Washington State
Transportation Commission
www.wstc.wa.gov

Statewide Rail Capacity and System Needs Study

Final Report

CAMBRIDGE SYSTEMATICS
Transportation leadership you can trust.

with

Berk & Associates, Inc.
Global Insight, Inc.
HDR, Inc.
Starboard Alliance Company
Transit Safety Management

December 2006

www.camsys.com

Washington State Transportation Commission

Richard Ford, Chair*

Elmira Forner, Vice Chair

Dan O'Neal*

Edward Barnes*

Bob Distler

Dale Stedman

Carol Moser*

*Member of the Rail Study Committee

STATE OF WASHINGTON

TRANSPORTATION COMMISSION

Transportation Building, PO Box 47308, Olympia, Washington 98504-7308 • (360) 705-7070
Fax: (360) 705-6802 • E-mail: transc@wsdot.wa.gov • http://www.wsdot.wa.gov/commission

January 5, 2007

The Honorable Christine Gregoire
Office of the Governor
P.O. Box 40002
Olympia, Washington 98504-0002

The Honorable Members
Washington State Senate
P.O. Box 40482
Olympia, Washington 98504-0482

The Honorable Members
Washington State House of Representatives
P.O. Box 40600
Olympia, Washington 98504-0600

Dear Governor Gregoire, Senators, and Representatives:

The Washington State Transportation Commission respectfully submits the enclosed *Statewide Rail Capacity and System Needs Study*, which was approved by the Commission at its meeting on December 12, 2006. Your interest in and attention to the need for policies to govern the State's participation in the rail transportation system is important to the mobility and commerce of the State.

The State has had a longstanding involvement in passenger rail service, investing heavily to develop the Amtrak *Cascades* intercity passenger rail service. In the last decade, it has also provided emergency funding to failing short line railroads and purchased specialized freight cars to ensure that agricultural shippers in the State have access to service and equipment.

The key question asked by the Legislature of this study was: "Should the State continue to participate in the freight and passenger rail system, and if so, how can it most effectively achieve public benefits?" Our conclusion is that the State should continue to participate in the freight and passenger rail systems.

The study concludes that the economic vitality of Washington State requires a robust rail system capable of providing its businesses, ports, and farms with competitive access to North American and overseas international markets. However, it also concludes that the rail system is nearing capacity. Service quality is strained and rail rates are going up for many Washington State businesses. The pressure on the rail system will increase as the Washington State economy

grows. The total freight tonnage moved over the Washington State rail system is expected to increase by about 60 percent between 2005 and 2025. The State's role is necessarily shaped by the fact that nearly all freight railroads are privately owned for profit companies.

The major freight railroads are investing to add capacity and improve service in Washington State, but their business practices and investment priorities are understandably driven primarily by the railroads' national-level needs and competition. The needs of Washington State businesses and communities are just one part of the railroads' considerations. Additional investment and incentives for investment are needed to ensure a robust rail system that meets Washington State's economic needs, as well as the railroads' business needs.

A carefully planned program of state investments and other actions that are consistent with the policies recommended by the study will allow the State to realize a higher level of public benefits – in economic growth, jobs, tax revenues, and reduced community impacts – from the rail system than would be obtained without state participation. However, the State should invest only when it has been demonstrated that projects will deliver public benefits to the citizens and businesses of Washington State, and when it has been demonstrated that there is a low likelihood of obtaining those benefits without public involvement.

The study recommends policies, procedures, and approaches to governance and management of the State's rail programs and assets that will help the State make effective and responsible improvements to the rail system – improvements that will serve the economic development, transportation, social, and environmental goals of Washington State and its citizens.

The study points to but does not recommend specific improvements to the rail system. If the Legislature chooses to adopt the policies and procedures recommended by the study, it may wish to apply the policies and procedures to determine the high-priority projects.

We appreciate your support for transportation improvements statewide, and hope that these recommendations will help to expedite projects that will keep Washington moving and keep Washington's economy thriving.

Sincerely,

Richard Ford
Chairman
Washington State Transportation Commission

Enclosure

Table of Contents

1.0 Executive Summary 1
2.0 Introduction and Background..... 9
2.1 Purpose of the Study..... 9
2.2 Issues..... 9
2.3 Structure of the Report..... 10
3.0 Washington State Rail System, Rail Users, Capacity, and Issues 12
3.1 Washington State Rail System..... 12
3.2 Washington State Rail Users..... 15
3.2.1 Manufacturers/Industrial Carload Shippers 17
3.2.2 Ports and International Trade Sector/ Intermodal Container Shippers..... 18
3.2.3 Agriculture and Foods Products Industry/ Bulk and Specialized Carload Shippers..... 19
3.2.4 Passenger Rail Riders..... 20
3.4 Capacity of the Washington State Rail System and Implications for Rail Users..... 21
4.0 Washington State Powers, Authorities, and Interests... 30
4.1 Washington State Powers and Authorities in Freight and Passenger Rail..... 30
4.2 Washington State Investments in the Rail System.. 32
4.3 Washington State Governance of Rail..... 36
4.4 Using State Powers and Authorities to Further State Interests in the Rail System..... 37
5.0 Policy Recommendations 39
5.1 Policy Recommendation One..... 40
5.2 Policy Recommendation Two..... 44
5.3 Policy Recommendation Three..... 51
5.4 Policy Recommendation Four..... 52
5.5 Policy Recommendation Five..... 53
5.6 Policy Recommendation Six..... 54
Appendix A.
Benefit Assessment Illustrative Case Study – East-West Capacity Projects..... A-1
Appendix B.
Glossary..... B-1

Cover photographs of Amtrak *Cascades* service and BNSF 4937 courtesy of David Honan.

List of Tables

1. Top 10 Outbound Commodities by Tonnage, 2004, 2015, and 2025 16

2. Rail Lines in Washington State Exceeding Capacity, 2015 and 2025 *Based on Peak Day Train Volumes and Assuming Operation of 8,000-Foot Trains* 27

3. Recent and Ongoing Washington State Rail Investment Projects 34

4. Examples of Projects Addressing the Rail Service Needs of Washington State Rail Users 41

5. Major Choke Points in the Rail System and Potential Projects to Increase Capacity 43

6. Recommended Benefit and Cost Measures 46

7. Recommended Measures to Include in Estimating a Benefit-Cost Ratio 47

8. Sample Decision Matrix for Comparison of Alternative Rail Projects and Actions 48

9. Benefit Evaluation Cross-User Group Comparison 50

10. Freight Mobility Strategic Investment Board Evaluation Criteria and Weights 51

11. Asset Management Principles for State Rail Assets 55

List of Figures

1. Washington State Rail Network..... 13

2. Washington State Rail Tonnage by Commodity (2004) and Forecast Tonnage (2015 and 2025) 17

3. Washington State Rail System: Mainline Capacities, 2006 22

4. Washington State Rail Network: Rail Choke Points, 2006 24

1.0 Executive Summary

The Washington Rail Capacity and System Needs Study was requested by the Washington State Legislature to:

- Assess rail needs in the State;
- Determine the State's interest in the rail system;
- Develop policies to govern the State's participation in the rail system; and
- Develop a plan for managing the rail lines, railcars, and service rights owned by the State.

The State has had a longstanding involvement in passenger rail service, investing heavily to develop the Amtrak *Cascades* intercity rail service. In the last decade, it also has provided emergency relief to failing short line railroads and purchased specialized freight cars to ensure that agricultural shippers in the State have access to service and equipment.

The key question asked by the Legislature for this study was: "Should the State continue to participate in the freight and passenger rail system, and if so, how can it most effectively achieve public benefits?" Our conclusion is that the State should continue to participate in the freight and passenger rail systems.

The Economic Vitality of Washington State Requires a Robust Rail System

The economic vitality of Washington State requires a robust rail system capable of providing its businesses, ports, and farms with competitive access to North American and overseas international markets. For example:

- Manufacturers, lumber and wood products producers, and central and eastern Washington agriculture and food products businesses rely on rail transportation to move heavy, bulky products to market cost effectively. These businesses generate 14 percent of the State's gross state product and 15.5 percent of its employment. If rail service deteriorates, these businesses may shift their freight to trucks, but this will increase their transportation costs and may increase the cost to state and

local government of maintaining roads. In some cases, the loss of rail service could drive businesses to relocate or close.

- The State's ports and international trade industry depend on rail to export grain and other agricultural products and to import intermodal containers of consumer goods. The ports generate more than 200,000 jobs directly and indirectly, and over $500 million in state and local tax revenues. If the rail system cannot deliver high-quality transportation services, especially for intermodal cargo that is not destined for Washington State, shippers will quickly shift to other ports. This could result in lower growth at Washington ports and a loss of port-related jobs. In addition, export trade plays a major role in the Washington economy, ranking it first among states in export value per capita. Without good rail connections to support both import and export trade, the Washington ports will become less attractive to ocean carriers, and ultimately, the State will become a less attractive location for export businesses.

- A high-quality intercity passenger rail service offers an alternative to automobile and air travel that can help reduce congestion, energy use, and environmental impacts of highways. If the rail system cannot accommodate frequent and reliable intercity passenger rail service, the State risks losing the benefits of passenger rail as an alternative to highway and air travel.

The System Is Nearing Capacity

The benefits that Washington State can obtain from a robust rail system are threatened because the system is nearing capacity. Service quality is strained and rail rates are going up for many Washington State businesses. For example:

- The Everett-Spokane line over Stevens Pass is the Burlington Northern Santa Fe Railway's (BNSF) major transcontinental route for double-stack intermodal trains. It operates today at about 123 percent of practical capacity.[1]

[1] Practical capacity is about 60 percent of the theoretical capacity and provides reliable service; it is the point at which the system ceases to operate freely and reliably and begins to suffer slowdowns and congestion. At higher percentages, rail congestion increases and service reliability deteriorates quickly. For more information about how rail capacity is determined, see Technical Memorandum #3, *Rail Capacity Needs and Constraints*.

- The BNSF's Auburn-Pasco line over Stampede Pass operates today at about 60 percent of practical capacity. However, the line cannot be used to relieve the Everett-Spokane line, because the ceiling of the Stampede Tunnel is too low to accommodate double-stack intermodal container trains.

- The BNSF's Vancouver-Pasco line, which follows the Columbia River along the north side of the Gorge, is used by double-stack intermodal container trains moving east, grain trains moving west to the Columbia River and Puget Sound ports, and carload trains moving both east and west to serve Washington State industrial and agricultural shippers. The line is operating today at about 70 percent of practical capacity. With the Everett-Spokane line nearing capacity, the BNSF has been routing more intermodal trains south along the I-5 rail corridor to Vancouver, Washington, and then east. This has added considerable volume to the Vancouver-Pasco line.

- The I-5 corridor rail line runs the length of the State from the Canadian border through Bellingham, Everett, Seattle, and Tacoma to Vancouver and Portland. It is the backbone of the Washington State rail system, controlling access to the east-west lines. Most of the line is owned by the BNSF, but the BNSF shares operating rights in some segments with the Union Pacific Railroad (UPRR), Amtrak's intercity-rail services, and the Sounder commuter-rail operations. The line operates at between 40 and 60 percent of practical capacity in most sections, but is subject to frequent stoppages when trains tie up the mainline to enter and exit the many ports, terminals, and industrial yards along the corridor. Some half dozen sections are chronic choke points, causing delays that ripple across the entire Washington State and Pacific Northwest rail system.

The pressure on the rail system will increase in the next decades. Between 2005 and 2025, the output of the Washington State economy (measured as gross state product) is expected to grow at an average of 3.5 percent per year. The total freight tonnage moved over the Washington State rail system is expected to increase by about 60 percent over the period. To accommodate this growth, many more rail lines within Washington State will be operating at or above their practical capacity.

Growth in rail traffic and rail congestion issues are also affecting Washington communities by increasing delays for automobile and truck drivers at rail-highway crossings, creating noise and safety problems, and disrupting communities and environmentally sensitive areas with construction projects. Dealing with these

problems in an uncoordinated fashion on a case-by-case basis is often frustrating for both the communities and the railroads.

As freight and passenger trains compete for time and space on the rail system, the capacity constraints may also frustrate the service and ridership plans for the State's passenger-rail program. The cost of resolving the rail choke points in the I-5 corridor to meet passenger service and ridership goals is increasing, potentially reducing the cost-effectiveness of the passenger rail program. Without capacity improvements, rail will not maintain its share of the Washington State freight market, rail shipping prices will increase, and service reliability will deteriorate for many of the State's industrial and agricultural shippers.

The Rail Industry Is Expanding Capacity, But May Not Meet All the State's Needs

The Class I railroads are adjusting their operations to increase the volume of freight moved through the system over the existing rail lines. They are operating longer trains and maximizing the number of containers packed on intermodal cars; consolidating pick-up and delivery of railcars at central terminals; and eliminating mainline switching wherever possible (i.e., minimizing the number of times trains are 'parked' on the mainline while picking up cars from individual shippers). These changes favor a hook-and-haul operations strategy, where the railroads pick up a full train in Seattle or Tacoma and haul it directly to Chicago, or pick up a full grain train in the Midwest and haul it directly to a Columbia River port. Hook-and-haul operations allow the railroads to achieve economies of scale that keep costs down and services profitable. However, capacity will remain constrained in Washington even with these changes.

The move toward wholesale rail service helps meet the needs of Washington State's ports, which handle high volumes of imported intermodal containers and exported grain. But it is problematic for Washington State's manufacturers and agricultural shippers. They need low-cost, shorter-haul carload service and do not generate the high volumes attractive to the railroads. In general, international intermodal container traffic has been outbidding domestic carload traffic for space on the rail system, and the railroads have been pricing out lower-volume, lower-profit shippers to meet the demands of higher-volume, higher-profit freight.

The shift toward high-volume, hook-and-haul operations is also problematic for Washington State's short line railroads. They provide a link between smaller shippers and the Class I railroads. If they cannot generate enough volume to get service

commitments from the Class I railroads, they lose revenue and customers. This makes it difficult financially to maintain track and service quality, further undermining their ability to provide service to their customers and compete with trucking.

While the Class I railroads are investing in the Washington State rail system to increase capacity and improve service, their business practices and investment priorities are driven primarily by the railroads' national-level needs and competition. The needs of Washington State businesses and communities are just one part and not the largest part of the railroads' considerations. Additional investment and incentives for investment are needed to ensure a robust rail system that meets Washington State's economic needs, as well as the railroads' business needs.

The State Should Participate in the Rail System in Partnership With the Private Sector to Increase Rail Capacity

A carefully planned program of state investments and other actions, consistent with the policies recommended by the study, will allow the State to realize a higher level of public benefits – in economic growth, jobs, tax revenues, and reduced community impacts – from its rail system than would be obtained without state participation.

