Washington State

Amtrak *Cascades* Mid-Range Plan

Washington State Department of Transportation

December 2008

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Prepared by the Freight Systems Division
State Rail and Marine Office
Washington State Department of Transportation

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Executive Summary

The Washington State Legislature directed the Washington State Department of Transportation (WSDOT) to develop a mid-range plan for Amtrak *Cascades* that identifies specific steps to achieve additional service beyond current levels. As stated in ESHB 1094, Section 226, WSDOT is required to submit a mid-range plan to the Office of Financial Management and the transportation committees of the legislature by December 31, 2008. The *Amtrak Cascades Mid-Range Plan* fulfills the legislative mandate by identifying and developing options that outline steps to achieve incremental Amtrak *Cascades* services for the next eight years.

Background

Washington State faces both challenges and opportunities resulting from the fundamental changes in our economy and society. Public investment policies embrace solutions that address multiple issues such as economic globalization, population growth, increased roadway congestion, higher fossil fuel prices, global climate changes, and increases in natural and man-made disasters.

Passenger rail, once used as a means to address only mobility problems, is increasingly viewed and used, at both national and regional levels, as an integrated part of robust and resilient multimodal transportation systems. Such robust transportation systems will help policymakers achieve multiple policy ends, including economic viability, societal mobility, environmental sustainability, and public safety.

Amtrak *Cascades* is an intercity passenger rail service between Eugene, Oregon, and Vancouver, British Columbia (B.C.). It is sponsored by the states of Washington and Oregon in partnership with other parties. The service, known as the Amtrak *Cascades*, provides travelers with a viable transportation alternative for their intercity trips.

Rail development in the Pacific Northwest began in 1864, when President Abraham Lincoln signed the Northern Pacific Railroad Charter to build a direct rail connection between the Great Lakes and Puget Sound. Washington State investment in Amtrak intercity passenger rail service began in 1994. After incremental infrastructure enhancements by Washington State and its partners, intercity passenger rail service with Talgo trains began in 1999, and was branded Amtrak *Cascades*.

Amtrak currently operates Amtrak *Cascades* intercity passenger rail service on the Pacific Northwest Rail Corridor (PNWRC), which runs roughly parallel to the I-5 corridor between Vancouver, British Columbia, and Eugene, Oregon. The PNWRC is owned by BNSF Railway (BNSF) in Washington State and by Union Pacific Railroad (UP) in Oregon State. Amtrak *Cascades* offers one daily round trip between Seattle and Vancouver, B.C.; one daily round trip between Portland and Bellingham; two daily round trips between Eugene and Portland; and four daily round trips between Portland and Seattle.

Plan Purpose

In response to a legislative mandate, the *Amtrak Cascades Mid-Range Plan* FY2010 to FY2017 is to provide Washington State policymakers with four strategic investment options for infrastructure development. These plan options incrementally enhance service capacity, improve on-time performance, and increase ridership on the segment between Seattle and Portland over the next eight years.

The mid-range plan:

- Identifies the needs of intercity passenger train services.
- Assesses potential of passenger rail as a strategic multimodal transportation solution.
- Specifies the steps of improving infrastructure to deliver additional intercity passenger services.
- Links capital and operational investment to ridership growth and economic and societal benefits.
- Provides a variety of information to support informed decision-making processes—legislative budgeting and prioritizing.

Methodology

The strategy adopted by WSDOT to develop the mid-range plan is fact-based and demand-driven. WSDOT strengthened its ridership forecast and analytic capacity by developing robust ridership databases and forecast models. WSDOT improved capital project cost estimation through a specific cost study of all historic rail projects.

Based on management directives, the mid-range plan provides policymakers with options that are designed, analyzed, and presented to address socioeconomic policy issues. Results of investment in infrastructure improvements to add additional services are assessed and measured in terms of enhanced capacity, improved reliability, and increased ridership for considering funding additional Amtrak *Cascades* services. Economic impact assessment, benefit/cost analysis, and cross

modal comparison were also performed to assist policymakers in linking the investment of an option to its effects on the economy and society.

Public Involvement

In the development of the mid-range plan, an advisory committee was formed, involving identifiable stakeholders. The advisory committee's role was to help WSDOT assess and evaluate beneficial impacts of rail infrastructure improvement on society, to help WSDOT understand concerns of local communities, and to share information and provide feedback during the mid-range plan development process. Advisory committee stakeholders involved in the development of the mid-range plan include:

- Metropolitan Planning Organizations and Regional Transportation Planning Organizations in the I-5 corridor
- Counties and cities within the study area
- Oregon State
- Province of British Columbia
- Private railroads
- Amtrak
- Washington Public Ports Association
- WSDOT planning units in different modes
- WSDOT regions
- All tribes in Washington State with an interest in the I-5 corridor
- Passenger rail advocacy groups

Two public/advisory committee meetings were held at WSDOT, led by State Rail and Marine Office staff, providing progress reports and opportunities for public comments and discussion. After the public/advisory committee meetings, the draft plan was available for two weeks for public review and comment. Some public comments were incorporated into the final draft and the remainder are included in Appendix 13 with WSDOT's responses.

Mid-Range Plan Options

Options presented in the mid-range plan are designed in the context of the current macroeconomic policymaking environment. The options build on incremental strategies with stakeholder involvement and are supported by capacity analyses and benefit/cost analysis. The four options presented in this plan are different approaches to achieve incremental Amtrak *Cascades* services for the next eight years between Portland and Seattle, where the greatest concentration of ridership and the most service improvements are needed (Exhibit ES-1).

Exhibit ES-1: Mid-Range Plan Options

Option 1 – Maintaining the Current Operation	• Option 1 is an analytical baseline. • No capital investment is needed. • It maintains capacity at four daily round trips between Seattle and Portland. • On-time performance is about 60 percent.
Option 2 – Incremental Strategy – Minimizing Capital Investment	• Completes four capital projects already underway by FY2012. • Capital investment is $141 million. • Capacity increases from four to five daily round trips between Seattle and Portland. • On-time performance improves from about 60 percent to about 95 percent.
Option 3 – Incremental Strategy – Matching Supply and Demand	• Completes all four projects in Option 2 and five additional new capital projects bye FY2017. • Capital investment is $537 million. • Capacity increases from four to six daily round trips between Seattle and Portland. • On-time performance improves from about 60 percent to about 97 percent.
Option 4 – No Financial Constraints	• Completes all four projects in Options 2 and 3 and five additional new capital projects by FY2014. • Capital investment is $817 million. • Capacity increases from four to eight daily round trips between Seattle and Portland. • On-time performance improves from about 60 percent to about 92 percent.

Investment in Capital Projects

Exhibit ES-2 shows Amtrak *Cascades* proposed infrastructure improvements and investment. Capital projects are incrementally developed as project groups. Project groups are building blocks that combine a number of projects to deliver an incremental service level. The cost estimates are based on prices during the implementation timeframe of each specific mid-range option.

Exhibit ES-2: Capital Investment by Option

Project Group*	Year of Completion	Capital Cost Estimates* ($ Million)				Deliverables
		Option 1: $0	Option 2: $141 Million	Option 3: $578 Million	Option 4: $817 Million	
Project Group A***: $141M for Options 2, 3, and 4	Option2,3,and 4: 2012		$141.2	$141.2	$141.2	Five Seattle to Portland and two Seattle to Vancouver, B.C. daily round trips, 95 percent on-time performance.
Project Group B: Option 3 $437M; Option 4 $334M	Option 3: 2017 Option 4: 2015			$437.1	$334.2	Six Seattle to Portland and two Seattle to Vancouver, B.C. daily round trips, 97 percent on-time performance.
Project Group C: $341M for Option 4	Option 4: 2015				$341.4	Eight Seattle to Portland and two Seattle to Vancouver, B.C. daily round trips, 92 percent on-time performance due to running two additional round trips without taking additional expensive reliability projects.
* A project group is a set of projects or project stages to be implemented collectively to achieve additional service.						
** Costs do not include anticipated expenditures prior to July 2009 in 2008 Transportation Supplemental Budget. These projects were currently funded as: Tacoma – Bypass of Pt. Defiance – 66th St. to Nisqually, $57.1 million; Vancouver – Yard Bypass and W 39th St., $59.9 million; King Street Station – Track Improvements, $13 million; Cascades Train Sets – Overhaul, $4 million. The cost estimates listed in options are additional costs needed to complete these projects starting July 2009.						
*** Projects anticipated to be complete prior to July 1, 2009 in the 2008 Transportation Supplemental Budget are not listed.						

Source: WSDOT State Rail and Marine Office

Operating Costs, Revenue, and Investment in Operations by Option

Operating costs include the costs to operate Amtrak *Cascades* intercity passenger train services and costs to maintain service equipment. Since each option in the mid-range plan operates at a different level, the operating costs vary. However, Options 3 and 4 operate more efficiently due to economies of scale.

Revenue includes ticket revenues and revenues from services provided on the trains such as food and beverage revenues.

Net state costs in operations is the state's net investment from public funds for Amtrak *Cascades* operation. It is the total operation costs minus revenues from operation. It is a public investment that aims for gaining greater economic and societal benefits.

Exhibit ES-3 shows the sum of operating costs, revenue, and investments in operations for all plan options from FY2010 to FY2017.

Exhibit ES-3: Total Operating Costs, Revenue, and Net State Costs for Amtrak *Cascades* Operations
Sum of FY2010 - FY2017 ($ Millions)

Plan Options	Operating Costs*	Revenue**	Net State Costs for Amtrak Cascades Operation***
Option 1: Maintaining Current Operation	$235.7	$118.4	$117.3
Option 2: Incremental Strategy 1 - Minimum Capital Investment	$360.2	$144.4	$215.8
Option 3: Incremental Strategy 2 - Supply Meets Demand	$366.7	$153.0	$213.8
Option 4: No Financial Constraints	$428.2	$157.2	$270.9

* Include operating costs, Talgo maintenance costs, maintenance costs enhancing reliability, and Amtrak administrative costs. Estimated based on historical data, Amtrak FFY2009 Cost Estimates, and planned activities.

** Include revenues from tickets and passenger services. Estimated based on historical revenue data assuming price neutral policy. Total revenue is the product of total forecasted passenger miles and revenue earned per passenger mile, adjusted for inflation.

*** This is the estimated costs Washington State pays for contracted Amtrak *Cascades* operation.

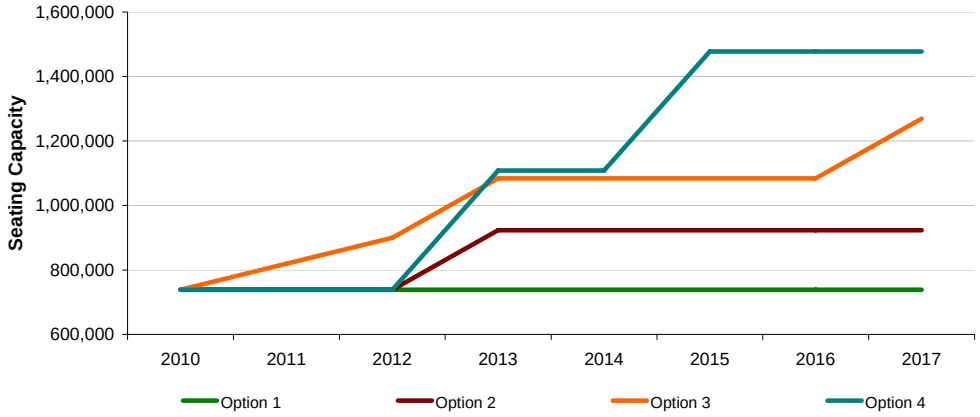
**** The sixth round trip starts in FY2017, the total operation cost here for Option 3 does not show full effect of the operation at the capacity built.

Source: WSDOT State Rail and Marine Office

Capacity Increase

The capacity growths for plan options are based on capital projects that build capacity for each plan option (Exhibit ES-4). The capacity increase and reliability improvement of capital projects are presented in Chapter 4. Exhibit 6-6 in Chapter 6 provides a dynamic view of capacity changes by option over the time frame of the mid-range plan.

Exhibit ES-4: Maximum Annual Seating Capacity by Option
Seattle to Portland FY2010-FY2017



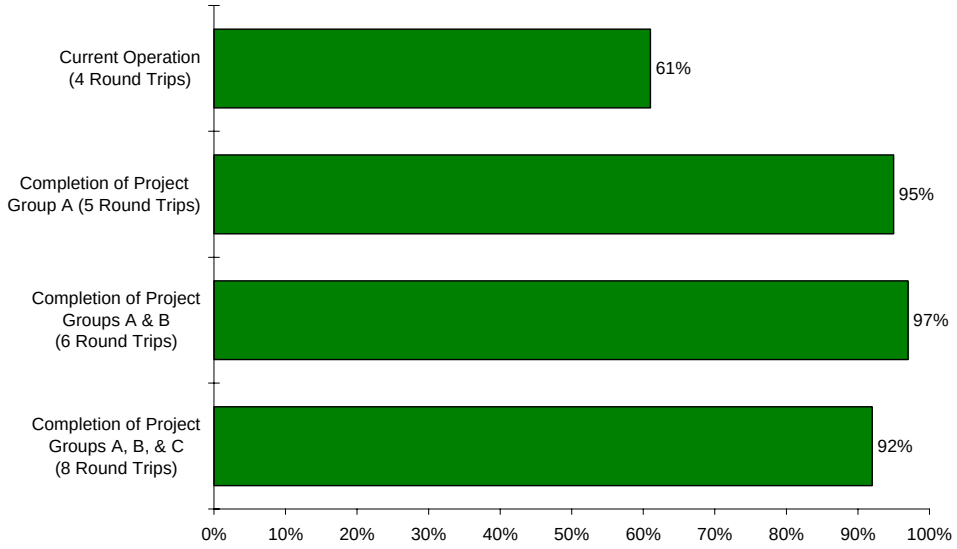
Note: Maximum seating capacity = Seats per train X Trains per day X 365 days

Source: WSDOT State Rail and Marine Office

Reliability Improvement

Operational analysis by the WSDOT State Rail and Marine Office in 2007-2008 reviewed the infrastructure necessary to support each mid-range plan option. The analysis included traffic conditions and growth expectations for Amtrak *Cascades*, Sounder, BNSF, and the UP. The analysis validated the investment in capital projects and their impacts on service capacity and on-time performance (Exhibit ES-5). Please note that on-time performance decreases slightly resulting from the operation of eight round trips.

Exhibit ES-5: Reliability Improvement by Option



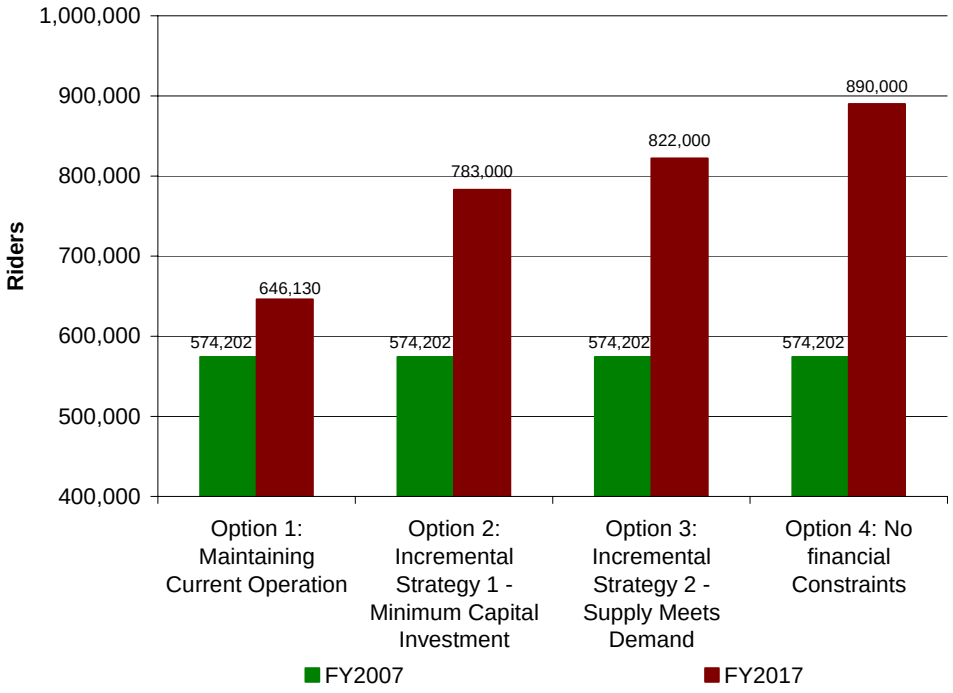
Source: Transit Safety Management

Ridership Growth

The ridership growth for plan options is estimated through two processes. First, the ridership forecast model is developed to forecast long-term growth of ridership based on factors such as population, gas prices and service availability. Second, based on improvement on on-time performance and scheduled time savings resulted from implementation of plan options, additional ridership growth is estimated using demand elasticity of time reduction published for Amtrak passenger trains.

The ridership growth for the mid-range plan options is demonstrated in Exhibit ES-6.

Exhibit ES-6: Annual Ridership Growth by Option
FY2007 vs. FY2017
Vancouver, B.C. to Portland



Source: WSDOT State Rail and Marine Office

Economic Impacts

When public funds are used to invest in Amtrak *Cascades* intercity passenger train services, the investment generates economic impacts that would benefit the state and local communities in general. The magnitudes of economic impacts are dependent on the size of investment and how the funds are invested. WSDOT used the Washington State input-output

economic model, developed using IMPLAN[1], to estimate the ripple effects of the increases in Amtrak *Cascades* services. The IMPLAN model was used to estimate the total economic impacts of mid-range plan options, including the cascading effects of the investments of each option. The economic impacts are assessed in terms of the following two indicators:

- **Employment** represents the jobs created by the investment. Amtrak *Cascades* service directly creates jobs in construction, maintenance, food service, and transportation operations. It also creates jobs indirectly by the affect of the outputs of other industries and government incomes.
- **Value added** is an indicator that reflects the net benefit of the investment. Both labor income (wages and salaries) and business incomes are counted as value added.

Exhibit ES-7 demonstrates economic impacts of the four plan options.

Exhibit ES-7: Economic Impacts of *Amtrak Cascades Mid-Range Plan* Options: Sum of FY2010 to FY2030*

Impact	Area	Option 1: Maintaining Current Operation	Option 2: Incremental Strategy 1 - Minimum Capital Investment	Option 3: Incremental Strategy 2 - Supply Meets Demand	Option 4: No Financial Constraints
Support Employment (Job-Year**)	Benefits to Local Communities Along I-5 Corridor	4,887	11,725	17,454	23,752
	Statewide Benefits (Include benefits to local communities)	6,202	15,024	22,825	31,138
Value Added*** ($ Million, 2008 Dollars)	Benefits to Local Communities Along I-5 Corridor	$306.5	$746.8	$1,139.9	$1,555.1
	Statewide Benefits (Include benefits to local communities)	$399.7	$977.6	$1,500.6	$2,048.1

Note: Economic impacts are assessed using IMPLAN Input-Output model for Washington State and its local areas.

* The projects completed during the mid-range plan period of FY2010 to FY2017 will generate benefits for local communities and Washington State for many years beyond FY2017.

** A job-year means that a person is employed as a full-time employee for a year.

*** Difference between the total sales revenue of an industry and the total cost of components, materials, and services purchased from other firms within a reporting period (usually one year). It is the industry's contribution to the gross domestic product (GDP).

Source: WSDOT State Rail and Marine Office

Benefit/Cost Analysis

The benefit/cost analysis looked at investments, benefits, and impacts of the Amtrak *Cascades* projects completed during the mid-range plan period

[1] IMPLAN is a commercial input-output model developed using input-output data from Bureau of Economic Analysis, U.S. Department of Commerce. The model used to estimate economic impacts in this plan is a Washington State specific model.

of FY2010 to FY2017. Because the projects can generate benefits for local communities and Washington State for many years beyond FY2017, the analysis looked at benefits and costs through FY2030. Economic benefits (revenue and value added) and societal benefits (congestion relief, safety improvement, and environmental impact reduction) were analyzed to calculate net benefit, which was used in the benefit/cost analysis. Exhibit ES-8 highlights this analysis.

Exhibit ES-8: Estimated Benefit/Cost Ratio by Investment Option

Plan Option	Sum of FY2010 to FY2030* - $ Million (2008 Dollars)			
	Total Cost ($ Million)**	**Total Benefit** ($ Million)**	**Net Benefit ($ Million)**	**B/C Ratio**
Option 1: Maintaining Current Operation	$310	$625	$315	**2.02**
Option 2: Incremental Strategy 1 - Minimum Capital Investment	$733	$1,853	$1,120	**2.53**
Option 3: Incremental Strategy 2 - Supply Meets Demand	$1,129	$2,744	$1,615	**2.43**
Option 4: No Financial Constraints	$1,536	$3,400	$1,864	**2.21**

Note: Option 1 is the baseline.

* The projects completed during the mid-range plan period of FY2010 to FY2017 will generate benefits for local communities and Washington State for many years beyond FY2017. Benefits are sum of FY2010 to FY2030.

** Operation costs are sums of FY2010 to FY2030. Capital investment is sum of FY2010 to FY2017. Both benefits and costs are discounted to present value (2008 dollars).

Source: WSDOT State Rail and Marine Office

Connectivity

Multimodal connectivity at Amtrak *Cascades* train stations includes travel by Sound Transit (Light Rail, Sounder, and Express Bus), marine (Washington State Ferries service, cruise ships), bus (public and private intercity bus services), air, and bicycle. Service improvements to enhance connectivity include integrated fares, travel packages, integrated schedules, passenger information systems, signage, and parking/bicycle storage.

Marketing

Amtrak *Cascades* marketing is operated by the WSDOT State Rail and Marine Office to optimize ridership and service capacity usage. It

promotes the achievement of ridership and revenue targets and builds strong brand awareness (Amtrak *Cascades* as differentiated from Amtrak and other transportation modes). It primarily targets adults ages 25-54 in the Seattle and Portland markets, where potential ridership is most concentrated. Marketing currently operates with a flat budget of $1 million to $1.3 million and is focused on non-business travelers. Depending on the mid-range plan option, Amtrak *Cascades* marketing can be positioned with an industry-standard, ridership-based budget to promote the ease, comfort, and environmental sustainability of train travel as a viable transportation alternative for business and non-business travelers.

Challenges and Opportunities

Mobility, reliability, environmental sustainability, safety, and tourism are important considerations when planning Amtrak *Cascades* intercity passenger rail development. A strategic investment in Amtrak *Cascades* infrastructure development, depending on the mid-range option, can:

- Increase mobility and reduce congestion on the I-5 corridor and at Sea-Tac International Airport.
- Increase reliability and attract business travelers.
- Increase energy efficiency and reduce environmental impacts of other more polluting and energy consuming transportation modes.
- Improve passenger safety and offset the safety of other transportation modes.
- Support and enhance tourism development, one of Washington's top industries.

Policymakers, in considering the *Amtrak Cascades Mid-Range Plan* options, are faced with strategic investment challenges that include the lack of dedicated federal funding, limited multimodal state funding, and uncertain Oregon State and British Columbia funding.

Policymakers are also presented with strategic investment opportunities that can reduce travel time up to 30 minutes, increase reliability (on-time performance) from 60 percent to 90 percent, reduce greenhouse gas emission and fuel consumption, and increase ridership.

Amtrak *Cascades* is experiencing double-digit ridership growth due to higher fuel prices and favorable socioeconomic trends as discussed throughout this plan. The trends are likely to continue beyond the mid- and long-range planning horizons as population and transportation demand increases and resources become scarcer. Strategic investment in Amtrak *Cascades* intercity passenger rail infrastructure development, as an integrated part of the multimodal solution of resilient transportation

systems in Washington State, provides policymakers an opportunity to meet societal needs from a long-term perspective.

To manage the risk of cost escalation, WSDOT plans to develop a better contract management practice. To this end, WSDOT should examine methods of lowering risk to the state including the development of a price agreement with BNSF to run a pre-determined number of round trips at a certain level of performance.

Washington State Department of Transportation

Chapter 1: Introduction

Since 1994 the Washington State Department of Transportation (WSDOT) has partnered with Amtrak, the state of Oregon, the province of British Columbia, the railroads, and others to provide fast, reliable, and more frequent intercity passenger rail service along the 466-mile Pacific Northwest Rail Corridor (PNWRC). As one of 11 federally designated corridors, the PNWRC extends from Eugene, Oregon to Vancouver, British Columbia (B.C.). The service, known as the Amtrak *Cascades*, provides travelers with a viable transportation alternative for their intercity trips.

Following the legislature's directive, WSDOT developed and published the *Long-Range Plan for Amtrak Cascades* (2006). The incremental approach, outlined in the plan, would allow the state of Washington to add faster, more frequent Amtrak *Cascades* service based on market demand, partnership investment, and legislative authorization. In order to ensure that public funds are expended in the most efficient manner, construction projects have been designed and grouped as "building blocks" to deliver incremental services. This strategy would allow projects to be constructed in a logical sequence to meet system performance objectives while providing flexibility for funding.

The Amtrak *Cascades* program is being implemented in stages, using a step-by-step approach for development. Service is added over time, based on available state and federal funding and market demand.

Legislative Mandates

Washington State Legislature has directed WSDOT to develop a mid-range plan for Amtrak *Cascades* that identifies specific steps to achieve additional service beyond current levels. ESHB 1094, Section 226, requires WSDOT to submit a mid-range plan to the Office of Financial Management and the transportation committees of the legislature by December 31, 2008. The *Amtrak Cascades Mid-Range Plan* fulfills the legislative mandate by identifying and developing options that outline steps to achieve incremental Amtrak *Cascades* services for the next eight years. Relevant legislative directives (Appendix 1) were reviewed and implemented as applicable to this mid-range plan.

The purposes of the mid-range plan include:

- Providing policymakers (the Governor and Washington State Legislature) with information, based on benefit and cost analyses, for further development of strategic economic investment policy for Washington State's Amtrak *Cascades* intercity passenger rail program.
- Describing four options to increase intercity passenger rail service along the I-5 corridor based on analysis of supply and demand, and estimating resources needed to implement these options.
- Specifying steps that increase capacity and improve reliability for additional intercity passenger rail services associated with each of the four mid-range plan options.
- Helping policymakers assess the potential of rail as part of an integrated transportation solution that addresses interwoven problems, such as economic development, road congestion, public safety, and environmental impacts.

Macro Policy Environment

Washington State faces both challenges and opportunities resulting from the fundamental changes in our economy and society. Challenges within the macroeconomic policy environment include economic globalization, population growth, increases in I-5 corridor congestion, higher fossil fuel prices, global climate changes, and increases in natural and man-made disasters. Passenger rail, once used as means to address only mobility problems, is increasingly viewed and used as an integrated part of macro solutions to achieve multiple ends. These macro solutions include economic viability, societal mobility, environmental sustainability, public safety, and transportation system redundancy and resiliency.

