Local	Trade Growth	$20,000,000
Long-Term (10+ Years)				
I-5 Columbia River Crossing	Portland-Vancouver	Regional	Trade Growth	$1,000,000,000
Fourth Plain Expansion	Vancouver	Local	Trade Growth	30,000,000
Columbia Blvd. Northbound Ramps to I-5	Portland	Local	Trade Growth	$56,000,000

Columbia/Snake River System and Oregon Coastal Cargo Ports
Marine Transportation System (MTS) Study
Inventory of Existing Facilities

NAME	TOWN	STATE	WTRWY	OWNER	PURPOSE	RWYCONN	REMARK1
Russell's Marine Fuel & Supply, Charleston Docl	Charleston	OR	Charleston Boat Basin	Oregon International Port of Coos Bay	Fueling vessels.	None.	Three 2- and one 1-inch fueling pipeli
Brandon Pacific, Charleston Wharf.	Charleston	OR	Charleston Boat Basin	Oregon International Port of Coos Bay	Receipt of seafood.	None.	-
Brandon Pacific, Charleston Plant Wharf.	Charleston	OR	Charleston Boat Basin	Brandon Pacific, Inc.	Receipt of seafood.	None.	Seafood processing plant is located at
Charleston Small Boat Basin, Outer Basin Piers.	Charleston	OR	Charleston Boat Basin	Oregon International Port of Coos Bay	Mooring fishing boats and pilot boats.	None.	Pilots boats, operated by Coos Bay To
U. S. Coast Guard, Station Coos Bay Moorings.	Charleston	OR	Charleston Boat Basin	Oregon International Port of Coos Bay	Mooring and fueling U. S. Coast Guard ve	None.	Tow 70- by 3-foot, concrete pile, conc
Carvalho Fisheries Dock.	Charleston	OR	Charleston Boat Basin	Oregon International Port of Coos Bay	Receipt of seafood.	None.	Office and storage shed are located on
Charleston Ice Dock.	Charleston	OR	Charleston Boat Basin	Oregon International Port of Coos Bay	Occasional receipt of seafood; icing fishir	None.	Office and ice house are located on do
Cutting Dock, Charleston Wharf.	Charleston	OR	South Slough.	Cutting Dock, Inc.	Receipt of seafood.	None.	Access to wharf is via through former
Hallmark Fisheries, Charleston Dock.	Charleston	OR	South Slough	Hallmark Fisheries.	Receipt of seafood; icing fishing vessels.	None.	Two wooden buildings on wharf are u
Triad, Charleston Wharf.	Charleston	OR	South Slough	Triad, Inc.	Not used.	None.	Former seafood processing and cannir
Oregon International Port of Coos Bay, Distant W	Charleston	OR	South Slough	Oregon International Port of Coos Bay	Mooring vessels.	None.	Unpaved parking lot is located at rear.
Charleston Shipyard, Hanson's Landing, Dock No	Charleston	OR	South Slough	Oregon International Port of Coos Bay	Mooring vessels for repair; mooring vesse	None.	Giddings Boat Works, Inc. operates a
Charleston Shipyard, Hanson's Landing, Dock No	Charleston	OR	South Slough	Oregon International Port of Coos Bay	Mooring vessels.	None.	-
Charleston Shipyard, Hanson's Landing, Dock No	Charleston	OR	South Slough	Oregon International Port of Coos Bay	Mooring vessels.	None.	Two 50- by 3-foot, timber pile, steel-c
Eureka Fisheries, Coos Bay Wharf.	Empire	OR	Coos Bay	Eureka Fisheries, Inc.	Receipt of seafood; icing fishing boats.	None.	Seafood processing facilities are locat
Sause Brothers, Cape Arago Wharf.	Empire	OR	Coos Bay	Sause Brothers.	Mooring barges.	None.	Approximately 10 acres of unpaved, c
North Bay Marine Industrial Park Dock and Slip.	North Bend	OR	Coos Bay	Oregon International Port of Coos Bay	Mooring vessels. (See Remarks.)	None.	Additional berthing is available at upp
Roseburg Forest Products Co., Wood Chip Dock.	North Bend	OR	Coos Bay	Roseburg Forest Products Co.	Shipment of wood chips.	One surface track serves r	Approximately 40 acres of open storag
Ocean Terminals Co., North Bend Wharf.	North Bend	OR	Coos Bay	Ocean Terminals Co.	Receipt and shipment of logs and lumber.	One surface track in rear c	Approximately 32 acres of paved oper
Weyerhaeuser Co., Coos Bay Wood Chip Dock.	North Bend	OR	Coos Bay	Weyerhaeuser Co.	Not used.	One surface track in rear c	Face of wharf is in line and contiguou
Weyerhaeuser Co., Coos Bay Lumber Dock.	North Bend	OR	Coos Bay	Weyerhaeuser Co.	Not used.	One surface track in rear c	Approximately 55 acres of asphalt-sur
Tyree Oil, North Bend Terminal Wharf.	North Bend	OR	Coos Bay	Oregon International Port of Coos Bay	Fueling vessels.	Union Pacific Railroad tra	One 8-, two 6-, and one 4-inch pipelin
Oregon Chip Terminal Wharf.	North Bend	OR	Coos Bay	Pacific Chip Terminal, Inc.	Shipment of wood chips.	Union Pacific Railroad tra	Dolphins front steel or concrete-cappe
Sause Brothers, Bayshore Dock.	Coos Bay	OR	Coos Bay	Sause Brothers.	Mooring vessels; mooring company-owne	Union Pacific Railroad tra	Only approximately 100- by 88-foot s
Chevron U.S.A., Coos Bay Wharf.	Coos Bay	OR	Coos Bay	Chevron U.S.A., Inc.	Not used.	One surface track in rear;	Face is in line with face of Ref. No. 24
Tosco Corp., Coos Bay Wharf.	Coos Bay	OR	Coos Bay	Tosco Corp.	Not used.	Union Pacific Railroad tra	Two mooring dolphins below wharf a
Oregon International Port of Coos Bay, Citrus Do	Coos Bay	OR	Coos Bay	Oregon International Port of Coos Bay	Mooring vessels.	Union Pacific Railroad tra	-
Dolphin Terminals Wharf.	Coos Bay	OR	Coos Bay	Oregon International Port of Coos Bay	Occasional shipment of logs.	Union Pacific Railroad tra	Logs are handled by ships' gear.
U. S. Coast Guard, Coos Bay Wharf.	Coos Bay	OR	Coos Bay	U. S. Government.	Mooring U. S. Coast Guard vessels.	Union Pacific Railroad tra	U. S. Coast Guard vessel Orcas moors
U. S. Army Corps of Engineers, Coos Bay Wharf	Coos Bay	OR	Coos Bay	U. S. Government.	Mooring Corps of Engineers' floating equ	Union Pacific Railroad tra	One 80- by 8-foot timber float at rear
Central Dock Co., Lower Wharf.	Coos Bay	OR	Coos Bay	Central Dock Co.	Not used.	Union Pacific Railroad tra	Face of wharf is in line and contiguou
Central Dock Co., Upper Wharf.	Coos Bay	OR	Coos Bay	Central Dock Co.	Not used.	Surface track at rear conn	Face of wharf is in line and contiguou
Coos Bay Towboat Co. Wharf.	Coos Bay	OR	Upper Coos Bay	Coos Bay Towboat Co.	Mooring company-owned tugs; mooring p	None.	Tugs used as pilot boats, 'Coos Bay' a
Knutson Towboat Co. Wharf.	Coos Bay	OR	Upper Coos Bay	Knutson Towboat Co.	Mooring company-owned vessels; moorir	Union Pacific Railroad tra	Additional berthing for barges is avail
Sause Brothers, Coos Bay Wharf.	Coos Bay	OR	Upper Coos Bay	Sause Brothers.	Mooring company-owned vessels.	Union Pacific Railroad tra	Area below lower wharf and between
Coos Bay City Dock.	Coos Bay	OR	Upper Coos Bay	City of Coos Bay.	Mooring excursion vessels and miscellane	Union Pacific Railroad tra	Harbor cruise vessel Rendezvous moo
Glenbrook Nickel Co. Wharf.	Bunker Hill	OR	Upper Coos Bay	Cominco, Inc.	Not used.	Union Pacific Railroad tra	Approximately 15 acres of open storag
Georgia Pacific Corp., Coos Bay Wood Chip Wh	Bunker Hill	OR	Upper Coos Bay	Georgia Pacific Corp.	Shipment of wood chips.	One surface track in rear c	Face of wharf is in line and contiguou
Coos Bay Docks Wharf.	Bunker Hill	OR	Upper Coos Bay	Georgia Pacific Corp.	Shipment of logs, finished lumber, plywo	None.	Face of wharf is in line and contiguou
Knutson Log Yard Dock.	Millington	OR	Isthmus Slough	Knutson Transportation Co.	Receipt of logs.	None.	Approximately 45 acres of open storag
Coastal Fibre, Isthmus Slough Wharf.	Bunker Hill	OR	Isthmus Slough	Coastal Fibre, Inc.	Shipment of wood chips by barge.	None.	Open storage area located at rear has c
B & G Navigation Dock.	Eastside	OR	Isthmus Slough	B & G Navigation.	Not used.	None.	Property was for sale at time of survey
Southern Oregon Marine Slip.	Eastside	OR	Coos River	Sause Brothers.	Occasional mooring barges for repair.	None.	-
Southern Oregon Marine Wharf.	Eastside	OR	Coos River	Sause Brothers.	Mooring vessels and barges for outfitting	None.	Two 2,000-ton floating drydocks are r
Hallmark Fisheries, Salmon Harbor Wharf.	Winchester Bay	OR	Umpqua River	Port of Umpqua, Salmon Harbor Marin	Receipt of seafood.	None.	Plans call for the replacement of the w
Salmon Harbor Marina, Breakwater Dock.	Winchester Bay	OR	Umpqua River	Douglas County.	Mooring commercial vessels.	None.	Harbormaster's office and paved parki
Reedsport Machine & Fabrication, Winchester B	Winchester Bay	OR	Umpqua River	Reedsport Machine & Fabrication.	Mooring vessels for repair.	None.	Marine repair plant is located at rear.