The State should participate in the rail system through a mix of direct investment, financial incentives to private parties, and advocacy on behalf of Washington businesses and communities. However, the State should do so only when the projects or actions can be demonstrated to deliver public benefits to the citizens and businesses of the State of Washington, and when it has been demonstrated that there is a low likelihood of obtaining these benefits without public involvement.

The cost of state participation in the private rail system must be weighed against the benefits and costs of alternative modes. For example, in some cases, the costs of maintaining and improving rail service may be higher than the costs of maintaining and improving highways to accommodate added truck and automobile traffic. The cost of improving rail service must also take into account the cost of mitigating the impacts of increased rail traffic on communities near terminals and along mainlines. Finally, the cost of state participation should weigh Washington State benefits against national benefits. When a substantial share of the benefits of a project accrue to rail users outside of Washington State, the State's contribution should be limited. This study recommends an approach to evaluating costs and benefits to the State and other beneficiaries in a systematic decision-making framework.

Washington State is not alone in facing challenges in the rail system. The nation is entering the early stages of a freight transportation capacity crisis. The American Association of State Highway Officials (AASHTO), the congressionally-mandated National Surface Transportation Policy and Revenue Study Commission, and Congress, as it takes up renewal of the national transportation program, are trying to establish forward-looking national policies and visions for the rail system. Washington State should take an active role in influencing the development of national policies and programs, and should look to multistate and Federal programs to help implement the recommendations of the report.

The Washington State Transportation Commission recommends six policies. They are summarized here and described in detail in Section 5.0, pages 38 to 53. The recommendations are as follows:

- **Policy Recommendation #1: Washington State should continue to participate in the preservation and improvement of both the freight and passenger rail transportation system where there are public benefits to Washington State, its businesses, and its communities.** The study provides guidance on how state actions can be used to address the needs of carload industrial shippers, agricultural shippers, ports and international trade industries, and the passenger-rail users. These include suggestions for mainline, terminal, and access improvements; development of consolidation facilities and shipper rail sidings; assistance to short line railroads; and mitigation of rail impacts on Washington communities.

- **Policy Recommendation #2: The State should base its decisions to participate in projects, programs, and other rail initiatives on a systematic assessment and comparison of benefits and costs across users and across modes.** The State should estimate quantifiable costs and benefits; economic impacts; and qualitative benefits for the State, rail users, the railroads and other carriers, and communities. Where appropriate, these benefits and impacts should be compared to the benefits and impacts of alternative investments in truck and barge services for freight, and the benefits and impacts of alternative investments in highway, bus, ferry, and air services for passengers.

- **Policy Recommendation #3: Where the State determines there are sufficient public benefits to justify public participation in the preservation and improvement of the rail transportation system, its actions should be guided by the following general principles:**

  - Emphasize operations and nonfinancial participation in projects before capital investment;
  - Preserve and encourage competition;
  - Target actions to encourage private investment that advances Washington State economic development goals;
  - Leverage state participation by allocating cost responsibility among beneficiaries; and
  - Require projects to have viable business plans.

- **Policy Recommendation #4: The State should designate a single entity to coordinate and direct the State's participation in the preservation and improvement of the rail transportation system. This entity should have the authority to negotiate directly with the railroads.** The Class I railroads are large national corporations. The State can be an effective advocate for a multiplicity of state, business, and community interests, but cannot do so without a coordinated and unified vision and voice.

- **Policy Recommendation #5: The State should take an active role in influencing and shaping the development of national rail policies and programs. The State should also develop a multistate coalition to address rail system needs across the Pacific Northwest.** The Washington State rail system is an integral part of the national and Pacific Northwest rail systems. The State's rail needs transcend the State's boundaries. The congressionally-mandated National Surface Transportation Policy and Revenue Study Commission, the American Association of State Highway and Transportation Officials, the Association of American Railroads, Congressional committees, and other groups are working to establish forward-looking national visions, policies, and programs for the rail system. Washington State should participate actively in these discussions. As part of this process, Washington State and its neighbors should also establish a multistate coalition to address rail system needs across the Pacific Northwest. Washington State and its neighbors should use the coalition as a forum to establish their common needs and work with the railroads to identify, prioritize, and implement the most cost-beneficial regional improvements.

- **Policy Recommendation #6: The State should implement the asset management plan developed as part of this study to govern investment and management decisions for state-owned rail assets.** The asset management plan sets objectives for the rail lines, specialized railcars, and service rights that the State owns; establishes performance measures to

determine if these objectives are being met; and describes management practices to ensure that the State's rail assets return maximum benefit to the public.

2.0 Introduction and Background

2.1 Purpose of the Study

Study Mandate from 2005-2007 Transportation Budget Proviso

The Purpose of this study is to –
a) assess the rail freight and rail passenger infrastructure needs in this State; b) review the current powers, authorities, and interests the State has in both passenger and freight rail;
c) recommend public policies for state participation and ownership in rail infrastructure and service delivery, including, but not limited to, planning and governance issues; and
d) develop a rail asset management plan.

The commission shall report their findings and conclusions of this study to the transportation committees of the legislature by December 1, 2006.

The *Washington Rail Capacity and System Needs Study* was initiated by the Washington State Legislature to answer the question: "Should the State continue to participate in the freight and passenger rail system, and if so, how can it most effectively achieve public benefits?"

2.2 Issues

The State has had a longstanding involvement in passenger rail service. In the last decade, it has provided emergency relief to failing short line railroads and purchased specialized railcars to ensure that agricultural shippers in the State have access to cars and service. The state rail policy has evolved through multiple major policy reviews (the most recent in 1995), legislation, and the Washington Transportation Plan (WTP).

The pressure to provide more structured guidance for state investments and actions has grown sharply in the last several years as the demand for rail service has begun to outstrip capacity and the price of rail service to Washington State shippers has increased. Today, the State faces some difficult issues.

The Railroads Are Focusing on High-Volume and Long-Haul Services, But the State's Industrial and Agricultural Shippers Also Need Low Volume and Short-Haul Services

Long-haul intermodal container trains and long-haul unit grain trains moving to and from Washington State's ports are the least complex and the most profitable for the Class I railroads to operate. As a result, the railroads have reoriented their operations to accommodate this business. But many Washington State shippers are low-volume carload shippers who generate only a few dozen carloads a week or a month, and they are being priced out of the rail market. When should the State help meet the needs of the ports and international trade business for premium long-haul rail service, and when should the State help meet the needs of

agricultural and local shippers for low-cost, shorter-haul rail services?

Rail Is Being Asked to Absorb Some of the Traffic Growth from Congested Highways

The I-5 corridor and many of the State's urban highways are congested. The public sees expanded freight and passenger rail services as part of the solution to highway congestion. But most rail shipments are long-distance shipments. Investment in new rail capacity may not moderate growth in truck traffic – most of which is associated with short- and medium-distance trips – on the State's congested urban highways. When and where should the State invest in freight and passenger rail capacity to help relieve highway congestion? How can the State ensure that the best use is made of each of its transportation modes?

Short Line Railroads Are Being Asked to Support Agricultural Shippers and Communities

Short line railroads provide low-cost transportation to manufacturers across the State and to shippers in the agricultural communities of eastern and central Washington, enabling these shippers to compete in world markets. But with low traffic volumes and high operating costs, many short lines are at risk of failing financially. When should the State invest in short lines to support existing jobs and communities?

The Intercity Passenger Rail Program Is Being Asked to Increase Ridership

The Legislature established an intercity passenger-rail program. Ridership and revenues have been increasing, but on-time performance has been decreasing as freight traffic increases. Considerable additional investment is needed to achieve the program's longer-term goals of more frequent service and higher ridership. Some of the investments may benefit freight rail, as well as passenger rail. When should the State invest to improve passenger rail service and reliability?

2.3 Structure of the Report

The report is organized as follows:

- **Chapter 3.0 – Washington State Rail System, Rail Users, Capacity, and Issues** describes the rail system, identifies the

key rail users, summarizes the study findings about current and projected capacity, and discusses the implications of capacity and service shortfalls for rail users and Washington State;

- **Chapter 4.0 – Washington State Powers, Authorities, and Interests** summarizes the State's current rail policies and programs; lists the State's recent investments in rail lines, railcars, and other rail equipment; and identifies – in broad terms – the roles that the State can play to shape the future of the rail system; and

- **Chapter 5.0 – Policy Recommendations** details the six policy recommendations.

3.0 Washington State Rail System, Rail Users, Capacity, and Issues

3.1 Washington State Rail System

The Washington State rail system comprises mainlines, branch lines, industrial spurs and leads, and rail yards and terminals operated by a variety of public and private rail carriers. (See Figure 1.) The freight railroads operate 3,628 miles of rail service in Washington State over 2,523 miles of rail lines.[2]

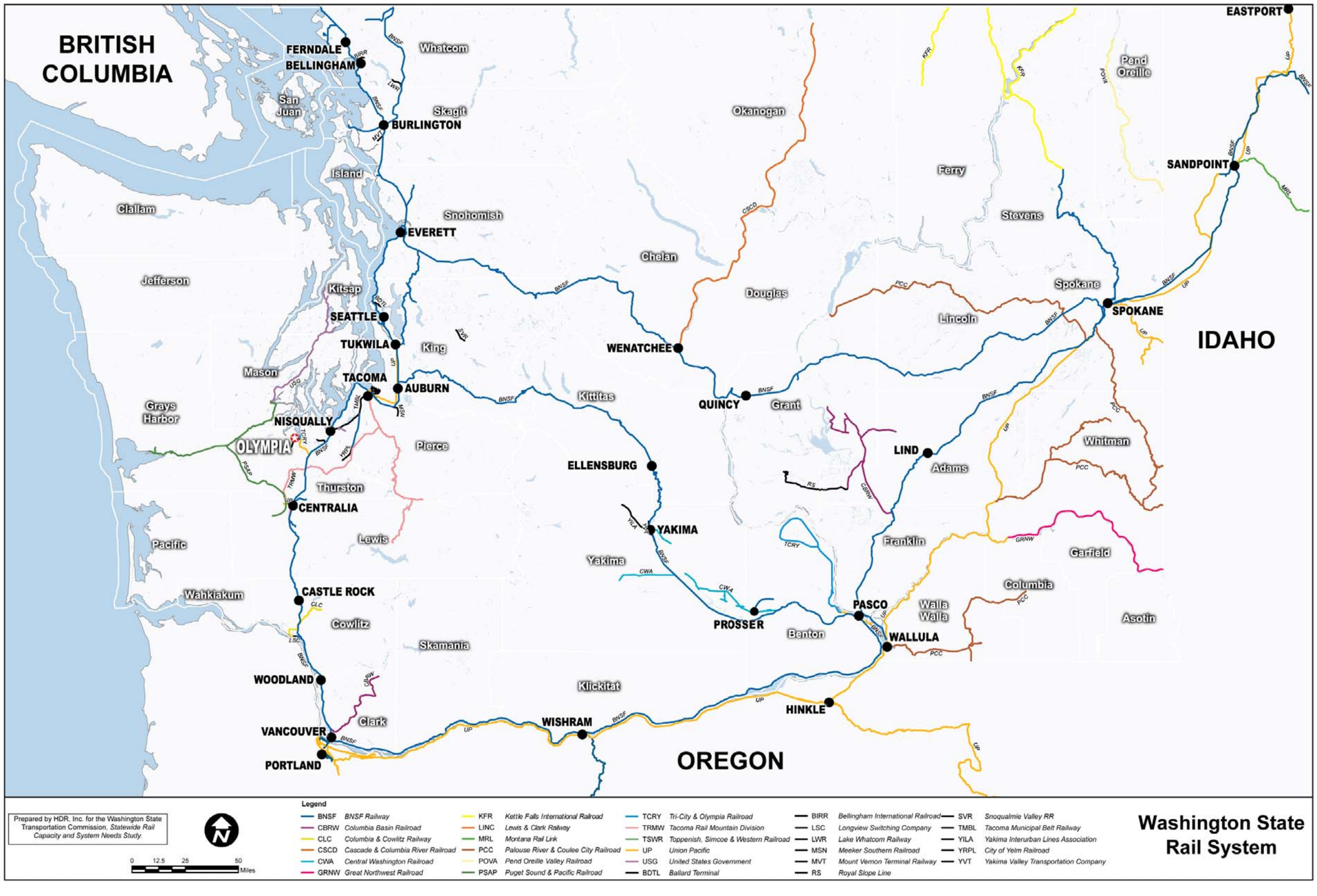
Who Operates the Rail System?

Railroad classification is determined by the Federal Surface Transportation Board. In 2004, Class I railroads were defined as railroads having $289.4 million or more in operating revenues. Class II railroads (referred to regional railroads) were defined as non-Class I line-haul railroads operating 350 miles or more with operating revenues of at least $40 million. Class III railroads (or short line railroads) were defined as all remaining non-Class I or II line-haul railroads. Switching or terminal railroads are railroads engaged primarily in switching and/or terminal services for other railroads.

Long-haul rail transportation is provided by two Class I railroads – BNSF and UPRR. The BNSF owns and operates the most mileage in the State – 1,572 in-state-operated miles, constituting 5 percent of the BNSF's total system mileage. The dominant position of the BNSF in many of the State's rail markets has significant implications for the degree of leverage that the State, rail shippers, and communities have in influencing its business decisions.

[2] Operated miles are greater than owned miles, because owning railroads lease operating rights over their lines to other railroads. And in a few areas, the U.S. Department of Transportation (DOT) Surface Transportation Board, which has economic regulatory oversight of the railroads, has mandated provision of operating rights to ensure competition between railroads.

Figure 1. Washington State Rail System



What Types of Services Do Freight Railroads Provide?

Intermodal services *receive fully-loaded and sealed truck trailers or containers from ships or trucks directly onto railcars for transport. Intermodal shipments are generally higher-value, lower-weight commodities than unit or carload trains.*

Carload services *are those that use a variety of railcar types to carry a range of commodities to a variety of customers. They generally carry lower-volume, higher-weight commodities than Intermodal trains. Examples of commodities shipped by carload include farm products, lumber, chemicals, and paper products.*

Unit carload trains *are those in which every car in the train is shipped from the same origin to the same destination. They are used for high-volume goods, such as coal, garbage, wheat, or any other suitable product gathered at one location for shipment.*

The BNSF System in Washington State

The BNSF owns and operates three east-west lines: The Everett to Spokane line, which passes through the Cascade Tunnel at Stevens Pass, is BNSF's primary route for double-stack intermodal traffic. The Auburn to Pasco route crosses the mountains through the Stampede Pass tunnel. The ceiling of the Stampede Pass tunnel is too low for double-stack intermodal container trains, limiting the capacity of this route. The third route follows the north side of the Columbia River from Vancouver, Washington to Pasco. This is the primary route for export grain trains inbound to the Columbia River ports, but due to heavy traffic through Stevens Pass, this has become a reliever route for intermodal traffic moving from Seattle and Tacoma to Vancouver, Washington, and then east along the river.