As directed in RCW 47.82, WSDOT has been monitoring and analyzing socioeconomic and technical conditions that affect intercity passenger rail development. These conditions are directly aligned with state and national policy priorities of transportation, economy, energy, and environment. Several chapters in this plan, specifically Chapter 2, discuss these factors in more detail.

In response to these driving factors, and given our competing needs for limited resources (capital and land), Washington State is increasing its policy efforts to address greenhouse gas emissions, congestion, and health and safety improvements, and to develop a more sustainable economy. WSDOT is seeking policies to increase efficiency, relieve highway congestion, and develop robust and resilient transportation systems.

Methodology

The strategy adopted by WSDOT to develop the mid-range plan is fact-based and demand-driven. WSDOT strengthened its ridership forecast and analytic capacity by developing ridership database and forecast models. WSDOT improved capital project cost estimation through a specific cost study of all historic rail projects.

Based on management directives, the mid-range plan provides policymakers with options that are designed, analyzed, and presented to address socioeconomic policy issues. These are used to integrate transportation solutions, when considering funding additional Amtrak *Cascades* services. Economic impact assessment, benefit/cost analysis, and cross modal comparison were also performed to assist policymakers in linking the investment of an option to its effects on the economy and society.

Options presented in the mid-range plan are designed in the context of the current macroeconomic policymaking environment. The options build on incremental strategies with stakeholder involvement and are supported by capacity analyses and benefit/cost analysis. This mid-range plan presents four options for future program development.

Relationship with Other Plans

The mid-range plan is implementing the vision of WSDOT's multimodal plan—the *Washington Transportation Plan*—and the incremental strategy developed in the *Long Range Plan for Amtrak Cascades* under the guidance of the legislature.

The *Washington Transportation Plan* is a 20-year multimodal plan that includes Amtrak *Cascades* development. It establishes guiding principles for investments in current and future facilities through 2026. These investment guidelines are meant to direct funding and resources toward programs and investments that yield the greatest benefits. The mid-range plan is an implementation of the rail section. It states, "as the projects currently underway move forward and the investment priorities are implemented, future planning efforts will build on what we learn about system operations, the pace and challenges of global warming, and the opportunities and limitations of different travel modes such as *rail*, bike, and transit."

The *Long Range Plan for Amtrak Cascades* is a 20-year plan that meets federal requirements for high-speed intercity rail service development through 2023. Based on the long-range plan, the mid-range plan builds for more in-depth planning and economic analysis of projects and investment

opportunities for Amtrak *Cascades* development. It states, "WSDOT will continue to work with the freight railroads, ports, and other partners to ensure the rail system has adequate capacity to meet the demands of its various users. The ability for freight and passenger traffic to coexist on a common infrastructure and continue to grow is important to our regional mobility and economy."

The plans were all developed in coordination with Metropolitan Planning Organizations (MPOs) and Regional Transportation Planning Organizations (RTPOs), and other state, regional, tribal, and local stakeholders within their respective planning areas. See the list below for the mid-range plan stakeholder list.

Public Involvement

In the development of the mid-range plan, an advisory committee was formed, involving as many stakeholders as possible. The advisory committee's role was to help WSDOT assess and evaluate beneficial impacts of rail infrastructure improvements on society, to help WSDOT understand concerns of local communities, and to share information and provide feedback during the mid-range plan development process. Advisory committee stakeholders involved in the development of the mid-range plan include:

- MPOs and RTPOs in the I-5 corridor
- Counties and cities within the study area
- Oregon State
- Province of British Columbia
- Private railroads
- Amtrak
- Washington Public Ports Association
- WSDOT planning units in different modes
- WSDOT regions
- All tribes in Washington State with an interest in the I-5 corridor
- Passenger rail advocacy groups

Two public/advisory committee meetings were held at WSDOT, led by State Rail and Marine Office staff, providing progress reports and opportunities for public comments and discussion. After the public/advisory committee meetings, the draft plan was available for two weeks for public review and comment. Some public comments were incorporated into the final draft and the remainder are included in Appendix 13 with WSDOT's responses. The mid-range plan was then submitted to WSDOT executive management for final approval. Appendix

2 provides a complete list of stakeholders and active participants involved in the process.

Organization of this Plan

This chapter introduces the mid-range plan, its legislative mandates, management direction, socioeconomic contexts, and the strategy and methodology WSDOT adopted to develop the plan.

Chapter 2 discusses the macroeconomic environment and its impact on intercity passenger rail infrastructure using historical, current, and future trends and data. This chapter also introduces the mid-range plan options.

Chapter 3 reports the results from ridership and capacity analyses, including models, methods, data sources, and forecasts that were used to develop plan options.

Chapter 4 lists detailed capital projects for "building block" infrastructure improvements, and the costs associated with these projects. The information on the capacity increases and reliability improvements of completing each "building block" for each plan option is included.

Chapter 5 addresses operations and maintenance issues. A simulation analysis provides on-time performance estimates used in the development of the options. Operational cost estimates are also provided, based on historic data and projected costs for each plan option.

Chapter 6 describes the mid-range plan options for achieving additional Amtrak *Cascades* service. It specifies the steps needed for each plan option. It presents detailed information on capital and operation costs, capacity increases and reliability improvements, ridership growth, and economic impacts of investment.

Chapter 7 provides the results of a benefit/cost analysis for all mid-range plan options. It includes assessment of public benefits and costs, discussion of economic and societal impacts, and analysis of full transportation costs.

Chapter 8 is an analysis of the importance of providing easy connections between the different modes of transportation, and how WSDOT is working with other modes to achieve this connectivity.

Chapter 9 is a marketing analysis, including a history of major marketing efforts, marketing goals, trends, updated costs, anticipated impacts, and efforts to measure performance.

Chapter 10 discusses past, present, and future funding challenges and opportunities.

This mid-range plan does not require additional environmental review. The 2006 *Long-Range Plan for Amtrak Cascades* has been determined, jointly by the Federal Railroad Administration and Federal Highway Administration, to sufficiently address the requirements of a Tier 1 Environmental Impact Statement. Individual projects will require a detailed environmental review to determine the need for additional environmental study and documentation. The projects contained in the options either already have completed environmental documentation, are nearing completion of required National Environmental Policy Act (NEPA) documentation, or are categorically excluded from environmental review.

Washington State Department of Transportation

Chapter 2: Amtrak *Cascades* Development, Socioeconomic Context, and Mid-Range Plan Options

Intercity passenger rail benefits society by reducing congestion, pollution, and fuel consumption, while increasing safety by complementing other more heavily used modes of transportation. This plan assesses benefits and costs and evaluates investment strategies related to Amtrak *Cascades* development within its socioeconomic context. This chapter provides an overview of the development Amtrak *Cascades* passenger train service, socioeconomic trends, and macro policy environment.

Amtrak *Cascades* Development

Rail development for the Pacific Northwest began in 1864. At that time President Abraham Lincoln signed the Northern Pacific Railroad Charter to build a direct rail connection between the Great Lakes and Puget Sound. In the mid-1890s passenger rail service reached its peak in ridership when its share of the market was estimated to be about 95 percent. Largely due to interstate highway system development and competition from airlines, passenger rail ridership reached its lowest point in 1970.

Washington State infrastructure investment in intercity passenger rail service began in the late 1980s, when some state funds were expended to improve train stations. The first state-sponsored Amtrak intercity passenger rail service began in 1994. After incremental enhancements by Washington State and its partners, the service was branded Amtrak *Cascades* in 1999, with the introduction of the European-style, custom-built equipment. In 2007 annual ridership reached 676,760 passengers, the highest in the history of the state-sponsored program. Incremental enhancements continue to improve service and ridership. Appendix 3 provides a more detailed history of rail development in Washington State.

Currently, Washington State provides Amtrak *Cascades* intercity passenger service for four daily round trips between Seattle and Portland as shown in Exhibit 2-1. Note that one of the four state-sponsored daily round trips between Seattle and Portland continues on to Bellingham.

Exhibit 2-1: Amtrak *Cascades* Daily Schedule

Amtrak *Cascades* Daily Schedule
Fall 2008

Southbound (*Read Down*) 517	509	507	513	501	Station	Northbound (*Read Up*) 510	500	504	506	516	508
5:45 pm					Vancouver, BC	11:35 am					
7:40			8:35 am		Bellingham	9:44				9:05 pm	
8:12			9:04		Mount Vernon	9:13				8:13	
8:54			9:55		Everett	8:31				7:31	
9:19			10:21		Edmonds	8:07				7:07	
10:05 pm			10:55 am		Seattle	7:40 am				6:40 pm	
	5:30 pm	2:20 pm	11:20 am	7:30 am	Seattle		12:00 pm		3:55 pm	6:20 pm	9:45 pm
	5:45	2:35	11:35	7:45	Tukwila		11:26		3:11	5:46	9:11
	6:15	3:05	12:05 pm	8:15	Tacoma		10:56		2:41	5:16	8:41
	6:54	3:44	12:44	8:54	Olympia/Lacey		10:18		2:03	4:38	8:03
	7:13	4:03	1:03	9:16	Centralia		9:57		1:42	4:17	7:42
	7:54	4:44	1:44	9:54	Kelso/Longview		9:18		1:03	3:38	7:03
	8:29	5:19	2:19	10:29	Vancouver, WA		8:45		12:30	3:05	6:30
	9:00	5:50 pm	3:00 pm	11:00 am	Portland		8:30 am		12:15 pm	2:50 pm	6:15 pm
	9:10	6:15 pm			Portland		8:05 am	11:35 am			
	9:31	6:36			Oregon City		7:24	10:54			
	10:17	7:22			Salem		6:42	10:12			
	10:46	7:51			Albany		6:13	9:43			
	11:45 pm	8:50 pm			Eugene		5:30 am	9:00 am			

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The railroad tracks that span the Pacific Northwest Rail Corridor (PNWRC) are owned by the BNSF Railway (BNSF) in Washington, by the Union Pacific Railroad (UP) between Portland and Eugene, Oregon, by BNSF between the Canadian Border and Fraser River, and by Canadian National Railway from the Fraser River to the Vancouver, B.C. station. Freight and passenger rail traffic run on the same tracks. The Washington State Department of Transportation (WSDOT) partners with federal, state, provincial, tribal, and local jurisdictions; railroads including Amtrak, BNSF, UP, Canadian National Railway (CN), VIA Rail Canada; and others under many agreements to provide Amtrak *Cascades* service.

The state-supported Amtrak *Cascades* service continues to demonstrate record growth in ridership. Ridership of 594,970 in the first three quarters of 2008 increased 16.3 percent over the same period in 2007. High gasoline prices, population growth, and many other factors have contributed to this increase.

Many planning documents have guided Amtrak *Cascades* development over the years. In 1995 WSDOT published *Options for Passenger Rail in the Pacific Northwest* and in December 1997, WSDOT produced the *Pacific Northwest Rail Corridor Operating Plan* for public review.

WSDOT published the *Long-Range Plan for Amtrak Cascades* (2006) that meets the U.S. Department of Transportation's recommended planning framework for high-speed intercity rail service development, a requirement for Washington State to be eligible for federal funding. The long-range plan outlines a 20-year progression of incremental improvements that increase train frequency, reliability, and safety, and reduce travel times.

Socioeconomic Context

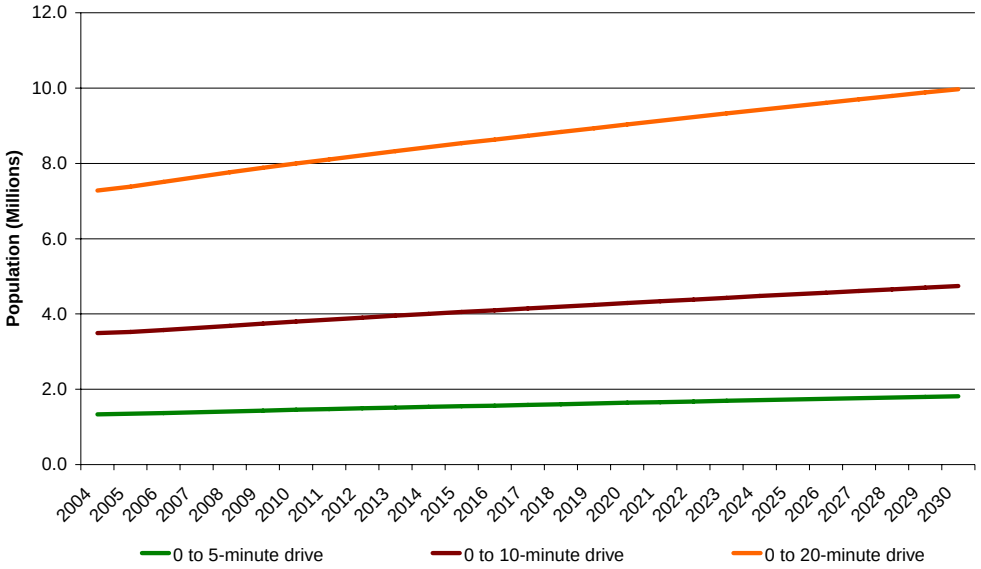
Population/Congestion

Western Washington and the Puget Sound region, anchored by major metropolitan areas, is the densest, most heavily populated area in Washington State. As of 2008 an estimated 3,664,000 people (four out of ten people) reside within 10 driving minutes of Oregon and Washington Amtrak *Cascades* stations.

Exhibit 2-2 shows increasing I-5 corridor population growth from 2004 to 2030, in terms of proximity to nearby Amtrak *Cascades* stations at 5-minute drive, 10-minute drive, and 20-minute drive times. Increasing travel demand on the I-5 corridor impacts mobility, safety, the environment, and energy consumption. Strategies that promote viable

transportation alternatives, such as intercity passenger rail cause mode shifts that can reduce travel demand on the I-5 corridor and improve mobility, safety, environmental sustainability, and the economy.

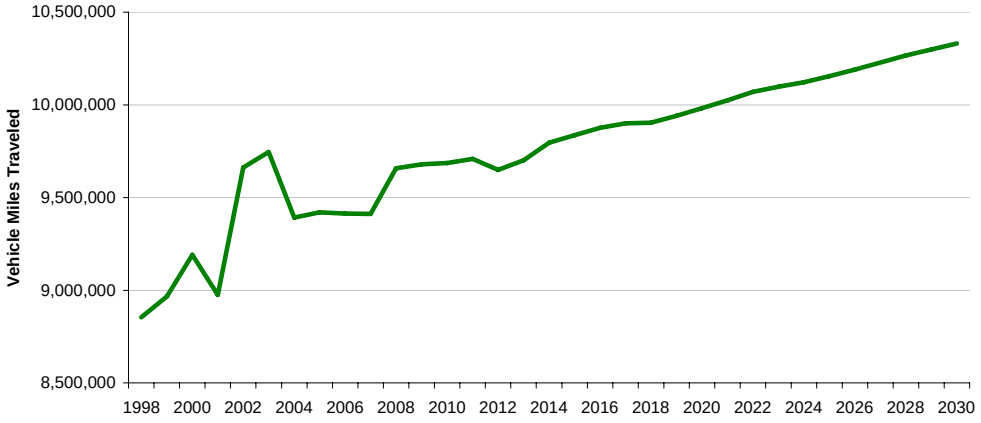
Exhibit 2-2: Population Surrounding Amtrak *Cascades* Services
Vancouver, B.C. to Eugene, OR
Drive Times to Amtrak Stations



Source: Data developed by WSDOT State Rail and Marine Office based on U.S. Census using WSDOT GIS tools.

Exhibit 2-3 shows the increase in I-5 vehicle miles traveled from 1998 to 2030.

Exhibit 2-3: Vehicle Miles Traveled Along the I-5 Corridor



Source: WSDOT Transportation Data Office, and FY2010 to FY2030 projections by State Rail and Marine Office.

With national highway congestions cost estimated at $70 billion annually, states are turning to rail as part of their transportation strategy. Specific

markets, like the Seattle, Portland, and Vancouver, B.C. metropolitan areas, have the most potential to generate public benefits from reduced highway congestion now and in the future. Intercity passenger rail is even more beneficial in regional markets with well-developed *intra*city mass transit systems, because intercity rail is more likely to be more competitive with driving on those routes.

The Amtrak *Cascades*' route goes along the same sections of the I-5 corridor. WSDOT estimates that daily delay along the I-5 corridor is about 300,000 hours and cost about $7 million a day. Amtrak *Cascades* passenger rail can help reduce congestion by diverting traffic away from the crowded I-5 corridor, increasing the serviceability of the overall transportation system.

According to a WSDOT Urban Planning Office model, a 5 percent reduction in I-5 traffic will reduce 70 percent of the delay caused by congestion. Therefore, it doesn't take a huge quantity of travelers switching to intercity passenger rail to generate substantial public benefits by reducing highway congestion.

Intercity passenger rail service could potentially ease air travel congestion (take-off and landing delays) and it could reduce the number of flights between cities. In areas with little to no additional space for runways, airports have fewer options for increasing capacity. In those areas, intercity passenger rail service would be more competitive.

There is an economic advantage for passenger rail in locations where train stations are located in central business districts, especially with convenient access to mass transit.

Safety and Security

On October 16, 2008, President George W. Bush signed into law a 2-part legislation: HR 2095, the Railroad Safety Enhancement Act of 2008, and HR 6003, the Passenger Rail Investment and Improvement Act of 2008. The legislation gives $12.9 billion for intercity passenger rail development over five years, almost double what the U.S. is currently spending. Safety and rail passenger improvements include increased rail safety inspectors, at-grade crossing improvements or eliminations, positive train control technology on rail main lines by 2015, and reporting required on service delays and poor on-time performance for the Amtrak Coast Starlight and Amtrak *Cascades*.

According to the National Safety Council (NSC), the safety of intercity passenger rail travel is comparable to commercial bus and air travel. The 2008 NSC Injury Facts report shows that passenger autos have a 0.81 U.S.

passenger fatalities per 100 million passenger miles ratio (1996-2005 data); buses have a 0.04 ratio; railroad passenger trains have a 0.05 ratio; and airlines have a 0.02 ratio. Passengers may choose to travel by rail to improve their own safety, if they believe passenger rail is safer than other modes.

In addition global development and global warming may cause transportation systems to be more vulnerable to natural and man-made disasters. The ability to respond to and recover from adversity is largely due to society's degree of resiliency. Regions and communities with viable transportation alternatives are better positioned to deal with adversity and successfully recover from emergencies.

A robust intercity passenger rail service is an asset in times of emergency. After the September 11, 2001 attack on the World Trade Center, Amtrak service resumed days before highways were open to the public. Likewise, after I-5 was flooded by the Chehalis River and its tributaries in December 2007, Amtrak *Cascades* service resumed in two days, while I-5 service resumed for public use after four days.

Environment/Energy

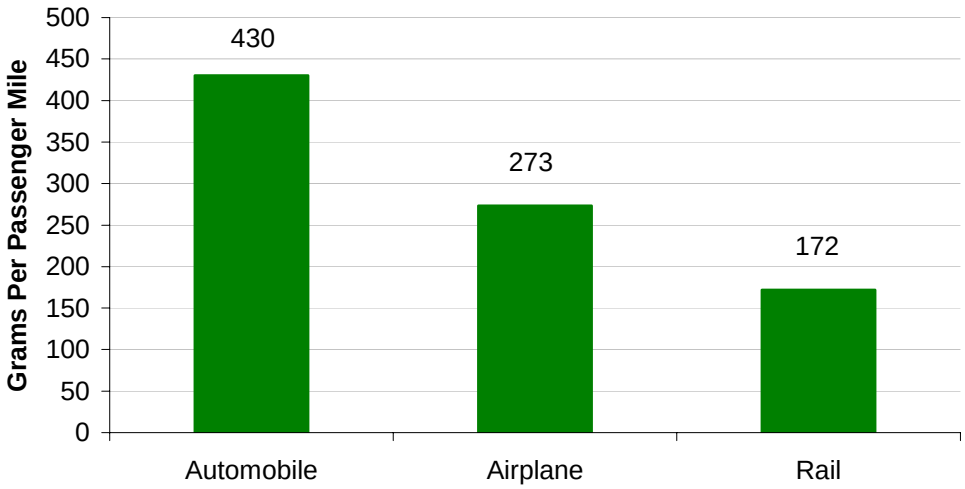
Transportation is the fastest growing source of carbon dioxide (CO_2) in the United States. CO_2 emissions are projected to exceed 175 percent of year 2000 levels by 2025. Personal cars and trucks now account for 40 percent of our nation's oil consumption. Cars and trucks produce about a third of the greenhouse gas emissions in the U.S. Increasing travel demand is expected to cancel out the CO_2 savings from the fuel economy and renewable fuel requirements as specified in the Energy Independence and Security Act of 2007.

The University of California at Berkley recently completed the first comprehensive environmental life-cycle assessment of passenger transportation in the U.S. The assessment includes significant indirect supply chain costs that are harder to measure. It analyzes the real costs of all system components in terms of their energy use and polluting by-products "from cradle to grave."

The University of California study shows that greenhouse gas emissions per passenger mile traveled is less for rail than for cars or airplanes, as indicated in Exhibit 2-4. Rail systems are the best energy and greenhouse gas performers, but they require much larger infrastructure requirements per passenger-mile served. High-speed rail can perform better than automobile and aircraft, but only if ridership is optimized. In the study, intercity passenger rail service similar to Amtrak *Cascades* was not included. Caltrain has a similar type of diesel propulsion system, but

offers a commuter service with shorter distances and more frequent service.

Exhibit 2-4: Greenhouse Gases by Transportation Mode



Source: University of California at Berkeley, Center for Future Urban Transport

Amtrak provides long-distance rail service and intercity passenger rail service throughout the U.S. Current initiatives to increase energy efficiency and reduce fuel consumption include a range of Amtrak programs. With its participation in the Chicago Climate Exchange, Amtrak is committed to cutting diesel emissions by 6 percent by 2010, the largest voluntary reduction commitment in the U.S., and the first commitment made by a national transportation company.

Intercity passenger rail can generate some public benefit by reducing dependency on gasoline and fossil fuels. Another public benefit would be to reduce vulnerability to an energy supply disruption.

Economy

Amtrak *Cascades* investments can increase the economic potential of an area. There are model approaches used around the world to stimulate the economy and improve intercity passenger rail infrastructure and service with established and clearly defined national policy goals, stakeholder roles, and committed funding. In the U.S. where passenger rail is all public sector, Amtrak is taking action to reduce costs, but it is not positioned to address broader goals, roles, and funding issues.

Intercity passenger rail services along designated corridors have a comparative advantage over other transportation modes in terms of financial viability and public benefits. However, currently there isn't a national policy framework for rail and transportation in general. This is a

major finding of the National Surface Transportation Policy and Revenue Study Commission Report of December 2007. The report was developed by an advisory group of 12 delegates, led by the U.S. Department of Transportation Secretary with a vision to create and sustain the pre-eminent surface transportation system in the world. Their recommendation to increase multimodal transportation infrastructure investment will guide future rail policy. The report's call to action states, "…our nation will need to put more emphasis on transit and intercity passenger rail and make them a priority for our country. A cultural shift will need to take place across America to encourage our citizens to take transit or passenger rail when the option is given."

Consumer and Travel Industry Trends

Eco-tourism is growing both in trips to important environmental sites and in ways travelers choose travel alternatives that are more environmentally sustainable. Rail, as part of "green travel," is emerging as the transportation alternative of choice for those who want to benefit local communities, reduce their carbon footprint, and experience the natural scenery in comfort and convenience as they travel.

Global warming is of high concern for 41 percent of Americans and 59 percent believe the affects are apparent now. Approximately 50 percent of Americans changed their summer travel plans due to high gas prices. Almost 25 percent of Americans working in the private sector don't get paid vacations. With soaring gas prices influencing consumer's travel plans, shorter, domestic trips are likely to continue to dominate travel destinations. Amtrak *Cascades* can be a preferred travel alternative for local and regional trips.

In the next five years, America is expected to experience an 80 percent growth in the number of households headed by someone 55+ years old. Their availability to travel, their established and stable income, and their nostalgia for trains is expected to stimulate rail travel, especially if their rail experience is favorable.

Wireless Internet (WiFi), cell phone reception, and electronic media are becoming standard amenities in all sectors of society, particularly among youth and young adults. The availability of convenient, state-of-the-art technology appeals to passengers and is an economic advantage for intercity passenger rail travel.

Mid-Range Plan Options

Washington State is facing both challenges and opportunities resulting from the fundamental changes in our economy and society. The main

factors that shape policy development have been discussed in a previous section. Transportation solutions, once used as a means to address only mobility problems, are increasingly viewed and used as strategies to achieve multiple ends, such as economic viability, societal mobility, and environmental sustainability. The options of the mid-range plan are designed, analyzed, and presented to assist policymakers in determining funding for the Amtrak *Cascades*, to achieve additional services that benefit society and the economy.

Purposes of Mid-Range Plan Options

The purposes of the plan options are identified as:

- Articulating the needs of intercity passenger train services and discussing supply and demand issues for various scenarios.
- Providing alternatives needed by policymakers in developing strategic investment policy, which might help achieve multiple policy ends using transportation solutions.
- Assessing potential of passenger rail as a strategic alternative of long-term transportation solutions, rather than a niche market segment for tourists and intercity travelers.
- Specifying the steps of improving infrastructure to deliver additional intercity passenger services, and link capital and operational investment to ridership growth and economic and societal benefits.
- Providing a variety of information to support informed decision-making processes—legislative budgeting and prioritizing.

Defining Options for Achieving Additional Services

Option 1: Maintaining Current Operation Strategy

This option is designed to maintain current Amtrak *Cascades* operation at four daily round-trip trains between Seattle and Portland and two daily round-trip trains between Seattle and Vancouver, B.C. This option would not have additional capital investment and infrastructure improvements in the mid-range plan period. All previous capital investments for incomplete projects would become sunk costs[1], as no additional investments for completing projects, which increase service capacity and reliability, will

[1] Sunk costs are costs that cannot be recovered once they have been incurred. If there is no additional investment to complete projects that increase service capacity, then the costs of the uncompleted projects are lost or sunk.

occur. Ridership growth will be confined at current capacity levels. The growth opportunity would be to attract additional riders to the non-peak seasons and low ridership days.

This option informs policymakers about the current status of Amtrak *Cascades* services and the outlook of maintaining the current status. It also serves as an analytic baseline for other options.

Option 2: Incremental Strategy 1 – Minimum Capital Investment

By identifying the cost to deliver the minimum increase of additional service, this option would deliver five daily round-trip trains between Seattle and Portland and maintain two daily round-trip trains between Seattle and Vancouver, B.C. in 2012. This option would complete capital projects that have already been started, and would sustain the capital costs that were already invested into the system to achieve incremental service gains. The increased service would be used to meet the demands that would rise due to improved schedule reliability and rail line capacity.