U.S. Coast Guard, Station Umpqua River Moorin	Winchester Bay	OR	Umpqua River	U.S. Government.	Mooring U.S. Coast Guard vessels.	None.	Concrete pile, concrete-decked piers f
International Paper Co, Gardiner Paper Mill Oil W	Gardiner	OR	Umpqua River	International Paper Co.	Not used.	One surface track serving	One 10-inch pipeline extends from wh
International Paper Co, Gardiner Saw Mill Wood	Gardiner	OR	Umpqua River	International Paper Co.	Not used.	One surface track serving	Approximately 10 acres of open storag
Fred Wahl Marine Construction, Reedsport Whar	Reedsport	OR	Umpqua River	Port of Umpqua.	Mooring vessels for repair.	None.	One 1,200-ton, marine railway and ma
Umpqua River Navigation, Reedsport Wharf.	Reedsport	OR	Umpqua River	Umpqua River Navigation Co.	Receipt of sand, gravel, and aggregate by	None.	Approximately 10 acres of open storag
U.S. Coast Guard Station, Siuslaw River Moorin	Florence	OR	Siuslaw River	U.S. Government.	Mooring and fueling U.S. Coast Guard ve	None.	U.S. Coast Guard Station Siuslaw Riv

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International C-Food Marketing, Florence Wharf	Florence	OR	Siuslaw River	Port of Siuslaw.	Receipt of seafood; icing fishing vessels.	None.	Seafood processing plant and Internat
Port of Siuslaw, West Basin Floats.	Florence	OR	Siuslaw River	Port of Siuslaw.	Mooring commercial vessels.	None.	Paved parking lot is located at rear.
Florence Marine Construction Wharf.	Florence	OR	Siuslaw River	Don Wilbur.	Mooring company-owned floating equipn	None.	Marine contractor's storage yard is loc
Kirby's Marine, Siuslaw Marina.	Cushman	OR	Siuslaw River	Kirby Hansen.	Mooring small vessels for repair.	None.	One 50-ton, marine railway is located
U.S. Coast Guard Station Yaquina Bay Moorings	Newport	OR	Yaquina Bay	U.S. Government.	Mooring U.S. Coast Guard vessels.	None.	Lower 150 feet of offshore wharf is co
Ocean Beauty Seafoods, Newport Wharf.	Newport	OR	Yaquina Bay	Ocean Beauty Seafoods, Inc.	Receipt of seafood.	None.	Seafood processing building is located
Bornstein Seafoods, Newport Wharf.	Newport	OR	Yaquina Bay	Bornstein Seafoods, Inc.	Receipt of seafood; icing fishing vessels.	None.	Seafood processing building is located
Trident Seafoods, Newport Plant Wharf.	Newport	OR	Yaquina Bay	Trident Seafoods, Inc.	Receipt of seafood; icing fishing vessels.	None.	Seafood processing building is located
Pacific Shrimp Co., Newport West Wharf.	Newport	OR	Yaquina Bay	Pacific Shrimp Co.	Receipt of seafood; icing fishing vessels.	None.	Seafood processing building is located
Hallmark Fisheries, Newport West Wharf.	Newport	OR	Yaquina Bay	Hallmark Fisheries.	Receipt of seafood; icing fishing vessels.	None.	Ice plant is located at rear of wharf.
Hallmark Fisheries, Newport East Wharf.	Newport	OR	Yaquina Bay	Hallmark Fisheries.	Receipt of seafood.	None.	Wharf is in line with Ref. No. 63.
Port of Newport, Excursion Dock.	Newport	OR	Yaquina Bay	Port of Newport.	Mooring excursion vessel 'Discovery.'	None.	Parking lot is located across street.
Port of Newport, Dock No. 1.	Newport	OR	Yaquina Bay	Port of Newport.	Mooring vessels.	None.	-
Yaquina Ice & Cold Storage Dock.	Newport	OR	Yaquina Bay	Pacific Shrimp Co.	Receipt of seafood.	None.	Seafood processing and cold storage b
Pacific Shrimp Co., Newport East Wharf.	Newport	OR	Yaquina Bay	Pacific Shrimp Co.	Receipt of seafood.	None.	Seafood processing and cold storage b
Port of Newport, Dock No. 3.	Newport	OR	Yaquina Bay	Port of Newport.	Mooring vessels.	None.	-
Port of Newport, Dock No. 5.	Newport	OR	Yaquina Bay	Port of Newport.	Mooring and fueling fishing vessels.	None.	One 3-inch fueling pipeline extends to
Port of Newport, Swede's Dock.	Newport	OR	Yaquina Bay	Port of Newport.	Mooring small vessels.	None.	Small repairs are made along floats by
Port of Newport, Service Wharf.	Newport	OR	Yaquina Bay	Port of Newport.	Handling supplies and equipment to and f	None.	Port offices and parking lot are located
Port of Newport, Dock No. 7.	Newport	OR	Yaquina Bay	Port of Newport.	Mooring fishing vessels.	None.	Port Dock No. 7 is utilized by vessels
Port of Newport, Berth 1 Wharf.	Newport	OR	Yaquina Bay	Port of Newport.	Occasional receipt and shipment of lumbe	None.	Upper side of timber wharf forms low
Port of Newport, Berth 2 Wharf.	Newport	OR	Yaquina Bay	Port of Newport.	Handling supplies and equipment for fishi	None.	Lower side of wharf forms upper part
Oregon State University, Hatfield Marine Scienc	South Beach	OR	Yaquina Bay	Oregon State University.	Mooring oceanographic research vessels.	None.	Oregon State University Oceanograph
Port of Newport, Dock No. 2	Newport	OR	Yaquina Bay	Port of Newport.	Receipt of seafood.	None.	-
U.S. Coast Guard, Station Cape Disappointment	Ilwaco	WA	Columbia River	United States Government.	Mooring U. S. Coast Guard lifeboats.	None.	Twin 120- by 4-foot, timber pile, timb
Ocean Fresh Crab & Seafood, Ilwaco Wharf.	Ilwaco	WA	Baker Bay	Ocean Fresh Crab & Seafood.	Receipt of seafood.	None.	Seafood receiving station is located at
Port of Ilwaco, Vertical Boat Lift Piers.	Ilwaco	WA	Baker Bay	Port of Ilwaco.	Mooring vessels for repair.	None.	Port of Ilwaco boat yard is located at r
Chinook Packing Co., Ilwaco Wharf.	Ilwaco	WA	Baker Bay	Port of Ilwaco.	Receipt of seafood; handling supplies and	None.	Seafood receiving station is located at
Jessie's Ilwaco Fish Co. Wharf.	Ilwaco	WA	Ilwaco Commercial Ba	Jessie's Ilwaco Fish Co., Inc.	Receipt of seafood; fueling small vessels.	None.	Jessie's Ilwaco Fish Co., Inc.: Seafoo
Chinook Packing Co., Chinook Wharf.	Chinook	WA	Columbia River	Chinook Packing Co.	Receipt of seafood; icing fishing vessels.	None.	Seafood processing plant is located at
Port of Chinook Wharves.	Chinook	WA	Columbia River	Port of Chinook.	Receipt of seafood; icing fishing vessels;	None.	Seafood processing plant is located at
Port of Chinook Wharf.	Chinook	WA	Columbia River	Port of Chinook.	Occasional receipt of seafood.	None.	One hoist for vessels up to 26-feet in l
Point Adams Packing Co., Hammond Wharf.	Hammond	OR	Columbia River	California Shellfish, Inc. d.b.a. Point A	Receipt of seafood; icing fishing vessels.	None.	Seafood processing plant is located in
Bioproducts, Warrenton Wharf.	Warrenton	OR	Columbia River	Bioproducts, Inc.	Not used.	None.	Wharf was formerly used for the recei
Nygaard Brothers Logging Co., Warrenton Whar	Warrenton	OR	Columbia River	City of Warrenton.	Receipt of logs.	None.	Wharf was being constructed at time o
Warrenton Fiber Co. Wharf.	Warrenton	OR	Columbia River	City of Warrenton.	Shipment of wood chips.	None.	Open storage area located at rear has o