These BNSF east-west corridors converge in Spokane to feed the two major BNSF routes providing access to grain producers in the Midwest and intermodal freight connections in Chicago.

The three east-west routes are linked by the north-south I-5 rail corridor. The I-5 corridor rail line runs the length of the State from the Canadian border through Bellingham, Everett, Seattle, and Tacoma to Vancouver and Portland. It is the backbone of the Washington State rail system, controlling access to the east-west lines. Most of the line is owned by the BNSF, but the BNSF shares operating rights over the line with the UPRR, Amtrak's intercity-rail services, and Sounder commuter-rail operations. (The UPRR also owns sections of rail line in the Auburn-Tacoma area that parallel the BNSF line.)

The UPRR System in Washington State

The UPRR's primary east-west corridor serving traffic in and out of Washington State is in Oregon, running between Portland and Hinkle on the south side of the Columbia River Gorge. At Hinkle, the line forks: one line runs northeast from Hinkle to Spokane, linking up with the Canadian Pacific near Eastport, Idaho; and the other line runs southeast from Hinkle to Pocatello, Idaho, connecting to the UPRR's Central Corridor and the heavily trafficked lines serving the Powder River Basin coal fields. This line is the UPRR's major connection between the grain producing regions of the Midwest and the Columbia River and Puget Sound ports. For the last 12 miles of the Hinkle to Spokane line (from Fish Lake to Spokane), the UPRR operates on the BNSF Lakeside Subdivision via trackage rights.

North of Vancouver, Washington, the UPRR has operating rights over the BNSF's I-5 rail line as far as Tacoma and Seattle. This is the UPRR's primary intermodal route connecting to the Ports of Seattle and Tacoma. South of Portland, the UPRR owns and operates the I-5 mainline, which is the major conduit for forest products from British Columbia, Washington, and Oregon to the growing population centers of Southern California and the Southwest. (The BNSF serves these markets using its line through Bend, Oregon, which parallels the UPRR line. The BNSF and the UPRR then share operating rights over the UPRR line through southern Oregon and Northern California.)

Short Lines

Each of the large Class I railroads is served by a number of smaller regional, short line and terminal railroads, which pick up and distribute railcars to individual industrial and agricultural shippers and receivers. These railroads provide critical services, particularly in lower-density rail corridors and markets where the Class I railroads cannot operate cost-effectively. In a number of cases, the short lines operate on branch lines that were previously owned and operated by the Class I railroads.

Intercity Passenger Rail

Intercity passenger rail service in Washington State is provided by Amtrak. The service with the highest ridership is the Amtrak *Cascades* service, operated by Amtrak in partnership with Washington State DOT. The Amtrak *Cascades* provides service along the I-5 rail corridor from Vancouver, British Columbia in the north through Everett, Seattle, Tacoma, and Olympia, and then south to Portland, Oregon. Oregon is a funding partner, underwriting Amtrak *Cascades* service to Eugene, Oregon. Amtrak also operates the Coast Starlight train between Seattle and Portland, and the Empire Builder train between Seattle and Spokane and between Portland and Spokane, with connections from Spokane east to Chicago.

3.2 Washington State Rail Users

Rail provides critical transportation for manufacturers, agricultural producers, lumber and wood products producers, the food products industry, and the ports and international trade sector – all important sectors of the Washington economy. Consider these statistics:

- Manufacturers, agricultural producers, and lumber and wood products producers generate 14 percent ($37 billion) of the State's $262 billion economic output value (gross state product) and 15.5 percent (425,700 jobs) of the State's employment.
- The Washington State ports generate between 200,000 and 300,000 direct, indirect, and trade-related jobs in the State. A portion of these jobs depend directly or indirectly on rail service.
- Sixteen percent of all freight tonnage moved in Washington State moves by rail.

Rail service is critical because it enables these Washington State industries to ship heavy or bulky commodities over long distances at low costs. Table 1 lists the top 10 outbound Washington State rail commodities by tonnage for 2004 and the forecast tonnages for 2015 and 2025. These are commodities that are shipped out of Washington State by rail. "Miscellaneous mixed shipments" are primarily merchandise and retail trade goods; many are moving in intermodal containers.

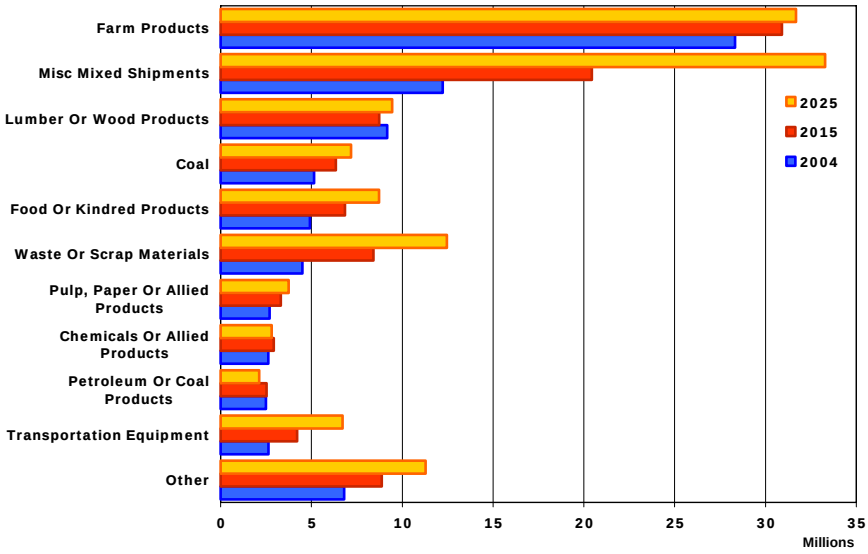
Table 1. Top 10 Outbound Commodities by Tonnage, 2004, 2015, and 2025

		Rail Tonnage			Compound Annual Growth Rate		
STCC	Commodity	2004	2015	2025	2004-2015	2015-2026	2004-2025
46	Miscellaneous mixed shipments	6,516,304	11,309,371	19,060,968	5.1%	5.4%	5.2%
24	Lumber or wood products	4,506,679	4,072,939	4,183,956	-0.9%	0.3%	-0.4%
11	Coal	2,142,403	2,743,497	3,184,686	2.3%	1.5%	1.9%
40	Waste or scrap materials	1,543,296	2,377,099	3,260,635	4.0%	3.2%	3.6%
26	Pulp, paper, or allied products	1,231,469	1,556,870	1,752,517	2.2%	1.2%	1.7%
20	Food or kindred products	1,075,792	1,662,293	2,389,104	4.0%	3.7%	3.9%
37	Transportation equipment	826,102	2,090,719	4,523,959	8.8%	8.0%	8.4%
1	Farm products	700,653	997,648	1,385,204	3.3%	3.3%	3.3%
33	Primary metal products	606,415	677,274	597,161	1.0%	-1.3%	-0.1%
28	Chemicals or allied products	353,040	381,960	367,654	0.7%	-0.4%	0.2%

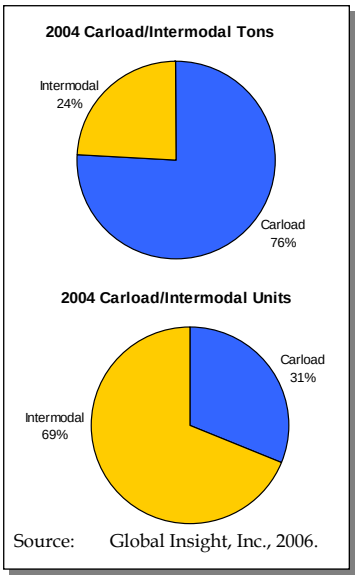
Source: Global Insight, Inc., 2006.

Figure 2 compares the 2004 tonnages to the forecast tonnages for 2015 and 2025. This figure includes commodities that are shipped into and out of Washington State; the previous figure showed only outbound commodities.

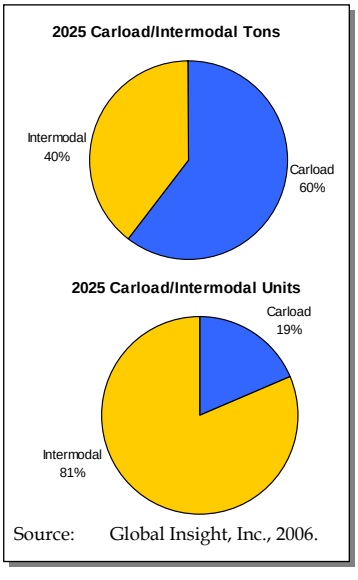
Figure 2. Washington State Rail Tonnage by Commodity (2004) and Forecast Tonnage (2015 and 2025)



Source: Global Insight, Inc., 2006.



Source: Global Insight, Inc., 2006.



Source: Global Insight, Inc., 2006.

Lighter commodities, such as merchandise and retail trade goods moving in intermodal containers, take up more railcar space and generate more trains than heavy, densely packed commodities, such as wheat or chemicals. While intermodal container shipments (a portion of miscellaneous mixed shipments) represent only 24 percent of tonnage in 2004, they represent 69 percent of railcar units. By 2025, intermodal container shipments will be 40 percent of tonnage and 81 percent of railcar units.

Without rail service, some of the Washington State businesses shipping by rail today would shift their rail freight to trucking, increasing their transportation costs and the cost to state and local government of highway maintenance; some would relocate to other states with the necessary rail service; and others might be forced out of business if higher transportation costs make them less competitive in global markets. This is of particular concern in the agricultural sector, where many traditional Washington crops are already under intense price competition in both domestic and international markets and where small increments of added cost can have significant impacts on competitive position.

3.2.1 Manufacturers/Industrial Carload Shippers

Manufacturing and industrial products industries are among the largest rail-using Washington State businesses, and they primarily

use rail carload services. Shippers include producers of metals, machinery, transportation equipment (including airplanes), wood and paper, and petroleum and plastic products. In 2004, the largest tonnage volumes of outbound shipments from these industries were waste and scrap materials; pulp, paper, and allied products; transportation equipment; primary metal products; and chemicals and allied products. Inbound manufactured or industrial products included coal; chemicals; clay, concrete, glass and stone; pulp and paper; and primary metal products.

Manufacturers interviewed for this study expect their volume of shipments to grow steadily, and economic forecasts show the demand for carload shipments growing at a compound rate of 1.8 percent per year for general manufacturing and 1.4 percent for lumber and wood products. However, many of the shippers reported that they were paying higher prices, were getting lower-quality service, and were often having business turned away by the railroads. These shippers will substitute truck for rail when they can, but for shippers of bulky, semifinished products or primary materials, trucking may not be feasible or cost-effective. In the longer term, there is a risk that Washington State will lose some of the businesses that depend on carload shipments to relocation or closure.

3.2.2 Ports and International Trade Sector/Intermodal Container Shippers

International trade generates huge flows of intermodal containers through the Ports of Seattle and Tacoma. Between 1994 and 2004, container traffic grew at an average annual rate of 3.7 percent at the Port of Tacoma, and 2.6 percent at the Port of Seattle. Much of the container traffic consists of merchandise and retail goods imported from Asia through the Ports, and then transferred to rail for shipment to Midwest and eastern U.S. markets. Intermodal rail traffic supporting the Ports and international trade is forecast to grow at a compound annual growth rate of 5.8 percent between 2005 and 2025.

Businesses and consumers across the U.S. benefit from this international trade, but healthy deepwater ports also provide benefits to Washington State. The Ports of Seattle, Tacoma, and Vancouver estimate that the total number of statewide jobs connected to each port are: 166,680 for the Port of Seattle; 113,000 for the Port of

Tacoma; and 15,500 for the Port of Vancouver.[3] The Ports also contribute over $500 million in state and local taxes associated with their maritime cargo operations. Washington State ranks third among all states in annual export value, and first in export value per capita. While many Washington State exporters do not use the rail system to deliver goods to the State's ports, the existence of a healthy rail system is important, because it brings more traffic to the ports and more shipping services that can be used by Washington State exporters. Ocean carriers make decisions about which ports to call, at what frequency, and with what services offered based on the overall market potential associated with the port. Strong long-haul rail services allow ocean carriers to access larger and more distant inland markets. Local export shipments help to balance import and export flows for the carrier. Thus, a strong rail system helps attract ocean carrier services to Washington State's ports and makes the State a more attractive location for national, regional, and local export businesses.

The ability of the Washington State trade sector to deliver these benefits to the economy is critically dependent on the ability of the Ports to compete with other North American ports. This is confirmed by experience of the last decade; first with loss of market share to Southern California ports, and then with gains as the California gateway experienced capacity problems. Looking forward, the Ports will face new competition from the Port of Vancouver, British Columbia; a new port being built specifically for North American inland container traffic at Prince Rupert, British Columbia; and "all-water" services that use the Panama Canal to reach East Coast ports. In this environment, an efficient rail system with good on-dock and near-dock connections is an important competitive advantage.

3.2.3 Agriculture and Foods Products Industry/Bulk and Specialized Carload Shippers

Agriculture and food products manufacturers are an important economic sector in the State, generating 3 percent of the gross state product and accounting for 6 percent of the employment. Washington State ranked 11th among states in agricultural

[3] These job estimates are self-reported by each port based on economic impact studies conducted by Martin Associates in 2001 (Vancouver), 2004 (Seattle), and 2005 (Tacoma). The Port of Seattle explains that their estimates include direct, indirect, and induced jobs related to marine cargo activities, as well as jobs with associated regional manufacturing and distributions firms moving cargo through the Port.

production in 2002, producing crops and livestock valued at over $5.3 billion. Agriculture is the major source of employment in many of the State's rural counties.

By tonnage, 36 percent of all Washington State agricultural shipments move by rail. Agricultural rail traffic outbound from Washington State is expected to grow at a compound annual growth rate of 3.3 percent over the next 20 years. Washington State also has a growing food products industry with particular strengths in frozen foods (7.3 percent of U.S. output) and wine production.

However, most of the agricultural tonnage moving on the Washington State rail system is Midwestern grain moving to the Lower Columbia River and Puget Sound ports for export. And because Midwestern grain is moving long distances by unit train, it is generally more profitable for the railroads than local Washington State agricultural shipments, which often are moving shorter distances for export or require specialized handling.

The Class I railroads are asking Washington agricultural shippers to consolidate their shipments at new facilities (such as the Ritzville loader), and this may prove economical for those shippers who can accommodate the changes. But these changes will affect the short lines, which may see declines in their markets; operators of small grain elevators along the short lines who also stand to lose business; and the remaining shippers on the short lines who could see reductions in service and increased costs.