Option 2 helps decision-making by specifying the investments needed to complete the capital projects for minimum service increase. This option also assesses benefits and costs associated with additional investments that would revive the sunk costs and deliver minimum incremental service.

Option 3: Incremental Strategy 2 – Supply Meets Demand

By best analyzing and matching supply and demand in a dynamic economy and a changing society, this option assesses both supply and demand and the interactions between them. It provides essential information about ridership growth, cost and revenue, local and state economic impacts, and environmental and social benefits for incremental investments. These investments would achieve additional service levels, where the increased supply (Amtrak *Cascades* service capacity) essentially meets the increased demand (ridership growth).

This option is essential because it supports decision-making by specifying investment levels, where the supply meets the demand, and provides information about a variety of benefits associated with such investments.

Option 4: Rail as a Long-Term Alternative Strategy – No Financial Constraints

By maximizing engineering feasibility, this option provides information about the maximum capacity that can be built during the mid-range plan horizon, FY2010 to FY2017, given the level of investment necessary to develop such infrastructure improvements. However, this option does

exclude a few reliability improvement projects that are expensive when compared to achieved improvements.

Option 4, which allows eight daily round trips between Seattle and Portland by FY2015, is a viable option in an environment where policymakers might be willing to promote rail as a strategic alternative and part of the solution to highway congestion. It also helps to explore the potential benefits and costs for such a strategic movement to address greenhouse gas reductions, congestion relief, public safety improvements, and transportation resilience to disasters.

Chapter 3: Ridership for Amtrak *Cascades*

Ridership for Amtrak *Cascades* on the Pacific Northwest Rail Corridor (PNWRC) has been increasing. This chapter highlights the changes in ridership in the past, present, and future and includes:

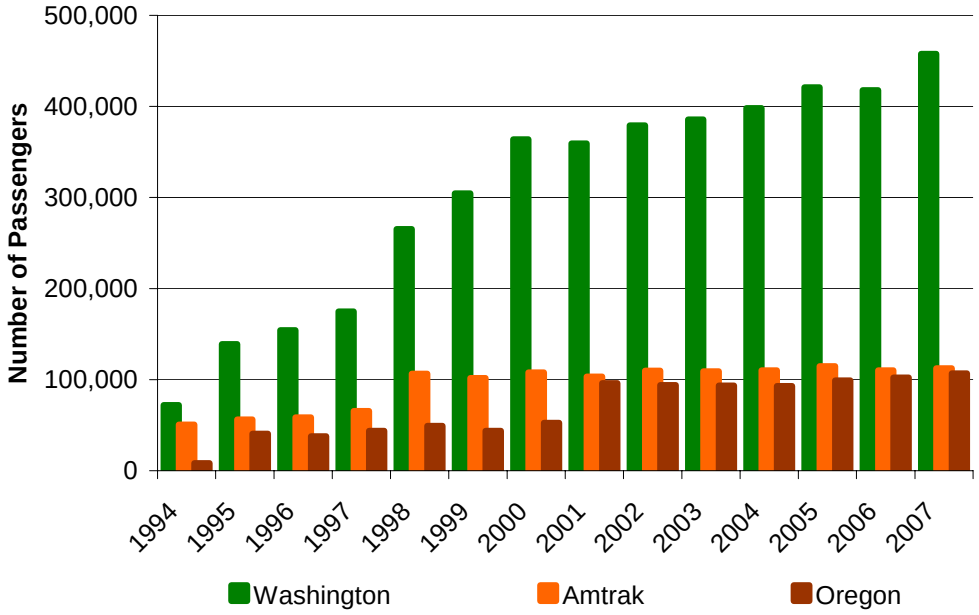
Ridership History

In 1993 Amtrak offered only one daily round trip between Seattle and Portland. Washington State saw the need and demand for more passenger rail service in the PNWRC, and in 1994 expanded service by introducing passenger trains sponsored by Washington State. This new Washington-sponsored train service first leased a train set from Renfe Talgo of America (Talgo) to provide a second daily regional round trip between Seattle and Portland. In 1995 Oregon sponsored a state-funded train and one of two existing Seattle to Portland daily round trips was extended to Eugene, Oregon. Also in 1995, after a 14-year absence, service was restored between Seattle and Vancouver, B.C. In 1996 Washington leased a second Talgo train to support service. The Amtrak *Cascades* brand debuted in 1999 and WSDOT expanded Seattle to Portland service by offering a third daily round trip.

Washington State initiated a new phase for Amtrak *Cascades* in 1999 by replacing leased equipment with custom-built trains purchased from Talgo. Currently there are five train sets in the Amtrak *Cascades* service. Washington State owns three train sets and Amtrak owns two. WSDOT signed a lease/purchase agreement for two train sets with Talgo in 1995, and took delivery in late 1998-early 1999. In 2000 a second daily Seattle to Portland train was extended to Eugene, sponsored by Oregon. A new stop in Tukwila was added in 2001. A fourth daily Seattle to Portland regional round trip started in July 2006, which completed the extent of current Amtrak *Cascades* regional service between Seattle and Portland.

Ridership has risen steadily on the PNWRC from Eugene, OR to Vancouver, B.C., from less than 200,000 annual passengers in 1994 to 676,760 passengers in 2007. Ridership for the three Washington-sponsored trains increased over 500 percent from 1994 to 2007, even though there were service disruptions for approximately three months in 2007. A complete history of the Amtrak *Cascades* annual ridership is shown in Exhibit 3-1.

Exhibit 3-1: Amtrak *Cascades* Annual Ridership 1994-2007



Source: WSDOT State Rail and Marine Office

Annual ridership for 2008 is expected to surpass all previous years in annual growth. Year-to-date ridership through October for Amtrak *Cascades* shows 27.4 percent growth over the same time in 2007. One reason for this growth is the rapid rise in gasoline prices in the last year, prompting consumers to consider train travel rather than driving for their travel needs. More convenient schedules and better connections have also fostered higher growth rates in the last several years.

Since 1994 when Washington began actively supporting Amtrak service, consumers have responded to the increased frequency of daily train service. In every case when or where the supply of passenger train capacity increased, higher ridership has quickly followed. Ridership increases are most pronounced in the Seattle to Portland corridor, now that it has four daily Amtrak *Cascades* regional round trips.

Ridership Distribution

Public use of Amtrak *Cascades* is also measured by station on-offs, which measure passenger volumes per station. This measurement is determined by counting the number of passengers who get on and off trains at each station along the Amtrak *Cascades* corridor. Station volumes can assist planners and businesses in determining local train station activity. This knowledge can support greater connectivity with bus systems and other transportation modes. It can also be of help in land use planning for residential and business expansion.

Station on-offs provide a good measurement of the distribution of ridership along the rail corridor. Amtrak *Cascades* currently has 17 stations, with an additional station scheduled for opening in Stanwood, WA in 2009. Originally, Amtrak *Cascades* had 15 stations in operation in 1995. Tukwila, WA opened in 2001, followed by Oregon City, OR in 2004. Restoration of older stations and building of new stations in more strategic locations led to greater volumes of passengers at stations. For passengers traveling between major cities (i.e. Seattle and Portland), having all trains stop at all stations increases travel time. Future consideration should be given to adding express trains between major cities.

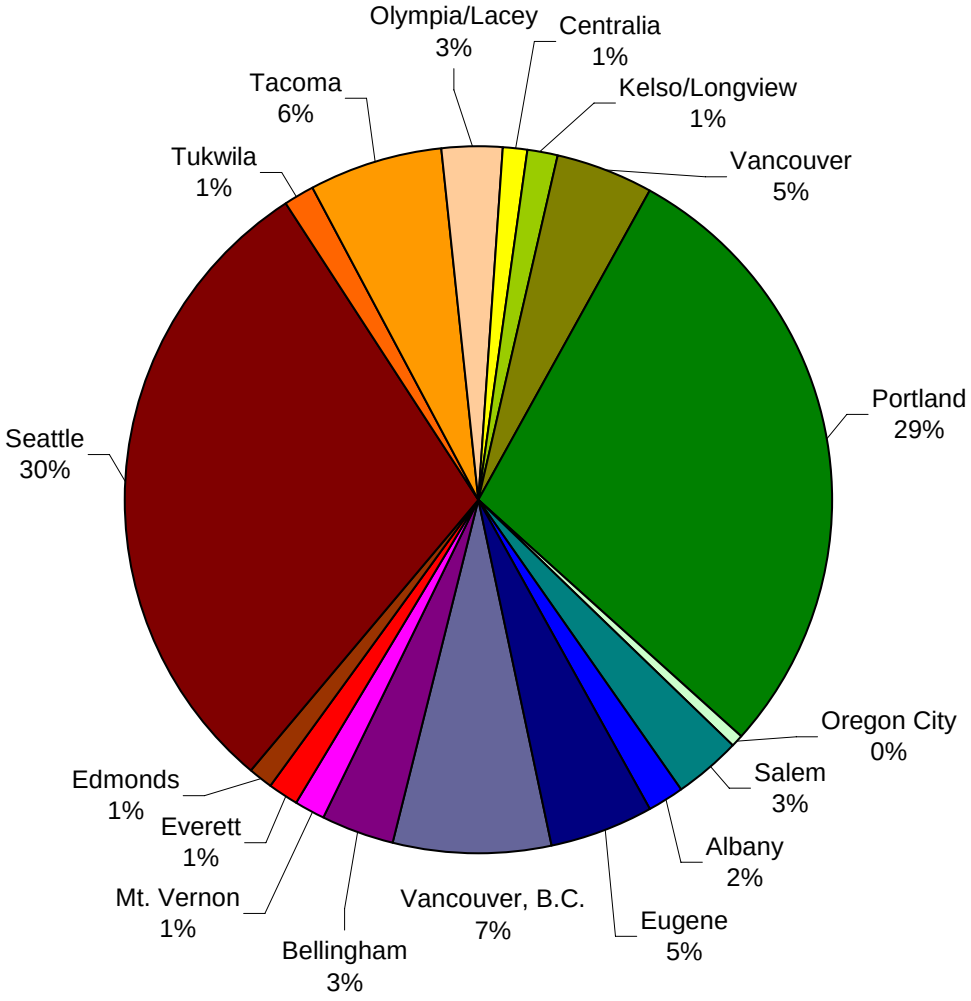
Station locations with 2007 total on-offs are listed from north to south in Exhibit 3-2. Nearly six out of every ten passengers begin or end their train travel at either the Seattle or Portland stations. These two cities serve as hubs for north and south traffic from each station and as beginning or end points for the four daily Seattle to Portland round trips. Exhibit 3-3 illustrates in a pie chart the share of on-offs by station in 2007.

Exhibit 3-2: Station On-Offs – 2007

Stations	Number	Percentage
Vancouver, B.C.	***105,960***	***7.2%***
Washington Stations		
Bellingham	51,291	3.5%
Mt. Vernon	19,321	1.3%
Everett	18,211	1.2%
Edmonds	18,200	1.2%
Seattle	438,845	29.8%
Tukwila	18,884	1.3%
Tacoma	87,996	6.0%
Olympia/Lacey	41,119	2.8%
Centralia	17,509	1.2%
Kelso/Longview	20,314	1.4%
Vancouver	66,761	4.5%
Total	***798,451***	***54.3%***
Oregon Stations		
Portland	421,658	28.7%
Oregon City	7,186	0.5%
Salem	42,303	2.9%
Albany	24,661	1.7%
Eugene	71,040	4.8%
Total	***566,848***	***38.5%***
Grand Total	**1,471,259**	**100.0%**

Source: WSDOT State Rail and Marine Office

Exhibit 3-3: Amtrak *Cascades* On-Offs by Station – 2007



Ridership Profile

Passenger demographics are important in determining characteristics of current passengers and potential growth of additional passengers. Surveys, periodically conducted by Amtrak, collect national and regional data to provide updated information on Amtrak *Cascades*. Current demographics of riders have been identified for targeting advertising campaigns:

- Adults 25-54.
- Household income $50,000+.
- Slightly skewed female (60 percent).
- Employed (52 percent full time, 12 percent part time).
- Educated (54 percent college graduate, 31 percent some college).
- Travels an average of seven one-way trips along the I-5 corridor per year, for business or leisure.

Approximately 81 percent of passengers are riding Amtrak *Cascades* for leisure. Ridership peaks during Friday, Saturday, and Sunday; and seasonally in the summer months and during the winter holidays. Attracting business travelers, especially those willing to pay higher fare tickets, is essential for increasing demand for current capacity and proposed capacity expansion. Providing frequent and reliable service with flexible timetables is important in attracting business customers.

Factors that Drive Ridership Growth

Ridership has grown over time, in part, because of underlying demographic characteristics of potential rail passengers. Population density and proximity to Amtrak stations is important in determining ridership growth. As of 2008 an estimated 3,664,000 people reside within 10 minutes of Oregon and Washington Amtrak *Cascades* stations. Employment opportunities and income levels of the same nearby populations are also important.

Greater capacity in the number of daily trips between stations is instrumental in increasing demand for passenger rail service. More daily trips expand the daily timetable, attracting more customers who may find an earlier or later travel time more attractive, especially for taking day trips. Business travelers especially respond to more flexibility and choices.

Passengers are sensitive to ticket pricing. Amtrak offers four categories of ticket prices. Similar to airlines, prices rise as the trains fill up. Historically when additional trips were added to the Seattle to Portland segment, ridership responded quickly. More seats were available per day which drove down ticket prices, as more seats were available at a lower price. Saving money can be a great incentive for switching to other travel times.

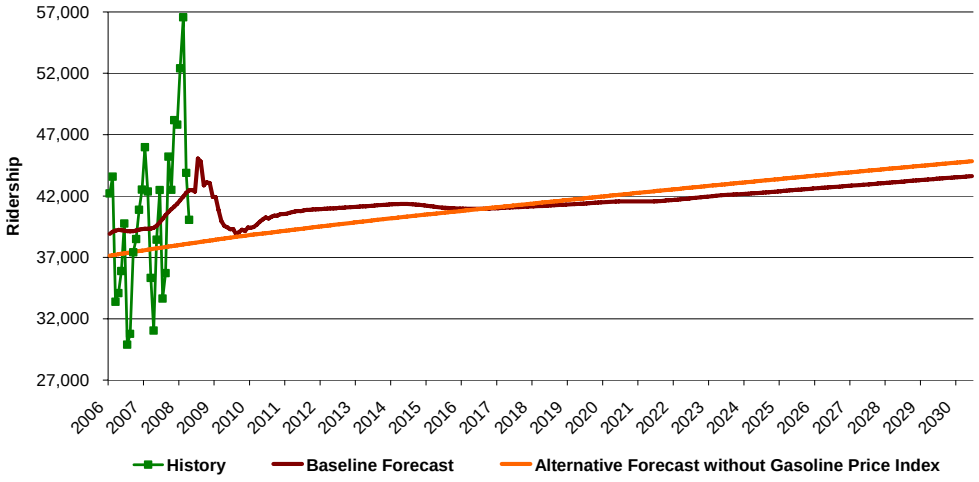
Higher costs for competing transportation modes also increase growth of ridership. Higher gasoline prices for automobile travel have been a big contributing factor for higher ridership, especially this past year. Nationwide, more highways and bridges are charging tolls, which add an additional cost to automobile travel. A new bridge, being planned for the I-5 crossing of the Columbia River between Washington and Oregon, is considering a toll for financing. This has the potential of furthering rail passenger growth between Portland and Seattle by increasing the cost of automobile travel.

Growth Forecast: Methods and Results

Ridership growth on Amtrak *Cascades* trains was forecasted using statistical methods relating ridership to population, capacity increases, and

inflation-adjusted gasoline prices. For more technical information concerning ridership forecasting, please refer to Appendix 4. The Seattle to Portland segment is highlighted here because of the proposed expansion of capacity for this portion of the PNWRC. Monthly ridership from 1996 to October 2008 was available for reference and forecasting. The baseline forecast used monthly ridership, average monthly train occupancy, population based upon driving time from Amtrak stations, inflation-adjusted gasoline prices, and capacity in number of daily round trips. An alternative forecast excluded gasoline prices for comparison. Exhibit 3-4 shows three data series: history starting in January 2006; the baseline forecast; and the alternative forecast. The baseline forecast provides a better fit to actual historical ridership, specifically gasoline prices have increased substantially since 2006. From FY2010 to FY2017, the baseline forecast projects an average of 3 percent higher ridership by including gasoline prices. After FY2017 the alternative forecast projects an average of 2 percent higher forecast.

Exhibit 3-4: Comparison of Monthly Ridership History, Baseline Forecast, and Alternative Forecast without Gasoline Price Index
Seattle to Portland



Stations included are Seattle, Tukwila, Tacoma, Olympia/Lacey, Centralia, Kelso/Longview, Vancouver, and Portland.

Source: WSDOT State Rail and Marine Office

Growth Analysis: Peak Ridership and Capacity, Time Saving and Reliability Improvement Effect – Discussion and Results

When Amtrak *Cascades* ridership is forecasted in total for the Seattle to Portland corridor, it does not take into consideration peak ridership that occurs when the train is at its fullest along the corridor. For the Seattle to Portland segment, this maximum regularly occurs between Olympia/Lacey and Centralia, whether traveling north or south. During the peak months of

ridership in summer, during the winter holidays, and for weekend days of Friday through Sunday, the Olympia/Lacey to Centralia segment is usually where a train is sold out and passengers are possibly turned away.

An analysis of the distribution of daily ridership in this peak section was conducted for a full year from July 2007 through June 2008 for all four Seattle to Portland daily round trip trains. Nearly 0.5 percent, or 2,348 passengers, was not provided reserved seating as ridership exceeded train capacity for the peak ridership segment between the Olympia/Lacey and Centralia stations. Passengers not securing reserved seating are provided, if possible, overflow seating in the Bistro and Lounge cars. Passengers provided overflow seating are classified as unsupplied marginal demand for the purposes of the following discussion about peak capacity and loading.

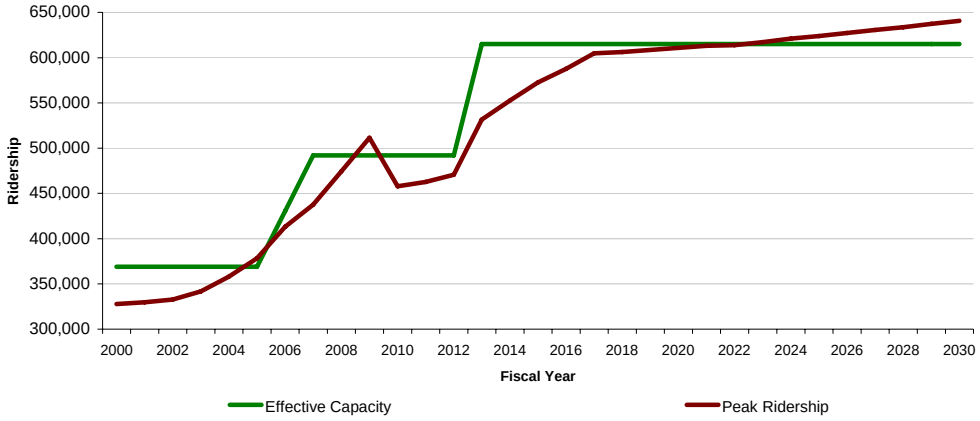
Passengers securing reserved seating, plus the overflow, determine a level of ridership or demand for the peak section. For the year's duration, from July 2007 through June 2008, the peak section demand totaled 474,800 riders. The four Seattle to Portland daily round trips provide a total of 738,760 seats annually. Dividing 474,800 by 738,760 determines an average peak-loading calculation of 64 percent. The difference of 263,960 seats between peak section demand riders and annual total seats reflects lower ridership in non-peak sections: lower ridership during spring and fall seasons and lower ridership levels from Monday through Thursday.

Sensitivity analysis of unsupplied marginal demand levels from 1 percent to 5 percent indicated a range of 5,515 to 27,518 riders. One percent unsupplied demand leading to a peak loading of 67 percent was chosen as a reasonable amount of unsupplied marginal demand. Meeting demand during peak trips is imperative, given the potential lost revenue of high paying passengers and resulting dissatisfied customers.

Ridership can also be responsive to travel time reductions and reliability improvements of adhering to schedules. Option 2 is used as an example for explanation. Option 2 provides for an additional daily round trip (total of five) between Seattle and Portland, starting in July 2012. The Tacoma – Bypass of Point Defiance – 66th St. to Nisqually, included with Options 2 through 4, results in a time savings of 6 minutes per one-way trip. A literature review of elasticity factors cites that train ridership increases 1.58 percent as time decreases by 1 percent. By using the same elasticity factor, expenditures for rail maintenance that improve on-time reliability from the current 61 percent to 95 percent also increases ridership by 18 percent when fully implemented.

Exhibit 3-5 provides a comparison of peak capacity and peak ridership for Option 2. The peak ridership line also incorporates the time and reliability enhancements inherent to Option 2. The chart shows that from 2000 through 2007, peak capacity accommodated the peak ridership levels. Starting in 2008, peak ridership begins to exceed peak capacity with rapidly increasing ridership due to higher gasoline prices and other factors. Both peak capacity and peak ridership rise rapidly from 2012 to 2014, when an additional daily round trip is added and time and reliability enhancements begin to take effect. From 2015 through 2030, peak ridership exceeds peak capacity and demonstrates a need for additional capacity. Options 3 and 4 provide for those additional capacities.

Exhibit 3-5: Peak Ridership vs. Effective Capacity
Option 2 – Minimum Capital Investment
Seattle to Portland



Stations included are Seattle, Tukwila, Tacoma, Olympia/Lacey, Centralia, Kelso/Longview, Vancouver, and Portland.

Peak Ridership: *Peak ridership is defined as annual ridership measured at peak segment of the route (Olympia/Lacey to Centralia is the peak segment of Seattle to Portland route).*
Effective Capacity: *Effective capacity is defined as average occupancy level where one percent of unsupplied demand happens due to peak time and peak section constraints.*

Source: WSDOT State Rail and Marine Office

Washington State Department of Transportation

Chapter 4: Amtrak *Cascades* Needed Infrastructure Improvements: FY2010 to FY2017

In 1993 the Washington State Legislature directed the Washington State Department of Transportation (WSDOT) to develop high-quality intercity passenger rail service through the incremental upgrading of the existing BNSF Railway Company's (BNSF) north-south main line. Since that time, WSDOT has been working with railroad companies and other organizations to identify, develop, prioritize, and build infrastructure projects. The 2006 long-range plan identified opportunities to improve existing services between 2004 and 2023. It proposed a set of infrastructure improvement projects that can, depending on the investment strategy "building blocks," enable WSDOT to fulfill the legislature's directive to provide safe, faster, more frequent, and more reliable passenger rail service through an incremental approach.

This chapter outlines major infrastructure improvements that can be implemented during the mid-range plan horizon—FY2010 to FY2017. The infrastructure improvements are designed to achieve additional services, given scenarios of ridership growth and investment goals described in Chapter 6. The economic, societal, and environmental benefits of these services, as well as investment levels to achieve these services, are further assessed in later chapters.

Identifying and Refining Infrastructure Improvements

Since the early 1990s, WSDOT has partnered with Amtrak *Cascades* stakeholders (i.e. BNSF, Amtrak, and others) to increase service—improving safety and building rail line capacity—through phased infrastructure project development. Projects are developed in a very specific order to achieve a range of operational goals—individual projects solve individual problems; groups of projects solve larger operational challenges.

The *Amtrak Cascades Mid-Range Plan* includes operations analysis focused on service goals and strategic investment options between FY2010 and FY2017. By phasing infrastructure projects for incremental implementation, WSDOT provides policymakers with additional flexibility to fund Amtrak *Cascades* services at a desirable level, given a variety of factors that affect state budget and priorities. Meanwhile, WSDOT can better identify solutions, analyzing how to implement projects and maximize public benefit at the given investment level.

Updating Costs to Implement Infrastructure Improvements

With all transportation projects, including rail, cost escalation is a challenge. Transportation projects are huge investments. They often take many years to complete. They contain many uncertainties (i.e. real estate, engineering design, public-private partnerships, societal and environmental challenges). These factors can easily drive cost estimates for transportation projects much higher than originally anticipated.

To better manage cost escalation and deliver transportation projects on time and within budget, WSDOT began use of cost validation processes called Cost Risk Assessment (CRA) and Cost Estimate Validation Process® (CEVP). While the cost validation processes were effective with highway projects, they were marginally effective with rail projects for several reasons:

- Unlike highway projects that have dedicated funding for system inventory and system preservation, rail projects have no dedicated funding sources to develop or manage such systems.

- Unlike highway projects with available historical data, rail projects have limited historical data. Consequently, less information is available for reliable cost estimates and risk analysis processes.

- Highway projects and rail projects have different inflation trends for their major components. Inflation indices that work for highway projects may not produce reliable cost projections for rail projects.

To address cost escalation concerns for rail projects, WSDOT State Rail and Marine Office staff conducted a study based on a set of 1994 to 2008 rail projects (mainly BNSF projects) experiencing cost escalation. The study identified cost escalation drivers and trends. It categorized rail project costs into five cost groups: pre-construction engineering, right of way, track, signal, and earthwork. It found specific indices to analyze inflation trends and quantify inflation effects. It deducted inflation effects, scope-of-work changes, and original cost estimate errors from the cost escalation.

The study found cost escalation for rail projects averaged about 60 percent (ranging from 2 percent to more than 100 percent) depending on cost type, cost categories, initial estimates, and project implementation timeframe. The rail signal system cost inflation index was also systematically understated.

To address the uncertainty of cost escalation and control risks, three cost estimation improvements were developed by the WSDOT State Rail and Marine Office to improve cost estimates:

- A set of rail project specific inflation indices were used to reflect cost inflation between cost estimates and project implementation.

- Cost escalation, due to scope-of-work changes, would be minimized with a developing rail project management system, which includes a database of historical and current information about project location, type, size, economic climate, and other factors.

- Cost escalation, due to estimation errors, was minimized with staff management control of the data and process. A cost item database that represents rail projects will be developed to help validate the cost estimates produced by consultants using their proprietary databases.

Exhibit 4-1 presents cost estimates for rail projects based on the improved methodology described above. Although WSDOT made its best effort to incorporate risk analysis into cost estimation processes, actual costs may still vary, depending on the funding availability, the outcome of environmental analysis for each project, the outlook of the national economy, and the project completion timeline (generally, the longer the timeline, the rougher the cost estimate).