Warrenton Wood Products Pier.	Warrenton	OR	Skipanon Waterway	Warrenton Wood Products, Cavenham	Shipment of wood chips; occasional shipr	None.	Log rafts are occasionally received at
Pacific Coast Seafoods, Warrenton Wharf.	Warrenton	OR	Skipanon Waterway	Pacific Coast Seafood, Inc.	Receipt of seafood; icing and fueling fishi	None.	Seafood processing plant is located in
Warrenton Boat Yard Dock.	Warrenton	OR	Skipanon Waterway	Warrenton Boat Yard.	Mooring small vessels for repair; handlin	None.	One 175- and one 50-ton marine railw
Astoria Marine Construction Co., Outfitting and	Astoria	OR	Lewis and Clark River	Astoria Marine Construction Co.	Mooring vessels for repair and outfitting;	None.	One 250- and one 50-ton marine railw
Port of Astoria Barge Slip.	Astoria	OR	Columbia River	Port of Astoria.	Receipt and shipment of conventional ger	None.	Sides of slip are not used for breasting
Port of Astoria, Pier No. 3.	Astoria	OR	Columbia River	Port of Astoria.	Mooring vessels; handling supplies and ec	None.	One 190,400-square-foot concrete bui
Port of Astoria, Pier No. 2.	Astoria	OR	Columbia River	Port of Astoria.	Receipt and shipment of conventional ger	None.	McCall Oil and Chemical Co.: Two 1
Port of Astoria, Pier No. 1, West Side.	Astoria	OR	Columbia River	Port of Astoria.	Receipt and shipment of conventional ger	None.	Approximately 5 acres of open storag
Port of Astoria, Pier No. 1, Face.	Astoria	OR	Columbia River	Port of Astoria.	Receipt and shipment of conventional ger	None.	See Remarks under P. W. D. Ref. No.
Astoria Warehousing Wharf.	Astoria	OR	Columbia River	Astoria Warehousing, Inc.	Receipt of canned salmon by barge.	None.	Four steel frame, metal covered buildi
Fishhawk Fisheries, Astoria Wharf.	Astoria	OR	Columbia River	Fishhawk Fisheries, Inc.	Receipt of seafood.	None.	Seafood processing plant is located at
Carmichael-Columbia Oil, Astoria Wharf.	Astoria	OR	Columbia River	Carmichael-Columbia Oil, Inc.	Fueling fishing vessels.	None.	One 3-inch pipeline extend to wharf fr
Bornstein Seafoods, Astoria Wharf.	Astoria	OR	Columbia River	Bornstein Seafoods, Inc.	Receipt of seafood.	None.	Seafood processing plant and storage
Ocean Foods of Astoria Wharf.	Astoria	OR	Columbia River	Ocean Foods of Astoria, Inc.	Receipt of seafood; icing fishing vessels.	None.	Seafood processing plant and storage
Fergus-McBarendse Co., Astoria Wharf.	Astoria	OR	Columbia River	Fergus-McBarendse Co.	Receipt of seafood; icing fishing vessels.	None.	Steel frame, metal-covered seafood pr
Foss Maritime Co., Astoria Wharf and Mooring I	Astoria	OR	Columbia River	Foss Maritime Co.	Mooring company-owned vessels and pilo	None.	Operators maintain offices in building
Englund Marine Supply Co., Astoria Wharf.	Astoria	OR	Columbia River	Englund Marine Supply Co., Inc.	Handling supplies to and from vessels.	None.	Marine supply store is located at rear.
Columbia River Maritime Museum, Astoria Wha	Astoria	OR	Columbia River	City of Astoria.	Mooring lightship 'Columbia' on exhibitic	None.	Maritime Museum is located in buildi

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Port of Astoria, East Mooring Basin Breakwater \	Astoria	OR	Columbia River	Port of Astoria.	Mooring commercial vessels and recreati	None.	A line of 7 steel breasting dolphins fro
Astoria Sea Products Wharf.	Astoria	OR	Columbia River	Astoria Sea Products LLC.	Receipt of seafood; icing fishing vessels.	None.	Seafood processing plant and cold sto
U. S. Coast Guard, Astoria Wharf.	Astoria	OR	Columbia River	U. S. Government.	Mooring U. S. Coast Guard vessels.	None.	Office, warehouse, shops, and buoy st
Tongue Point Job Corps Center, Pier 7.	Astoria	OR	Columbia River	U. S. Government.	Mooring training vessels.	None.	A 50-foot-wide, concrete launching ra
Tongue Point, Piers 3, 4, and 5.	Astoria	OR	Columbia River	State of Oregon.	Shipment of steel products; mooring vess	None.	Pacific Marine and Steel, Inc. leases 4
Tongue Point, Piers 1 and 2.	Astoria	OR	Columbia River	State of Oregon.	Mooring company-owned vessels and bar	None.	Entrance channel has a depth of 34 fe
U. S. Army Corps of Engineers, Astoria Wharf.	Astoria	OR	Columbia River	U. S. Government.	Mooring government-owned floating equi	None.	U. S. Army Corps of Engineers, Astor
James River Corp., Wauna Mill, Transit Shed Do	Wauna	OR	Columbia River	James River Corp.	Shipment of paper products and wood pul	Plant trackage connects w	Approximately 25,000 square feet of
James River Corp., Wauna Mill, Fuel Oil Wharf.	Wauna	OR	Columbia River	James River Corp.	Receipt of Bunker 'C' fuel oil for plant co	Plant trackage connects w	Faces of P. W. D. Ref. Nos. 38, 39, an
James River Corp., Wauna Mill, Peco Wharf.	Wauna	OR	Columbia River	James River Corp.	Receipt of wood chips and sawdust.	Plant trackage connects w	Open storage area for wood chips loca
James River Corp., Wauna Mill, Driscoll Slough	Wauna	OR	Columbia River	James River Corp.	Occasionally mooring barges.	Plant trackage connects w	Wharf was formerly used for shipmen
Wahkiakum Ferry Landing.	Puget Island	WA	Columbia River	Wahkiakum County, Washington.	Landing for vehicular and passenger ferry	None.	Ferry maintains hourly schedule year-
Portland General Electric Co., Beaver Generating	Westport	OR	Columbia River	Port of St. Helens.	Not used.	Two unused surface track	One 20-inch, insulated, and one 6-inc
Portland General Electric Co., Bradbury Slough I	Mayger	OR	Columbia River	Port of St. Helens.	Mooring oceangoing vessels in storage.	None.	-
Mayger Lower Wharf.	Mayger	OR	Columbia River	Robert and Darliss Hyke.	Occasional receipt of seafood; handling a	None.	A 250- by 40-foot net storage shed is
Mayger Upper Wharf.	Mayger	OR	Columbia River	Jerry Everman.	Occasional receipt of seafood; handling a	None.	A 250- by 40- and 80-foot net storage
Reynolds Metals Co., Longview Reduction Plant	Longview	WA	Columbia River	Reynolds Metals Co.	Receipt of alumina.	Trackage serving plant in	Two steel alumina storage tanks are lo
Weyerhaeuser Co., Longview Plant, Salt Dock.	Longview	WA	Columbia River	Weyerhaeuser Co.	Receipt of salt.	Trackage serving plant in	Open storage area on wharf has capac
Weyerhaeuser Co., Longview Plant, Lumber Bar	Longview	WA	Columbia River	Weyerhaeuser Co.	Shipment of lumber and newsprint.	Trackage serving plant in	Approximately 2 1/2 acres of unpaved
Weyerhaeuser Co., Longview Plant, Woodpulp E	Longview	WA	Columbia River	Weyerhaeuser Co.	Shipment of lumber, paper products, and	Trackage serving plant in	Three warehouses on wharf with a tot