The challenge faced by Washington State agriculture is to maintain competitive rail service as it focuses on higher-value added crops and produce that may not generate the volumes that are attractive to the Class I railroads.

How do Amtrak Cascades ridership forecasts compare with other intercity corridors?

Amtrak Cascades – ***In 2005, three round-trip trains between Seattle to Portland served 0.4 million riders. In 2023, 17 round-trip trains (13 between Seattle and Portland and 4 north of Seattle) are forecast to serve 3.0 million riders.***

Capitol Corridor* **–** ***In 2003, 12 round-trip trains between San Francisco Bay Area and Sacramento served 1.14 million riders.***

Surfliner Corridor* **–** ***In 2003, 11 daily round-trip trains between San Diego, Los Angeles, and San Luis Obispo served 2.2 million riders.***

Northeast Corridor – ***In 2001, 42 round-trips trains between Boston to New York to Washington, D.C. served 10.9 million riders.***

*Source: *Amtrak Strategic Plan FY2005-2009, Amtrak, June 2004.*

3.2.4 Passenger Rail Riders

Washington State supports intercity passenger rail and commuter rail services. The major service is the Amtrak *Cascades* intercity rail program, which provides service from Vancouver, British Columbia through Everett, Seattle, Tacoma and Olympia, and then south to Vancouver, Washington and Portland and Eugene, Oregon. The program currently provides four round trips daily between Seattle and Portland, with one round trip daily between Seattle and Bellingham, and one round trip daily between Seattle and Vancouver, BC. Ridership in 2005 was about 421,000 on the

four trains that were supported financially by Washington State at that time, and about 637,000 on the entire *Cascades* service.[4] The State's passenger rail plans envision serving up to 3.0[5] million riders with 17 round-trip trains (13 between Seattle and Portland and 4 north of Seattle) in 2023.

Sound Transit provides Sounder commuter rail services in the Puget Sound region, with weekday peak-period service between Seattle and Tacoma and between Seattle and Everett. Both services operate over BNSF tracks. The *Cascades* service is operated by Amtrak; the Sounder commuter trains are operated by BNSF and maintained by Amtrak.

In the Puget Sound region, Sounder ridership is projected to grow from 1.2 million passenger trips in 2006 to 2.6 million passenger trips in 2011, a five-year increase of 117 percent.

Forecasts for both the Amtrak *Cascades* and the Sounder services are predicated on substantial investments to increase capacity and improve operations along the I-5 rail corridor. Full build out of the draft Long-Range Plan for the *Cascades* program calls for additional investments of $6.5 billion (in 2006 dollars) by 2023.

Rail Capacity *is calculated in a two-step process.*

First, a "theoretical capacity" is determined, assuming perfect conditions and operations.

Second, "practical capacity" is determined by considering factors, such as possible disruptions, signal needs, human decisions, weather, possible equipment failures, supply and demand imbalances, and seasonal demand.

Practical capacity is about 60 percent of the theoretical capacity and provides reliable service; it is similar to a highway level of service of "C." At higher percentages, rail congestion increases and service reliability deteriorates quickly.

3.4 Capacity of the Washington State Rail System and Implications for Rail Users

The Washington State rail system is nearing capacity; service quality is strained, and rates are going up.

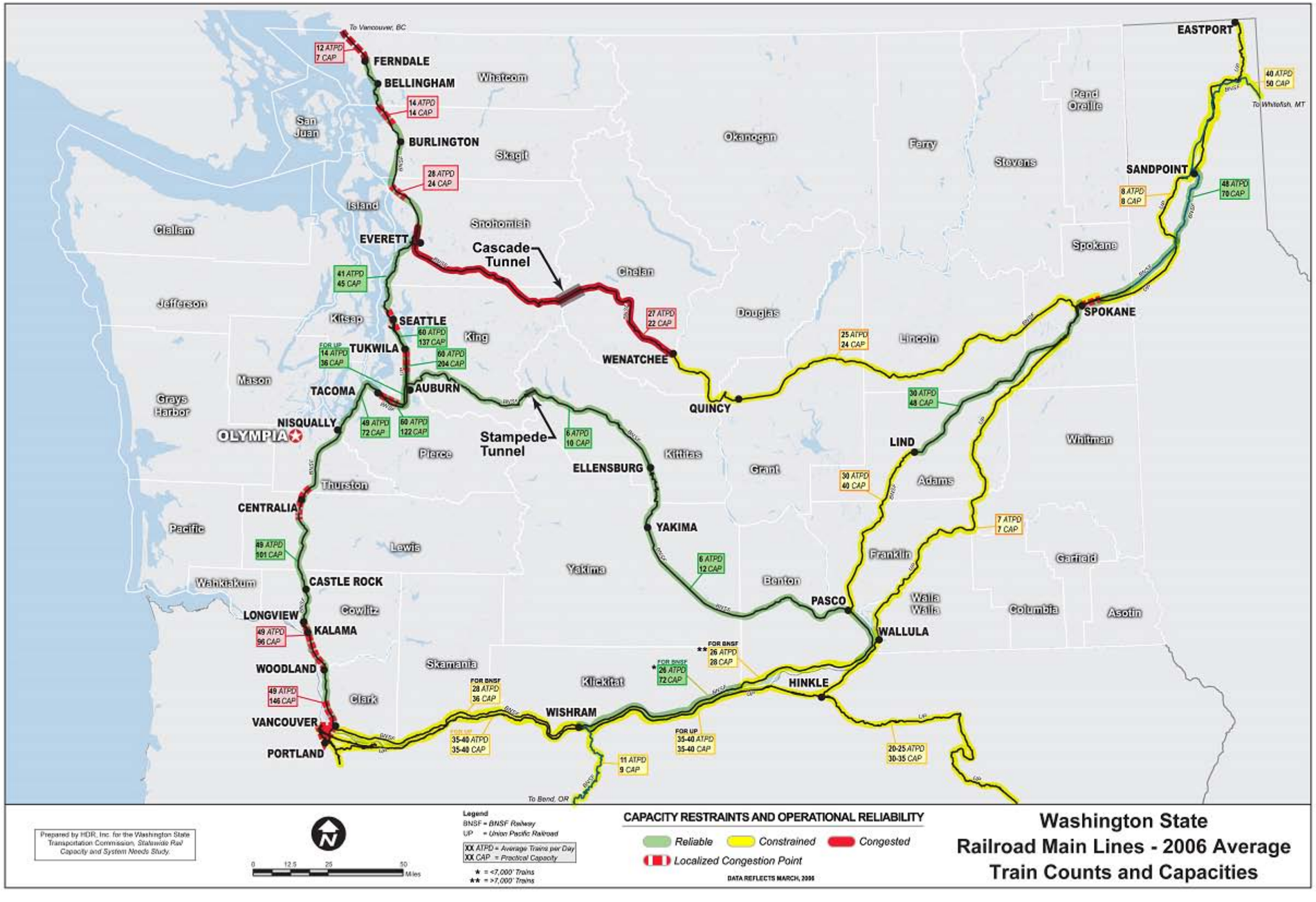
Figure 3 compares the average number of trains operated on each line to the practical capacity of the line.

The Everett-Spokane line, which passes through the Cascade Tunnel at Stevens Pass, is the BNSF's major transcontinental route for double-stack intermodal container trains. It is heavily used, operating today at about 123 percent of practical capacity.

[4] As of July 1, 2006, there are four round trips daily on the Seattle to Portland segment. Prior to this, there were only three round trips daily.

[5] A range of ridership projections were produced that varied based on fare structure and other variables. 3 million is a higher end projection.

Figure 3. Washington State Rail System: Mainline Capacities, 2006



The BNSF's Auburn-Pasco line, which passes through the Stampede Tunnel, operates today at about 60 percent of practical capacity. The line cannot be used to relieve the Everett-Spokane line, because the ceiling of the Stampede Tunnel is too low to accommodate double-stack intermodal container trains. Grades over Stampede Pass also make it difficult to haul heavy-loaded unit grain trains along this line.

The BNSF's Vancouver-Pasco line, which follows the Columbia River along the north side of the Gorge, is used by double-stack intermodal container trains moving east, grain trains moving west to the Puget Sound and Columbia River ports, and carload trains moving both east and west to serve Washington State industrial and agricultural shippers. The line is operating today at about 70 percent of practical capacity.

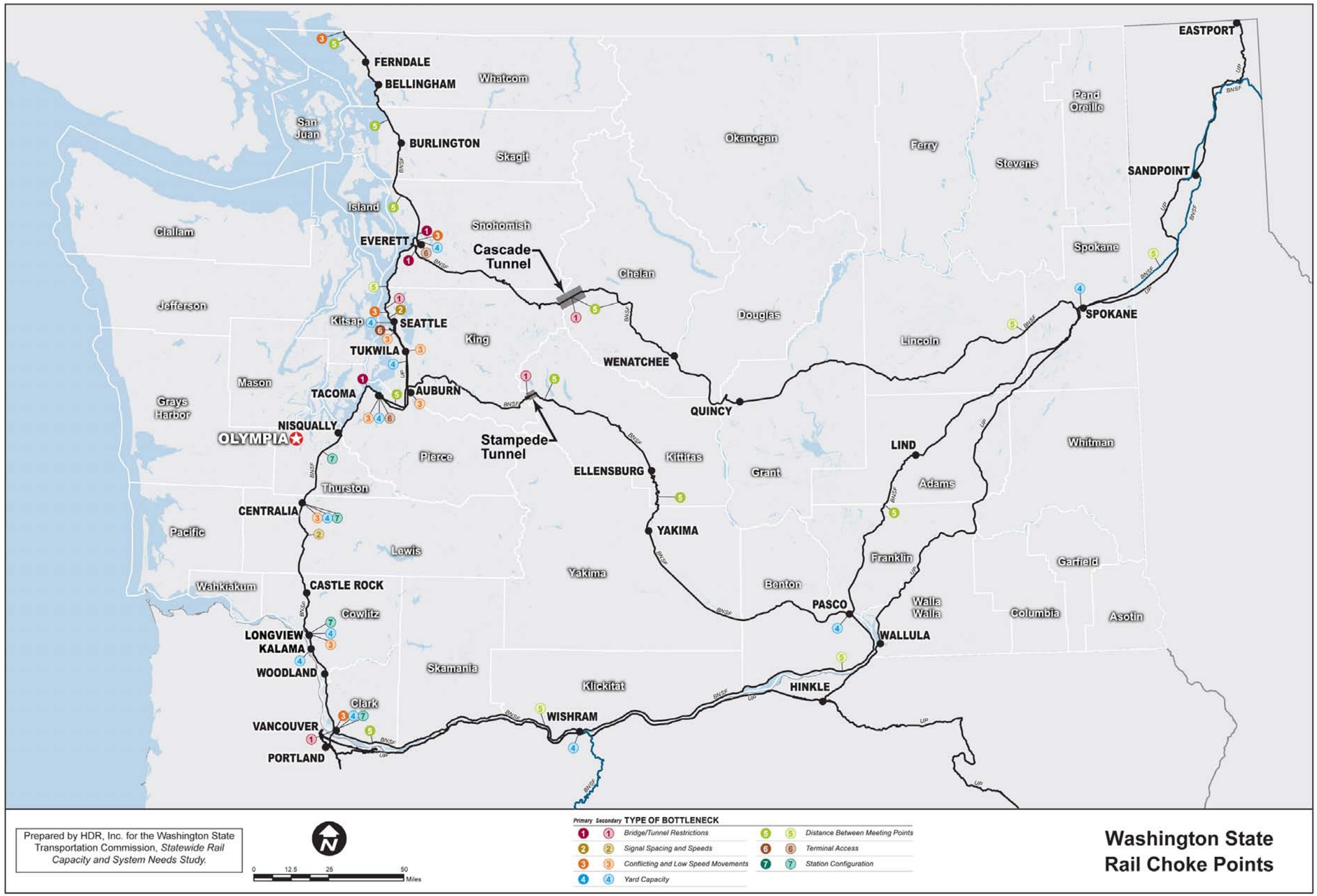
The I-5 corridor rail line runs the length of the State from the Canadian border, Bellingham and Everett through Seattle, and Tacoma to Vancouver and Portland. It is the backbone of the Washington State rail system, controlling access to the east-west lines. Most of the line is owned by the BNSF, but the BNSF shares operating rights over the line with the UPRR, Amtrak's intercity-rail services, and the Sounder commuter-rail operations. The line operates at between 40 and 60 percent of practical capacity in most sections, but is subject to frequent stoppages when trains tie up the mainline to enter and exit the many ports, terminals, and industrial yards along the corridor. Some half dozen sections are chronic choke points, causing delays that ripple across the entire Washington State and Pacific Northwest rail system.

Rail Choke Points

Figure 4 locates the major rail choke points by type across the Washington State rail system.

With the Everett-Spokane line nearing its maximum capacity, the BNSF has been routing more intermodal trains south along the I-5 rail corridor to Vancouver, Washington, and then east. This has added considerable volume to the Vancouver-Pasco line along the Columbia River Gorge, and made the scheduling of train moves through the Gorge and along the I-5 rail corridor more complex.

Figure 4. Washington State Rail System: Rail Choke Points, 2006



The on-time performance of the Amtrak *Cascades* service has dropped, and delays for both BNSF and UPRR freight trains have increased, although recent changes in freight operating practices have improved performance somewhat. The problem is particularly acute in the Portland/Vancouver area, where the railroads' north-south and east-west routes intersect. Rail simulation studies of grain trains bound for the ports, intermodal trains running through, industrial carload trains serving local industries, and intercity passenger trains shuttling up and down the I-5 corridor show that the delay hours per train moving through the Portland/Vancouver area are greater than the delay hours for trains in the Chicago area, one of the nation's most congested rail hubs.[6]

The Class I railroads are adjusting their operations to increase the volume of freight moved through the system over the existing rail lines, but the operational changes may not be sufficient to satisfy the future needs of Washington shippers. The short-term operating strategies being pursued by the railroads include the following:

- Operating longer 8,000-foot trains and maximizing the number of containers packed on intermodal flat cars;
- Marketing and operating single origin and destination unit trains for carload traffic;
- Consolidating pick-up and delivery of railcars at central terminals operated by third parties (examples include new rail-served industrial parks, logistics hubs, and transload centers);
- Eliminating mainline switching whenever possible (i.e., picking up and setting out individual cars or sets of cars for specific shippers and receivers while the train is "parked" on the mainline; this blocks the mainline and reduces line and system capacity); and
- Transferring responsibility for branch-line switching from the Class I railroads to local short lines, wherever possible.