Infrastructure Improvements and Service Capacity

Exhibit 4-1 describes the rail projects that could be implemented, depending on the funding level, to achieve additional service. Each project solves a particular problem (i.e. eliminate a chokepoint, increase safety) and fulfills a specific operational goal. Because operations analysis is based on an incremental approach to project development, if funding is not available to complete all of the listed projects, a sub-set or phase of each project can be implemented and achieve certain passenger service levels associated with that particular investment level.

Exhibit 4-1: Projects and Project Stages that Could Be Implemented to Achieve Additional Service Levels During the Mid-Range Planning Horizon: FY2010 to FY2017

Project Group	Project Name	Year of Completion	Capital Cost Estimates* ($ Million)			
			Option 1: $0	Option 2: $141 Million	Option 3: $578 Million	Option 4: $817 Million
Project Group A***: $141M for Options 2, 3, and 4	Tacoma – Bypass of Pt. Defiance – 66th St. to Nisqually**	2012		$42.8	$42.8	$42.8
	Vancouver – Yard Bypass and W 39th St.**	2012		$90.4	$90.4	$90.4
	King Street Station – Track Improvements**	2011		$2.0	$2.0	$2.0
	Cascades Train Sets – Overhaul**	2011		$6.0	$6.0	$6.0
	Five Seattle to Portland and two Seattle to Vancouver, B.C. daily round trips, 95 percent on-time performance.					
Project Group B: Option 3 $437M; Option 4 $334M	Increase Capacity of Existing Train Sets	2011			$48.4	
	Kelso-Martin's Bluff – New Siding	Option 3: 2017 Option 4: 2013			$83.4	$60.2
	Kelso-Martin's Bluff – Kelso-Longview Jct. – 3rd Main Track	Option 3: 2017 Option 4: 2013			$151.0	$125.8
	Cascades – Two New Train Sets	Option 3: 2016 Option 4: 2012			$56.8	$50.8
	Blaine to Vancouver, WA – Main Line Track Upgrade	Option 3: 2013 Option 4: 2014			$97.4	$97.4
	Six Seattle to Portland and two Seattle to Vancouver, B.C. daily round trips, 97 percent on-time performance.					
Project Group C: $341M for Option 4	Centralia – New Crossover Near China Creek	2011				$3.7
	Cascades – Two New Train Sets & Four Locomotives	2012				$69.9
	Kelso-Martin's Bluff – Kalama 3rd Main Track	2013				$77.8
	Cascades – Higher Speed Locomotives	2014				$88.4
	Tacoma – Reservation to Stewart – New 3rd Main Track	2014				$101.7
	Eight Seattle to Portland and two Seattle to Vancouver, B.C. daily round trips, 92 percent on-time performance due to running two additional round trips without taking additional expensive reliability projects.					

* A project group is a set of projects or project stages to be implemented collectively to achieve additional service.

** Costs do not include anticipated expenditures prior to July 2009. These projects were currently funded as: Tacoma – Bypass of Pt. Defiance – 66th St. to Nisqually, $59.5 million; Vancouver – Yard Bypass and W 39th St., $115 million (include $55 million in 09-11 bienium); King Street Station – Track Improvements, 13 million; Cascades Train Sets – Overhaul, $4million. The cost estimates listed in the options are additional costs needed to complete these projects starting July 2009.

*** Projects anticipated to be complete prior to July 1, 2009 in the 2008 Transportation Supplemental Budget are not listed.

Source: WSDOT State Rail and Marine Office.

There are a number of smaller incomplete projects that are underway or are planned to be underway as of this writing. These projects have reliability benefits and in some cases capacity benefits to increase passenger rail service frequency. Some of these projects will be completed prior to the start of this plan's study period, July 1, 2009, and some will carry forward beyond that date. Exhibit 4-2 lists the detail of these projects and their overall costs and anticipated costs to be expended prior to July 1, 2009. These projects are not discussed further in this chapter as

they are planned to be complete, or nearly so, prior to the beginning of the mid-range planning horizon.

Exhibit 4-2: Projects with Reliability Benefits

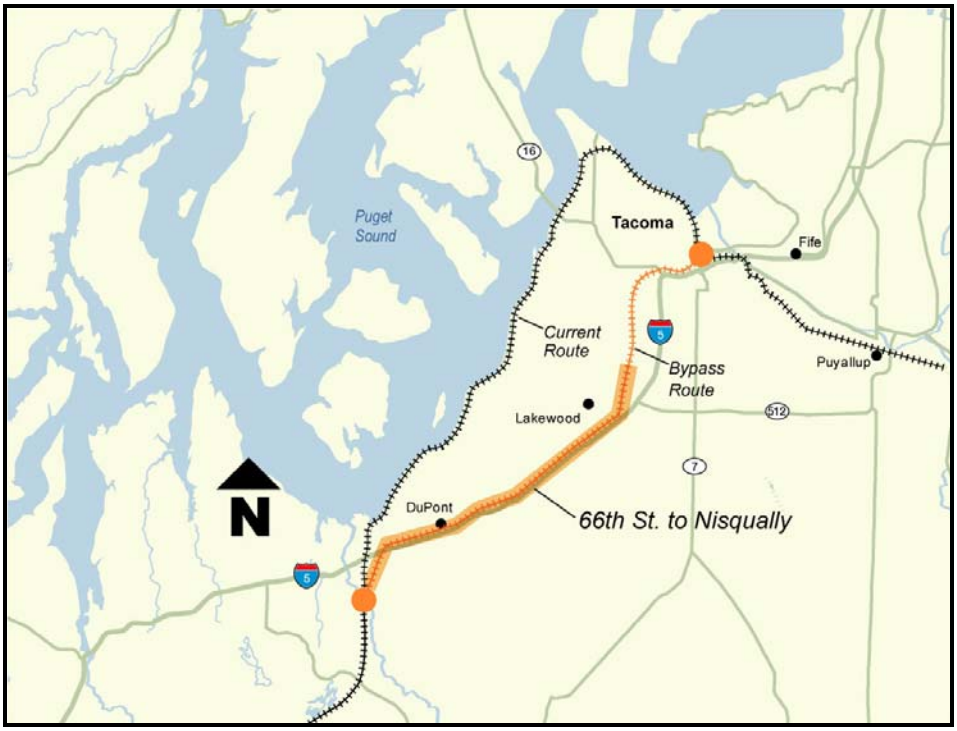
Project Name	Total Budget	Planned Expenditures Prior to July 1, 2009	Planned Expenditures Starting July 1, 2009
Tenino – High Speed Crossovers	$3,875,000	$3,875,000	$0
Mt Vernon – Siding Upgrade	$3,800,000	$3,800,000	$0
Everett – Curve Realignments and Storage Tracks	$14,000,000	$14,000,000	$0
Stanwood – Siding Upgrades	$15,950,000	$15,950,000	$0
Blaine – Customs Facility Siding	$6,000,000	$6,000,000	$0
King Street Station – Track Improvements	$15,000,000	$13,000,000	$2,000,000
Cascades Train Sets – Overhaul	$10,000,000	$4,000,000	$6,000,000
Stanwood – New Station	$5,000,000	$5,000,000	$0

Budgets and planned expenditures are based on the 2008 Supplemental Transportation Budget.

The remainder of this chapter contains information about specific rail projects between Seattle and Portland. Each rail project contains the following information: title, beginning and ending rail milepost (MP) [1], project components, map or photo, cost and funding information, timeframe, and a brief explanation of why it is needed and how it can independently solve a particular problem.

[1] Mileposts or rail mileposts are designations by the railroad indicating the railroad track distance from an established starting point to an ending point.

Tacoma – Bypass of Point Defiance – 66th St. to Nisqually (Rail mileposts 24.7 to 24.2, 11.5 to 0.0, and 9.0 to 0.6)



This project is the first phase of a much larger project listed as Point Defiance Bypass in the long-range plan. Since then, the project has been separated into two phases.

Currently passenger trains must slow down to use the curved tracks along Puget Sound and the single-track tunnels under Point Defiance. The first phase of this project builds a bypass so that passenger trains can avoid those areas. Freight trains would continue to use the existing tracks in the Point Defiance area. This project would increase capacity to allow increases in passenger service, as well as provide reliable Amtrak *Cascades* service by reducing travel time by six minutes and eliminate conflicts with freight trains.

The proposed route of this WSDOT project is the same that Sound Transit would use to extend *Sounder* Commuter Rail service to Lakewood. After both the WSDOT-sponsored and Sound Transit-sponsored projects are completed, Amtrak trains and *Sounder* Commuter Rail would share the route with infrequent freight trains currently serving, Fort Lewis, and other shippers in Lakewood, south Tacoma, and Roy.

This first phase improvement on this bypass route includes a new second track between 66th Street in south Tacoma and Bridgeport Way in Lakewood. It reconstructs the remainder of the existing Sound Transit-

owned track between Lakewood and Nisqually and reconfigures the rail junction at Nisqually on the BNSF's Seattle Subdivision main line. The current cost estimate for this portion of the project is $42.8 million with delivery by 2012 (Exhibit 5A-2, Appendix 5). This project is listed in the 2003 Legislative Transportation Package and the 2005 Transportation Partnership Account, but it would require additional funding beyond the $59.8 million allocated by the state legislature. The design and environmental documentation is complete. The initial work between S. 66th Street and Bridgeport Way is planned to begin construction, along with Sound Transit-funded improvements, in late 2008.

Vancouver – Yard Bypass and W. 39th Street (Rail mileposts 9.9 to 10.4 and 133.3 to 136.5)

This project consists of a single-track bypass of the heavily congested Vancouver rail yard, a siding[2] extension, and associated turnouts from rail MP 133.3 to rail MP 136.5 of the BNSF's Seattle Subdivision and connecting tracks, crossovers[3], and track improvements from rail MP 9.9 to rail MP 10.4 on the BNSF's Fallbridge Subdivision. The bypass separates grain freight traffic from passenger traffic to allow for projected increased traffic in both freight and passenger rail. All the improvements relieve congestion for freight coming from eastern Washington. West 39th Street, which bisects the rail yard, would also be grade separated[4], thus providing a safer crossing for vehicles and pedestrians.

The current estimated construction cost of this project is $150.7 million. This project is listed in the 2003 Legislative Transportation Package. To deliver the project in 2012 it will cost $90.4 million (Exhibit 5A-3, Appendix 5). The design and environmental documentation for this project has been completed, and portions of the rail improvements and the W. 39th Street Bridge are under construction as of this writing.

Add Fifth Seattle to Portland Daily Round Trip

By completing the Vancouver and Tacoma projects described above, the number of daily round trips between Seattle and Portland can be increased from four to five and maintain the two Seattle to Vancouver, B.C. daily round trips.

[2] A siding is an auxiliary track located next to a main line that allows a train to move out of the way of an oncoming train. Sidings are also used to store trains or to add/subtract rail cars.
[3] A crossover is a set of turnouts connecting multiple tracks. A crossover allows a train to move from one track to another.
[4] Grade separated means the crossing lines of rail, auto, or pedestrian traffic are vertically separated from each other (i.e. a roadway that crosses over or under a railroad track).

Increase Capacity of Existing Train Sets

The current fleet of train sets was built from 1996 to 1998 by Renfe Talgo of America (Talgo). Each set has 12 cars and has a relatively fixed consist[5], as it takes a crew of five to seven people up to six hours to add or remove cars for any one train set. Thus, the train set cannot be increased or decreased easily to react to short-term peaks or valleys in ridership. Riders may be turned away during times of peak demand.

In addition each train has one locomotive, usually an Electro-Motive Diesel (EMD) F59 of 3,500-horsepower provided by Amtrak, as well as a cab car.[6] The cab car is required to provide a place for the engineer to operate the train when the powered locomotive is pushing the train instead of pulling. It also provides additional safety in case of a collision. The existing fleet of 12-car train sets is based on the ability of one locomotive to keep to schedule while pulling or pushing the train set and cab car. To move a larger train set and stay on schedule, the cab car needs to be replaced with a second locomotive on each train.

There is a very limited availability of the model of Talgo cars in the current fleet on the used market. This model of train car is no longer in production and has been replaced with a new model that meets current

[5] A consist is the number of cars forming a train set, not including the locomotive or current cab car.
[6] A cab car is an unpowered locomotive.

U.S. rail equipment regulations without modifications. These newer model cars, although similar, are not compatible mechanically with the cars in the current fleet. Further, there is a very limited availability of the model of car in the current fleet on the used market.

This project would purchase a new train set of 14 cars and purchase five new locomotives to supplement the Amtrak-provided fleet of locomotives. The addition of a new type of train set would allow the cars in the existing train sets to be re-arranged to form four train sets consisting of at least 14 cars. This would increase the overall capacity of all trains in the Amtrak *Cascades* service without additional "on the ground" infrastructure improvements.

The cost of the one train set and five locomotives is estimated to be $48.4 million, with delivery by 2012 (Exhibit 5A-4, Appendix 5). As the EMD F59 is no longer in production, the estimate also assumes that locomotives, either of a new design or second-hand from inside the U.S., will be available. While the existing fleet is comprised of equipment from specific manufacturers, the purchase of additional equipment would be a competitive process open to all qualified equipment manufacturers.

Kelso to Martin's Bluff – New Siding (Rail mileposts 105.5 to 110.0)

This project is a phase of a much larger rail improvement project listed as Kelso to Martin's Bluff Rail Project in the long-range plan. Since then, the project has been separated into six phases.

This project consists of adding a Centralized Traffic Controlled[7] arrival and departure track capable of holding up to two full-length trains and associated switches and crossovers on BNSF's Seattle Subdivision. This would allow grain trains inbound for Kalama and empty trains outbound from Kalama to move off the main line, when the Port of Kalama tracks at the two grain terminals are filled with other trains. The project is needed because current congestion on the rail line in this area negatively affects reliability and the ability to add service for additional Amtrak *Cascades* trains. Once this project is completed, service would be more reliable and additional service could be added.

This project can be delivered as early as 2013 at a cost of $60.2 million with Option 4, or 2017 at a cost of $83.4 million with Option 3 (Exhibit 5A-5, Appendix 5). This project is listed in the 2003 Legislative Transportation Package, but would require additional funding beyond the $49 million allocated by the state legislature. Conceptual design and environmental documentation for this project began in 2001. It is anticipated that final design will begin by 2013.

[7] Centralized Traffic Controlled track means the track is dispatcher controlled.

Kelso to Martin's Bluff – Kelso-Longview Jct. – 3rd Main Track (Rail mileposts 96.2 to 102.1)

This project is a phase of a much larger project listed as Kelso to Martin's Bluff Rail Project in the long-range plan. Since then, the project has been separated into six phases.

This project will build on other phases and construct a 4.5-mile third main line track from the passenger station in Kelso to Longview Junction South at the south end of Longview Yard. The Longview Yard is an area of congestion with trains of cars bound for and coming from the Port of Longview and the Weyerhaeuser paper mill. Here cars are switched by BNSF, Union Pacific Railroad (UP), and the Longview Switching Company. The third track would allow passenger and freight trains to move around freight trains leaving or bound for Longview Yard. A new rail bridge over the Coweeman River, as well as two bridges over private access roads, would also be built.

A 5,000-foot storage track in south Kelso would be replaced and converted to main track. This siding would cross Yew Street and Mill Street in Kelso at grade. This project will not require these two grade crossings[8] south of the station to be closed or replaced. They are planned to be replaced in a later phase of the overall project.

[8] A grade crossing is the area along the track where a roadway or pathway crosses on the same grade level.

This project could be delivered as early as 2013 at a cost of $125.8 million with Option 4, or in 2017 at a cost of $151.0 million with Option 3 (Exhibit 5A-6, Appendix 5).

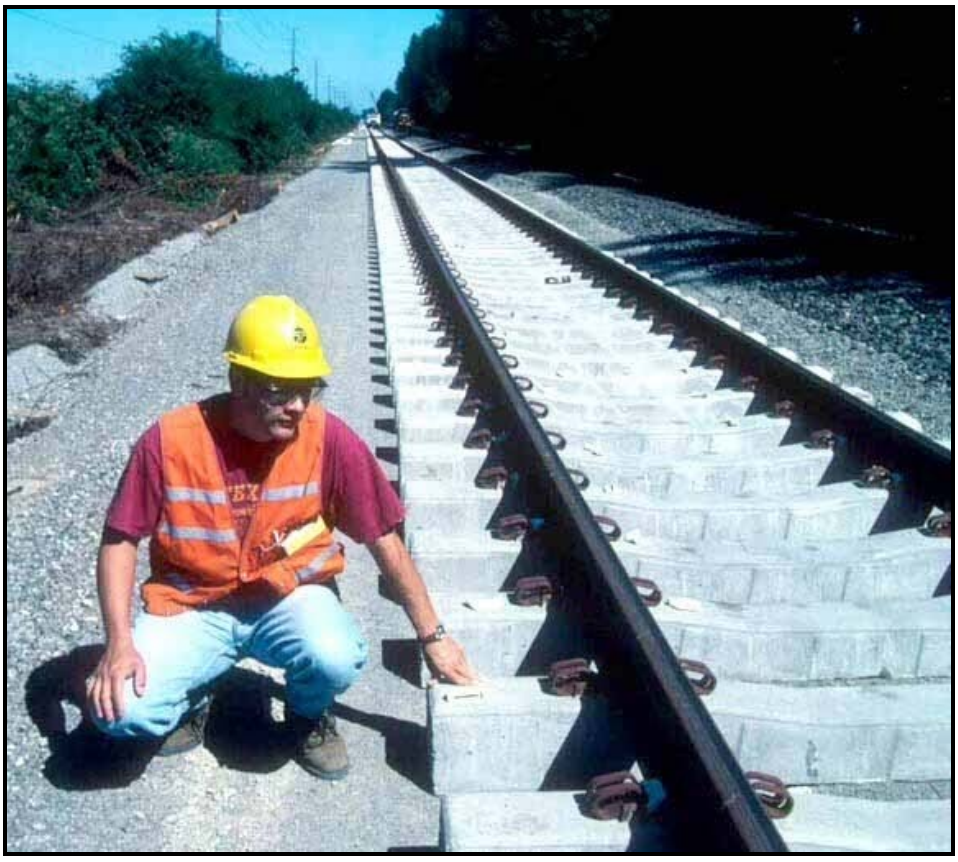
Cascades - Two New Train Sets

In order to increase service capacity between Seattle and Portland, either the service elsewhere would have to be reduced, or more train equipment would be required to supplement the existing fleet of five Talgo-built train sets. While more equipment could be leased from elsewhere in the U.S., it is more conservative to assume that the program would acquire new equipment.

This project would acquire two new train sets for this purpose. It is assumed Amtrak would be able to provide the required locomotives, if WSDOT has not purchased the new high-speed locomotives described later.

The purchase of equipment is difficult to predict as purchasing rail equipment in small quantities, such as two at a time, can increase unit costs substantially. The cost of two new train sets is estimated to be $50.8 million with delivery by 2013 with Option 4 or $56.8 million in 2017 with Option 3 (Exhibit 5A-7, Appendix 5), but could be as much as 25 percent less, if the purchase is associated with a larger order. The estimate assumes a 14-car train set similar to the current fleet, but the equipment purchase would be a competitive process open to all qualified equipment manufacturers.

Blaine to Vancouver, WA – Main Line Track Upgrade



Currently, all the main line tracks that the Amtrak *Cascades* operate on are maintained to Federal Railroad Administration (FRA) "Class IV"[9] standards. Class IV tracks are limited to a maximum speed of 79 mph on straight or nearly straight track. When a track falls out of compliance with the Class IV standard, a "slow order"[10] is imposed by the owning railroad until repairs can be made.

This project will upgrade and maintain all existing main line tracks to FRA "Class V"[11] standards. However, trains would still be limited to 79 mph maximum due to signal limitations. When tracks are brought up and maintained at a higher track standard, then if they fall into disrepair, the Amtrak *Cascades* trains would still be able to operate at 79 mph. This will eliminate nearly all slow orders, thus increasing on-time performance

[9] Class IV is a Federal Railroad Administration (FRA) safety standard focused on track structure, geometry, inspection, and road bed. The Class IV maximum allowable speed for passenger trains is 79 mph.
[10] A slow order is a track condition, usually temporary in nature, that can cancel or severely delay train service (i.e. track damage due to a winter storm, track maintenance in process).
[11] Class V is a higher FRA track safety standard. The maximum allowable speed for passenger trains is 90 mph.

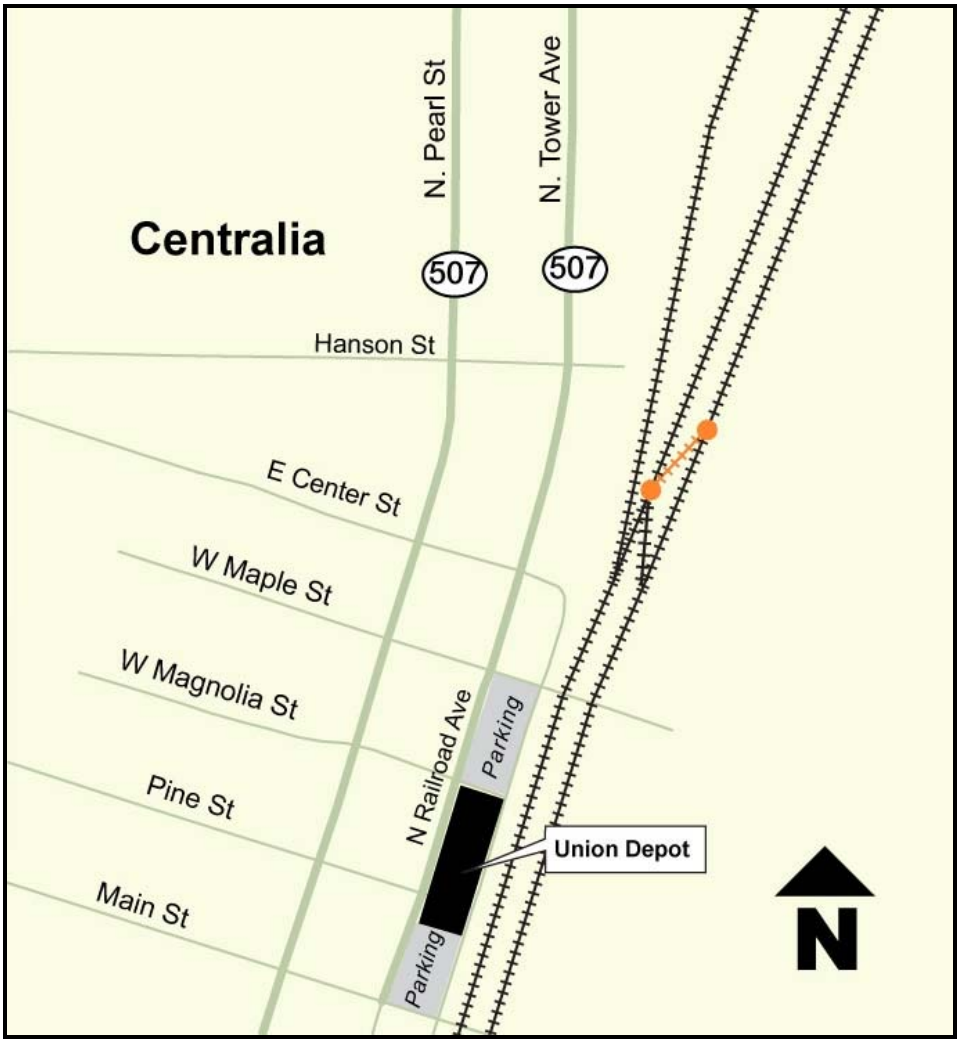
and increasing schedule reliability. A similar project is underway on California's Capital Corridor.

WSDOT estimates it will cost more than $200,000 per track mile. This equates to $97.4 million with delivery in 2014 (Exhibit 5A-8, Appendix 5). In addition, the cost of maintaining the tracks to the higher standard will be higher than today. This will take about four years to implement without severely disrupting existing service. BNSF estimates it will cost between $10,000 and $13,000 (2008 estimates) per track mile annually for ongoing maintenance at the higher track standard.

Six Seattle to Portland and Two Seattle to Vancouver, B.C. Daily Round Trips

By completing the above projects (increasing train capacity, completing the first two phases of Kelso-Martin's Bluff, purchasing two new train sets, and main line track upgrades), the number of daily round trips between Seattle and Portland can be increased to six.

Centralia – New Crossover Near China Creek
(Rail mileposts 53.5 to 53.6)



Construction of this crossover provides flexibility for trains to move between tracks when entering and departing Centralia's Union Depot, ensuring that passengers can exit the train on the west side of the rail line, adjacent to the station. Without this crossover, there would be situations when a passenger train on the east main line would require passengers to cross the west main line, which reduces passenger safety. This project would provide increased capacity, reliability, and safety. The estimated construction cost of this project is $3.7 million with delivery by 2011 (Exhibit 5A-9, Appendix 5).

Cascades - Two New Train Sets & Four Locomotives

As described earlier, in order to add more service between Seattle and Portland, more train equipment would be required to supplement the existing fleet. This project would acquire an additional two new train sets for this purpose. This project would also purchase four additional high-speed locomotives, as described later.

The purchase of rail equipment is difficult to predict because small purchase orders, such as two at a time, can increase unit costs substantially. The cost of two new train sets and four locomotives is estimated to be $69.9 million with delivery by 2013 (Exhibit 5A-10, Appendix 5), but they could cost as much as 25 percent less, if they are part of a larger order. The estimate assumes a 14-car train set similar to the current fleet with a capacity of approximately 300 passengers, but the purchase of the equipment would be a competitive process open to all qualified equipment manufacturers.

Kelso to Martin's Bluff – Kalama 3rd Main Track (rail mileposts 105.8 to 108.9)

This project is a phase of a much larger project listed as Kelso to Martin's Bluff Rail Project in the long-range plan. Since then, the project has been separated into six phases.

This project would build on other phases and construct a 2.9-mile third main track around the congested Port of Kalama area. Here 7,000-foot BNSF and UP grain trains move between the main tracks and one of the largest grain terminals on the west coast. These movements, on and off the main line, create congestion on the main tracks. The third main track would allow passenger and freight trains to move around freight trains that are waiting to enter or are leaving the Port of Kalama.

This project is estimated to cost $77.8 million with delivery by 2014 (Exhibit 5A-11, Appendix 5).