Weyerhaeuser Co., Longview Plant, Barge Slip.	Longview	WA	Columbia River	Weyerhaeuser Co.	Receipt of wood chips by barge.	Trackage serving plant in	Approximately 12 acres of open stora
Weyerhaeuser Co., Longview Plant Log Export V	Longview	WA	Columbia River	Weyerhaeuser Co.	Shipment of logs.	Trackage serving plant in	Approximately 20 acres of paved, ope
Port of Longview, Berth No. 1.	Longview	WA	Columbia River	Port of Longview.	Receipt and shipment of conventional ger	One surface track joins wi	Hopper cars unload bulk materials int
Port of Longview, Berths Nos. 2 and 3.	Longview	WA	Columbia River	Port of Longview.	Receipt and shipment of conventional ger	One surface track along fu	Face of wharf is in line and contiguou
Port of Longview, Grain Wharf, Berth No. 4.	Longview	WA	Columbia River	Port of Longview.	Not used.	Four tracks serving car du	Wharf was formerly used for receipt c
Port of Longview, Petroleum Coke Wharf, Berth	Longview	WA	Columbia River	Port of Longview.	Shipment of petroleum coke in foreign an	Surface tracks in rear of st	Logs are handled by ships' gear from
Port of Longview, Berths Nos. 6 and 7.	Longview	WA	Columbia River	Port of Longview.	Receipt and shipment of general cargo in	Three surface tracks on ap	Approximately 5 acres of open storag
International Paper Co., Longview Wood Chip E	Longview	WA	Columbia River	International Paper Co.	Shipment of wood chips.	Trackage serving plant an	Open storage area located in rear has
Longview Fibre Co., Fuel Oil Dock.	Longview	WA	Columbia River	Longview Fibre Co.	Receipt of fuel oil for plant consumption.	Trackage serving plant in	One 16-inch pipeline with three 8-inc
Longview Fibre Co., Wood Chip Dock.	Longview	WA	Columbia River	Longview Fibre Co.	Receipt of wood chips and hogged fuel.	Trackage serving rail car	Open wood chip storage area located
Foss Maritime Co., Rainier Mooring.	Rainier	OR	Columbia River	Foss Maritime Co.	Mooring and repairing company-owned fl	None.	An additional row of 12 timber moori
Port of Kalama, Bulk Materials Dock.	Kalama	WA	Columbia River	Port of Kalama.	Mooring vessels. (See Remarks).	None.	Plans call for the construction of a 40
Peavey Co., Kalama Grain Elevator Wharves.	Kalama	WA	Columbia River	Peavey Co., a division of ConAgra Co	Receipt of grain by barge and shipment by	Two surface tracks serve t	Grain elevator located in rear consisti
Kalama Chemical, Kalama Wharf.	Kalama	WA	Columbia River	Kalama Chemical, Inc., a Freedom Ch	Receipt of toluene by vessel.	One surface track serving	One 6-inch pipeline extends from wha
RSG/Forest Products, Kalama Wharf.	Kalama	WA	Columbia River	Port of Kalama.	Shipment of lumber by oceangoing barge.	Plant trackage connects w	Approximately 40 acres of open stora
RSG/Forest Products, Kalama Log Handling Plat	Kalama	WA	Columbia River	Port of Kalama.	Receipt rafted logs.	Burlington Northern Railr	Open storage area is described under
Harvest States Cooperatives, Kalama Grain Elev	Kalama	WA	Columbia River	Port of Kalama.	Receipt of grain by barge and shipment by	Two surface tracks serve	Grain elevator located in rear consisti
Chevron Chemical Co., St. Helens Wharf.	St. Helens	OR	Columbia River	Chevron Chemical Co.	Shipment of liquid fertilizer.	Three surface tracks servi	One 6-inch pipeline extends to wharf
Port of St. Helens Pier.	Columbia City	OR	Columbia River	Port of St. Helens.	Shipment of lumber; receipt of rafted logs	One 8-car-capacity track i	Dixieline Lumber Co.: Approximatel
Port of St. Helens Dock.	Columbia City	OR	Columbia River	Port of St. Helens.	Not used.	Trackage in rear connects	Outer 140 feet of approach is on timb
Boise Cascade Corp., St. Helens Mill, Dock.	St. Helens	OR	Multnomah Channel	Boise Cascade Corp.	Shipment of bulk woodpulp; receipt of fu	Two surface tracks serve	One 10-inch pneumatic pipeline exten
Armstrong World Industries, St. Helens Wharf.	St. Helens	OR	Scappoose Bay	Armstrong World Industries.	Not used.	One surface track serving	Portions of timber decking and appro
Multnomah Plywood, St. Helens Dock.	St. Helens	OR	Scappoose Bay	Multnomah Plywood Corp.	Not used.	Three surface tracks serve	Log raft storage area and chain and bu
Lone Star Northwest, Santosh Plant Dock.	Scappoose	OR	Santosh Slough	Lone Star Northwest.	Shipment of sand and gravel.	None.	An additional 110 feet of mooring spa
Foss Maritime, Scappoose Boom Dock.	Scappoose	OR	Multnomah Channel	Cavenham Corp.	Shipment of rafted logs.	None.	-
Georgia-Pacific Corp. Linnton Wood Chip Dock.	Portland	OR	Willamette River	Georgia-Pacific Corp.	Shipment of wood chips.	Three surface tracks in re	Chip storage yard located at rear has t
Trumbull Asphalt, Linnton Terminal Wharf.	Portland	OR	Willamette River	Trumbull Asphalt, division of Owens	Occasional receipt of asphalt.	One surface track serving	One 12-inch, hot-oil traced pipeline e
GATX Tank Storage Terminals Corp., Portland I	Portland	OR	Willamette River	GATX Tank Storage Terminals Corp.	Receipt and shipment of liquid bulk comm	Two tracks in rear, total c	One 12-, six 10-, one 8-, and three 6-i
Linnton Plywood Association, Portland Dock.	Portland	OR	Willamette River	Linnton Plywood Association.	Not used.	None.	Rafted logs are moored along 700-foo
ARCO Products Co., Linnton Terminal Wharf.	Portland	OR	Willamette River	ARCO Products Co., Division of Atla	Receipt and shipment of petroleum produ	One surface track in rear	One 10-, one 8-, and two 6-inch pipeli
Mobil Oil Corp., Linnton Terminal Wharf.	Portland	OR	Willamette River	Mobil Oil Corp.	Receipt and shipment of petroleum produ	Plant trackage in rear con	Three 10-, and three 8-inch pipelines
Time Oil Co., Linnton Terminal Wharf.	Portland	OR	Willamette River	Time Oil Co.	Receipt and shipment of petroleum produ	None.	Three 10-inch pipelines extend from
Foss Maritime Co., Portland Mooring.	Portland	OR	Willamette River	Foss Maritime Co.	Mooring and repairing company-owned fl	None.	At head of slip along inner row of dol
Riverside Industrial Park, Piers and Barge Slips.	Portland	OR	Willamette River	Riverside Industrial Park.	Mooring company-owned floating equipn	None.	Additional 300 feet of mooring is avai

U. S. Army Corps of Engineers, Portland Moorin	Portland	OR	Willamette River	United States Government.	Mooring, repairing and outfitting Corps o	One surface track at rear o	The face of Dock B and the approach
Pacific Northern Oil Corp., Portland Terminal W	Portland	OR	Willamette River	Northwest Natural Gas Co.	Receipt and shipment of petroleum produ	Plant trackage in rear con	A 350- by 6-foot timber approach exte