These strategies will help meet the needs of the ports and intermodal shippers, but will likely complicate the problem of

[6] "Freight, Intercity Passenger and Commuter Rail," PowerPoint presentation to the Portland-Vancouver I-5 Transportation and Trade Partnership on May 21, 2002; and "Final Strategic Plan: June 2002," prepared by Willard F. Keeney and HDR, Inc. for the Portland-Vancouver I-5 Transportation and Trade Partnership.

industrial carload shippers who cannot take advantage of longer and better packed intermodal trains. The Class I railroads are asking shippers, wherever possible, to reorganize and upgrade their tracks and track layouts to improve switching efficiency and be more compatible with the railroads' hook-and-haul operations. The more track space within the shipper's property and the longer the entrance and exit tracks, the faster and more efficiently the railroad can pick up or set out cars. This saves time and labor costs for the railroads and keeps high-volume mainlines open more hours of the day for through train movements. But for low-volume shippers, the costs of these site improvements are usually prohibitive. The same problems apply to consolidating rail pick-up and delivery of railcars at central terminals operated by third parties; unless the consolidation centers are well located, designed, and financed, the financial risks to shippers and operators may be very high.

Consolidation and outsourcing of terminal operations to third parties and transfer of branch-line switching from Class I to short line railroads can result in the replacement of union rail jobs with lower-paying nonunion jobs. Unless offset by future growth in Class I business that generates new union jobs, the loss of union jobs can mean a lower income and standard of living for some Washington State residents with jobs in the rail industry.

The new operating strategies also impact the State's agricultural shippers. Low-cost rail service keeps product costs competitive, but the increasing cost of rail service and the Class I railroads' focus on higher-profit, hook-and-haul intermodal traffic has made it more costly and more difficult for some agricultural shippers to get service at acceptable prices. The Class I railroads also have been asking Washington State grain and other bulk agricultural shippers to consolidate shipping points so that the railroads can operate more unit trains. Notable examples of this trend are the Ritzville grain-loading facility and the new Railex produce service at Wallula.[7]

While these new rail operating strategies have the potential to partially address future capacity needs, the analysis conducted for this study suggests that they may not be sufficient in the longer term. Table 2 lists the lines where mainline practical capacity will be exceeded within 20 years even with the additional capacity gained by operating longer trains and implementing better scheduling. The existing choke points will persist and worsen, some more quickly than others.

[7] http://www.wsdot.wa.gov/Projects/Rail/Freight/PortWallaWalla/.

Nationally, rail capacity is not keeping pace with demand. The rail industry today is stable, productive, and competitive with enough business and profit to operate, but it is not yet attracting capital fast enough to replenish its infrastructure quickly or keep pace with demand and public expectations. This trend has been documented in several recent reports.[8]

Table 2. Rail Lines in Washington State Exceeding Practical Capacity, 2015 and 2025
Based on Peak Day Train Volumes and Assuming Operation of 8,000-Foot Trains

2015	2025
Everett-Burlington	Everett-Burlington
Burlington-Ferndale	Burlington-Ferndale
Ferndale-New Westminster	Ferndale-New Westminster
Everett-Spokane, Washington (BNSF)	Everett-Spokane, Washington (BNSF)
Vancouver-Wishram	Vancouver-Wishram
Wishram-Roosevelt	Wishram-Roosevelt
Roosevelt-Pasco	Roosevelt-Pasco
	Pasco-Spokane, Washington (BNSF)
Pasco (Wallula)-Spokane, Washington (UP)	Pasco (Wallula)-Spokane, Washington (UP)
Spokane, Washington-Sandpoint, Idaho (UP)	Spokane, Washington-Sandpoint, Idaho (UP)
Auburn-Yakima	Auburn-Yakima
Yakima-Pasco	Yakima-Pasco

Railroading is one of the most capital intensive industries in the U.S., and investment in fixed assets can be a risky proposition.

[8] See for example: AASHTO, *Freight-Rail Bottom Line Report*, Washington, D.C., 2003; and United States Government Accountability Office, *Freight Railroads: Industry Health Has Improved, But Concerns About Competition and Capacity Should Be Addressed*, Washington, D.C., October 2006.

During the 1990s, when railroads found themselves with excess capacity and profits were down, Wall Street downgraded bond ratings and railroad stock prices fell. In the last several years, this trend has reversed and Class I railroads are reinvesting heavily to maintain and add capacity to their systems. However, much of this investment is replacing existing infrastructure and maintaining existing capacity, because rail traffic places enormous wear and tear on rails, bridges, tunnels, and locomotives. To reduce longer-term financial risk, both the BNSF and the UPRR have investment strategies that emphasize increasing capacity through operations first and infrastructure expansion last.

To manage demand while new capacity is being added, the railroads are using pricing to turn aside lower-profit carload freight in favor of intermodal and coal traffic, which can be handled more cost-effectively and profitably in unit or destination-specific trains. In some markets and corridors, international intermodal traffic is squeezing out industrial and low-density agricultural carload traffic. Shippers, who are used to being price setters, are now price takers. This is a painful change for all shippers, especially captive shippers, who are being forced to rethink their supply chains and markets.

The national capacity crunch is focusing more rail traffic and railroad investment on the Pacific Southwest at the expense of the Pacific Northwest and Washington State. Continuing high levels of growth and the competition between the BNSF and the UPRR for the lucrative Southern California rail market have made Southern California the key focal point of investment for both railroads. This has shifted investment away from the Pacific Northwest and Washington State.

Capacity shortfalls will complicate the improvement of intercity passenger rail service. As a condition of the deregulation of the railroad industry in 1980, Federal law requires that freight railroads share the use of their lines with intercity passenger rail providers and give passenger trains priority over freight trains. But the differing needs of the passenger and freight railroad create tension between the needs of the passenger rail operators and the needs of freight rail operators as each tries to maximize the performance of their respective operations.

In general, frequent passenger rail service, especially frequent high-speed rail service, requires relatively wide time-space slots on the mainline to ensure that the passenger trains do not

overtake and collide with slower-moving carload freight trains.[9] The freight railroads, who own the track, are focused on obtaining the maximum benefit from each available train slot and the revenue they receive for providing train slots to the passenger railroads is usually modest.

When the Amtrak *Cascades* program was initiated, the freight railroads were willing to sell slots to the State, especially in return for physical improvements to the rail lines that would benefit both the passenger and freight railroads. With capacity tightening and increasing shipper pressure to improve throughput and reliability, the freight railroads are less willing or able to accommodate expansion of the intercity rail program. As a result, passenger services are often asked to pay a premium when they purchase slots or contribute to mainline capacity improvements.

Amtrak *Cascades* ridership and revenues have been increasing, but on-time performance has been decreasing as freight traffic increases and the freight railroads give priority to freight trains. Considerable additional investment is needed to achieve the program's longer-term goals of more frequent service and higher ridership. However, if congestion continues to build and the cost of improvements increases, on-time performance may deteriorate further, undermining ridership growth and reducing the cost-effectiveness of the program. Unless a coordinated solution is examined, the future cost of the Amtrak *Cascades* program may exceed the public benefits anticipated in the original plans, and the State may need to examine alternative strategies for the passenger rail program.

[9] Intermodal trains are also significant consumers of rail capacity, because they are long, move at speeds similar to passenger trains, and require priority of movement. The railroads market these trains as premium services, and they generate substantial revenue for the railroads.

4.0 Washington State Powers, Authorities, and Interests

Given the State's need for a robust rail system and the emerging capacity needs, what are the State's powers and authorities? What can the State do to address the capacity needs of the system?

4.1 Washington State Powers and Authorities in Freight and Passenger Rail

The State of Washington has a longstanding interest and involvement in both freight and passenger rail. Many of the needs of the Washington State rail system can be addressed by building on the existing freight and passenger rail policies in the Revised Code of Washington (RCW). The policy recommendations of this study build on this foundation, and in many instances, confirm existing policy. The existing statutes include the following:

The Essential Rail Assistance Account is a dedicated rail account created in the state treasury and governed by RCW 47.76.250. Money in the account can only be used for purposes specified in the RCW, including:

- *Acquiring, rebuilding, or rehabilitating rail lines;*
- *Purchasing or rehabilitating essential railroad equipment;*
- *Railroad improvements to mitigate port or mainline congestion;*
- *Construction of loading facilities; and*
- *Preservation of future rail corridors.*

- **RCW 47.76, Freight Rail Services –** This section, which reflects recommendations to the Legislature by the 1995 Washington State Freight Rail Policy Development Committee and others, spells out State policies and interests in freight rail. The statutes:
  - Recognize the critical role of a healthy freight-rail system in supporting the economic vitality of the State and key economic sectors;
  - Mandate continuing roles and responsibilities for the Washington State DOT and the Washington Utilities and Transportation Commission in administering the State's freight rail programs;
  - Provide for technical assistance in the establishment of county rail and port districts;
  - Create an Essential Rail Assistance Account to provide financial assistance for acquisition and improvements to rail lines, purchasing or rehabilitating rail equipment for essential services, and construction of loading facilities to increase business on light density lines or mitigate impacts of abandonment;

- Describe criteria for prioritizing projects that include cost-benefit analysis and cofunding from other beneficiaries; and
- Create a rail preservation program aimed at rail lines and rights-of-way abandoned by the Class I railroads.

- **RCW 47.79, High-Speed Ground Transportation –** This section establishes a program to promote a high-quality, high-speed, intercity rail system. The statute was enacted based on the Legislative recognition that major intercity transportation corridors in Washington are becoming increasingly congested; that high-speed ground transportation offers a safer, more efficient, and environmentally responsible alternative to increasing highway capacity; and that high-speed ground transportation can complement existing air transportation systems, as well as regional growth management plans. Some of the goals of this statute include the following:

  - Reduce travel time between downtown Portland and downtown Seattle to a maximum of two hours by 2010;
  - Implement high-speed ground transportation service offering top speeds over 150 mph between Everett and Portland, Oregon by 2020;
  - Implement high-speed ground transportation service offering top speeds over 150 mph between Everett and Vancouver, BC by 2025; and
  - Implement high-speed ground transportation service offering top speeds over 150 mph between Seattle and Spokane by 2030.

  In addition, this statute recognizes the Legislature's intent to develop public support and awareness of the benefits of a high-speed ground transportation system through the incremental upgrading of existing service. The statute makes the Department of Transportation responsible for developing a prioritized list of projects to improve existing passenger rail service.

- **RCW 47.46 Public-Private Transportation Initiatives –** This section spells out the benefits, roles, and responsibilities of public-private partnerships as a means of developing innovatively financed transportation infrastructure projects. The statute was enacted to create incentives for private investment in road and bridge projects, but many of the policies and approaches specified in the statute could be applied to public-private financing of private rail projects, where the State can demonstrate a clear public interest and significant benefits.

These existing statutes define the State's interest in freight and passenger rail, assign roles and responsibilities for the oversight of the State's interest in rail, and establish a number of specific passenger and freight investment programs. The statutes provide a broad foundation for continued state participation in the preservation and improvement of the rail transportation system, where there are public benefits to Washington State, its businesses, and its communities.

Any rail improvement strategies suggested for State participation also must be consistent with the Washington State Constitution. There are a number of provisions in the Constitution that may limit the State's involvement in the private rail system. The guidelines outlined in Article VIII of the Constitution, "State, County and Municipal Indebtedness," limit the extent to which the State, counties, or cities can give or loan credit to corporations. The provisions of RCW 47.76 and 47.46 address this limitation by making it clear that the State may not participate in projects with private ownership unless there are clear and demonstrated public benefits. The policies recommended in this report also recognize this need to demonstrate public benefit before the State can invest in the private rail system. Nevertheless, before the Legislature enacts specific investment or financial assistance programs that are rooted in the policies proposed in this report, a thorough legal evaluation of the programs' compliance with the constitutional provisions should be undertaken.

4.2 Washington State Investments in the Rail System

Over the last 15 years, the State has used its powers and authorities to:

- Develop the Amtrak *Cascades* service as part of its high-speed intercity rail program;
- Acquire and preserve rail lines and rights-of-way abandoned by the Class I and other railroads;
- Provide assistance to short line railroads to maintain service for shippers and receivers who do not have access to mainline rail service; and
- Purchase specialized railcars (e.g., hopper cars for the Washington Grain Train, and refrigerated produce cars) to

ensure an adequate pool of equipment for Washington State growers.

The State has contributed consistently to both the passenger and freight rail systems. Table 3 lists the passenger and freight rail projects that the State has participated in since 2003. By 2005, the State had contributed a total of about $120 million to the Amtrak *Cascades* program capital budget (including the projects listed below). Freight rail investments by the State have totaled about $31.5[10] million since 1990, with 2003 to 2005 funding alone reaching $12.5 million.

All the State's investments were authorized – some with clear policy guidance and analysis of the public benefits, others with less clear guidance and more limited assessment of longer-term benefits. As a result of these investments and other prior investments, the State now owns a number of rail lines, specialized railcars, rail maintenance equipment, and rights to use privately owned rail lines. But the State does not have a centralized inventory of these assets, nor does it have a comprehensive plan for their use, maintenance, and eventual replacement or disposal.

[10]This number represents actual state expenditures and does not include money programmed or set aside for future use.