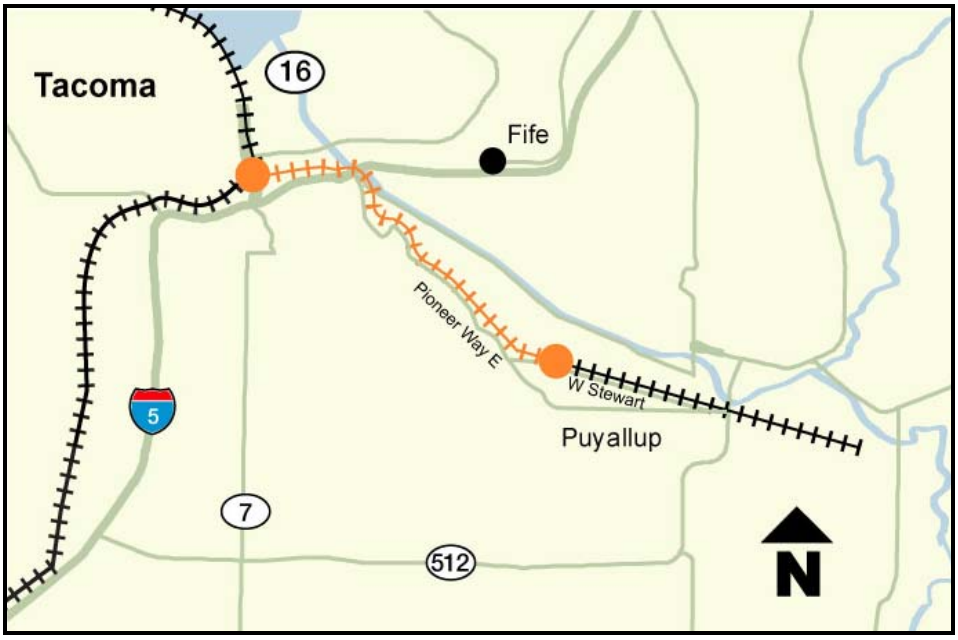
Cascades - Higher Speed Locomotives

As stated earlier, currently each train has one locomotive, usually an EMD F59 of 3,500 horsepower provided by Amtrak and a cab car. This project would purchase 16 new locomotives that are capable of operating consistently and economically with higher speeds (up to 110 mph) and higher acceleration rates than the current F59 locomotive fleet. This project would provide two locomotives per train set plus two reserve locomotives for scheduled maintenance and in case of break-downs.

The estimated cost is $88.4 million with delivery by 2015 (Exhibit 5A-12, Appendix 5), however, as previously stated, the purchase of equipment is difficult to predict since purchasing rail equipment in small quantities, such as two at a time, can increase unit costs substantially. Purchasing the rail equipment as part of a larger order would reduce costs.

For a more detailed discussion of the type of locomotives needed for higher-speed travel, see the 2006 long-range plan, Volume 1; Amtrak *Cascades* Operating and Infrastructure Plan Technical Report, page 4-46.

Tacoma - Reservation to Stewart – New 3rd Main Track (rail mileposts 38.2 to 33.9)



A new main line will be built next to the existing double track. The purpose of this track is to provide a dedicated track for lower speed freight trains that originate, terminate, or stop in Tacoma. The track is needed because freight traffic is predicted to continue to grow in this area over the next 20 years. Without increased capacity additional traffic would result in increased congestion and reduced reliability.

The estimated construction cost of this project is $101.7 million with delivery by 2015 (Exhibit 5A-13, Appendix 5).

Eight Seattle to Portland and Two Seattle to Vancouver, B.C. Daily Round Trips

By completing the above projects (new cross-over in Centralia, two new train sets and higher speed locomotives, the 3rd main track at Kalama, and a new main line in Tacoma), the number of daily round trips between Seattle and Portland can be increased to eight.

Chapter 5: Operational Analysis and Costs

This chapter of the *Amtrak Cascades Mid-Range Plan* reviews the operating environment of Amtrak *Cascades* service in support of mid-range plan options that can allow up to four additional daily Amtrak *Cascades* round trips between Seattle and Portland. Computer simulation modeling was performed throughout 2007-2008 to validate infrastructure requirements necessary for new service, and to identify opportunities to improve the on-time performance and reliability of the service. Appendix 6 provides detailed information regarding the operational analysis and costs described throughout this chapter.

Appendix 6 includes details about the operational analysis, additional reliability projects, service enhancements, and passenger train delays.

Operational Analysis

Operational analysis uses computer simulation modeling to validate Amtrak *Cascades* timetables, track capacity, and service capacity. It looks at proposed infrastructure improvements to increase frequency, improve reliability, and meet on-time performance targets between Seattle and Portland. Operational analysis also helps determine the order of infrastructure and operating projects to be included in Options 2, 3, and 4. Project types include:

- Timetable (schedule) improvements.
- Track capacity improvements.
- Reliability improvements.

It also examines the feasibility of increasing the frequency (up to four daily round trips) and the fleet (up to four additional trains) for Amtrak *Cascades* service between Seattle and Portland.

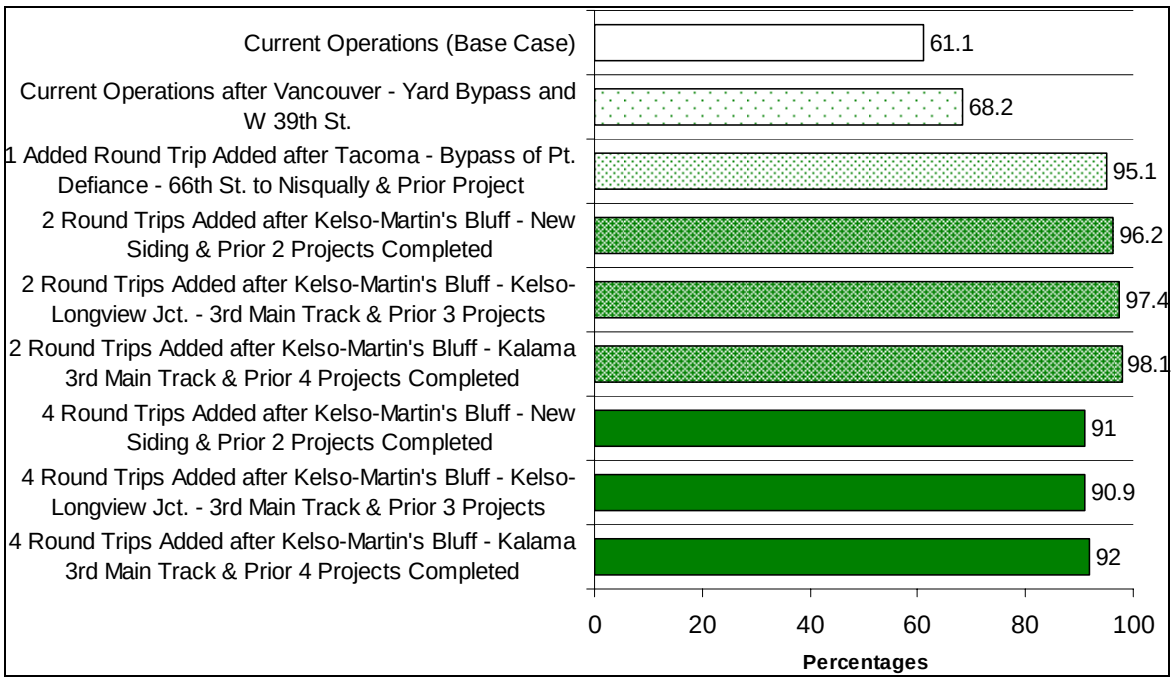
The operational analysis for this plan examined four weeks of railroad operation in randomized traffic patterns to represent the current railroad conditions. It analyzed over 2,800 trains in each of 16 simulations. Each simulation began with a base case that was subjected to extensive analysis before proceeding. Each simulation contained many variables, including the differentiations between freight and passenger rail movements. The modeling process ensured that the results represent the infrastructure requirements as accurately as possible.

Modeling results validated and confirmed the previous 2003 operations analysis. The model addressed on-time performance; it didn't address reliability, slow orders, or the "state of good" railroad repair and maintenance.

Exhibit 5-1 shows anticipated on-time performance when a cumulative set of improvements, adding 1, 2, or 4 additional daily Amtrak *Cascades* round trips between Seattle and Portland, is complete.

Exhibit 5-1: Passenger Service On-Time Performance Based on Five Cases of Randomized Freight Service

WSDOT (Seattle-Portland) Rail Traffic Controller Simulation Results
WSDOT Trains' On-Time Performance Percentage – 3 hr. 40 min. (including 10 min. tolerance)



Source: BNSF Railway Company

The exhibit above shows that the Amtrak *Cascades* has a base case of 61.1 percent on-time performance (a key measure of service reliability), which is relatively consistent with current operations, particularly during peak traffic periods. Completion of the Vancouver – Yard Bypass & W 39th St. Project increases on-time from 61.1 percent to 68.2 percent, but not enough for an additional Amtrak *Cascades* Seattle to Portland daily round trip. Completion of the Tacoma – Bypass of Pt. Defiance Project – 66th St. to Nisqually increases on-time performance and track capacity dramatically, enough to add one additional Seattle to Portland daily round trip to the system and improve on-time performance from 68.2 percent to 95.1 percent.

With the completion of the first two phases of the Kelso-Martin's Bluff Project, an additional Seattle to Portland daily round trip can be implemented with on-time performance in the range of 96 percent to 97 percent.

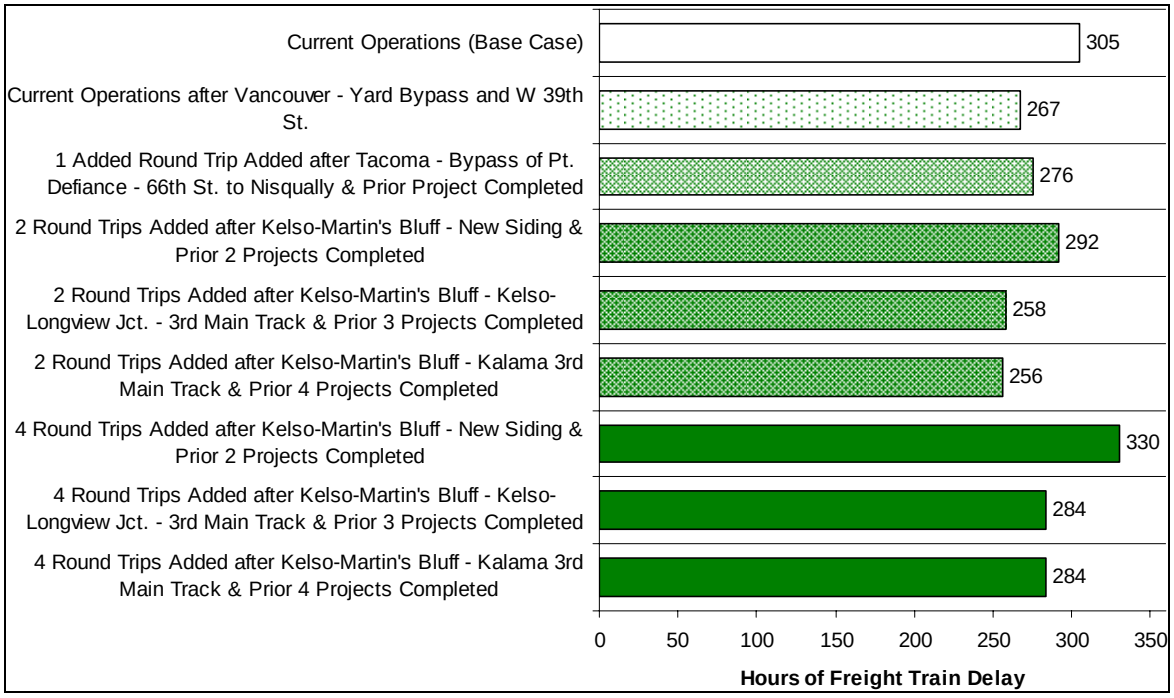
It is important to note that although four daily round trips could be operated, the operation occurs at slightly reduced levels of reliability. This demonstrates that the remaining Kelso-Martin's Bluff – Kalama 3rd Main Track project should be completed and will provide some reliability benefit when the full complement of four additional daily round trips between Seattle and Portland are implemented.

As previously discussed, BNSF is agreeable to allowing additional Amtrak *Cascades* service as long as it will not negatively impact freight service. Impacts to freight service are measured in hours of delay. Current freight train delays, as replicated in the base case, are 304.6 hours per week. It is BNSF's position that intercity passenger rail service expansion can be accommodated as long as their freight business is not adversely impacted.

Exhibit 5-2 shows the relationship between infrastructure improvements, additional Amtrak *Cascades* service, and freight train delay. The modeling confirms that the infrastructure plan can be implemented without negatively impacting freight business.

Exhibit 5-2: WSDOT Plan's Impact on Freight Service

WSDOT (Seattle-Portland) Rail Traffic Controller Simulation Results
Freight Train Delay in hours per week (all main line freight trains)



Source: BNSF Railway Company

Opportunities to Enhance Reliability and Improve Performance

Reliability Improvement

Operational analysis confirms, with a high level of probability, that the incremental infrastructure developments related to Options 2, 3, and 4 would enable additional Amtrak *Cascades* daily round trips between Seattle and Portland, as well as improvement of reliability and overall system performance.

Achieving the 90 percent on-time performance goal in Options 2, 3, and 4 will make Amtrak *Cascades* service punctual and dependable. People who are not satisfied with their service are much more likely to tell others as people who receive a satisfactory rail experience. Amtrak *Cascades* can not achieve broader acceptance unless service is punctual and dependable, regardless of other infrastructure and operating improvements.

Amtrak *Cascades* uses a limited amount of rolling stock (equipment) making multiple trips within the Pacific Northwest Rail Corridor (PNWRC) each day. One delayed train can cause a domino effect of successive delays for passenger and freight trains using the same corridor.

When frequencies (additional daily round trips) are added, operating tolerances become tighter. Amtrak *Cascades* service not only needs the rail line capacity for additional service, but it needs operational changes for much tighter precision and punctuality in the daily operating environment.

Additional Recommended Reliability Improvements

At the request of WSDOT, BNSF ran operational analysis to address three recommended reliability improvements that are currently outside the scope of the mid-range plan. They also have a high potential to increase the capacity for future expansion.

1. **Oregon.** There is a highly congested section of the corridor between the Columbia River and Portland's Union Station. The segment contains several drawbridges and crossing movements of freight traffic to and from port facilities and yard traffic. Four projects have been identified. Two are funded by the state of Oregon and two are unfunded.

2. **Napavine – Winlock to Chehalis 3rd Main Track.** Between Chehalis Junction and Winlock, there is a need for a dedicated main line track, which would allow passenger trains to travel unimpeded by slow moving freight trains traveling on the gradient of Napavine Hill. The dedicated passenger train track would also eliminate sharp curvature, allowing higher travel speeds, which would reduce travel times. This project is unfunded.

3. **Kelso-Martin's Bluff – Longview to Kalama 3rd Main Track.** This project phase adds a third main line track between Kalama and Longview Junction to enhance reliability and achieve an on-time performance of 96 percent or better. This phase is currently unfunded.

Other Reliability Improvements

- **Maintenance Facility.** At the Seattle Maintenance Facility, where trains receive more intensive servicing and maintenance every four days, Amtrak is finalizing plans to reconstruct the facility for current and future needs of Amtrak *Cascades* intercity passenger service, Amtrak long distance service, and Sounder commuter trains.

- **Stations.** Train station access improvements are needed to enhance safety, capacity, wheelchair access, baggage loading, and boarding and de-boarding time.

- **Integrated Scheduling.** Between Seattle, Tacoma, and Nisqually, there are plans to minimize Amtrak *Cascades* and Sound Transit scheduling conflicts. This would allow opportunities to provide rail-to-rail connections and passenger transfers at common stations in Tacoma, Tukwila, and Seattle, where Amtrak *Cascades* and Sound Transit offer complementary services.

Maintenance of Track

The current methods of performing track maintenance during normal daylight hours require "work windows" that limit rail capacity to move freight and passenger trains efficiently through the system. As freight and passenger frequencies increase, the ability to perform track maintenance decreases and the result is slow orders, which can cancel or severely delay train service. Slow orders are placed on a track when conditions exist (i.e. damage to track or crossovers largely due to storm-related events) that restrict the ability for freight and passenger trains to operate at designated track speeds. Slow orders, which are temporary in nature, are problems particularly during construction seasons, when new construction and capitalized maintenance projects are underway.

WSDOT and BNSF are considering additional track maintenance enhancements that limit slow orders, achieve track maintenance goals, accommodate infrastructure growth, and meet the need for absolutely reliable service. Enhancements include:

- **Night maintenance.** Performing maintenance activities at night when traffic is lighter.

- **Alternative methods or equipment.** Multi-function, high-speed track maintenance machines.

- **Capitalized maintenance.** Upgrading from Class IV to Class V track maintenance standards. This is included in Chapter 4 in the project titled "Blaine – Vancouver, WA – Main Line Track Upgrades."

Traffic Management

BNSF is evaluating a "movement planner" program for use throughout their entire system to increase reliability and better manage traffic flow.

Positive Train Control

New rail safety laws require the installation and operation of positive train control, an advanced signal system, by 2015 on rail lines that have mixed

passenger and freight traffic. BNSF is currently testing them on select corridors within their system.

Opportunities for Service Enhancements

In quarterly Amtrak customer satisfaction index surveys, Amtrak *Cascades* service has been ranked in the top five in the nation in customer satisfaction throughout its history. Customers have enjoyed a level of service that is considered better in overall quality than "typical" Amtrak service.

In 2008 Amtrak surveyed existing and potential Amtrak *Cascades* customers. Participants were asked about amenities and improvements to further enhance customer satisfaction. The survey resulted in several recommendations for Coach Class and Business Class travelers. The largest segment of potential new riders is more likely to be business travelers. Their main suggestions are:

- Wireless Internet (WiFi) onboard the passenger coaches.
- WiFi in separate Business Class lounges and in stations.
- Quiet car.
- Business Class amenity upgrades.
- Enhanced passenger information display system.

Analysis and Estimation of Operating Costs

Cost estimation analysis provides detailed and accurate forecasts of Amtrak *Cascades* operating costs for the four strategic investment options discussed in this plan. Operating cost categories, which are defined further in this section, include:

- **Train costs** are direct costs associated with each train. Train costs change with the number of operating trains.

- **System costs** are indirect costs that change with the number of trains, passengers, and train sets. The system cost is allocated equally among the trains.

- **Passenger costs** are individual costs allocated to trains by their ridership. The cost estimation analysis projections do not accurately reflect the relationship of passengers to individual trains, which is an overly complex calculation. The total passenger cost is allocated equally among the trains.

Train Costs

- **Labor and Support for Train and Engine:** Labor costs for engineers, conductors, and other train operating staff.

- **Labor and Support for Onboard Service:** Labor costs for staff involved in dispensing food and beverages on trains to passengers.

- **Fuel:** Costs for locomotive fuel.

- **Commissary Provisions and Management:** Costs for food, beverages, and consumable supplies dispensed on trains to passengers and non-consumable supplies used for customer service on trains.

- **Host Railroad Maintenance-of-Way**: Costs for maintaining track (e.g. track, signals, crossings) and facilities (e.g. stations, other buildings).

- **Host Railroad Performance Payments**: Payments to the railroad for keeping trains on schedule.

- **Insurance**: Purchased property and liability insurance and costs of self-insurance.

System Costs

- **Advertising:** Costs for advertising Amtrak *Cascades* service.

- **General Support:** Expenses not related directly to train operation and the use of resources not dedicated entirely to Amtrak *Cascades* operation (e.g. general counsel, claims services, customer communications, payroll, safety and environmental control, engineering, materials management, human resources, technical training, police and safety services, and procurement/purchasing).

- **Transportation:** Personnel supervising and managing the service and associated costs as well as the costs of buses in lieu of train service and alternative transportation for passengers during service interruptions. Includes itemized categories of yard operations, terminal payments, passenger inconvenience, and transportation supervision and training.

- **Maintenance of Equipment:** Costs of vehicle maintenance.

- **Other Railroad Costs:** Charges by the railroad (BNSF in Washington State and UP in Oregon for the Amtrak *Cascades*) that

are not specific to train operation (e.g. administration, control center functions, avoidable costs).

- **Reservations:** Costs related to managing passenger reservations and the maintenance of information technology systems used for passenger reservations.

- **Other Amtrak Costs:** Includes itemized sub-categories of Amtrak operations and transportation support and amtrak fixed infrastructure maintenance.

Passenger Costs

- **Station Services:** Labor costs for station staff (e.g. ticket agent, janitors) and utility expenses for stations.

- **Commissions:** Fees paid to travel agents and to credit card services.

- **Sales:** Marketing support and the costs of non-station ticketing (e.g. tickets by mail).

The Amtrak *Cascades* cost estimation timeframe is Federal Fiscal Year 2009 (FFY09), which is October 1, 2008 through September 30, 2009. FFY09 cost estimates are split between the partners: Washington at 65 percent, Oregon at 20 percent, and Amtrak at 15 percent. Some cost estimates, such as the cost of Washington State's higher performance Talgo trains, are split differently per agreement with each set of stakeholders.

Analysis results show that cost estimates change based on escalating factors, when capacity changes for additional daily round trips on the Seattle to Portland and Seattle to Vancouver, B.C. segments.

Exhibit 5-3 shows economies of scale.[1] On the Seattle to Portland daily round trip, the "cost per trip" decreases as capacity increases. Factors influencing the "cost per trip" reduction include:

- The cost of adding passenger coaches to existing Talgo train sets.

- The costs of adding locomotives to Talgo train sets that receive an additional passenger coach (a power requirement).

[1] Reduction in cost per round trip resulting from increased round trips, realized through operational efficiencies. Economies of scale can be accomplished because as roundtrip increases, the cost of operate additional roundtrip falls.

- The cost of adding more trains to the fleet.
- The cost of additional Talgo maintenance.
- The cost of enhanced reliability (capitalized maintenance) associated with Options 2, 3, and 4 that eliminate slow orders and improve on-time performance.

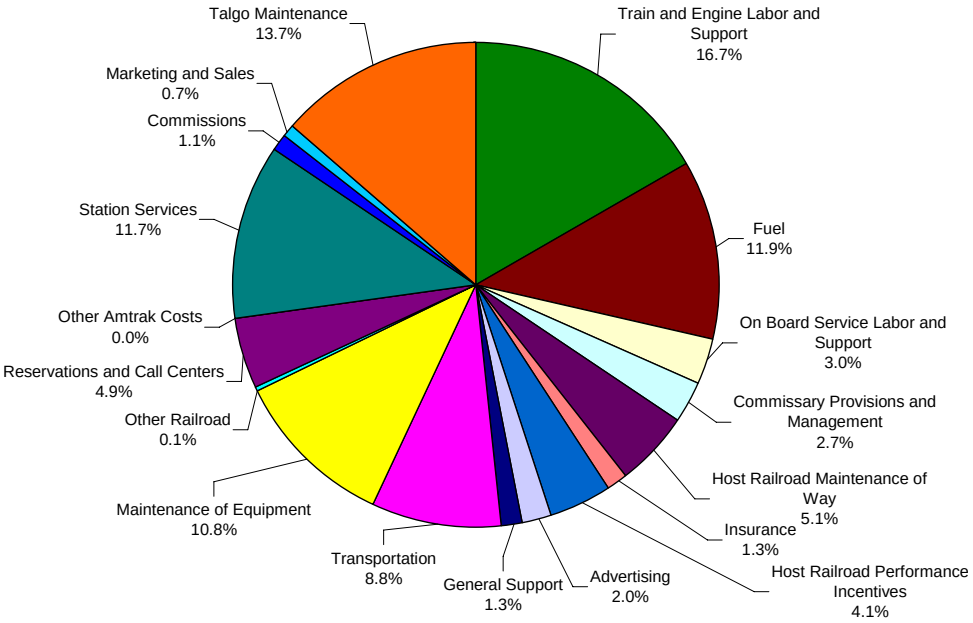
Exhibit 5-3: Estimates of Annual Operating Costs and Maintenance Costs (2008 Dollars)

Daily Round Trips	Amtrak Operating Cost Per Round Trip	Amtrak Operating Cost Per One-Way Trip	Talgo Maintenance Cost Per Round Trip	Talgo Maintenance Cost Per One-Way Trip	Reliability Enhancement Maintenance Cost Per Round Trip	Reliability Enhancement Maintenance Cost Per One-Way Trip
4	$5,753,341	$2,876,671	$913,540	$456,770	$940,125	$470,063
5	$5,499,419	$2,749,710	$899,596	$449,798	$940,125	$470,063
6	$5,293,188	$2,646,594	$890,774	$445,387	$940,125	$470,063
8	$4,997,243	$2,498,622	$873,709	$436,854	$940,125	$470,063

Source: WSDOT State Rail and Marine Office

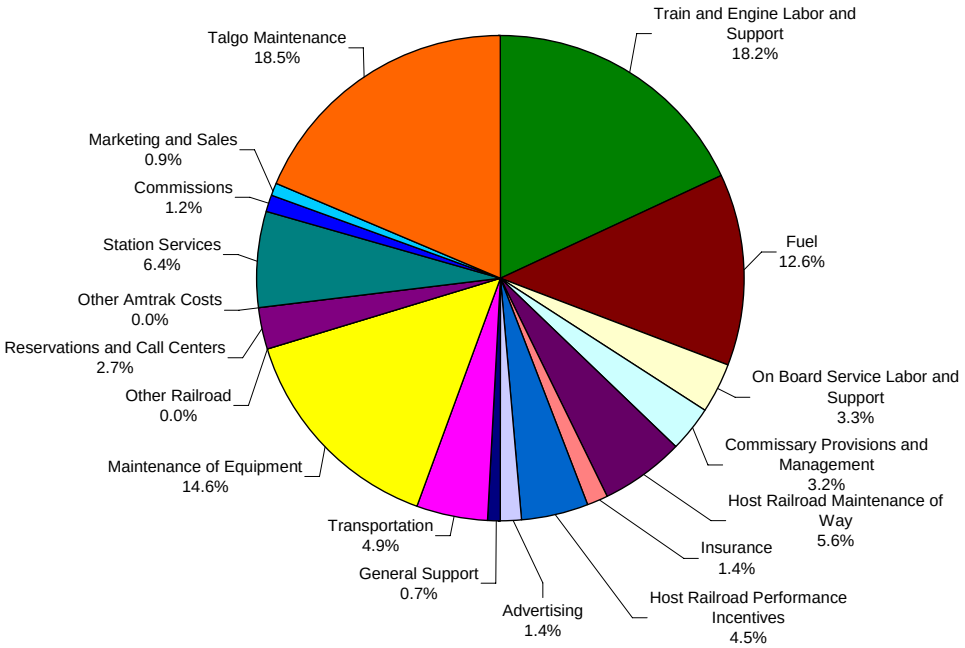
Exhibits 5-4 and 5-5 show analysis results on how Amtrak *Cascades* operating costs change as capacity is added to the Seattle to Portland daily round trip segment as incrementally developed in Options 2, 3, and 4.