Elf Atochem North America, Portland Plant, Doc	Portland	OR	Willamette River	Elf Atochem North America, Inc.	Shipment and occasional receipt of liquid	Six surface tracks serve pl	The following pipelines extends to wh
Elf Atochem North America, Portland Plant, Doc	Portland	OR	Willamette River	Elf Atochem North America, Inc.	Mooring vessels.	Six surface tracks serve pl	Vessels carrying salt for discharge at a
Elf Atochem North America, Portland Plant, Doc	Portland	OR	Willamette River	Elf Atochem North America, Inc.	Receipt of salt by self-unloading vessels.	Six surface tracks serve pl	Open storage area at rear has capacity
GATX Terminals Corp., , Willbridge Plant Pier.	Portland	OR	Willamette River	GATX Terminals Corp.	Receipt and shipment of petroleum produ	Terminal trackage in rear	Four 12-, two 10-, two 8-, and five 6-i
Chevron U.S.A., Willbridge Terminal Pier.	Portland	OR	Willamette River	Chevron U.S.A., Inc.	Receipt and shipment of petroleum produ	Terminal trackage in rear	Two 16-, four 12-, one 10-, five 8-, an
Unocal Petroleum Products and Chemicals Divis	Portland	OR	Willamette River	Unocal Petroleum Products and Chemi	Receipt and shipment of petroleum produ	Terminal trackage in rear	Two 12-, four 10-, two 8-, five 6-, and
McCall Oil and Chemical Co., Portland Terminal	Portland	OR	Willamette River	McCall Oil and Chemical Co.	Receipt and shipment of petroleum produ	One surface track at rear o	One 14-inch insulated, one 10-inch, a
Lone Star Northwest, Front Avenue Plant Pier.	Portland	OR	Willamette River	Lone Star Northwest, Inc.	Receipt of sand and gravel by self-unload	None.	Open storage area with capacity for ap
Shaver Transportation Co., Portland Mooring.	Portland	OR	Willamette River	Shaver Transportation Co.	Mooring company-owned floating equipm	None.	Maintenance shop is located on steel f
Lakeside Industries, Portland Pier.	Portland	OR	Willamette River	Lakeside Industries.	Receipt of aggregate by self-unloading ve	None.	Open storage area with capacity for ap
Gunderson Marine, Portland Outfitting Pier.	Portland	OR	Willamette River	Gunderson Marine, Inc.	Mooring vessels and barges for occasiona	Plant trackage in rear con	A side launching buildings way locate
Texaco Refining and Marketing, Portland Termin	Portland	OR	Willamette River	Texaco Refining and Marketing Inc.	Receipt and shipment of petroleum produ	None.	One 12-, two 8-, two 6-, and one 4-inc
Gunderson Marine, Portland Berthing and Outfitt	Portland	OR	Willamette River	Gunderson Marine, Inc.	Mooring vessels for outfitting and repair.	Two surface tracks join ad	-
Waterway Terminals Co., Portland Front Avenue	Portland	OR	Willamette River	Waterway Terminals Co., a division of	Receipt and shipment of conventional ger	Eight platform-level track	Transit shed is also operated as a publ
Western Transportation, Portland Mooring Whar	Portland	OR	Willamette River	Western Transportation, a division of J	Mooring company-owned vessels.	None.	Row of steel mooring dolphins is in li
City of Portland, Fireboat No. 2 Dock.	Portland	OR	Willamette River	Port of Portland.	Mooring fireboats and harbor patrol vesse	None.	Fireboat 'David Campbell,' and fire an
Port of Portland Terminal 2, BerthS 204, 205 and	Portland	OR	Willamette River	Port of Portland.	Receipt and shipment of conventional, co	Two connecting surface tr	A 27< acre container storage yard at r
Sulzer-Bingham Pumps,Dock.	Portland	OR	Willamette River	Port of Portland.	Mooring vessels, Handling various suppli	One surface track on apro	-
Port of Portland Terminal 1, Berths 101, 102, and	Portland	OR	Willamette River	Port of Portland.	Receipt and shipment of wood pulp and p	Two surface tracks on eac	Face of wharf is in line and contiguou
Port of Portland Terminal 2, Berth 203.	Portland	OR	Willamette River	Port of Portland.	Receipt and shipment of wood pulp and p	Use of trackage serving T	Wharf is adjacent to and has use of fa
Port of Portland Terminal 1; Berth 104.	Portland	OR	Willamette River	Port of Portland.	Mooring reserve fleet vessels.	One surface track serving	Transit shed is at rear and connected t
Port of Portland Terminal 1, Berths 105 and 106.	Portland	OR	Willamette River	Port of Portland.	Mooring reserve fleet vessels.	Two surface tracks on apr	Warehouse No. 2 and House 106 are u
City of Portland Governor Tom McCall Waterfro	Portland	OR	Willamette River	City of Portland.	Mooring excursion vessel 'Spirit of Portla	None.	Excursion vessel operates throughout
Zidell Marine Group Wharf.	Portland	OR	Willamette River	Zidell Marine Group Inc.	Mooring floating equipment; Handling su	None.	Steel grating bridge sections form dec
James River Corp.; Lake Oswego Wood Chip Tr	Lake Oswego	OR	Willamette River	Port of Portland.	Shipment of wood chips by barge.	One surface track serves c	Approximately 15 acres of open stora
Simpson Paper Co.; Evergreen Mill Wharf.	West Linn	OR	Willamette River	Portland General Electric Co.	Receipt of bagged starch, clay and baled v	None.	Building has storage space for approx
Ross Island Sand & Gravel Co., Hardtack Island	Portland	OR	Willamette River	Ross Island Sand & Gravel Co.	Receipt and shipment of sand and gravel.	None.	Approximately 5 acres of open storag
Ross Island Sand & Gravel Co., Tait Plant Dock.	Portland	OR	Willamette River	Ross Island Sand & Gravel Co.	Receipt of sand and gravel.	None.	Open storage area located at rear has c
Lone Star Northwest, City Center Plant Dock.	Portland	OR	Willamette River	Lone Star Northwest, Inc.	Not used.	None.	Former ready-mix plant located at rea
Lone Star Northwest, Portland Mooring.	Portland	OR	Willamette River	Lone Star Northwest, Inc.	Not used.	None.	-
Portland General Electric Co., Station L, Upper D	Portland	OR	Willamette River	Portland General Electric Co.	Not used.	None.	Oregon Museum of Science & Industr
City of Portland, Engine 7 Dock.	Portland	OR	Willamette River	City of Portland Fire Bureau.	Not used.	None.	Fire Prevention Division, East Side O
Louis Dreyfus Corp., Portland Wharf.	Portland	OR	Willamette River	Louis Dreyfus Corp.	Shipment of grain.	Four surface tracks in rear	Vessels up to 750 feet in length can b
Louis Dreyfus Corp., Portland Barge Dock.	Portland	OR	Willamette River	Louis Dreyfus Corp.	Receipt of grain by barge.	None.	Grain elevator located at rear consisti
Cargill, Portland Barge Dock.	Portland	OR	Willamette River	Cargill, Inc.	Receipt of grain by barge.	None.	Grain elevator located at rear consisti
Cargill, Portland Wharf.	Portland	OR	Willamette River	Cargill, Inc.	Shipment of grain.	Four surface tracks at rear	See Remarks, P. W. D. Ref. No. 121.