Table 3. Recent and Ongoing Washington State Rail Investment Projects

Project	Year Complete	State Contribution
Crossover Projects		
Woodland Crossover	2005	$4 million
Ruston Crossover	2005	$3.6 million
Titlow High Speed Crossovers	2005	$4 million
Felida Crossover	2005	$2.2 million
Tenino High-Speed Crossover	In progress	$3.8 million
Centennial High-Speed Crossovers (Leary, Pattison)	In progress	$3.4 million
Winlock High-Speed crossovers	In progress	$3.4 million
Track Rehabilitation, Construction, or Realignment Projects		
PA Junction Curve Realignments and Delta Yard Storage Tracks	2008	$14 million
Chehalis Junction to Blakeslee Junction Via Centralia	In progress	$7 million
King Street Station Track Improvements	In progress	$15 million
Columbia Basin Railroad Wheeler-Warden 286K	In progress	$400,000
Northern Columbia Basin Railroad Project	In progress	$2 million
Point Defiance Bypass	In progress	$59 million
Port of Pend Oreille 286K Upgrades	In progress	$695,000
Tacoma RMDRR Morton Line Repairs	2005	$3.18 million
Stanwood Siding Upgrade	In progress	$3 million
Kelso-Martin's Bluff Rail Project	In progress	$53 million
Bellingham Waterfront Redevelopment	In progress	$5 million
Bellingham GP Area Upgrades	In progress	$200,000
Lewis and Clark Railroad Rehabilitation	In progress	$300,000
Mt. Vernon Siding Upgrade	In progress	$3.8 million
Railroad Yard Reconfiguration or Expansion Projects		
Dayton Yard Rehabilitation	In progress	$270,000
Vancouver Rail Project	In progress	$100 million
Swift Customs Facility at Blaine/White Rock	In progress	$3 million

Table 3. Recent and Ongoing Washington State Rail Investment Projects (continued)

Project	Year Complete	State Contribution
Actions to Support Agricultural or Industrial Carload Shippers: Spur Track Construction or Improvement and Short Line Acquisition, Other		
Industrial Spur Track to Winlock Glass Manufacturing Plant	2006	$800,000
Geiger Spur Connection	In progress	$5 million
PCC Cheney-Coulee City-Pullman Acquisition and Upgrades	In progress	$28 million
Produce Railcar Pool	In progress	$2 million
TS and W Yakama Sawmill Traffic Upgrades	In progress	$640,000
Increased Passenger Service		
New Seattle to Portland Roundtrip	2006	$2.75 million
Sound Transit: Sounder Track Improvements	2003	$17 million
Equipment Purchase or Upgrade		
One Existing Train Set from Oregon	2003	$7.5 million
Cascades Trainsets Overhaul	In progress	$10 million
Port Access		
Port of Grays Harbor Grain Terminal Loop Track	2003	$2 million
Port of Olympia On-Dock Rail Spur	2006	$375 thousand
Port of Columbia Railroad Improvements	In progress	$5.3 million
Port of Pasco Intermodal Facility Improvements	In progress	$5.4 million
Port of Pend Orielle 286K Upgrades	In progress	$695,000
Port of Walla Walla Railex Project	In progress	2.5 million
Transload Facility		
Quincy Transload Facility	2005	$2 million
Quincy Short-Haul Intermodal Pilot Project	In progress	$900,000
Feasibility Studies		
BNSF Skagit River Bridge Replacement Study	In progress	$150,000
Eastern Skagit Rail Study	2006	$50,000

4.3 Washington State Governance of Rail

Four groups within the state government have legislatively mandated roles and responsibilities for oversight, management, and implementation of the State's interest in passenger and freight rail.

Washington State Utilities and Transportation Commission (WUTC)

The Washington Utilities and Transportation Commission (WUTC) is responsible for railroad safety. The rail group is part of the WUTC safety and consumer protection division, but separate from the transportation safety group, which covers persons and property traveling Washington State roads. A primary responsibility of the rail group is to work with the Federal Railroad Administration (FRA) to inspect rail shipments of hazardous materials. There are more than 300 inspection points throughout the State, including shippers' facilities, railroad yards, and terminals.

Washington State Department of Transportation

Washington State Department of Transportation (WSDOT) is charged with planning, funding, implementation, construction, and maintenance of the multimodal transportation system in Washington State. As such, it is the conduit for state and Federal transportation dollars. The WSDOT freight rail program is housed within the Office of Freight Strategy and Policy. The passenger program is housed within the Public Transportation and Rail Division.

Freight Mobility Strategic Investment Board (FMSIB)

The Freight Mobility Strategic Investment Board (FMSIB) was created by the Washington State Legislature in 1998 to administer projects and strategies to lessen the impacts of freight movement on local communities and to facilitate efficient and profitable freight movement in Washington State. The 10-member board has representatives from Washington ports, railroads, cities, counties, WSDOT, the governor's office, truckers, steamship operators, and private citizens. Periodically, FMSIB issues a call for projects in order to maintain a six-year list of active projects. Its past rail funding has gone primarily to grade separations and crossing improvements.

Washington Community Economic Revitalization Board (CERB)

Washington Community Economic Revitalization Board (CERB) issues grants and loans that will retain existing jobs and create new ones, boosting business growth across the State. CERB can provide funding for rail projects that promote industrial development and has done so in the past. An example of this type of project was its $1,000,000 low-interest loan to the Port of Longview to help construct a second rail line and rail spurs serving a planned new facility for processing newly imported cars.

Each of these groups has knowledgeable and effective staff, and each carries out its mandates effectively; however, the lack of a central point of contact and coordination makes it difficult for businesses, communities, and the railroads to deal with the State, and in some cases, weakens the State's negotiating position.

4.4 Using State Powers and Authorities to Further State Interests in the Rail System

Building on its existing powers and authorities, the State can:

- Influence the investment decisions of the Class I railroads to resolve rail choke points of critical importance to key rail user groups in the State and, thereby, provide more capacity for Washington State rail users. This will generally involve public-private partnerships in which the State is a minority partner, but the State's investment can influence the timing and priority of the Class I railroads' investment decisions.

- Increase its advocacy for a Federal program that addresses critical national rail capacity needs. Many of the key capacity choke points in the Washington rail system affect the national economy and shippers outside of the State. The State should look for Federal action and funding to address these choke points.

- Work with rail users in industrial and agricultural markets to assist in the transition to rail service models that preserve high quality, reasonably priced, rail service options. The State can help ensure that these transitions occur in a timely fashion before the lack of action has negative economic consequences for the State.

- Work with third-party service providers and advocate for innovative operations practices and services that support the economic development goals of the State and its communities.

- Establish local governance models that allow shippers and affected communities to be involved directly in the resolution of short line problems.

- Support cost-effective intercity passenger rail options that improve the overall balance and performance of the State's highway and air passenger systems.

- Create a more effective, centralized, rail management function within state government with authority to advocate and negotiate state interests with the railroads.

5.0 Policy Recommendations

This report makes six policy recommendations that address capacity issues and system needs in the Washington State rail system. The policy recommendations address the justification for continued action in the rail system (Policy Recommendation #1), provide a framework for determining if specific actions are appropriate for the State (Policy Recommendation #2), present guiding principles for action in the rail system (Policy Recommendation #3), offer a new governance framework (Policy Recommendation #4), recommend involvement in national and regional rail policy discussions (Policy Recommendation #5), and propose adoption of a rail asset management plan (Policy Recommendation #6). These policy recommendations are consistent with the five prioritized guidelines for future transportation investments set forth in the Washington Transportation Plan:

- **Preservation –** Preserve and extend prior investments in existing transportation facilities and the services they provide to people and commerce. The guiding principles contained in Policy Recommendation #3 below emphasize investment in operational improvements and use of existing rail infrastructure prior to investment in new capacity.

- **Safety –** Target construction projects, enforcement, and education to save lives, reduce injuries, and protect property. Policy Recommendation #2 below lays out a framework for evaluating the benefits and impacts of action in the rail system and calls for an evaluation of safety impacts as one of the benefit measures.

- **Economic Vitality –** Improve freight movement and support economic sectors that rely on the transportation system, such as agriculture, tourism, and manufacturing. Throughout this report it is argued that rail transportation is critical to the economic vitality of key industries in Washington State. This is emphasized in Policy Recommendation #1 below.

- **Mobility –** Facilitate movement of people and goods to contribute to a strong economy and a better quality of life for citizens. The framework for evaluating potential actions in the rail system includes assessment of mobility impacts for both passengers and freight.

- **Environmental Quality and Health –** Bring benefits to the environment and citizens' health by improving the existing transportation infrastructure. The evaluation of environmental impacts of actions in the rail system is an important aspect of the decision-making process laid out in Policy Recommendation #2.

5.1 Policy Recommendation One

Policy Recommendation #1: Washington State should continue to participate in the preservation and improvement of both the freight and passenger rail transportation system where there are public benefits to Washington State, its businesses, and its communities.

The freight rail system in Washington State provides critical transportation for major manufacturing and resource industries and rail links to the State's international trade ports. Key segments of the rail system are already operating at or near their practical capacity. Given the current investment priorities and new operating strategies of the Class I railroads, it is likely that capacity will continue to be constrained, that shippers within Washington State (particularly those in traditional industrial and agricultural carload markets) will see declines in service or price increases, that growth at the ports could be slowed, and that there will continue to be conflicts between passenger and freight trains. Without state action, the businesses and citizens of the State will not realize the potential benefits that rail transportation could provide.

Working with the railroads, rail users, and communities, Washington State should develop a description of the rail transportation system needed for the 21st Century as a framework for policy and investment. The description of the rail system and its evolution should address the rail transportation needs of the major rail user groups in Washington State, and should be focused on the high-priority problems identified in this study. The specific types of actions that could be supported will vary by user group.

Table 4 lists examples of the types of strategies that would address the rail service needs of Washington State rail users. For each strategy, examples also are provided of specific projects and actions that could be undertaken to implement the strategy.

Table 4. Examples of Projects Addressing the Rail Service Needs of Washington State Rail Users

Possible Strategies	Possible Projects/Actions
Industrial Manufacturers	
• Offer financial assistance and technical assistance to shippers for site improvements. Assistance can be in the form of tax-exempt bond financing repaid with user fees, industrial development tax credits, or CERB assistance. • Provide assistance for development of industrial carload transload/consolidation facilities, including financial assistance programs (similar programs to those described for site improvements), site identification; investments in supporting infrastructure (both through CERB and state DOT programs), and expedited permitting processes. • Develop rail improvement districts for service preservation on low density lines. This could include expansion of the existing Local Rail Assistance program or new financing programs targeted to these districts.	• New on-site storage track. • Site access improvements off mainline. • New loop tracks on-site. • Proposed carload consolidation facilities in the South Sound area – possibly a rail-served industrial park for carload consolidation to rationalize a dispersed, low-density system of carload shippers near Tacoma and provide more efficient rail service for these customers.
Ports and International Trade	
• Develop a comprehensive strategy to increase State's east-west rail capacity in partnership with Class I railroads, ports, and Federal government.	• Investments that resolve high priority east-west bottlenecks, such as crown cutting the Stampede Pass Tunnel to allow double-stack trains and providing supporting infrastructure and grade separations to allow for increased usage of this line. • Advocate for Federal funding of high priority east-west bottlenecks and designation as Corridors of National Significance. An example would be the development of a high capacity corridor over Stampede Pass with a new tunnel, lengthened sidings, construction of new track from Lind to Ellensburg, and other downstream capacity improvements. • Investments that resolve high priority north-south bottlenecks, such as completing the Vancouver Rail Project that provides access to east-west corridors for trade traffic. • Advocating to railroads and ports beneficial operating strategies such as directional running (e.g., running directionally on Stevens Pass line and Stampede Pass line after crown cutting Stampede Pass) and scheduling alternatives. • Expedited permitting processes for projects that eliminate high priority bottlenecks.
• Increase domestic and international intermodal terminal capacity through financial assistance, identification of and local advocacy for sites, and development of expedited permitting processes.	• Work with Port of Seattle and Port of Tacoma to investigate potentially feasible sites for new near-dock/off-dock intermodal terminals.

Table 4. Examples of Projects Addressing the Rail Service Needs of Washington State Rail Users (continued)

Type of Action	Illustrative Examples
Ports and International Trade (continued)	
• Partner with ports, Class I railroads, and third-party switchers to resolve critical port access bottlenecks.	• Port of Vancouver Rail Extension Project (providing direct access to the Port from the Columbia River Corridor eliminating mainline diamond crossings on the I-5 Rail Corridor). • Advocating to railroads and ports beneficial operating strategies. • Expedited permitting processes for projects that eliminate high priority bottlenecks.
• Partner in community impact mitigation to allow for higher rail traffic associated with international trade.	• Rail crossing grade separations along the Stampede Pass line to accommodate increased traffic associated with crown cutting the tunnel.
Agriculture and Food Products Businesses	
• Encourage formation of Railroad Transportation Improvement Districts (under existing or expanded TID authorities) to assist rail carriers and shippers in low density agricultural and industrial carload corridors. Districts should receive financial assistance through the Local Rail Assistance program.	• Track upgrades to meet specified service objectives; • Maintenance of rights-of-way and track owned by the State or district; and • Development of consolidation facilities, including collaborative work with multiple interested parties (such as the Railex project).
Passenger Rail Users	
• Continue to support incremental development of high-quality intercity passenger rail programs where documented demand exists and high levels of farebox recovery of operating and maintenance costs can be achieved.	• Partner with Class I railroads in mainline infrastructure improvements that provide positive benefit-cost tradeoffs. • Identify traffic thresholds and key track segments where separating passenger rail and freight rail on their own track is cost-beneficial. • Advocate alternative operating strategies to the Class I railroads that will increase combined operating efficiencies for passenger and freight rail. • Give priority to projects that provide benefits to freight and passenger rail service.

Source: Cambridge Systematics, Inc.; and HDR, Inc., 2006.

Table 5 lists some of the worst choke points in the system, which affect many Washington State rail users, and projects that could help relieve these strategic choke points.

The State should base its decisions to participate in these or similar projects, programs, and rail initiatives based on a systematic assessment and comparison of benefits and costs across users and across modes, as described further in the next policy recommendation.

Table 5. Major Choke Points in the Rail System and Potential Projects to Increase Capacity

Choke Points	Potential Projects
Port of Seattle Access and Argo Yard Operations	Duwamish Corridor and Second Lead Improvements
Mainline access to Port of Tacoma	Tacoma Tideflats Improvements: North Wye Connection, Puyallup River Crossing
Port of Vancouver access	Port of Vancouver Rail Extension Project
I-5 Corridor and access to Ports of Kalama and Longview	Kelso to Martins Bluff Third mainline
I-5 Corridor Centralia-Chehalis Segment	Centralia-Chehalis Rail Corridor Consolidation Project (Blakeslee Junction)
I-5 Corridor-Everett and Delta yard segments	Everett Passenger Rail Speed Improvements and Delta Yard Expansion
I-5 Corridor-Bellingham segment	Bellingham Mainline Track realignment
East-West Corridor: Stampede Pass	Stampede Pass High Capacity Rail Improvement Project (including Lind-Ellensburg connection)
East-West Corridor: Spokane Improvements and Spokane to Sandpoint Corridor	Bridging the Valley Projects, including improving mainline capacity, 72 grade crossings, additional trackage, etc.
Lack of yard capacity in South Sound Region	Proposed carload consolidation facilities in the South Sound area.
Congestion at Vancouver (WA) Yard, including safety concerns	Vancouver Rail Project
Seattle to Portland Freight/Passenger Train conflicts	WSDOT Point Defiance Bypass Phase 1 Project

Source: HDR, Inc., 2006.

5.2 Policy Recommendation Two

Policy Recommendation #2: The State should base its decisions to participate in projects, programs, and other rail initiatives on a systematic assessment and comparison of benefits and costs across users and across modes.

The assessment should:

- Assess the benefits and costs of the projects, programs, and other rail initiatives for each of four major groups: the State; rail users, including shippers and passengers; carriers, including railroads, ports, and truckers; and affected communities.
- Consider qualitative and nonmonetary benefits and costs, as well as quantifiable benefits and costs.
- Compare the benefits and costs for the project to the benefits and costs of taking no action.
- Where appropriate, also compare the benefits and costs of the project to investment in other transportation modes and service that might achieve the same goals.
- Use the assessment of benefits and cost to determine who the State should partner with and how the partnership should be structured so that project costs are allocated in accordance with benefits.