Exhibit 5-4: Amtrak *Cascades* Operating Costs for Seattle to Portland Four Daily Round Trips (2008 Dollars)



Source: WSDOT State Rail and Marine Office

Exhibit 5-5: Amtrak *Cascades* Operating Costs for Seattle to Portland Eight Daily Round Trips (2008 Dollars)



Source: WSDOT State Rail and Marine Office

Washington State Department of Transportation

Chapter 6: Options for Achieving Additional Amtrak *Cascades* Service

The analysis in this chapter articulates the needs of intercity passenger train services and discusses supply and demand issues for various scenarios. Comparing the alternatives available to policymakers, the option analysis provides information to help develop strategic investment policies that achieves multiple policy ends using transportation solutions. The option analysis specifies the steps of improving infrastructure to deliver additional intercity passenger services, and link capital and operational investment to ridership growth and economic and societal benefits to support informed decision-making processes—legislative budgeting and prioritizing.

Options for Achieving Additional Services

Options presented in the *Amtrak Cascades Mid-Range Plan* are designed in the context of the current macroeconomic policymaking environment. They build on incremental strategy with stakeholder involvement and are supported by capacity analyses and benefit/cost analysis. This mid-range plan presents four options for future program development described in details in Chapter 2. The following is a brief summary of these options.

Option 1 – Maintaining Current Operation Strategy

This option has no additional capital investment and infrastructure improvements in the mid-range planning period. It maintains the current operation level of Amtrak *Cascades* service. All previous capital investments become sunk costs[1], due to no additional investment for completing projects that would increase service capacity.

Options 2 and 3 – Incremental Strategies

These options address specific investment goals based on the supply and demand interactions of our dynamic economy and changing society. They provide essential information about ridership growth, cost and revenue, local and state economic impacts, and environment and social benefits/costs.

[1] Sunk costs are costs that cannot be recovered once they have been incurred. If there is no additional investment to complete projects that increase service capacity, then the costs of the uncompleted projects are lost or sunk.

Option 4 – Rail as a Long-Term Alternative Strategy – No Financial Constraints

This option examines the engineering feasibility of the maximum capacity that can be built, given the availability of investment to develop such infrastructure improvements.

Option 4 is viable in an environment where policymakers are willing to promote rail as a strategic component in integrated transportation solution. In such an environment, rail, while providing transportation service, would help address issues such as greenhouse gas reduction, congestion relief, public safety improvement, and transportation resilience to natural and man-made disasters.

Investment in Capital Projects by Option

Investment options are designed to achieve multiple goals using passenger rail as part of an integrated solution. Investment in capital projects is used to improve infrastructure and acquire additional equipment that is needed to expand the level of operations. The planning period for capital investment is from fiscal year 2010 to fiscal year 2017.

Exhibit 6-1 demonstrates investments in capital projects and shows the capacity and reliability to be achieved by these capital projects.

Exhibit 6-1: Costs of Capital Projects to Achieve Additional Service Level: FY2010 to FY2017

Project Group*	Project Name	Year of Completion	Capital Cost Estimates* ($ million)			
			Option 1: $0	Option 2: $141 Million	Option 3: $578 Million	Option 4: $817 Million
Project Group A***: $141M for Options 2, 3, and 4	Tacoma – Bypass of Pt. Defiance – 66th St. to Nisqually**	Option 2, 3, and 4: 2012		$141.2	$141.2	$141.2
	Vancouver – Yard Bypass and W 39th St.**					
	King Street Station – Track Improvements**					
	Cascades Train Sets – Overhaul**					
	Five Seattle to Portland and two Seattle to Vancouver, B.C. daily round trips, 95 percent on-time performance.					
Project Group B: Option 3 $437M; Option 4 $334M	Increase Capacity of Existing Train Sets	Option 3: 2017 Option 4: 2015			$437.1	$334.2
	Kelso-Martin's Bluff – Stage 1 – New Siding					
	Kelso-Martin's Bluff – Stage 2 – Kelso-Longview Jct. – 3rd Main Track					
	Cascades – Two New Train Sets					
	Blaine to Vancouver, WA – Main Line Track Upgrade					
	Six Seattle to Portland and two Seattle to Vancouver, B.C. daily round trips, 97 percent on-time performance.					
Project Group C: $341M for Option 4	Centralia – New Crossover Near China Creek	Option 4: 2015				$341.4
	Cascades – Two New Train Sets & Four Locomotives					
	Kelso-Martin's Bluff – Stage 3 – Kalama 3rd Main Track					
	Cascades – Higher Speed Locomotives					
	Tacoma – Reservation to Stewart – New 3rd Main Track					
	Eight Seattle to Portland and two Seattle to Vancouver, B.C. daily round trips, 92 percent on-time performance due to running two additional round trips without taking additional expensive reliability projects.					

* A project group is a set of projects or project stages to be implemented collectively to achieve additional service.

** Costs do not include anticipated expenditures prior to July 2009 in 2008 Transportation Supplemental Budget. These projects were currently funded as: Tacoma – Bypass of Pt. Defiance – 66th St. to Nisqually, $57.1 million; Vancouver – Yard Bypass and W 39th St., $59.9 million; King Street Station – Track Improvements, $13 million; Cascades Train Sets – Overhaul, $4 million. The cost estimates listed in options are additional costs needed to complete these project starting July 2009.

*** Projects anticipated to be complete prior to July 1, 2009 in the 2008 Transportation Supplemental Budget are not listed.

Source: WSDOT State Rail and Marine Office

Operating Costs, Revenue, and Investment in Operations by Option

Operating Costs

Operating costs include the costs to operate Amtrak *Cascades* intercity passenger train services and costs to maintain service equipment. Since

each option in the mid-range plan operates at a different level, the operating costs vary. However, Options 3 and 4 operate more efficiently due to economies of scale.

Revenue

Revenue includes ticket revenues and revenues from services provided on the trains such as food and beverage revenues.

Investment in Operations

Investment in operations is the state's net investment of public funds to maintain the operation. It is the total operation costs minus revenues from operation. It is a public investment that aims for gaining greater economic and societal benefits.

Exhibit 6-2 shows the sum of operating costs, revenue, and investments in operations for all plan options from FY2010 to FY2017.

Exhibit 6-2: Total Operating Costs, Revenue, and Net State Costs for Amtrak *Cascades* Operations FY2010 - FY2017 ($ Millions)

Plan Options	Operating Costs*	Revenue**	Net State Costs for Amtrak *Cascades* Operation***
Option 1: Maintaining Current Operation	$235.7	$118.4	$117.3
Option 2: Incremental Strategy 1 - Minimum Capital Investment	$360.2	$144.4	$215.8
Option 3: Incremental Strategy 2 - Supply Meets Demand	$366.7	$153.0	$213.8****
Option 4: No Financial Constraints	$428.2	$157.2	$270.9
* Include operating costs, Talgo maintenance costs, maintenance costs enhancing reliability, and Amtrak administrative costs. Estimated based on historical data, Amtrak FFY2009 Cost Estimates, and planned activities.			
** Include revenues from tickets and passenger services. Estimated based on historical revenue data assuming price neutral policy. Total revenue is the product of total forecasted passenger miles and revenue earned per passenger mile, adjusted for inflati			
*** This is the estimated costs Washington State pays for contracted Amtrak Cascades operation.			
**** The sixth round trip starts in FY2017, the total operation cost here for option 3 does not show full effect of the operation at the capacity built.			

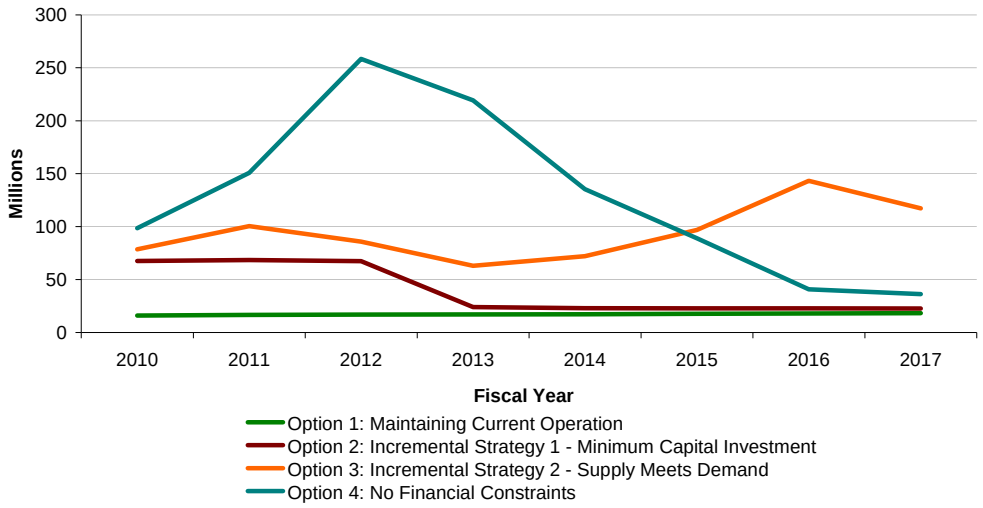
Source: WSDOT State Rail and Marine Office

Total Public Investment by Option

Total public investment includes both capital investments and operational costs. It reflects public costs for a specific option of Amtrak *Cascades* intercity passenger train service.

Exhibit 6-3 shows the total investment (sum of capital projects and operations) over time for the four options. The chart only reflects capital investments during the mid-range planning period of FY2010 to FY2017.

Exhibit 6-3: Dynamics of Total Public Investment
Passenger Rail Investment by Option: FY2010 to FY2017



Source: WSDOT State Rail and Marine Office

Operation Investments

Annual operation investments for FY2010 to FY2017 are present in all incremental strategy options, from around $14 million to $48 million, per year depending on capacity development level of each option.

Capital Investments

The timing of capital investments depend on each option's construction schedule. Depending on the option, estimated project completion dates are 2011, 2013, 2015, and 2017.

Option 1 has no investment in capital projects, since this option only invests in operations. Its line in Exhibit 6-3 is relatively flat.

Option 2 would invest and build capacity of five daily round-trip trains between Seattle and Portland at $141 million as soon as possible to complete ongoing projects that increase reliability/on-time performance

and capacity. The investment improves reliability (on-time performance) from approximately 60 percent currently to above 90 percent.

Option 3 would invest in capital project investments and train sets gradually, based on the market demand. For a total capital of roughly $578 million, this option gradually increases equipment and capacity to 14 cars per train in 2011, five daily round trips between Seattle and Portland in 2013, and six daily round trips between Seattle and Portland to meet demand in 2017. The investment improves reliability (on-time performance) from roughly 60 percent currently to above 90 percent.

Option 4 would invest in even more capital projects to build capacity to eight daily round trips between Seattle and Portland in the shortest time based on engineering feasibility. A total capital of roughly $816 million would be invested by 2015. The reliability would be improved to above 90 percent.

In the "supply meets demand" financially constrained strategy of Option 3, the capital investment is over a longer period of time than the "no financial constraints" strategy of Option 4. This is because Option 3 is designed to meet the growth of demand for a policy neutral scenario, while Option 4 is designed for policies that stimulate demand of train services.

Exhibit 6-4 lays out the annualized investment details for all four options. It shows the distribution of investments between capital projects and operation. The operation investments are the total operating costs minus revenues. It is the public costs for Amtrak *Cascades* services.

Exhibit 6-4: Passenger Rail Investment by Year and Option
FY2010 to FY2017 ($ Million)

Year	Option 1: Maintaining Current Operation			Option 2: Incremental Strategy 1 - Minimum Capital Investment			Option 3: Incremental Strategy 2 - Supply Meets Demand			Option 4: No Financial Constraints		
	Net State Costs for Amtrak *Cascades* Operation*	Costs of Capital Projects	Total State Investment	Net State Costs for Amtrak *Cascades* Operation	Costs of Capital Projects	Total State Investment	Net State Costs for Amtrak *Cascades* Operation	Costs of Capital Projects	Total State Investment	Net State Costs for Amtrak *Cascades* Operation	Costs of Capital Projects	Total State Investment
2010	$13.6	$0.0	**$13.6**	$14.7	$48.4	**$63.1**	$14.7	$72.2	**$86.9**	$14.7	$92.6	**$107.3**
2011	$13.6	$0.0	**$13.6**	$15.3	$48.4	**$63.7**	$15.3	$107.1	**$122.5**	$15.3	$157.9	**$173.2**
2012	$14.2	$0.0	**$14.2**	$17.4	$44.4	**$61.8**	$16.2	$77.0	**$93.2**	$17.4	$249.2	**$266.6**
2013	$14.5	$0.0	**$14.5**	$34.0	$0.0	**$34.0**	$32.7	$39.0	**$71.6**	$40.6	$196.8	**$237.5**
2014	$14.9	$0.0	**$14.9**	$33.8	$0.0	**$33.8**	$32.4	$26.6	**$59.0**	$38.4	$85.2	**$123.5**
2015	$15.2	$0.0	**$15.2**	$33.6	$0.0	**$33.6**	$32.1	$47.4	**$79.5**	$49.0	$35.0	**$84.0**
2016	$15.5	$0.0	**$15.5**	$33.6	$0.0	**$33.6**	$32.0	$116.1	**$148.2**	$47.7	$0.0	**$47.7**
2017	$15.8	$0.0	**$15.8**	$33.5	$0.0	**$33.5**	$38.3	$92.8	**$131.1**	$47.9	$0.0	**$47.9**
Total Cost	**$117.3**	**$0.0**	**$117.3**	**$215.8**	**$141.2**	**$357.0**	**$213.8**	**$578.1**	**$791.9**	**$270.9**	**$816.7**	**$1,087.6**

* This is the estimated costs Washington State pays for contracted Amtrak *Cascades* operation.

Source: WSDOT State Rail and Marine Office

Growth of Ridership and Capacity by Option

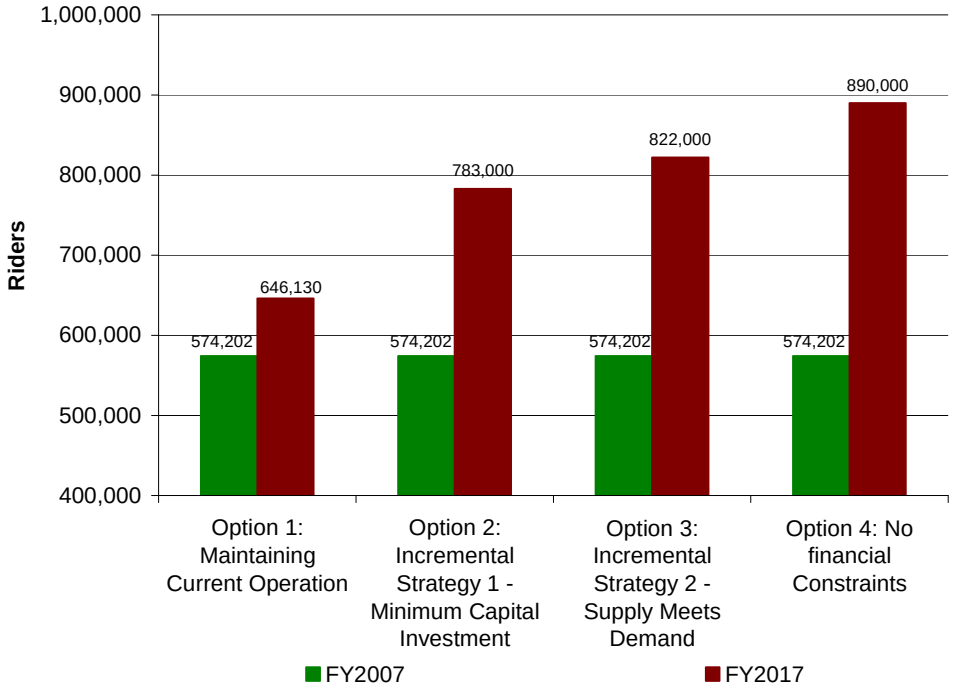
Ridership Growth - Demand

The ridership growth for plan options is estimated through two processes. First, the ridership forecast model is developed to forecast long term growth of ridership based on factors such as population, gas prices, and service availability (Chapter 3 and Appendix 4).

Second, based on improvement on on-time performance and scheduled time savings resulting from implementation of plan options, additional ridership growth is estimated using demand elasticity of time reduction published for Amtrak passenger trains.

The total ridership growth for options is demonstrated in Exhibit 6-5.

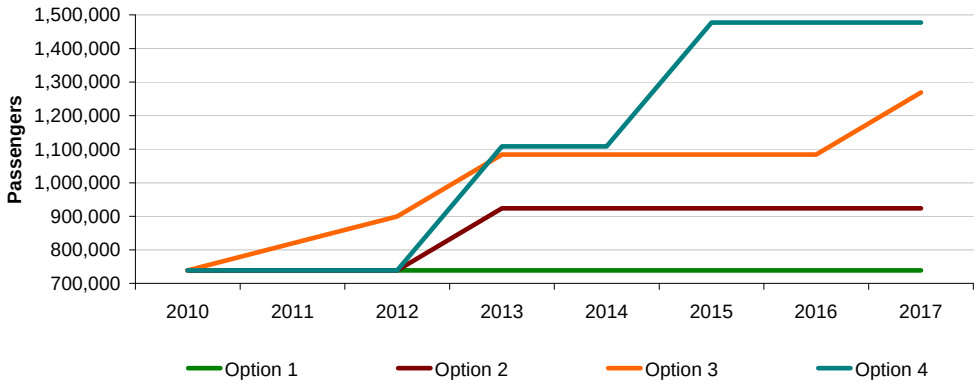
Exhibit 6-5: Annual Ridership Growth by Option
FY2007 vs. FY2017
Vancouver, B.C. to Portland



Capacity Growth – Supply

The capacity growth for plan options is based on capital projects that build capacity for each plan option. The capacity increase and reliability improvement of capital projects are presented in Chapter 4. Exhibit 6-6 provides a dynamic view of capacity changes by option over the time frame of the mid-range plan.

Exhibit 6-6: Maximum Annual Seating Capacity by Option
Seattle to Portland FY2010 to FY2017



Demand and Supply Analysis

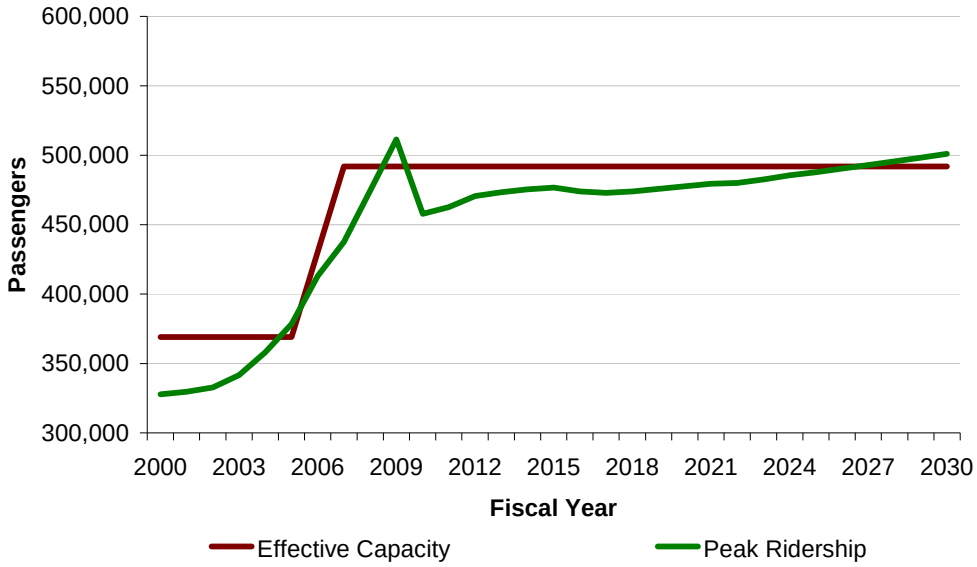
The demand of Amtrak *Cascades* intercity passenger rail service, like utilities such as electricity, is seasonal. While electricity production usually has scalability that allows the electric company to adjust production for peaks and valleys, passenger rail has little flexibility to adjust due to the fixed schedule. The big gap between peak and valley demands makes capacity use and development much more challenging. If WSDOT builds sufficient supply to meet the peak demand, the average capacity use will be low due to the valley in demand. If WSDOT limits the capacity growth, peak demand will not be met. Therefore, there is a trade-off between economic efficiency and policy to meet the societal demand. This is a policy issue similar to policies to regulate and subsidize electrical industries, where economic efficiency does not guarantee sufficient supply. However, the efficiency can be improved through attracting riders in non-peak time through both service improvement and marketing.

Appendix 7 discussed effective or peak capacity and peak ridership—supply and demand indicators. The supply and demand analysis, which is based on peak demand and effective capacity defined, provides information on how growth of the Amtrak *Cascades* service is related to ridership growth.

The following charts demonstrate the relationship between supply and demand for the four policy options of Amtrak *Cascades* investment.

Option 1 – Maintain Current Operations Strategy: Ridership would exceed the capacity in FY2008, and could exceed the capacity for the future by any factor that cause ridership jumps since there is little room to meet the additional growth of ridership (Exhibit 6-7).

Exhibit 6-7: Peak Ridership vs. Effective Capacity (Seattle/Portland): Option 1 - Maintain Current Operation

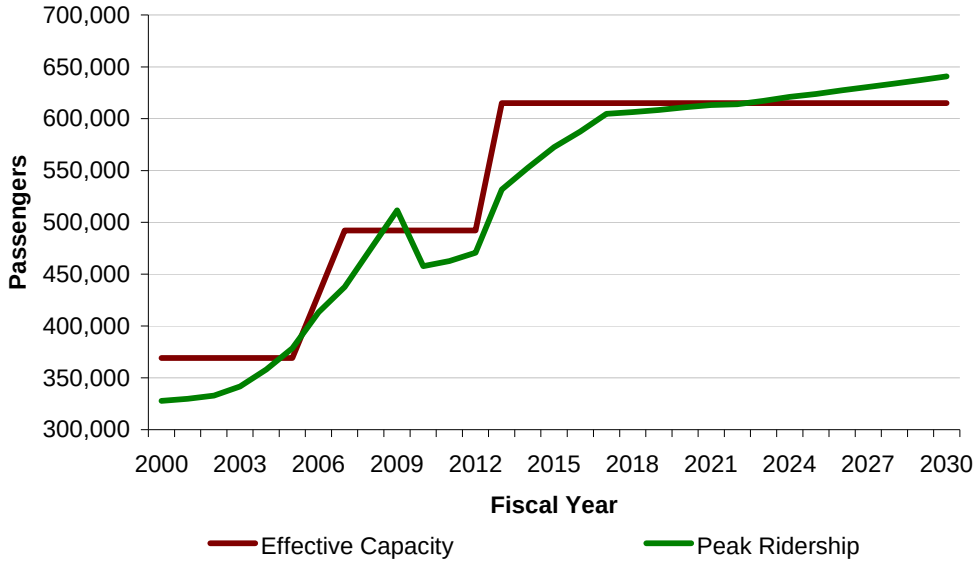


Peak Ridership: *Peak ridership is defined as annual ridership measured at peak segment of the route (Olympia/Lacey to Centralia is the peak segment of Seattle to Portland route).*
Effective Capacity: *Effective capacity is defined as average occupancy level where one percent of unsupplied demand happens due to peak time and peak section constraints.*

Source: WSDOT State Rail and Marine Office

Option 2 – Minimum Capital Investments: Peak ridership would exceed seating capacity in FY2008 and could exceed the capacity for the future by any factor that causes ridership jumps until FY2013, when the minimum capital investments would increase service levels to five daily round-trip trains between Seattle and Portland. The improved reliability and increased capacity resulting from completion of capital investments and operational improvements would continue to drive up ridership. The demand indicated by ridership would exceed supply in about ten years (Exhibit 6-8).

Exhibit 6-8: Peak Ridership vs. Effective Capacity (Seattle/Portland): Option 2 - Minimum Capital Investment



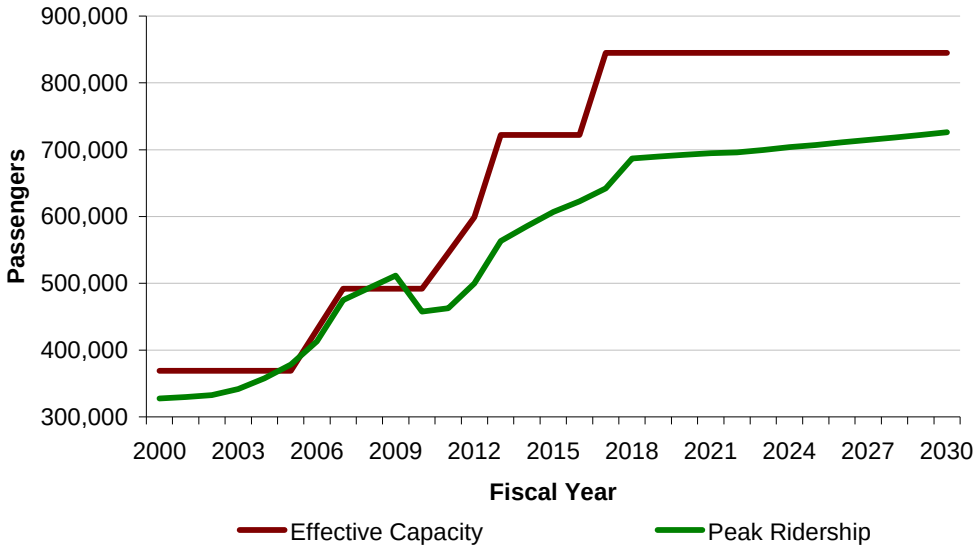
Peak Ridership: *Peak ridership is defined as annual ridership measured at peak segment of the route (Olympia/Lacey to Centralia is the peak segment of Seattle to Portland route).*
Effective Capacity: *Effective capacity is defined as average occupancy level where one percent of unsupplied demand happens due to peak time and peak section constraints.*

Source: WSDOT State Rail and Marine Office

Option 3 – Supply Meets Demand: Peak ridership would exceed capacity in FY2008. Capacity would stay above ridership in FY2009 and could exceed capacity at any time. The investment in a new train set would add two additional cars to each train set and the longer trains would increase service levels for additional riders in FY2011.

The capital investment would deliver a fifth daily round-trip train between Seattle and Portland in FY2013. Ridership would continue to increase due to reliability improvements and other factors. The capital investments would deliver a sixth daily round-trip train between Seattle and Portland in FY2017, to ensure that sufficient seating capacity is available to meet the ridership growth. Since higher frequency and reliability improvements could trigger the demand for business riders, the ample capacity could be filled by such a demand. Since the increase in such a demand was not estimated by the ridership model due to lack of data, ridership indicated by the demand curve may be understated (Exhibit 6-9).