Lone Star Northwest, River Street Terminal Doc	Portland	OR	Willamette River	Lone Star Northwest, Inc.	Receipt of bulk cement.	Two surface tracks, each s	Sixteen concrete silos located in rear h
Lone Star Northwest, River Street Terminal Moo	Portland	OR	Willamette River	Lone Star Northwest, Inc.	Mooring company-owned floating equipm	Union Pacific Railroad: C	-
Ross Island Sand & Gravel Co., Albina Plant Do	Portland	OR	Willamette River	Ross Island Sand & Gravel Co.	Receipt of sand and gravel by barge.	Union Pacific Railroad: C	Ready-mix asphalt plant and approxin
Ash Grove Cement Co., Portland Wharf.	Portland	OR	Willamette River	Ash Grove Cement Co.	Receipt of bulk cement.	One surface track and two	Seven concrete silos located in rear ha
Columbia Aluminum, Portland Wharf.	Portland	OR	Willamette River	Columbia Aluminum Corp.	Receipt of alumina by vessel.	Two surface trucks at rear	Three storage silos are on steel pipe p
Port of Portland Swan Island Ship Repair Yard, E	Portland	OR	Willamette River	Port of Portland.	Mooring vessels for repair, conversion, ar	Trackage serving shipyard	Floating Drydock No. 4, capacity 87,0
Port of Portland Swan Island Ship Repair Yard, S	Portland	OR	Willamette River	Port of Portland.	Mooring small craft and floating staging f	Trackage serving shipyard	-
Port of Portland Swan Island Ship Repair Yard, F	Portland	OR	Willamette River	Port of Portland.	Mooring vessels for repair, conversion, ar	One surface track in cente	Floating Drydock No. 3, capacity 27,0
Port of Portland Swan Island Ship Repair Yard P	Portland	OR	Willamette River	Port of Portland.	Mooring vessels for repair, conversion, ar	Trackage serving shipyard	Floating Drydock No. 1, capacity 15,0
Port of Portland Swan Island Ship Repair Yard, E	Portland	OR	Willamette River	Port of Portland.	Mooring vessels.	Trackage serving shipyard	-
Port of Portland Swan Island Ship Repair Yard, E	Portland	OR	Willamette River	Port of Portland.	Mooring vessels.	None.	-
Port of Portland; Seaplane Hangar Dock.	Portland	OR	Willamette River	Port of Portland.	Mooring miscellaneous vessels and barge	None.	-
Fred Devine Diving & Salvage Co. Dock.	Portland	OR	Willamette River	Marine Salvage Consortium, Inc.	Mooring company-owned floating equipm	None.	Office and supplies and equipment sto
U.S. Naval and marine Corps Reserve Portland P	Portland	OR	Willamette River	United States Government.	Mooring Naval Reserve vessels.	None.	U.S. Naval and Marine Corps Readin
U.S. Coast Guard Group, Portland; Mooring Floa	Portland	OR	Willamette River	United States Government.	Mooring and repairing U.S. Coast Guard	None.	One 4-inch sewage and 2-inch fueling
Willamette Western Corp.; Piers.	Portland	OR	Willamette River	Willamette Western Corp.	Mooring floating equipment for repair.	Trackage in rear connects	-

McCormick & Baxter Wharf	Portland	OR	Willamette River	McCormick & Baxter Co.	Mooring miscellaneous vessels and barge	Trackage in rear connects	Company was in receivership at time
Nichols Marine Ways Portland, Wharf.	Portland	OR	Willamette River	Nichols Marine Ways Inc.	Mooring vessels awaiting repair.	None.	One 1,000- and one 500-ton marine ra
Port of Portland Terminal 4, Automobile Unloadi	Portland	OR	Willamette River	Port of Portland.	Receipt of automobiles.	One surface ladder track v	A 73-acre, fenced, asphalt-surfaced, o
Port of Portland Terminal 4, Berths 415 and 414.	Portland	OR	Willamette River	Port of Portland.	Receipt and shipment of conventional, ge	Two parallel, 800-foot-lon	A 38-acre, asphalt-surfaced, open stor
Port of Portland Terminal 4, Berth 412.	Portland	OR	Willamette River	Port of Portland.	Mooring vessels and barges.	Terminal trackage in rear	At time of survey (1995) wharf was in
Port of Portland Terminal 4, Berths 411 and 410.	Portland	OR	Willamette River	Port of Portland.	Receipt and shipment of miscellaneous bu	Three surface tracks along	Steel and concrete bulk storage wareh
Port of Portland Terminal 4, Harbor Patrol and Fi	Portland	OR	Willamette River	Port of Portland.	Mooring fireboats and harbor patrol vesse	None.	Office building is located on a 60- by
Port of Portland Terminal 4, Berths 406, 407, and	Portland	OR	Willamette River	Port of Portland.	Receipt and shipment of conventional and	Two surface tracks along	Approximately 13 acres of asphalt sur
Port of Portland Terminal 4, Roll-on Roll-off Fac	Portland	OR	Willamette River	Port of Portland.	Receipt and shipment of roll-on roll-off g	Trackage serving terminal	Slip 1 is 1,500 feet long by approxima
Port of Portland Terminal 4, Pier 1, Berths 403, 4	Portland	OR	Willamette River	Port of Portland.	PM Ag Products Inc.: Receipt and shipme	Four surface tracks serve	Cargill, Inc., operates grain elevator a
Port of Portland Terminal 4, Grain Elevator,Berth	Portland	OR	Willamette River	Port of Portland.	Shipment of grain.	Four surface tracks serve	House No. 5 at rear no longer functio
International Terminals Berth 4, Bulk Loader Do	Portland	OR	Willamette River	Schnitzer Steel Products Co.	Shipment of miscellaneous bulk commod	Trackage serving terminal	Terminal at rear occupies approximate
International Terminals Berth 5, Layup Mooring.	Portland	OR	Willamette River	Schnitzer Steel Products Co.	Mooring vessels.	Trackage serving terminal	
International Terminals Berths 1, 2, and 3 Wharf.	Portland	OR	Willamette River	Schnitzer Steel Products Co.	Shipment of scrap metal; Receipt and ship	Two surface tracks on wh	Facility operates as a public terminal.
Premier Edible Oils Corp Dock.	Portland	OR	Willamette River	Schnitzer Steel Products Co.	Receipt of crude palm, coconut, and palm	Two surface tracks serve	Two 6-inch pipelines extend from pla
Time Oil Co., Rivergate Terminal Wharf.	Portland	OR	Willamette River	Time Oil Co.	Receipt and shipment of petroleum produ	One 6-car-capacity surfac	One 10-, five 8- and four 6-inch pipeli
James River Corp., Western Transportation, Rive	Portland	OR	Willamette River	James River Corp., Western Transport	Receipt and shipment of general cargo, R	Two platform-level tracks	Transit shed, which also is operated a
Ash Grove Cement Co. Rivergate Plant, Dock.	Portland	OR	Willamette River	Ash Grove Cement Co.	Receipt of limestone.	One surface track serves c	Open storage area for 80,000 tons of l
Unocal Rivergate/Portland Agricultural Terminal	Portland	OR	Willamette River	Unocal Petroleum Products & Chemic	Receipt of granulated bulk urea; receipt a	Surface tracks in rear serv	Two timber A-frame storage buildings
Oregon Steel Mills Dock	Portland	OR	Willamette River	Oregon Steel Mills, Inc.	Mooring miscellaneous vessels, occasionl	One surface track at rear c	-
Port of Portland Terminal 5, Berth 503 Bulk Han	Portland	OR	Willamette River	Port of Portland.	Not used.	One surface track serves r	Stacker-reclaimer served open storage
STC Submarine Systems Dock	Portland	OR	Willamette River	Port of Portland.	Shipment of fiber optic cable	Trackage serving plant in	Fiber optic cable manufacturing plant
Port of Portland Terminal 5, Berth 501 Grain Ter	Portland	OR	Willamette River	Port of Portland.	Receipt and shipment of grain.	Four surface tracks encirc	Grain elevator in rear has 48 concrete
Port of Portland Terminal 6, Automobile Unloadi	Portland	OR	Columbia River (Orego	Port of Portland.	Receipt of motor vehicles.	Four surface ladder tracks	A 75-acre, fenced, asphalt-surfaced, o
Port of Portland, Terminal 6, Berths 603, 604 and	Portland	OR	Columbia River (Orego	Port of Portland.	Receipt and shipment of containerized ge	One surface track alongsid	Container yard at rear occupies 68.2 a
Port of Portland Terminal 6, Automobile Unloadi	Portland	OR	Columbia River (Orego	Port of Portland.	Receipt and shipment of automobiles.	Eight surface ladder track	A 50-acre, fenced, paved open storage
Ross Island Sand & Gravel Co., Vanport Pier.	Portland	OR	Columbia River (Orego	Ross Island Sand & Gravel Co.	Receipt of sand and gravel by barge.	None.	A ready-mix concrete plant is located
Diversified Marine Mooring	Portland	OR	Columbia River (Orego	Diversified Marine Inc.	Mooring small vessels and barges for repa	None.	Marine repair plant is located at rear.
Tidewater Barge Lines, Vancouver Wharf.	Vancouver	WA	Columbia River	Tidewater Barge Lines, Inc.	Shipment of containerized solid waste; m	None.	Compressed air is available on wharf.