The assessment of benefits and costs should focus on the key measures listed in Table 6. Using a short list of measures helps to simplify the assessment process and focus on the benefits and costs that are most important to the affected groups. For the State, key measures would include jobs created or retained in the private and public sectors, and the impact on rail-related union jobs; tax benefits gained through the growth of new or retained businesses; contribution to transportation system efficiency and balance; and costs. Details on how the benefits and costs can be measured are provided in the technical memoranda prepared for the study.[11]

[11] See Interim Report 2 and Task 7 Technical Memorandum for background information on the selection and use of the benefit and cost measures. Task 8 Technical Memorandum also provides examples of how the assessment methodology can be applied to evaluation of a set of illustrative case examples.

One of the measures recommended for the State is a benefit-cost ratio. RCW 47.76 requires that freight-rail projects be subject to a benefit-cost analysis. Some states rely exclusively on a benefit-cost analysis, but this report recommends using a benefit-cost ratio as one of several measures. This allows decision-makers to consider specific benefit measures – such as jobs created by a project – independent of costs.

The measures typically included in formal benefit-cost analysis of rail projects are listed in Table 7. The technical memoranda accompanying this report describe the process for conducting a benefit-cost analysis using techniques recommended by the FRA and adopted by other states.[12] The specific techniques used to calculate the benefits and costs will vary depending on the type of project. WSDOT's recent analysis of the PCC short line acquisition provides a good case study on how to apply some of the cost analysis techniques to freight rail projects.

Benefit-cost analysis has not been required for Washington State passenger rail projects, although WSDOT has conducted cross-modal cost analyses of passenger-rail projects, comparing the total cost per passenger mile for rail, highway, and air modes. This report recommends conducting benefit-cost analysis for passenger-rail projects, as well as for freight-rail projects. The analysis should compare state benefits to state costs for passenger-rail projects and, where appropriate, alternative investments. On-time performance, which strongly affects intercity ridership, must be examined carefully when conducting benefit-cost analysis of passenger rail projects.

If a freight-rail project is expected to have significant national economic benefits that might justify Federal funding, an economic impact analysis should be conducted using the framework recommended by the U.S. DOT in its "Toolbox for Regional Policy Analysis."[13]

The results of the assessment of benefits and costs for all rail users should be summarized in a decision matrix. The format for the decision matrix is illustrated in Table 8. A decision matrix allows for direct comparisons among alternative rail project packages and, where appropriate, comparisons of the benefits and costs of alternative investments in truck and barge services for freight, and

[12]See Interim Report 2 and Technical Memorandum 7 for summary information on benefits and impacts used by other states and organizations.

[13]See "Toolbox for Regional Policy Analysis" at http://www.fhwa.dot.gov/Planning/toolbox/index.htm.

the benefits and costs of alternative investments in highway, bus, ferry, and air services for passengers.

Table 6. Recommended Benefit and Cost Measures

Rail User	Benefit and Cost Measures
State	• Jobs created/retained (private sector, public sector, and impact on rail-related union jobs) • Tax benefits (through new or retained businesses) • Contribution to transportation system efficiency/ balance (measured in terms of reduced travel delays, improved system reliability, or system redundancy, as appropriate) • Environmental benefits (air pollution and water quality impacts) • Safety benefits (reduced property damage, injuries, and fatalities) • Availability of partner funding • Cost to State • Benefit-cost ratio (using recommended benefit-cost analysis methodology)
Shippers	• Business cost impact (through impact on cost of service) • Access to service (does project increase rail/ transportation service options) • Service reliability (on-time performance) • Transit time
Passengers	• Rail capacity for passenger trains • Travel costs • Travel time • Increased modal choice/access
Railroads	• System velocity improvements • Hours of train delay • Yard dwell time • Increased revenue traffic • Equipment availability
Ports	• Throughput • Market share
Communities (Similar to State)	• Environmental benefits • Safety benefits • Reduced roadway delays and truck/auto delay at grade crossings • Local jobs created or retained

Source: Cambridge Systematics, Inc., 2006.

Table 7. Recommended Measures to Include in Estimating a Benefit-Cost Ratio

Measure	Explanation
Transportation and Economic Benefits	
Avoided maintenance costs	If the project preserves rail service, the no-action alternative may put more trucks on the highway. This may produce a net positive or negative benefit to be evaluated based on the type of road affected and the cost of maintaining the rail line.
Reduction in shipper costs (for shipments originating in State) – freight only	Benefits derived from lower logistic costs to the shippers, which ultimately can lead to lower consumer prices.
Reduction in automobile delays at grade crossings	Benefits resulting from improving grade crossing and decreasing automobile delays.
Economic Impacts	
New or retained jobs	Jobs that a particular project/action may keep from moving out of the State (e.g., by construction of a rail spur serving a factory or warehouse, etc.), or new jobs that are created within the State. Also to be considered are changes in job quality and pay levels (e.g., adding, losing, or changing union jobs).This measure accounts for both retained and new jobs.
Tax increases from industrial development	A rail action/project may foster industrial development that results ultimately in increased industrial property taxes to the State.
External Impacts	
Safety improvements	By diverting truck freight to rail, savings on highway safety improvements can occur.
Environmental benefits	Railroads are on average three or more times more fuel efficient than trucks. The State can benefit from savings due to environmental improvements.

Source: Cambridge Systematics, Inc., 2006.

Table 8. Sample Decision Matrix for Comparison of Alternative Rail Projects and Actions

	Measures	No Action	Alternative A	Alternative B
State	Jobs			
	Tax/Fee Benefits			
	System Efficiency			
	Environmental Benefits			
	Safety Benefits			
	Partner Funding			
	Cost to State			
	Benefit-Cost			
	Summary State			
Shippers	Business Cost Impacts			
	Access to Service			
	Service Reliability			
	Transit Time			
	Summary Shippers			
Passengers	Rail Capacity for Passenger Trains			
	Travel Costs			
	Travel Time			
	Increased Modal Choice/Access			
	Summary Passengers			
Railroads	System Velocity Improvements			
	Hours of Train Delay			
	Yard Dwell Time			
	Increased Revenue Traffic			
	Equipment Utilization			
	Summary Railroads			
Ports	Throughput			
	Market Share			
	Summary Ports			
Communities	Environmental Benefits			
	Safety Benefits			
	Reduced Roadway Delays			
	Local Jobs			
	Summary Communities			
National	Pct Benefits in WA State			
	Other States Benefiting			
	Summary National			

Source: Cambridge Systematics, Inc., 2006.

The decision matrix can accommodate quantitative measures, as well as qualitative measures. A simplified case study of how this framework can be used is provided in the appendix to this report.

Table 9 shows how the assessments of benefits and costs by affected group might be arrayed to determine who the State should partner with and how the partnership should be structured, so that project costs are allocated in accordance with benefits.

The assignment of an overall assessment of benefits and costs as "high," "medium," or "low" is a process of value judgment by the decision-maker. This study does not recommend a specific weighting scheme at this time, preferring that the initial applications of this process be as open and transparent as possible. As the State gains experience in assessing and weighting the benefits and costs of rail projects, the Legislature may wish to direct the WUTC and WSDOT to adopt a formal weighting procedure, such as that used by the FMSIB. The Board's weighting scheme is summarized in Table 10.

In states that conduct rail benefit-cost assessments and analyses, the technical work is done by a variety of different organizations that have responsibility for rail programs and policies. This may include state DOT rail offices, separate rail agencies or commissions, or policy offices at the secretarial level. For example, at Florida DOT, the Rail Office is responsible for rail investment benefit-cost assessment and analysis; in Virginia, it is the Rail Division of the Virginia Department of Rail and Public Transportation; at Pennsylvania DOT, it is the Bureau of Rail Freight Ports and Waterways; and at New Jersey DOT, it is the Bureau of Freight Services. At Louisiana DOTD, coordination is done through the secretarial Office of Intermodal Transportation, and at Maryland DOT, coordination is through the secretarial Office of Freight. In all cases, these offices draw on the technical and policy expertise and advice of other state and local agencies involved in rail-related finance, regulation, safety, environmental protection, and economic development.

Table 9. Benefit Evaluation Cross-User Group Comparison

Proposed Action	WA State	Shippers	Passengers	Railroads	Community	Likely Recommendation	Level of Action	Example
A	H	H	H	H	H	State should participate, but only if other beneficiaries contribute appropriate share	Consider direct investment and supporting legal and institutional mechanisms	Consider sources such as additional dedicated state freight rail funds, Federal funding sources through the Safe Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), and other state matching sources
B	H	L	L	L	H	State should participate and be prepared to contribute more than other groups	Consider direct investment and supporting legal and institutional mechanisms	Consider sources such as additional dedicated state freight rail funds, Federal funding sources through SAFETEA-LU, and other state matching sources
C	M	M	M	M	M	State should participate with caution and only if costs to do so are low	Consider tax exempt financing loans or other methods that have limited costs to State, but benefit private industry	Consider public-private partnerships, tax credits, and other nonfinancing incentives
D	L	H	H	H	L	State should probably not participate	State should probably not participate with financial, institutional, or legal mechanisms	No state role is anticipated
E	L	L	L	L	L	State should probably not participate	State should probably not participate with financial, institutional, or legal mechanisms	No state role is anticipated

Source: Cambridge Systematics, Inc., 2006.

H = High; M = Medium; and L = Low.

Table 10. Freight Mobility Strategic Investment Board Evaluation Criteria and Weights

Evaluation Criteria Category	Weight
Freight Mobility for the Project Area	35 maximum
Freight Mobility for the Region, State, and Nation	35 maximum
General Mobility	25 maximum
Safety	20 maximum
Freight and Economic Value	15 maximum
Environment	10 maximum
Partnership	25 maximum
Consistency with Regional and State Plans	5 maximum
Cost	10 maximum
Special Issues	8 maximum
Total	**188 points**

Source: http://www.fmsib.wa.gov.

5.3 Policy Recommendation Three

Where the State determines there are sufficient public benefits to justify public participation in the preservation and improvement of the rail transportation system, its actions should be guided by the following general principles:

- **Emphasize operations and nonfinancial participation in projects before capital investment –** The State should give priority to preserving and improving rail transportation through leadership, planning, permitting, maintenance, and operations that leverage existing rail infrastructure and services rather than through capital investment.

- **Preserve and encourage competition –** Investment in one railroad's infrastructure can change the competitive balance among railroads to the detriment of the overall system. Before making an investment that directly benefits only one rail company, the State should conduct a comprehensive analysis of competitive impacts on other rail carriers and users.

- **Target actions to encourage private investment that advances Washington State economic development goals –** State

The State Can Promote Operational Strategies That Maximize Benefits for Washington Rail Users and Communities

- *Careful scheduling to avoid conflicts;*
- *Longer trains;*
- *Consolidating primary switching locations;*
- *Consolidated dispatch center;*
- *Carrier and routing alternatives;*
- *Scheduled point-to-point service;*
- *Improved intermodal terminal production;*
- *Reducing/eliminating main line work events;*
- *Co-production;*
- *Switching zone agreements; and*
- *Rationalizing carload network with regards to the truck/rail transloading facilities, new carload gathering/distribution centers, and remarketing of unprofitable traffic.*

actions should influence railroad investment decisions so that rail improvements generate greater benefits to Washington State than could be achieved if the State did not invest.

- **Leverage State participation by allocating cost responsibility among beneficiaries –** The State should not invest in the private rail system unless the railroads and other beneficiaries participate in proportion to their benefits and risks.

- **Require projects to have viable business plans –** Funding from the State should be contingent upon demonstration that the project proponent has rail service and customer agreements in place in order to make the project financially viable.

5.4 Policy Recommendation Four

Policy Recommendation #4: The State should designate a single entity to coordinate and direct the State's participation in the preservation and improvement of the rail transportation system. This entity should have the authority to negotiate directly with the railroads.

The responsibility for oversight and management of Washington State's rail programs and investments is divided among the WSDOT, the FMSIB, the Washington Community Economic Revitalization Board, and WUTC. Each has knowledgeable and effective staff, and each carries out its mandates effectively; however, the lack of a central point of contact and coordination makes it difficult for businesses, communities, and the railroads to deal with the State, and in some cases weakens the State's negotiating position.

This situation exists in many states and is only now becoming a significant problem as states move to deal with increasingly congested freight transportation systems and insistent demands from businesses and communities that they create more comprehensive policies and undertake larger investment programs.

Some states have moved to address the problem by organizing cross-agency policy committees or by designating a single entity or position, such as an undersecretary of transportation to coordinate state policies and programs and negotiate with shippers and carriers.

Having a single entity coordinate all Washington State's rail activities would give the State the ability to:

- Represent the interests of multiple stakeholders in negotiations with rail carriers more effectively than would individual stakeholders by themselves;

- Develop strategic packages of projects and actions across the State that would effectively promote state interests and be more attractive to the rail carriers than dealing with projects on a case-by–case basis;

- Represent the interests of multiple communities in resolving common rail issues; and

- Work more effectively with partners in other states and at the national level.

Washington State may wish to explore one or both of the approaches that are being taken by other states. Any approach taken by the Legislature should include oversight over freight and passenger rail systems, both public and private, and adequate authority to represent the interests of the State with the carriers, the Federal government, and other states.

5.5 Policy Recommendation Five

Policy Recommendation #5: The State should take an active role in influencing and shaping the development of national rail policies and programs. The State should also develop a multi-state coalition to address rail system needs across the Pacific Northwest.

The Washington State rail system is an integral part of the national and Pacific Northwest rail systems. The State's rail needs transcend the State's boundaries. The nation is entering the early stages of a freight transportation capacity crisis. The congressionally-mandated National Surface Transportation Policy and Revenue Study Commission, the American Association of State Highway and Transportation Officials, the Association of American Railroads, the Congressional committee charged with reauthorization of the national transportation program, and other groups are working to address the emerging crisis and establish forward-looking national visions, policies, and programs for the rail system. Washington State should participate actively in these discussions.

As part of this process, Washington State and its neighbors should also establish a multistate coalition to address rail system needs

across the Pacific Northwest. Washington State and its neighbors should use the coalition as a forum to establish their common needs and work with the railroads to identify, prioritize, and implement the most cost-beneficial regional improvements. There is precedent for this in the I-95 Corridor Coalition and its Mid-Atlantic Rail Operations Program. The Pacific Northwest rail coalition could be formed as part of the newly established West Coast Corridor Coalition; as an independent coalition advising the Pacific Northwest states, the West Coast Corridor Coalition, and national groups; or as a formal multistate compact. There is existing legal precedent for multistate compacts, which are contracts among states that carry the force and effect of statutory law. A multistate compact could create the legal framework to develop policies, plans, and regulatory mechanisms for multistate rail programs in the Pacific Northwest.