Exhibit 6-9: Peak Ridership vs. Effective Capacity (Seattle/Portland): Option 3 - Supply Meets Demand

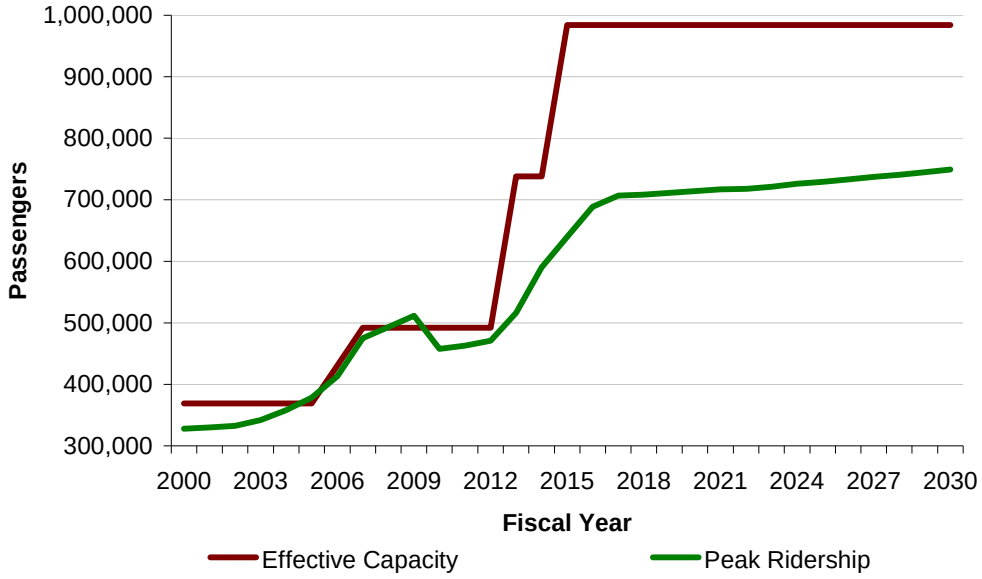


Peak Ridership: *Peak ridership is defined as annual ridership measured at peak segment of the route (Olympia/Lacey to Centralia is the peak segment of Seattle to Portland route).*
Effective Capacity: *Effective capacity is defined as average occupancy level where one percent of unsupplied demand happens due to peak time and peak section constraints.*

Source: WSDOT State Rail and Marine Office

Option 4 – No Financial Constraints: Peak ridership would exceed the capacity in FY2008. Capacity would stay above the capacity in FY2009. In this option, rail service would be used as a strategic solution to address multiple issues related to transportation. Ample capacity would be built for policies that encourage the use of passenger rail services. Investments in capital projects are only subject to engineering feasibility during this period. The invested capital projects would deliver two additional daily round-trip trains between Seattle and Portland in FY2013, and another two daily round-trip trains in FY2015, for a total of eight daily round trips between Seattle and Portland. The improved reliability, the higher capacity, and frequency would attract additional riders to Amtrak *Cascades* service. This option also opens other incentive policies, such as a modified fare structure, that could increase rail ridership substantially. The ample capacity could be used for any promotional policies that view passenger rail as part of a solution to address multiple issues (Exhibit 6-10).

Exhibit 6-10: Peak Ridership vs. Effective Capacity (Seattle/Portland): Option 4 - No Financial Constraint



Peak Ridership: *Peak ridership is defined as annual ridership measured at peak segment of the route (Olympia/Lacey to Centralia is the peak segment of Seattle to Portland route).*
Effective Capacity: *Effective capacity is defined as average occupancy level where one percent of unsupplied demand happens due to peak time and peak section constraints.*

Source: WSDOT State Rail and Marine Office

Economic Impacts

When public funds are used to invest in Amtrak *Cascades* intercity passenger train services, the investment generates economic impacts that affect the state's economy, employment, people's income, business' profits, and taxes to governments. These economic impacts would benefit the state and local communities in general. The magnitudes of economic impacts are dependent on the size of investment and how the funds are invested.

WSDOT used the Washington State input-output economic model, developed using IMPLAN[2], to estimate the ripple effects of the increases in Amtrak *Cascades* services. The IMPLAN model was used to estimate the total economic impacts of mid-range plan options, including the cascading effects of the investments of each option (direct, indirect, and

[2] IMPLAN is a commercial input-output model developed using input-output data from Bureau of Economic Analysis, U.S. Department of Commerce. The model used to estimate economic impacts in this plan is a Washington State specific model.

induced impacts). The economic impacts are assessed in terms of the following two indicators:

- **Employment** represents the jobs created by the investment. Amtrak *Cascades* service directly creates jobs in construction, maintenance, food service, and transportation operations. It also creates jobs indirectly by the affect of the outputs of other industries and government incomes.

- **Value added** is an indicator that reflects the net benefit of the investment. Both labor income (wages and salaries) and business incomes are counted as value added.

Exhibit 6-11 demonstrates economic impacts of the four plan options.

Exhibit 6-11: Economic Impacts of *Amtrak Cascades Mid-Range Plan* Options: Sum of FY2010 to FY2030*

Impact	Area	Option 1: Maintaining Current Operation	Option 2: Incremental Strategy 1 - Minimum Capital Investment	Option 3: Incremental Strategy 2 - Supply Meets Demand	Option 4: No Financial Constraints
Support Employment (Job-Year**)	Benefits to Local Communities Along I-5 Corridor	4,887	11,725	17,454	23,752
	Statewide Benefits (Include benefits to local communities)	6,202	15,024	22,825	31,138
Value Added*** ($ Million, 2008 Dollars)	Benefits to Local Communities Along I-5 Corridor	$306.5	$746.8	$1,139.9	$1,555.1
	Statewide Benefits (Include benefits to local communities)	$399.7	$977.6	$1,500.6	$2,048.1

Note: Economic impacts are assessed using IMPLAN Input-Output model for Washington State and its local areas.

* The projects completed during the mid-range plan period of FY2010 to FY2017 will generate benefits for local communities and Washington State for many years beyond FY2017.

** A job-year means that a person is employed as a full time employee for a year.

*** Difference between the total sales revenue of an industry and the total cost of components, materials, and services purchased from other firms within a reporting period (usually one year). It is the industry's contribution to the gross domestic product (GDP).

Source: WSDOT State Rail and Marine Office

Chapter 7: Benefit/Cost Analysis

Studies show that passenger rail has many benefits. With its fuel efficiency, safety records, and lower environmental impacts, passenger rail has resurfaced as an attractive candidate that can be included in policy options aimed at solving economic, social, and environmental problems with integrated solutions.

The common public benefits associated with passenger rail include stimulating the state's economy, supporting local communities and businesses with jobs and revenues, reducing congestion, improving public safety, offering a transportation choice, reducing environmental pollution, and saving energy.

This chapter will assess benefits and costs associated with the four plan options that provide various Amtrak *Cascades* service levels. The impacts of these options on the state budget, the state's economy, local communities, highway congestion, public safety, and the environment will be evaluated to determine the likely effects of these policy options. This chapter includes three sections:

- Understanding Public Investment and Benefit
- Benefits and Costs Assessment
- Transportation Cost Analysis

Understanding Public Investment and Benefit

Investment analysis in the public sector is very different from private sector analysis. There are several principles that must be understood in analyzing public investment and public benefits.

Discounting

Discounting addresses the problem of translating values from one time period to another. The larger the discount rate, the more weight that is placed on benefits and costs in the near-term over benefits and costs in the future. Unlike the private sector, long-term benefits, such as environmental quality, are important public policymaking criteria. Consequently, public investment analysis usually uses a relatively lower discount rate than the private sector.

Leveraging

Public projects usually involve multiple sources of investment and partnership. While the analysis of such an investment assesses the efficiency of total investment, public investment analysis also assesses the effectiveness of public investment only. In other words, a measure of the effectiveness of public investment is how much additional investment a public investment can bring into a specific project. This measure is called leveraging.

Distributional Benefits

Many public investment projects provide distributional benefits to the public by transferring public resources to where they are needed most. Such a transfer payment is not a traditionally defined benefit. It could be measured as a public benefit, if it helps reach the goal of public policy to benefit the targeted public group.

With/Without Principle

Many public investment projects provide benefits to the public by mitigating negative impacts. While such investment does not create positive value, it reduces the negative value. The difference between the larger negative value and the smaller negative value is defined as a benefit based on the with/without principle. For example, with an investment in Amtrak *Cascades* capacity, more people would ride trains instead of driving cars. This results in less emissions, due to the fact that rail has a lower emission level per passenger mile compared to auto. The difference of the higher emission (auto) and lower emission (rail) will be defined as a benefit of the investment in Amtrak *Cascades*. Without such an investment project, societal loss due to higher emissions would be much larger. The reduced societal loss would be the benefit of the investment project. Also, as more people choose to ride the train, the emission per passenger would decrease.

Public Benefits and Public Costs

Based on the above discussion about the characteristics of public investment analysis, the benefit/cost analyses performed and presented in this chapter will be based on an assessment of public benefits and public costs.

Period of Analysis

Although the capital investment projects for this plan are implemented from FY2010 to FY2017, the benefits of the plan options are assessed for a longer period: FY2010 to FY2030. The reason for using a longer period for benefit/cost analysis is to demonstrate the benefits of capital projects.

Although projects will be completed in the mid-range plan period, their benefits last for many years.

Benefits and Costs Assessment

This section is a summary of the benefit/cost analyses for the plan options. Appendix 8 will provide the detailed analysis and methodology.

Public Benefit Assessment

Public benefits of statewide rail investment are those benefits directly or indirectly received by the public due to the specified investment. There are three categories of benefits from public investment:

- **Taxes** are generated from investment. These taxes are direct incomes from the public investment and can be spent and reinvested for public benefit.

- **Economic impacts** resulting from the investment, such as the employment and personal incomes, are generated from the investment projects.

- **External impacts**, such as greenhouse gas emissions and accidents, are reduced.

There are multiple benefits associated with passenger rail from all three types of public benefits described above. The magnitude of benefits received by the people of Washington State depends on how passenger rail will be integrated into the policies that embrace integrated solutions for interconnected problems. In general passenger rail has been identified by many studies to have the following benefits:

- ***Tourism Market:*** Passenger rail is one of the major ways for tourists to access Washington State's bountiful cultural and amenity resources, natural beauties, and historical heritages.

- ***Supports Local Communities:*** Passenger rail construction projects bring jobs and revenue to local communities and businesses.

- ***Generate Government Incomes for Public Programs:*** While rail, like highways, is a publicly funded infrastructure improvement and operation, it supports growth of many businesses in various industries that pay business taxes to governments.

- ***Congestion Relief:*** Passenger rail helps solve congestion problems. As the economy and population continue to grow, the

congestion problems on the I-5 corridor will increase. The potential of passenger rail as part of the solution for congestion is promising.

- ***Public Safety:*** Passenger rail transportation has a strong safety record with a national accident fatality rate of 0.08 per 100 million passenger miles, about 1/10 that of motor vehicles. Replacing motor vehicle drivers with passenger rail riders will help improve public safety.

- ***Energy Benefit:*** Passenger rail is much more efficient than airplanes and motor vehicles. Increasing passenger rail services will reduce the growth of other energy inefficient modes and help tackle the energy dependence problems.

- ***Pollution Reduction:*** The level of released toxic substances and greenhouse gas emissions for passenger rail is lower than auto. Replacing motor vehicle users with rail riders will help reduce environmental pollution.

- ***Transportation Choice:*** Passenger rail provides the public another transportation option, especially for the mobility-impaired and the non-driving public.

Public benefits of the mid-range plan options are measured in terms of the following indicators:

Economic Benefits

- ***Revenue:*** Revenue from Amtrak *Cascades* operations, in this analysis, is not counted as an economic benefit. It actually offsets the state's investment in Amtrak *Cascades* infrastructure improvement, operation, and maintenance. In other words, public investments (costs) would be larger without Amtrak *Cascades* service revenue.

- ***Value Added:*** Value added includes personal income from employment, profits for businesses, and taxes paid to governments. Amtrak *Cascades* train services support industries such as tourism, transportation, construction, and maintenance. The value added to the economy resulting from direct and secondary impacts of Amtrak *Cascades* services is measured as economic benefits using IMPLAN—an Input-Output model that measures economic impacts. Other indicators of economic impacts of the plan options, such as economic output, jobs created, and taxes, were presented in Chapter 6 and not used as a measure of net benefits.

Societal Benefits

Societal benefits measured in these plan options include congestion benefits, safety benefits, and environmental benefits. The methodology used to assess these benefits is described in Appendix 7.

- ***Congestion Relief:*** Congestion on the I-5 corridor continues to increase. By diverting traffic away from the I-5 corridor, incremental services of Amtrak *Cascades* can help relieve the congestion of I-5. Amtrak *Cascades* currently accounts for less than one percent of traffic volume along the I-5 corridor. However, as Exhibit 7-1 demonstrates, a small fraction of I-5 traffic reduction could lead to tremendous improvement in reducing delay hours that are costs to travelers. In addition, the potential return on investment is very promising, if rail is considered a strategic alternative for transportation resilience to natural and man-made disasters.

Exhibit 7-1: Benefit of Reducing Congestion

I-5 Interstate Highway Average Daily Traffic Reduction and Hours of Delay				
	Traffic Reduction %			
	0%	-5%	-10%	-20%
Hours of Delay	302,000	90,000	64,000	30,000
Reduced Hours of Delay Due to Traffic Reduction	-	212,000	238,000	272,000
% Delay Reduction from Today	0	-70%	-79%	-90%

Source: WSDOT Urban Planning Office

- ***Safety Improvement:*** The societal costs of motor vehicle collisions on Washington State highways were estimated at $2.5 billion in 2007. Passenger rail transportation has a strong safety record. The national fatality rate is only one tenth of that of highway travel (Exhibit 7-2).

Exhibit 7-2: Comparison of Passenger Safety

Fatality and Injury: Highway vs. Rail			
	Fatality Per Million Passenger Mile	**Injury Per Million Passenger Mile**	**Sum**
Rail	0.0005	0.0590	0.06
Highway	0.0119	0.7689	0.78
Rail to Highway Ratio	0.0387	0.0768	0.08

Source: USDOT Bureau of Transportation Statistics

It is clearly evident that passenger rail travel benefits public safety and is in the public interest. Work remains to further improve rail safety, including rail crossings and trespassing. If more passengers use rail instead of auto, the societal cost of motor vehicle collisions for roadways will be reduced. Since passenger rail has lower fatality and injury rates, passenger safety improves. Reduced societal costs will be assessed as public benefits of using passenger rail.

- ***Health Benefit of Environmental Pollution Reduction:*** Passenger rail has lower emission rates for many greenhouse gases and toxic substances. Exhibit 7-3 provides a comparison of emission rates for three modes.

Exhibit 7-3: Emission Rates – Grams per Passenger Mile

	Automobile	**Airplane**	**Rail**
Carbon Dioxide (CO_2)	430	273	172
Volatile Organic Compounds (VOC)	2.68	0.15	0.16
Carbon Monoxide (CO)	16.40	0.46	0.60
Nitrogen Oxides (NO_X)	0.90	0.21	0.90
Particulate Matter (PM)	0.01	Not Applicable	0.08
Road Dust	0.88	Not Applicable	Not Applicable
Sulfur Oxides (SO_X)	0.03	Not Available	0.05

Source: Compiled by WSDOT State Rail and Marine Office based on multiple sources.

If more travelers use passenger rail instead of motor vehicles, the total emission rates of pollutants would be much lower. The social

costs caused by pollution would be reduced. Such reduction in social costs will be measured as environmental benefits of using passenger rail. The environmental benefits assessed in this plan are mostly health impacts caused by pollutants.

The environmental impacts of global warming, resulting from greenhouse gases, could cost society billions of dollars. Such societal costs have not been well studied and documented. WSDOT was not able to assess them in this chapter. Therefore, the environmental benefits assessed by this chapter might understate the real benefits, which could be substantially higher.

Total Public Benefits

Total public benefits include both economic benefits and societal benefits. Many public benefits are intangible; they are therefore not included in the assessment.

Exhibit 7-4 provides an overview of public benefits for the four plan options. Detailed benefit assessment is provided in Appendix 8. In general, the magnitude of benefits is correlated to investment size. However, the efficiency criteria presented later in this chapter will provide information on which options are more efficient.

Exhibit 7-4: Estimated Public Benefits by Investment Option (2008 Dollars, $ Million)

Plan Option	Economic Benefit	Societal Benefits			Sum
	Value Added	Congestion Relief Benefit	Safety Benefit	Environmental Benefit	
Option 1: Maintaining Current Operation	$399.7	$0.0	$67.2	$158.0	**$625**
Option 2: Incremental Strategy 1 - Minimum Capital Investment	$977.6	$598.3	$81.1	$196.3	**$1,853**
Option 3: Incremental Strategy 2 - Supply Meets Demand	$1,500.6	$939.9	$87.7	$215.4	**$2,744**
Option 4: No Financial Constraints	$2,048.1	$1,041.0	$89.6	$221.0	**$3,400**
Note: Option 1 is the baseline.					
* The projects completed during the mid-range plan period of FY2010 to FY2017 will generate benefits for local communities and Washington State for many years beyond FY2017. Benefits are sum of FY2010 to FY2030.					

Source: Benefits estimated by WSDOT State Rail and Marine Office based on multiple data sources. See Appendix 8 for details.

Public Cost Assessment

Based on the above discussion about the characteristics of public investment analysis, WSDOT assessed public costs of the mid-range plan options by two categories: cost of capital projects and cost of operation and maintenance.

Cost of Capital Projects

Cost of capital projects includes costs for projects to increase capacity and improve reliability, and equipment investment for locomotives and cars. WSDOT estimated the capital costs based on cost estimates provided by external consultants in the long-range plan and the recent study on historical costs of rail projects. Costs of capital projects planned for implementation between FY2010 and FY2017 are listed in Chapter 4. An annual summary of capital cost estimates for each plan option is presented in Chapter 6, Exhibit 6-1.

Costs of Operation and Maintenance

Costs of operation and maintenance include both operating costs for Amtrak *Cascades* passenger train services and maintenance costs of train equipment owned by the state of Washington. Chapter 5 discussed the estimation process and economies of scale for operating costs and maintenance costs among plan options, from FY2010 to FY2030.

Public Costs for Amtrak Cascades Program

Total public costs the for Amtrak *Cascades* program include all costs for capital projects and state support for operation and maintenance of Amtrak *Cascades* services. State support is the total program costs minus operational revenue received from tickets, food, and other services. Revenue is estimated based on a revenue neutral policy, which means that revenue estimates reflect no change in price except adjustments for inflation and change in operation costs.

While WSDOT estimates revenue based on revenue neutral policy (no price increase), it is noted that increased ridership, higher capacity and frequency, and improved reliability provide an opportunity to raise prices and increase revenues for the program. Therefore, the revenues estimated for this plan options are conservative (see Exhibit 7-5).

Exhibit 7-5: Estimated Public Costs for Amtrak *Cascades* Passenger Rail Sum of FY2010 to FY2030 (2008 Dollars, $ Million)

Options	Service Level	Costs of Subsidize Operation and Maintenance	Capital Investment	Administrative and Marketing Costs	Total Cost
Option 1: Maintaining Current Operation	Four round trips between Seattle and Portland and two round trips between Seattle and Vancouver, B.C.	$280	$0	$29	$310
Option 2: Incremental Strategy 1 - Minimum Capital Investment	Five round trips between Seattle and Portland and two round trips between Seattle and Vancouver, B.C.	$563	$133	$37	$733
Option 3: Incremental Strategy 2 - Supply Meets Demand	Six round trips between Seattle and Portland and two round trips between Seattle and Vancouver, B.C.	$573	$516	$40	$1,129
Option 4: No Financial Constraints	Eight round trips between Seattle and Portland and two round trips between Seattle and Vancouver, B.C.	$746	$749	$41	$1,536
Note: Option 1 is the baseline.					
** Operation costs are sums of FY2010 to FY2030. Capital investment is sum of FY2010 to FY2017. Both costs are discounted to present value (2008 dollars).					

Source: WSDOT State Rail and Marine Office

Benefit/Cost Ratio and Net Benefit

As noted in an earlier section, a benefit/cost ratio is used to measure economic efficiency for each option, as investment size usually dictates the magnitude of benefits. A net benefit measure is used to measure the size of the benefits with no linkage to how much is invested.

Exhibit 7-6 demonstrates the total benefit/cost ratio for public investment options outlined in the mid-range plan. All options involve capital project investments to achieve higher benefit/cost ratios. This is because the capital projects increase capacity and improve reliability to meet the increased demand of ridership growth. Such gain in capacity and improvement in reliability allow much higher service levels to serve more riders, while improving program efficiency by economies of scale.

Exhibit 7-6: Estimated Benefit/Cost Ratio by Investment Option

Plan Option	Sum of FY2010 to FY2030 - $ Million (2008 Dollars)			
	Total Cost ($ Million)	Total Benefit ($ Million)	Net Benefit ($ Million)	B/C Ratio
Option 1: Maintaining Current Operation	$310	$625	$315	**2.02**
Option 2: Incremental Strategy 1 - Minimum Capital Investment	$733	$1,853	$1,120	**2.53**
Option 3: Incremental Strategy 2 - Supply Meets Demand	$1,129	$2,744	$1,615	**2.43**
Option 4: No Financial Constraints	$1,536	$3,400	$1,864	**2.21**

Note: Option 1 is the baseline.

* The projects completed during the mid-range plan period of FY2010 to FY2017 will generate benefits for local communities and Washington State for many years beyond FY2017. Benefits are sum of FY2010 to FY2030.

** Operation costs are sums of FY2010 to FY2030. Capital investment is sum of FY2010 to FY2017. Both benefits and costs are discounted to present value (2008 dollars).

Source: WSDOT State Rail and Marine Office

Exhibit 7-7 shows the incremental benefit/cost ratios for Options 2, 3, and 4. Option 1 is used as a baseline for the analysis. The results indicate incremental investments generate higher benefit/cost ratios. This indicates that additional public investments will improve current efficiency of the Amtrak *Cascades* program.

Exhibit 7-7: Incremental Benefit/Cost Ratio by Investment Options

Plan Option	Sum of FY2010 to FY2030 - $ Million (2008 Dollars)		
	Incremental Investment**	Incremental Benefit	Incremental Investment B/C Ratio
Option 1: Maintaining Current Operation	**Baseline**	**Baseline**	**Baseline**
Option 2: Incremental Strategy 1 - Minimum Capital Investment	$423	$1,228	2.90
Option 3: Incremental Strategy 2 - Supply Meets Demand	$819	$2,119	2.59
Option 4: No Financial Constraints	$1,226	$2,775	2.26
Note: Option 1 is the baseline.			
* The projects completed during the mid-range plan period of FY2010 to FY2017 will generate benefits for local communities and Washington State for many years beyond FY2017. Benefits are sum of FY2010 to FY2030.			
** Operation costs are sums of FY2010 to FY2030. Capital investment is sum of FY2010 to FY2017. Both benefits and costs are discounted to present value (2008 dollars).			

Source: WSDOT State Rail and Marine Office

Transportation Cost Analysis

For an individual to travel from one place to another, different types of costs are incurred based on their mode of travel. This section discusses the cost composition of three modes (rail, highway, and air), the methods to assess these costs, and comparison of the full costs to travel for these modes. Detailed information and methods about environmental costs will be described in Appendix 9.

Costs of Passenger Rail Travel

User Costs

User costs for passenger rail modes are the price of the tickets to ride the train. These costs are calculated based on historical data from operation of the Amtrak *Cascades* program.

System Utilization Costs

There are two types of system utilization costs. The first type is the public capital investments necessary to develop and maintain infrastructure improvements. These types of costs are estimated based on life-cycle

analysis methods. Life cycles used in this analysis are 25 years and 50 years depending on the types of capital projects. The second type of system utilization costs is the net costs the state pays to operate and maintain the systems that are not recovered from the service revenue. These costs are estimated using reported data from prior operation costs.

Safety Costs

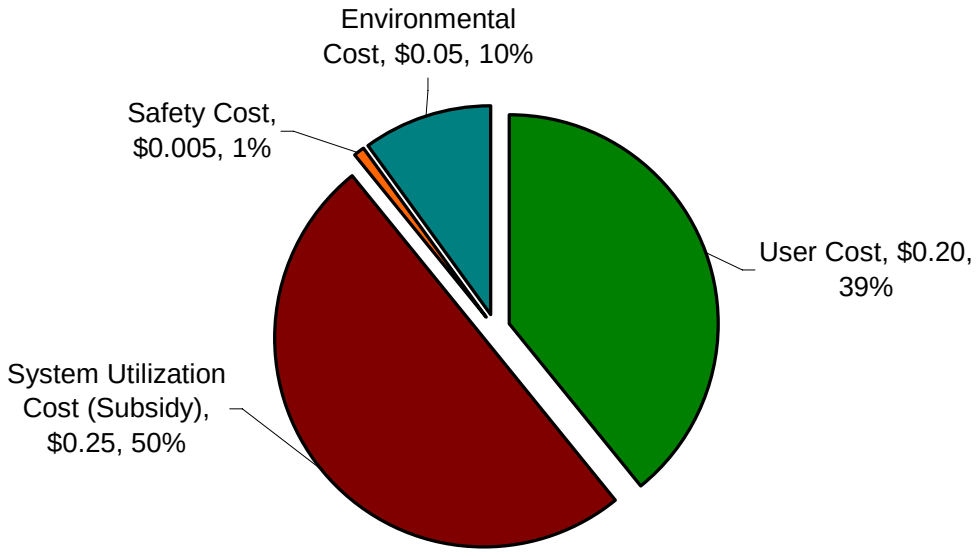
These are societal costs of collision-caused deaths and injuries. Rail has a much smaller probability to have accidents that cause passenger deaths and injuries. Data from the Bureau of Transportation Statistics are used to assess the probabilities of death and injury for both rail and highway travel. Then highway safety costs are used to estimate the safety costs for rail based on comparison of the probabilities.

Environmental Pollution Costs

Environmental costs are determined based on emission levels of locomotives and their costs to society. The data used for the assessment are published government data and research findings. These data sources include both rail and highway modes (Appendix 9).

Exhibit 7-8 describes the full rail transportation costs in 2008 dollars. The full cost per mile for rail transportation is $0.51.

Exhibit 7-8: Composition of Cost Per Passenger Mile – Passenger Rail
Full Cost Per Mile: $0.51 (2008)



Source: WSDOT State Rail and Marine Office

Costs of Highway Travel

User Costs

User costs for the highway mode include car depreciation, insurance, fuel cost, and maintenance of the car. There are various ways to calculate highway user costs per mile. The costs published by the Internal Revenue Service are used and adjusted for Washington State. Taxes and fees that are assessed to fund highway system operations and improvements are excluded from the user costs to avoid double counting.