Tidewater Barge Lines, Vancouver Towboat Rep	Vancouver	WA	Columbia River	Tidewater Barge Lines, Inc.	Mooring and repairing company-owned to	None.	Additional berthing is available adjac
Vanalco, Vancouver Alumina Dock.	Vancouver	WA	Columbia River	Aluminum Co. of America.	Receipt of alumina.	Trackage at rear of storag	Four steel alumina storage tanks locat
Port of Vancouver, Terminal No. 4, Berths Nos.	Vancouver	WA	Columbia River	Port of Vancouver.	Mooring vessels.	None.	Two steel mooring buoys installed by
Port of Vancouver, Terminal No. 4, Berth No. 10	Vancouver	WA	Columbia River	Port of Vancouver.	Receipt of automobiles in foreign trade. (	None.	Approximately 45 acres of paved, ope
Port of Vancouver, Terminal No. 3, Berths Nos.	Vancouver	WA	Columbia River	Port of Vancouver.	Receipt and shipment of conventional and	None.	Nine port-owned warehouses and shed
Port of Vancouver, Dry Bulk Materials Loading	Vancouver	WA	Columbia River	Port of Vancouver.	Shipment of dry bulk materials.	One surface track serves c	Steel frame, metal-covered, 430 by 12
Port of Vancouver, Oil Terminal Dock, Berth No	Vancouver	WA	Columbia River	Port of Vancouver.	Receipt and shipment of petroleum produ	None.	GATX Terminals Corp: Three 6-inch
Port of Vancouver, Terminal No. 2, Berths Nos.	Vancouver	WA	Columbia River	Port of Vancouver.	Receipt and shipment of conventional and	Two surface tracks on apr	Face of wharf is in line with face of R
United Grain Corp., Vancouver Grain Elevator W	Vancouver	WA	Columbia River	Port of Vancouver.	Receipt and shipment of grain.	Two surface tracks serve	Grain elevator located at rear consisti
Fort Vancouver Plywood Co., Vancouver Log Li	Vancouver	WA	Columbia River	Port of Vancouver.	Not used.	Plant trackage in rear con	Approximately 3 acres of open storag
Holnam, Vancouver Pier.	Vancouver	WA	Columbia River	Holnam, Inc.	Occasional receipt of cement.	Two surface tracks serve	Four 12- and one 8-inch pipelines on
Boise Cascade Corp., Vancouver Dock.	Vancouver	WA	Columbia River	Boise Cascade Corp.	Receipt of woodpulp.	Plant trackage connects w	One 12-inch pipeline for unloading w
Columbia Business Center Mooring.	Vancouver	WA	Columbia River	Columbia Business Center.	Mooring vessels.	None.	-
Columbia Business Center, Crane Dock.	Vancouver	WA	Columbia River	Columbia Business Center.	Receipt and shipment of steel products, lu	One surface track at rear,	Approximately 22 acres of open stora
Columbia Business Center, West Slip.	Vancouver	WA	Columbia River	Columbia Business Center.	Mooring vessels.	One surface track at rear,	Slip is approximately 140 feet wide fr
Columbia Business Center, East Slip.	Vancouver	WA	Columbia River	Columbia Business Center.	Mooring vessels.	One surface track at rear,	-
Tidewater Barge Lines, Vancouver Mooring Doc	Vancouver	WA	Columbia River	Tidewater Barge Lines, Inc.	Mooring company-owned floating equipn	None.	Dispatch office is located at rear.
Tidewater Barge Lines, Vancouver Urea Dock.	Vancouver	WA	Columbia River	Tidewater Barge Lines, Inc.	Receipt of liquid urea by barge; mooring	None.	Three 6-inch pipelines extend to 4 ste
Toombs Sand & Gravel Dock	Troutdale	OR	Columbia River (Orego	Don Toombs Trucking Corp.	Receipt of gravel by barge.	None.	Open storage area at rear has capacity
Foss Maritime Co., Sundial Division Dock.	Troutdale	OR	Columbia River	James River Corp.	Shipment of logs (see Remarks).	None.	Logs are received by truck in yard and
James River Corp. Sundial Wood Chip Dock.	Troutdale	OR	Columbia River	James River Corp.	Shipment of wood chips.	None.	Open storage area at rear has capacity
Sundial Marine Dock	Troutdale	OR	Columbia River	Sundial Marine Construction and Repa	Mooring tugboats and barges for repair, o	None.	Floating Drydock No. 1, capacity 1,70
Gresham Sand and Gravel Co. Sundial Pier.	Troutdale	OR	Columbia River	Gresham Sand and Gravel Co.	Receipt of sand and gravel; mooring com	None.	Approximately 30 acres of open stora
James River Corp., Camas Mill Log Lift.	Camas	WA	Columbia River, Cama	James River Corp.	Receipt of rafted logs.	Plant trackage in rear con	Storage area for log rafts extends alon
James River Corp., Camas Mill PECO Unloading	Camas	WA	Columbia River, Cama	James River Corp.	Receipt of wood chips, hogged fuel, and s	Plant trackage in rear con	Hogged fuel is deposited directly onto

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James River Corp., Camas Mill Shipping Dock.	Camas	WA	Columbia River, Cama	James River Corp.	Receipt of bagged raw materials; clay, sta	Plant trackage in rear con	Warehouse located at rear has approxi
Bradford Island Excursion Boat Dock.	Troutdale	OR	Columbia River	Port of Cascade Locks.	Landing for excursion vessels.	None.	Bonneville Dam Visitors Center is loc
Cascade Locks Excursion Boat Dock.	Cascade Locks	OR	Columbia River	Port of Cascade Locks.	Landing for excursion vessel MV 'Colum	None.	Sternwheel excursion vessel 'Columbi
Stevenson Landing Excursion Boat Dock.	Stevenson	WA	Columbia River	Port of Skamania County.	Landing for excursion vessel MV 'Colum	None.	Sternwheel excursion vessel 'Columbi
Port of Hood River, Commercial Dock and Barge	Hood River	OR	Columbia River	Hood River Port Commission.	Boarding passengers; Mooring excursion	None.	-
Nichols Boat Works Dock.	Hood River	OR	Columbia River	Hood River Port Commission.	Mooring vessels and barges for repair.	None.	Marine repair plant and fabrication sh
SDS Lumber Co. Dock.	Bingen	WA	Columbia River	SDS Lumber Co.	Shipment of wood chips and log rafts.	Plant trackage in rear con	Approximately 400 feet of additional
Mountain Fir Chip Co., The Dalles Division Log	The Dalles	OR	Columbia River	Port of The Dalles.	Receipt of logs; shipment of wood chips.	None.	Open storage areas in rear have capac
Bernert Barge Lines Wharf.	The Dalles	OR	Columbia River	Bernert Barge Lines Inc...	Receipt of sand and gravel; Mooring and	None.	-
Cargill, The Dalles Grain Elevator, Dock.	The Dalles	OR	Columbia River	Port of The Dalles.	Shipment of grain.	None.	Grain elevator at rear, consisting of 3
Port of The Dalles Dock.	The Dalles	OR	Columbia River	Port of The Dalles.	Shipment of grain.	One surface track, total ca	Grain elevator located at First and Co
Port of Klickitat Barge Dock.	Dallesport	WA	Columbia River	Klickitat County Port District.	Receipt and shipment of containerized an	One surface track in rear c	Approximately 14 acres of open stora
Mid Columbia Producers, 'A' House Dock.	Biggs Junction	OR	Columbia River	Mid Columbia Producers, Inc.	Shipment of grain.	None.	Grain elevator at rear, consisting of 4
Cargill, Arlington Grain Elevator Dock.	Arlington	OR	Columbia River	Port of Arlington.	Shipment of grain.	None.	Grain elevator at rear, consisting of 4
Farmers Warehouse and Commission Co. Roose	Roosevelt	WA	Columbia River	Farmers Warehouse and Commission (	Shipment of grain.	One surface track, total ca	Grain elevator at rear, consisting of 10
Port of Morrow Slip.	Boardman	OR	Columbia River	Port of Morrow.	Not used.	None.	Approximately 15 acres of open stora
Longview Fibre Co., Boardman Wood Chip Doc	Boardman	OR	Columbia River	Port of Morrow.	Shipment of wood chips.	None.	Open storage area at rear has capacity
Port of Morrow, Container Slipway and Fleet Mo	Boardman	OR	Columbia River	Port of Morrow.	Receipt and shipment of containerized ge	None.	Open storage area in rear has capacity
Tidewater Terminals, Port of Morrow, Wood Chi	Boardman	OR	Columbia River	Port of Morrow.	Shipment of wood chips.	None.	Open storage area at rear has capacity
Cargill, Port of Morrow Grain Elevator Dock.	Boardman	OR	Columbia River	Port of Morrow.	Shipment of grain.	None.	Grain elevator at rear consisting of 5 s
Morrow County Grain Growers, Hogue-Warner I	Irrigon	OR	Columbia River	Morrow County Grain Growers, Inc.	Shipment of grain.	None.	Grain elevator at rear consisting of tim
Port of Umatilla, Commercial Dock.	Umatilla	OR	Columbia River	Port of Umatilla.	Receipt and shipment of containerized ge	None.	Open storage area in rear has capacity
Pendleton Grain Growers McNary Elevator Dock	Umatilla	OR	Columbia River	Pendleton Grain Growers, Inc.	Shipment of grain.	One 10-car capacity surfa	Grain elevator at rear, consisting of 15
Tidewater Terminal Co., Umatilla Dock.	Umatilla	OR	Columbia River	Tidewater Barge Lines.	Receipt and shipment of petroleum produ	None.	One 8- and one 6-inch pipelines exten
Walla Walla Grain Growers, Port Kelley Dock.	Port Kelley	WA	Columbia River	Walla Walla Grain Growers, Inc.	Shipment of grain.	None.	Grain elevator at rear consisting of 3 c
Walla Walla Grain Growers, Port Wallula Pier.	Wallula	WA	Columbia River	Walla Walla Grain Growers, Inc.	Shipment of grain.	None.	Grain elevator at rear, consisting of 2
Boise Cascade Wallula Plant, Barge Slip Dock.	Wallula	WA	Columbia River	Boise Cascade Corp.	Shipment of wood pulp; Receipt of 50% c	Trackage serving plant in	Slip is 250 feet wide by 600 feet long.