The State should use the procedures recommended in this report to begin to identify projects of national and regional significance. And it should look to national and multistate programs to help fund and implement these projects.

5.6 Policy Recommendation Six

Policy Recommendation #6: The State should implement the asset management plan developed as part of this study to govern investment and management decisions for state-owned rail assets.

The guiding principles of the asset management plan are as follows:

- The asset management plan should be based on a business-case analysis of the goals and objectives for each class of assets;
- The plan should use clear performance measures and a monitoring system to determine how assets are performing;
- Benchmarks for each performance measure should be established based on industry standards; and
- An inventory management system (including information about condition and disposition of the assets) should be adopted.

The State currently owns the following classes of assets: freight rail lines, freight railcars (grain cars and refrigerated cars),

maintenance-of-way equipment, right-of-way, passenger train sets and passenger service agreements (train slots). A more complete inventory of these assets is provided in the full asset management plan. For each class of assets, the key features of the asset management strategy are summarized in Table 11.

Table 11. Asset Management Principles for State Rail Assets

Freight Rail Lines (Short Lines)	• State should be owner of last resort and should encourage private ownership and/or operation in conjunction with Rail Improvement Districts if public involvement is warranted. • Purchase decisions should be based on benefit-cost analysis. • Operate lines in conformance with business plan that specifies projected customer base and monitors performance measures (carloads carried, revenues earned, and return on invested capital) against specified benchmarks. • Implement inventory maintenance and monitoring system with periodic inspections and assessments of condition. Use annual and life-cycle costs as performance measures. • Third-party operating agreements should specify obligations of operator with respect to meeting specified performance benchmarks.
Freight Railcars	• Implement inventory and equipment tracking system. • Track location of each car (using global position systems where feasible). • Track usage by Washington State shippers, including level of revenue service. • Specify periodic condition inspections. • Adopt performance measures and benchmarks, including costs of operation and maintenance per revenue mile and life-cycle costs.
Miscellaneous Rail Equipment	• Develop inventory of equipment and conduct condition assessment. • Over longer term, consider disposal of the equipment and outsourcing the activity to the private sector.
Passenger Train Sets	• Continue with current Amtrak asset management program. • Investigate approaches to develop a sinking fund to cover depreciation of train sets that would be protected from use in meeting general fund current obligations.

Source: Cambridge Systematics Inc., and HDR Inc., 2006.

Appendix A. Benefit Assessment Illustrative Case Study – East-West Capacity Projects

As described in Section 3.4 of this report, constraints on the east-west lines of the Washington State rail system could inhibit future rail traffic growth, particularly intermodal growth through the ports. As an illustration of how the benefit assessment matrices can be used to evaluate strategic project packages, this case study presents an evaluation of a package to increase east-west capacity. A version of this case study that provides a detailed description of all of the calculation methodologies and data inputs, along with several other case studies, is included in Technical Memorandum 8.

The projects in this package include improving Stampede Pass to allow for double-stack containers, and incorporating "Bridging the Valley" improvements for the Spokane to Sandpoint, Idaho section. The State must decide if it should participate in this east-west rail capacity expansion program, and if so, at what level of involvement. There are two alternatives for Washington State to consider in this illustration:

- **Do Nothing –** Under this scenario, the State does not invest public funding to improve east-west capacity. Any investment is done by the railroads.

- **Alternative A: East-West Capacity Expansion Project –** A $350 million investment, shared between the State and the railroads, for selective capacity improvements. This will add approximately 50 percent more capacity (from 22 to 24 trains per day to 34 to 36 trains per day).

A summary of the improvements for Alternative A is contained in Table A.1. Table A.2 provides the results of the benefit/impact evaluation of Alternative A and a No Action case. Table A.3 provides a summary of the final assessment of benefits/impacts across all affected groups.

Table A.1 East-West Capacity Expansion: Summary of Alternative A

Project
Crown cut Stampede Pass
Construct Lind, WA to Ellensburg, WA connection
Install 8,000-ft siding tracks to provide 20-minute headways between Auburn, WA and Ellensburg, WA and between Lind, WA and Spokane, WA
Install CTC train control system overlaid with ETMS
Grade separated the corridor from Spokane, WA to Athol, ID as suggested in "Bridging the Valley"

Table A.2 East-West Capacity Expansion: Benefit/Impact Evaluation

	Measures	No Action	Alternative A: East-West Capacity Expansion Project
State	Jobs	Net New Jobs = 0	Net New Jobs = 500
	Tax/Fee Benefits	None	None
	System Efficiency	Congested	Reliable
	Environmental Benefits	Negative: emissions from YY trains x 400 mi x 12,000 tons	Negative: emissions from 12 trains x 300 mi x 6,480 tons
	Partner Funding	BNSF & UP make improvements	Expect railroad participation
	Benefit/Cost	n/a (Cost = $0)	B/C = 0.181
	Summary State	*LOW*	*MEDIUM*
Shippers	Business Cost Impacts	Increases due to increased rail cost, loss of service, and deteriorating reliability	Improvements to international intermodal traffic; little benefit to WA shippers
	Access to Service	Railroads disinvest from selected rail markets	Improved access for international shippers
	Service Reliability	Poor	Reliable in short term
	Summary Shippers	*LOW*	*MEDIUM*
Passengers	Rail Capacity for Passenger Trains	Limited to current services	Potential 1 or 2 train expansion
	Summary Passengers	*LOW*	*LOW*
Railroads	System Velocity Improvements	Further delays due to capacity issues	Crown cutting Stevens Pass, installing CTC, and eliminating grade crossings will increase velocity.
	Hours of Train Delay	Requires simulation analysis	Requires simulation analysis
	Yard Dwell Time	Requires simulation analysis	Requires simulation analysis

Table A.2 East-West Capacity Expansion: Benefit/Impact Evaluation (continued)

	Measures	No Action	Alternative A: East-West Capacity Expansion Project
	Increased Revenue Traffic	Yes	12 trains x 100 cars/train x $6000 car
	Equipment Utilization	Little change	Reduction in car cycle time; requires simulation analysis to quantify
	Summary Railroads	*LOW*	*MEDIUM*
Ports	Throughput	Current Capacity = XX	Additional 12 trains/day = 2400 containers per day
	Market Share	Decline	Requires complete analysis of West Coast Ports
	Summary Ports	*LOW*	*HIGH*
Communities	Environmental Benefits	Negative: emissions from YY trains x mileage x 12,000 tons/train	Negative: emissions from 12 trains x 300 miles x 6,480 tons/train
	Safety Benefits	More potential train incidents and grade crossing accidents due to increased trains	More potential train incidents; safety improvements from elimination of 20 grade crossing
	Reduced Roadway Delays	No change.	Elimination of 20 grade crossings
	Local Jobs	Mostly at the port; some increase in train crews	Mostly at the port; some increase in train crews
	Summary Communities	*LOW*	*MEDIUM*
National	Pct Benefits in WA State	Requires detailed economic analysis.	Requires detailed economic analysis
	Other States Benefiting	ID, IN, IL, MT, MN, NE, NJ, OH, PA, NY	ID, IN, IL, MT, MN, NE, NJ, OH, PA, NY
	Summary National	*LOW*	*MEDIUM*

Table A.3 Summary Decision Matrix

	No Action	Alternative A: East-West Capacity Expansion Project
State	Low	Medium
Shippers	Low	Medium
Passengers	Low	Low
Railroads	Low	Medium
Ports	Low	High
Communities	Low	Medium
National	Low	Medium

Appendix B. Glossary

A

Automatic Block Signaling (ABS) – An automatic system that prevents two trains moving in the same direction from occupying the same section of track simultaneously. As the lead train exits a section of track, it automatically triggers the signal to allow the following train to enter.

B

Branch Lines – A subsidiary, secondary, local, or feeder line of railway, which extends from the principal lines of rail traffic to connect to external shipping points.

C

Carload –

1. Carload services are those that use a variety of railcar types to carry a range of commodities to a variety of customers. They generally carry lower-volume, higher-weight commodities than Intermodal trains.

2. A rail-car loaded to its weight or space-carrying capacity.

Carload Manifest – Another name for mixed-carload shipments, or those that move a diverse range of commodities on a single train.

Centralized Traffic Control (CTC) – Train movements are controlled by signals, which are in turn controlled by dispatchers at a centralized location. The dispatchers will generally have a computerized graphical depiction of all or part of the railroad, allowing them to monitor train movements. Software prevents conflicting signal settings that could lead to an accident.

Class I – A railroad with average annual gross operating revenue of $250 million or more, in 1991 dollars. The threshold is adjusted every several years by the Surface Transportation Board to reflect

the effects of inflation and other factors. For example, in 2004, the threshold was $277.7 million.

Class II – A railroad with average annual gross operating revenue of between $20 million and $250 million, in 1991 dollars. In 2004, the lower and upper thresholds were $20.5 million and $277.7 million. Railroads considered by the Association of American Railroads (AAR) as "Regional Railroads" are typically Class II railroads

Class III – A railroad with average annual gross operating revenue of less than $20 million, in 1991 dollars. In 2004, the threshold was $20.5 million. Local short-line railroads typically fall under this category.

Commuter Rail – Urban passenger train service for local short-distance travel operating between a central city and adjacent suburbs. Service must be operated on a regular basis by or under contract with a transit operator for the purpose of transporting passengers within urbanized areas, or between urbanized areas and outlying areas. It does not include heavy rail rapid transit or light rail/street car transit service. Intercity rail service is excluded, except for that portion of such service that is operated by or under contract with a public transit agency for predominately commuter services.

Containers – Standard-sized rectangular box used to transport freight by ship, rail and highway. International shipping containers are 20 or 40 feet long, conform to International Standards Organization (ISO) standards and are designed to fit in ships' holds. Containers are transported on roads atop a container chassis towed by a tractor. Domestic containers, up to 53 feet long and of lighter construction, are designed for rail and highway use only.

D

Dark Territory – Unsignalized sections of the railroad.

Double-stack – The movement of containers on articulated rail cars which enable one container to be stacked on another container for better ride quality and car utilization.

Drayage – The movement of a container or trailer between an intermodal terminal and a customer's facility for loading or unloading. The vast majority of drayage takes place by truck.

Dynamic Capacity – The ability of a yard to receive, process, and dispatch traffic, generally described in trains per hour for receiving and dispatching, and cars per hour for switching.

Dynamic Track Occupancy – The density or spacing of moving trains.

H

Hopper Cars – A railroad freight car that can be either covered or uncovered, and has doors on its sides or undersides. Hopper cars are used to transport loose bulk commodities such as grain, ore, and coal.

G

Grade Crossing – A highway crossing that is at the same level (grade) as the rail.

Gross State Product (GSP) – The total market value of all final goods and services produced for money in a state within a given period of time, after deducting the cost of goods and services used in the process of production, but before depreciation.

I

Integrator – Marketing companies that assume the all-in organization and handling of complete shipping orders from the consignor to the consignee.

Interchange – A junction of highways on different levels that permits traffic to move from one to the other without crossing traffic streams.

Intermodal –

1. The use of two or more modes of transportation to complete a cargo move. For example, truck/rail or truck/ship.

2. Freight that is packed in an intermodal unit (trailer or container) and can therefore be transferred directly from the container ship to rail or truck for transportation. Intermodal shipments generally hold higher-value, lower-weight commodities than unit or carload trains.

Intermodal Units – Trailers and containers that can be transported, fully-loaded, from ship to rail or truck.

L

Line-haul – The movement of a railroad unit from origin to destination.

Long-haul – A freight shipment having a long distance between the origin and destination.

Logistics – Movement and supply of goods through the economy from raw materials, through all stages of the manufacturing process, to the final delivery of the finished product to companies and consumers.

M

Mainlines – A designation by each railroad of its own track signifying a line over which through-trains pass with relatively high frequency. Mainlines generally have heavier weight rail, more sophisticated signaling systems, and better maintenance than branchlines.

Multimodal – Representing more than one mode of transportation.

P

Practical Capacity – This is the capacity at which trains on the system are all moving without incurring significant delay or experiencing significant operational problems. Also defined as "The percentage of theoretical capacity that provides reliable and predictable train operation." The rail industry considers this to be between 50 and 60 percent of theoretical capacity.

R

Railcar – Double- stack railcars vary in length from 70 to 325 feet, with an industry average (for purposes of estimating capacity) of 305 feet. 270-foot railcars are better suited to the conveyance of international containers and are currently being developed by the major carriers to maximize the mainline capacity.

Rail Capacity – The number of trains that can occupy a given segment of track over a given period of time.

S

Short-haul – A freight shipment over a short distance between origin and destination.

Shortline – A switch carrier or roadhaul carrier that is not a Class I carrier. The carrier usually owns less than one hundred miles of track.

Sidings – A track parallel to a main track, having switches at both ends, used for meeting and passing trains.

Single-track – Rail right-of-way comprised of only one line of track, used by trains running in either direction.

Static Capacity – The ability of a yard to accommodate standing equipment (i.e., cars that are stored, awaiting movement, or awaiting processing).

Surface Transportation Board – The Surface Transportation Board (STB) is an economic regulatory agency created by Congress to resolve railroad rate and service disputes and review proposed railroad mergers. Although administratively affiliated with the U.S. Department of Transportation, it is decisionally independent. It serves as both an adjudicatory and a regulatory body.

Switch – A mechanical installation enabling trains to be guided from one line of rail tracks to another.

T

TEU – See Twenty-Foot Equivalent Unit.

Terminal – Area where docking and handling of freight takes place. In the case of intermodal shipping, it is the area where modal transfer of containers/trailers takes place.

Theoretical Capacity – The maximum amount of traffic that the infrastructure can accommodate.

Trackage Rights – The legal right to use a rail line.

Track Warrant Control (TWC) – A verbal authorization, usually with a radio, from a dispatcher to the train engineer permitting the train to occupy a specific section of the track. Used in unsignalized (dark territory) sections of the railroad.

Transload – To physically transfer commodity from one transportation vehicle to another, such as unloading freight from a rail car into a truck. This is a labor-intensive process that is usually performed manually.

Twenty-Foot Equivalent Unit (TEU) – The unit of measure for international container volumes. A 20-foot container is counted as one TEU, and a 40-foot container is counted as two TEUs. The 40-foot container is the most common type used in waterborne transportation.

U

Unit Train – A freight train composed of cars carrying a single type of commodity that are all bound for the same destination. By hauling only one kind of freight for one destination, a unit train does not need to switch cars at various intermediate junctions and so can make nonstop runs between two terminals. This reduces shipping time and shipping costs.