Unocal Corp. Kennewick Plant, Finley Area Barg	Kennewick	WA	Columbia River	Unocal Corp.	Shipment of liquid fertilizer (urea ammon	One surface track serves p	One 8-inch pipeline extends to wharf
Unocal Corp. Kennewick Plant, Kennewick Area	Kennewick	WA	Columbia River	Unocal Corp.	Mooring miscellaneous vessels and barge	Trackage serving plant in	-
Unocal Chemicals, Hedges Area Dock.	Kennewick	WA	Columbia River	Unocal Corp.	Receipt of anhydrous ammonia and urea;	Four surface tracks, total c	Concrete and timber urea storage war
Harvest States Cooperatives, Kennewick Dock.	Kennewick	WA	Columbia River	Harvest States Cooperatives.	Shipment of grain.	One surface track, capacit	Grain elevator at rear, consisting of 21
Port of Benton, Barge Slip.	North Richland	WA	Columbia River	Port of Benton.	Receipt and shipment of heavy-lift items i	None.	Industrial park located in rear; open st
Port of Benton, High Dock.	North Richland	WA	Columbia River	Port of Benton.	Not used.	None.	-
Port of Pasco, Marine Terminal Wharf.	Pasco	WA	Columbia River	Port of Pasco.	Shipment of grain.	One platform level track s	Continental Grain Co.: Grain elevato
Port of Pasco, Barge Slip No. 1, Container Termi	Pasco	WA	Columbia River	Port of Pasco.	Receipt and shipment of containerized ge	One surface track along re	Improved open storage area at rear fo
Port of Walla Walla Dock.	Burbank	WA	Snake River	Port of Walla Walla.	Mooring river excursion vessels, boarding	None.	-
Co-Grain, Burbank Elevator Barge Slip.	Burbank	WA	Snake River	Port of Walla Walla.	Shipment of grain.	None.	Grain elevator at rear consisting of 3 c
Cargill, Burbank Grain Elevator Dock.	Burbank	WA	Snake River	Port of Walla Walla.	Shipment of grain.	One surface track, total ca	Grain elevator at rear consisting of 11
Northwest Terminalling Co., East Pasco Termina	Pasco	WA	Snake River	Northwest Terminalling Co.	Receipt and shipment of petroleum produ	None.	Three 6-inch pipelines extend from w
Tidewater Terminal Co., Pasco Terminal, Moori	Pasco	WA	Snake River	Tidewater Terminal Co., subsidiary of	Mooring vessels and barges; handling sup	Two surface tracks serve t	Two 6-inch pipelines on center sectio
Tidewater Terminal Co., Pasco Terminal, Petrol	Pasco	WA	Snake River	Tidewater Terminal Co., subsidiary of	Receipt and shipment of petroleum produ	Two surface tracks serve t	Three 8- and one 6-inch pipelines exte
Tidewater Terminal Co., Pasco Terminal, Fertili	Pasco	WA	Snake River	Tidewater Terminal Co., subsidiary of	Receipt and occasional shipment of liquid	Two surface tracks serve t	One 10-inch pipeline extends from wh
Walla Walla Grain Growers, Sheffler Dock.	Sheffler	WA	Snake River	Walla Walla Grain Growers, Inc.	Shipment of grain.	None.	Grain elevator at rear consisting of 10
Louis Dreyfus Corp., Windust Elevator Dock.	Windust	WA	Snake River	Louis Dreyfus Corp.	Shipment of grain.	None.	Grain elevator at rear consisting of tim
Columbia County Grain Growers, Lyons Ferry D	Lyons Ferry	WA	Snake River	Columbia County Grain Growers, Inc.	Shipment of grain.	None.	Grain elevator at rear consisting of 10
Pomeroy Grain Growers Dock.	Central Ferry	WA	Snake River	Port of Garfield.	Shipment of grain.	None.	Grain elevator at rear consisting of 14
Columbia Grain International, Central Ferry Elev	Central Ferry	WA	Snake River	Port of Whitman County.	Shipment of grain.	None.	Grain elevator at rear consisting of 2 c
Central Ferry Terminal Association Grain Dock.	Central Ferry	WA	Snake River	Central Ferry Terminal Association In	Shipment of grain.	None.	Grain elevator at rear, consisting of 8
Port of Whitman; Boettcher Landing Dock.	Central Ferry	WA	Snake River	Port of Whitman County.	Receipt of anhydrous ammonia; Mooring	One 5-car capacity surface	One 4-inch pipeline extends from wha
Almota Elevator Co. Dock.	Almota	WA	Snake River	Almota Elevator Co.	Shipment of grain.	None.	Grain elevator at rear consisting of 2 c
S & R Grain Co., Port of Almota Dock.	Almota	WA	Snake River	Port of Whitman.	Shipment of grain.	None.	Grain elevator in rear, consisting of or
Tidewater Terminal Co., Wilma Dock.	Wilma	WA	Snake River	Tidewater Terminal Co., subsidiary of	Receipt of petroleum products and liquid	One 12-car capacity surfa	Approximately 11.7 acres of open sto
Granger Co., Wilma Dock	Wilma	WA	Snake River	Tidewater Terminal Co.	Shipment of wood chips.	One surface track serves c	Eight acre open storage area at rear ha
Port of Whitman County, Site I Wharf.	Wilma	WA	Snake River	Port of Whitman County.	Shipment of logs.	One surface track serves c	Logs are handled for Columbia Vista

Foss Maritime Co. Wood Chip Dock.	Wilma	WA	Snake River	Foss Maritime Co.	Shipment of wood chips.	None.	Two hydraulic truck dumpers serve as
Mountain Fir Chip Co., Wilma Division, Dock.	Wilma	WA	Snake River	Longview Fibre Co.	Shipment of wood chips.	None.	Storage bins have total capacity for 2,
Stegner Grain Terminal Dock.	Wilma	WA	Snake River	Port of Whitman County.	Shipment of grain.	One surface track serves s	Grain elevator at rear consisting of on
Port of Whitman County, Site A Dock.	Wilma	WA	Snake River	Port of Whitman County.	Receipt and shipment of logs and miscella	None.	Approximately 3.5 acres of open stora
Port of Clarkston Dock.	Clarkston	WA	Snake River	Port of Clarkston.	Receipt and shipment of containerized an	None.	Approximately 3 acres of open storag
Lewis-Clark Terminal, Clarkston Grain Terminal	Clarkston	WA	Snake River	Lewis-Clark Terminal, Inc.	Shipment of grain.	None.	Grain elevator at rear consisting of 13
Mountain Fir Chip Co., Lewiston Division Dock.	North Lewiston	ID	Clearwater River	Longview Fibre Co.	Shipment of wood chips and hogged fuel.	None.	Storage bins have total capacity for 4,
Port of Lewiston Container Terminal Dock.	North Lewiston	ID	Clearwater River	Port of Lewiston.	Receipt and shipment of containerized an	One surface track serving	Open storage areas in rear have total c
Continental Grain Co., Lewiston Elevator Dock.	North Lewiston	ID	Clearwater River	Continental Grain Co.	Shipment of grain.	One surface track, capacit	Grain elevator at rear, consisting of 10
Lewis-Clark Terminal, Lewiston Dock.	North Lewiston	ID	Clearwater River	Lewis-Clark Terminal, Inc.	Shipment of grain.	Two surface tracks, total c	Grain elevator at rear, consisting of 28