System Utilization Costs

System utilization costs are public costs to develop and maintain highway systems. Although travelers use the system essentially free of charge (tolling is an exception), highway system utilization costs are actually a part of user costs. This is because highway systems are mostly funded by special taxes and fees such as motor fuel taxes and vehicle license fees. These costs are assessed using historical data, WSDOT expenditures—excluding non-highway modes—and historical data on vehicle miles traveled.

Safety Costs

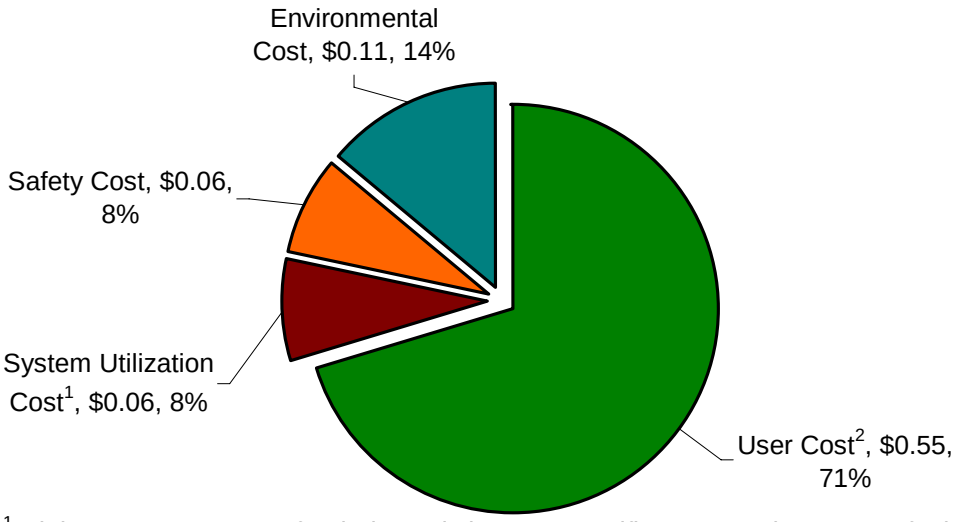
These are societal costs of collision-caused deaths and injuries. WSDOT Transportation Data Office estimates the annual cost to the state based on total deaths and injuries occurred. Safety costs per mile are developed using the annual cost and miles traveled on state highways.

Environmental Pollution Costs

Environmental pollution costs are assessed based on emission levels of motor vehicles and their costs to society. The data used for the assessment are published government data and research findings (Appendix 9).

Exhibit 7-9 describes the full highway transportation costs in 2008 dollars. The full cost per mile for highway transportation is $0.78.

Exhibit 7-9: Composition of Cost Per Passenger Mile – Highway
Full Cost Per Mile: $0.78 (2008)



[1] Highways systems are funded mostly by user specific taxes such as motor fuel taxes and vehicle license fees.
[2] Special user taxes and fees paid by users such as motor fuel tax and license fee are excluded.

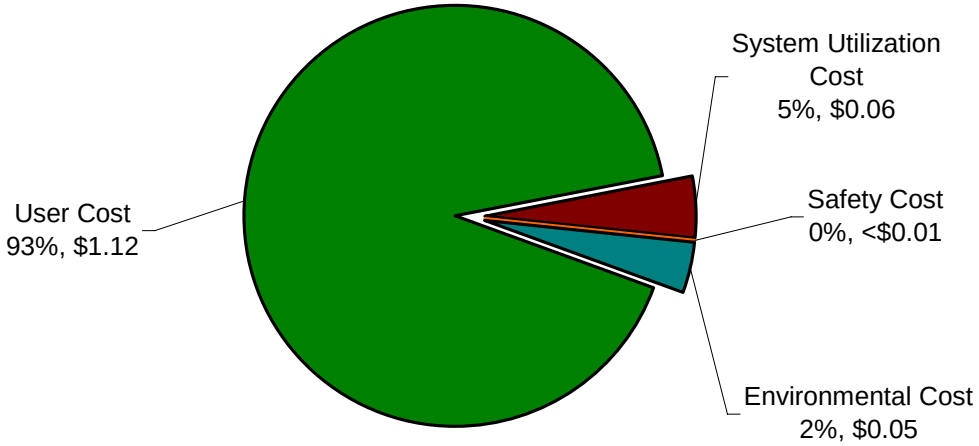
Source: WSDOT State Rail and Marine Office

Costs of Air Travel

The composition of costs of air travel and definitions are similar to rail travel. These data are adopted from Berk and Associates (2006).

Exhibit 7-10 describes full air transportation costs in 2008 dollars. The full cost per mile for air travel is $1.23.

Exhibit 7-10: Composition of Cost Per Passenger Mile – Air
Full Cost Per Mile: $1.23 (2008)



Source: WSDOT State Rail and Marine Office

Cross Modal Comparison

Exhibit 7-11 compares full costs of transportation for highway, rail, and air for 2008. Please note WSDOT used Option 3 as an example of rail system utilization costs because Option 3 has heavy capital and operation investments for increasing capacity and improving reliability.

Exhibit 7-11: Transportation Costs: Cross Modal Comparison

Esitmated Transportation Cost by Mode ($/Passenger Mile)				
Year	**Cost Type**	**Rail**	**Highway/Motor Vehicle**	**Air**
2008	User Costs*	$0.20	$0.55	$1.12
	System Utilization Costs**	$0.26	$0.06	$0.06
	Environmental Costs	$0.05	$0.11	$0.05
	Safety Costs	$0.00	$0.06	$0.00
	Other Costs***	N/A	N/A	N/A
	Total Costs	**$0.51**	**$0.78**	**$1.23**

* User costs: Rail user costs are the ticket price based on historical operations data. Highway user costs are car depreciation, insurance, fuel, and car maintenance. Special user taxes and fees paid by users such as motor fuel tax and license fees are excluded from highway user costs to avoid double counting.

** System utilization costs: Rail systems are mostly funded by public investments (subsidies besides what is recovered from service revenue). Highway systems are mostly funded by specific user taxes, such as motor fuel taxes and vehicle license fees.

*** Cost such as flexibility is not assessed because lack of data.

Source: WSDOT State Rail and Marine Office

Washington State Department of Transportation

Chapter 8: Amtrak *Cascades* and Connectivity

Connectivity is an important aspect of the *Amtrak Cascades Mid-Range Plan*. Nobody starts their journey at the train station; travelers reach the station by another mode or, in some cases, a combination of modes. Therefore, if a mode does not exist or is unknown by a potential passenger, ridership would suffer. The more seamless the transfer, the more the likelihood that people will make use of it.

This chapter examines the importance of providing easy connections between modes of transportation, with special focus on the Amtrak *Cascades* passenger service.

This chapter has two main but complimentary areas of focus—station location and transportation mode. This chapter and exhibits describe what exists, what could exist, and shows these by each Amtrak station.

Other issues that can influence traveler choice were examined. They include communication of the alternatives, clarity of the message and pricing, and through-ticketing opportunities.

Connections with Other Modes

Public Transportation

Vancouver, B.C.

Translink, the regional transportation authority in the greater Vancouver, B.C. area, provides extensive transit services throughout the region. SkyTrain's 30.8 miles of track, making it the longest automated light rapid transit system in the world, operates on multiple routes with stations at key locations. The Main Street Skytrain Station is located adjacent to the Pacific Central Station served by Amtrak *Cascades*, providing an effective connection to and from the trains. Depending upon time of day, Skytrain locations are served every four to twelve minutes.

The Skytrain Waterfront Station, in the heart of downtown Vancouver, provides access to cruise terminals, and links with West Coast Express commuter trains and the Vancouver SeaBus. In 2009 the station will link with the new Canada Line, connecting downtown Vancouver with the Vancouver International Airport.

Translink also provides extensive bus service throughout the region with routes that stop at Pacific Central Station. Greyhound Canada Thruway connections also depart from Pacific Central Station.

Translink has implemented an extensive "trip planner" to assist individuals in determining schedules and the most effective methods of reaching their destinations.

Washington State

Most communities served by Amtrak *Cascades* are also served by local/regional transit agencies. In some cases stations—like Centennial Station in Olympia/Lacey and Skagit Station in Mount Vernon—are owned and operated by local transit agencies as multimodal facilities. Although some public transit agencies have coordinated schedules to coincide with Amtrak *Cascades* arrivals and departures, there are opportunities to improve these connections. Exhibit 8-1 lists Amtrak *Cascades* stations within Washington State and types of transportation connections that are available. Individual station stops throughout the corridor are highlighted on the Amtrak *Cascades* Web site (www.amtrakcascades.com/RoutesAndDestinations.aspx), where additional information on available connecting services is provided.

Exhibit 8-1: Amtrak *Cascades* Stations in Washington State and Transportation Connections

Station	Transportation Connections
Fairhaven Station, Bellingham	• Whatcom Transportation Authority • Greyhound • San Juan Island Commuter • Alaska Marine Highway System • Taxi
Skagit Station, Mt. Vernon	• Skagit Transit • Greyhound • Taxi
Everett Station, Everett	• Everett Transit • Sound Transit • Community Transit • Greyhound • Northwestern Trailways • Taxi
Edmonds Station, Edmonds	• Community Transit • Sound Transit • Washington State Ferries • Taxi
King Street Station, Seattle	• King County Metro • Sound Transit • Greyhound • Northwestern Trailways • Washington State Ferries • Victoria Clipper • Community Transit • Taxi
Tukwila Station, Tukwila	• Seattle Express • Sound Transit • Metro Transit • Taxi
Tacoma Amtrak Station, Tacoma	• Pierce Transit • Sound Transit • Tacoma Link Light Rail • Greyhound • Washington State Ferries • Northwestern Trailways • Taxi
Centennial Station, Olympia/Lacey	• Intercity Transit • Taxi
Union Depot, Centralia	• Twin Transit • Taxi
Kelso Multimodal Transportation Center, Kelso	• CUBS (Community Urban Bus Services) • Taxi
Vancouver Station, Vancouver	• C-TRAN (Clark County Transportation Benefit Area) • Taxi

Portland, OR Area

Tri-Met, the public transit agency in greater Portland, provides MAX light rail throughout Portland and surrounding suburbs, as well as extensive bus service. The north end of the Portland Transit Mall is located at Portland Union Station. Additional construction is underway at the station and will provide dedicated bus and MAX lanes that will extend to points throughout the Portland area. Currently, MAX service is located several blocks from Union Station. MAX service connects with neighboring suburbs, the Portland Exposition Center, and Portland International Airport. The system further integrates with the Portland Streetcar and Westside Express Service commuter rail that will open in early 2009.

Tri-Met, like Translink, provides an extensive "trip planner" to allow passengers to determine routing, schedules, and options to coordinate their trips.

Sound Transit: Light Rail, Sounder, and ST Express Bus

Sound Transit, the regional transportation authority in the Central Puget Sound, is developing a network of commuter rail, light rail, and express bus services in the region.

Sounder Commuter Rail currently operates between Tacoma, Seattle, and Everett during peak commuting hours. Sounder and Amtrak *Cascades* use the same route, and both serve stations at Everett, Edmonds, Seattle, Tukwila, and Tacoma. Sounder provides additional intermediate stops along the route. Sound Transit and WSDOT are exploring opportunities to provide for coordinated ticketing, which would allow persons to travel between sites (i.e. Auburn to Portland via Sounder and Amtrak *Cascades*) that are uniquely served by one or the other, similar to coordination of services in Europe. Between Seattle and Everett, the "Rail Plus" program allows Sounder travelers to ride Amtrak *Cascades* using their Sounder monthly pass and vice versa. Sounder operating schedules are already coordinated with Amtrak *Cascades* to eliminate operational conflicts.

Sound Transit will be operating light rail in Seattle in 2009. The International District light rail station at the Metro Bus Tunnel is one block from King Street Station. Construction is underway to provide a light rail link to Sea-Tac International Airport.

In Tacoma, Sounder, Tacoma Link Light Rail, and ST Express Bus services operate from the Tacoma Dome Station at Freighthouse Square. Amtrak *Cascades* will be moving to that facility upon completion of the Tacoma—Bypass of Point Defiance – 66th St. to Nisqually project, described on page 4-7.

Washington State Ferries

Washington State Ferries operate a ferry service from several places in the Puget Sound. Edmonds and Seattle are located near Amtrak *Cascades* stations. Amtrak is not mentioned on the Washington State Ferries Web site, although it indicates connections by road, local transit, and Sound Transit Sounder trains.

Edmonds Ferry Terminal is the closest, with a 5-minute walk connecting the train station and the ferry terminal. The Seattle ferry terminal (Coleman Dock) is within walking distance of Seattle's King Street Station. A regular connection runs on Metro Transit Service 99 (Waterfront Streetcar) from the ferry terminal to within a block of King Street Station and vice versa.

Amtrak Thruway Motorcoach

Thruway motorcoach service provides coordinated train/bus service with connections at Amtrak stations as well as through integrated fares and ticketing.

Amtrak has contracted with Olympic Trailways to provide "thruway" bus service between Seattle and Vancouver, B.C. This service meets up with Amtrak long-distance and Amtrak *Cascades* trains in Seattle.

Since May 2008, WSDOT has sponsored a round-trip thruway bus connection with trains 500 and 509 in Seattle that provides service to Everett, Mount Vernon, and Bellingham. This bus provides direct connections and ticketing with Amtrak *Cascades* and provides for a southbound link to Amtrak's Empire Builder, which travels east to Chicago via Spokane and Minneapolis.

Oregon's Department of Transportation sponsors multiple daily round-trip thruway bus connections to Amtrak trains that serve Portland Union Station.

Intercity Bus

There are a variety of intercity bus providers (i.e. Greyhound, etc.) that parallel the Amtrak *Cascades* route. Greyhound Canada serves Pacific Central Station in Vancouver. In Portland, the Greyhound terminal is one block from Union Station. Greyhound serves most Amtrak stations throughout the route. These bus companies do not have coordinated ticketing/interline connections with Amtrak at this time, but they do provide information on Amtrak service to potential customers who are not well served by existing bus schedules.

The initial phase of WSDOT's Travel Options (intercity travel planner) is anticipated to be in place by January 2009. Amtrak *Cascades* schedules are integrated in the travel planner to be proposed as travel options.

Sea-Tac International Airport

Tukwila station is less than five miles from Sea-Tac International Airport. In the future a more direct shuttle bus connection between the two facilities should be explored, as a more seamless connection between the airport and the train station could attract more riders.

Bellingham Cruise Terminal

The Bellingham Cruise Terminal, located adjacent to Bellingham's Fairhaven Station (Amtrak *Cascades*), provides cruise ship and ferry connections to southeast Alaska, Victoria, B.C., and the San Juan Islands.

Rental Cars

Amtrak has explored providing rental car satellites at train stations on the Amtrak *Cascades* route. Currently, rental cars are available at Union Station in Portland and Vancouver's Pacific Central Station.

Car Sharing Services

Another option that is open to visitors to a different city is the use of car sharing. There are a number of car sharing services, such as *Zipcar* and *Car Sharing US*. The service operates when a user pays a subscription fee and then makes use of the service of a car. Not all locations offer this service, but it is possible for it to be available in Seattle, Portland, and other locations.

Taxi

Taxis are available at the stations shown in Exhibit 8-1, but it is important to note that they are limited to particular areas. Edmonds and Centralia have limited taxi service. The current Amtrak *Cascades* timetable does not indicate if taxi service is available at stations, or what hours they operate if they are available. Adding an entry on this aspect may influence some people to travel by train.

Bike

There are two ways that bike riders could build ridership numbers. One concerns the "on the ground" facilities at stations (racks and lockers) and dedicated bike lanes to and from stations. The other is the ability to transport bicycles onboard the trains. Both of these impact whether bike users will take the train.

Cruise Ships

Passengers who use the cruise ship service are usually one-way passengers. They either travel to Seattle or Vancouver, B.C. to catch a cruise ship, which then takes them back to a different port, or they arrive in Seattle or Vancouver, B.C. having boarded in a different port.

They are very unlikely to be local residents of the Vancouver, B.C. or Seattle area. The vast majority of cruise ship passengers is on an inclusive tour package that includes bus or shuttle transfers between the train station and the docks.

Amtrak often works cooperatively with cruise ship lines to develop "packages" that include travel by rail as part of the trip. As an example, coordinated travel between Amtrak *Cascades*, Victoria Clipper, and other major cruise lines provide for coordinated travel for thousands of passengers annually on Amtrak *Cascades* to Vancouver, B.C.

Other Issues Impacting the Integration of Transportation

Integrated Fares/Travel Packages

Many passengers, who use the Amtrak *Cascades* service to connect with cruise ships, are taking advantage of an integrated fare that was put together by the tour operator. However in addition to these fares, there are many other avenues that could be explored. WSDOT needs to work with the Washington State Ferries and local transit agencies to explore what opportunities exist for integrated fares.

Travel Planners

Also mentioned, as part of the marketing of the Amtrak *Cascades* service, is the ability for these trains to be shown alongside other services in timetables and journey planners that operate in the corridor. WSDOT should pursue connections with these other agencies and organizations that produce these documents, and work with them to obtain maximum visibility for the service.

Integrated Schedules

An issue that has been raised by passengers in the past has been the lack of integration between services that are operated by different organizations. While it is never possible to cater for late running services, it should be possible to ensure that buses, ferries, and trains make every effort to coordinate their timetables to ensure that passengers, who are not using only the one mode, are able to make reasonable connections.

WSDOT could improve coordination of schedules and, where it is practical, show these connections in published literature.

Passenger Information Systems

One aspect of travel, which is gaining in importance as technology becomes more readily available, is access to real-time information systems on train arrival and departure times. Passengers are becoming accustomed to finding out how flights are performing from the Internet. This avoids arrival at the terminal too early for services that are running late. As the timetable develops and reaches multiple journeys each day, it will become even more important that real-time running information be available over the Internet and cell phones.

Signs Including Pictograms

Some parts of the state enjoy a far greater degree of tourism, and thus non-English speaking people could be users of the Amtrak *Cascades* services. WSDOT knows that tourism is an important aspect of the service. The Amtrak *Cascades* service must cater to the non-English speaker, and one way to accomplish that is to use internationally recognized pictograms for signage on the stations throughout the network.

WSDOT found several examples where there are a few signs from different modes of transportation. Signs from I-5 to Amtrak *Cascades* stations were good, but signs for pedestrians from ferry terminals, transit centers, and bus stops are rarely found. A full survey of locations that could benefit from better signage should be performed and submitted for future funding consideration.

Parking

An inventory of parking availability appears in Exhibit 8-2. Some locations have insufficient parking at this time. WSDOT should determine how to add to the pool of parking spaces. In addition WSDOT noted that at locations such as Tacoma, when the service moves to Freighthouse Square in the future, parking will become a major issue. WSDOT will need to work with Sound Transit to explore options for expanding parking availability at this location.

Exhibit 8-2: Parking Availability at Amtrak *Cascades* Stations Portland, OR to Vancouver, B.C.

Station	Free at Station	On-Street Parking	Pay Lots	Disabled	Bikes	Other
Union Station Portland, OR	0	45 & 1 motorcycle	177 @ 1.25/hr or $6.50/day	9	5	There is a 411-stall Smart Park two blocks north at $1.25/hour or $6.00/day, limit 24 hours. It also has motorcycle parking.
Vancouver Station Vancouver, WA	30 – 2 hr. max. 60 – long term	0	0	3	0	None
Kelso Multimodal Transportation Center Kelso, WA	15 – 7AM to 9PM, no overnight 45 – 1 week max	16	0	2	8 + lockers	None
Union Depot Centralia, WA	72	15 + street parking within two blocks	0	1	16	None
Centennial Station Olympia/Lacey, WA	126	0	0	6	5 + lockers	None
Tacoma Amtrak Station Tacoma, WA	80	0	0	0	0	2,400 spaces at Tacoma Dome Station, 3 blocks west
Tukwila Station Tukwila, WA	250	0	0	0	0	None
King Street Station Seattle, WA	0	Metered $1.50/day	Day only $9/day	0	0	Several other garages within 3 blocks, day/overnight $20/day
Edmonds Station Edmonds, WA	6 pickup /dropoff only	0	210 $12/day	0	0	None
Everett Station Everett, WA	25 +8 rideshare	0	0	0	6	4 Park & Ride lots with 750 stalls adjacent to station
Skagit Station Mt. Vernon, WA	90	13 free, 2 hr. limit	0	4	8	None
Fairhaven Station Bellingham, WA	18	0	160 $6/day, $30/week	0	8	None
Pacific Central Station Vancouver, B.C.	0	19 $2 Canadian, 2 hr. max.	21 $1 Canadian, 1 hr. max.	0	0	37 Free, 2 hr limit within 1 block; 20 long-term within 3 blocks northwest, $12/day Canadian

An outcome of the two Advisory Committee meetings included different options to improve connectivity. Although there wasn't enough time to examine or test these options, WSDOT will need to explore them further in the future.

Chapter 9: Amtrak *Cascades* Marketing

Introduction

Marketing and advertising efforts for Amtrak *Cascades* is a cooperative effort shared by Amtrak and the Washington State Department of Transportation (WSDOT). A comprehensive advertising campaign has been employed annually focusing on brand building and awareness to reach a mass media target market. In addition to media advertising, Amtrak employs two regional field marketing representatives to develop and implement grassroots marketing in designated markets serving the Amtrak *Cascades* route.

Looking ahead to the next eight years, the marketing plan is focused on the following key elements:

- The travel experience—delivery of service, frequency/schedule, ease of travel.
- Customer satisfaction—onboard customer service, amenities offered, consistency.
- Execution and attention to detail.

Goals and Objectives

1. To support the achievement of ridership and revenue targets.
2. To establish strong brand awareness for Amtrak *Cascades.*
3. To differentiate Amtrak *Cascades* from other transportation options in this market and position it as the preferred method of intercity travel.
4. To establish Amtrak *Cascades* as the preferred choice for business travel in the I-5 corridor.

Marketing Analysis

Market Size

In Washington State about 2.4 million people live within a 10-minute drive of an Amtrak *Cascades* train station as of 2008. Population growth in this area is expected to climb to over 3 million by FY2030.

Current Ridership

Total ridership on Amtrak *Cascades* has risen from 94,000 in 1993 to over 676,000 in 2007. In the history of the service, ridership has risen steadily with losses sustained in only one year.

Rising gas prices, on-going construction projects along the I-5 corridor, and growing concerns about the quality of the environment have helped to drive consumers to consider alternative transportation options. These conditions have contributed to substantial growth in ridership in 2008.

Current Travel Options

Multimodal travel options include personal vehicles, public and private transit, aviation, marine, and rail. The current primary mode of travel is the automobile.

The main thoroughfare available to consumers traveling within the PNWRC is Interstate 5 (I-5). On average, people are making roughly seven
one-way trips on I-5 during a given year. Seattle, Tacoma, and Portland remain the most popular destinations, and more than twice as many trips are for leisure, as opposed to business. Travel times for Amtrak *Cascades* are very competitive with private vehicles and transit alternatives due to the congestion on I-5.

Air travel is accommodated by a choice of domestic and international carriers, operating out of Seattle-Tacoma International, King County International/Boeing Field (Seattle), Portland International, and Vancouver (Canada) International. Amtrak *Cascades* will compete directly with air travel in the I-5 corridor that it serves. Air travel may provide faster flight plan times, but once airport access, check-in, security, and baggage claim wait times are factored in, the total travel time by Amtrak *Cascades* is relatively comparable.

Travel by Amtrak *Cascades* also allows customers to take advantage of onboard amenities and facilities and make more productive use of their travel time.

Segments and Target Markets

The Amtrak *Cascades* market comprises a mix of local residents and visitors, traveling for a variety of purposes including intercity travel, vacation/recreation, business travel, and personal business.

The business traveler is a “golden egg” in that they represent the potential for significant revenue and ridership increases. In order to capitalize on this segment, significant improvements in service, frequency, and on-time performance will need to be made to accommodate the business traveler’s needs.

Demographics

Current demographics (advertising target):

- Adults 25-54.
- Household income (HHI) $50,000+.
- Slightly skewed female.
- Employed (52 percent full time, 12 percent part time).
- Educated (54 percent college graduate, 31 percent some college).
- Travels an average of seven one-way trips along the I-5 corridor per year, for business or leisure.

Pricing

Current pricing for Amtrak *Cascades* ranges from as low as $10 one-way to/from neighboring cities, to as high as $114 for one-way travel on the entire route between Vancouver, BC and Eugene, OR.

Amtrak *Cascades* service between Seattle and Portland is as low as $28 one-way. Comparable one-way air travel between Seattle and Portland (depending on airline restrictions and policies) ranges from $95 to $150, inclusive of all taxes and fees. For travel by automobile, the estimated cost between Seattle and Portland is $0.61 per mile. This makes the comparable cost of traveling the 173 miles between Seattle and Portland by automobile roughly at $106 (one-way).

Marketing Strategy

Opportunities and Challenges

Strengths

- Convenience.
- Alternative to driving a car on already congested roads.
- High levels of customer service and access to amenities.
- Traditional allure of passenger rail services.
- High level of public support.

Weaknesses

- Dependence on the host railroad (Amtrak does not own railroad).
- Service reliability (on-time performance).
- Speed of service/travel time.
- Frequency/schedule.
- Perception of cost, relative to automobile use.
- Dependency on other services for trip connections/completion.

Threats

- Continuing challenges with on-time performance (rail line capacity—congestion from increased freight rail traffic).
- Equipment maintenance and malfunctions.
- Harsh weather conditions resulting in mudslides and flooding.
- Limited political support/funding.
- Volatile gas prices:
  - Reduce discretionary spending.
  - Increase Amtrak's fuel costs, creating pressure for fare increases.

Opportunities

- Volatile gas prices help increase awareness and consideration of alternative travel.
- Development of partnership and alliances with other transportation service providers, attractions, and the travel industry to deliver a seamless, integrated customer travel experience.
- Unique Pacific Northwest brand.
- Promotion of "green" travel.

Branding and Positioning

Amtrak *Cascades* is a unique Northwest brand. Awareness of train travel is fairly significant and Amtrak is well known. However, there is still confusion among consumers regarding the difference between Amtrak and Amtrak *Cascades*. Most consumers assume that Amtrak and Amtrak *Cascades* are one and the same. It is important to establish Amtrak *Cascades* as its own independent identity from Amtrak (similar to Amtrak's *Coast Starlight* and *Empire Builder*) and highlight the Northwest appeal and branding.

More than just a convenient way to travel, trains are also energy efficient. Amtrak *Cascades* intercity passenger rail can move more people for each energy dollar, minimize damage to the environment, and increase the safety of our transportation system. Highlighting Amtrak *Cascades*' energy efficiency will be an effective way to reach out to the consumer's consciousness and desire to choose travel options that reduce carbon emissions.

Advertising and Promotion

An annual marketing and advertising plan is executed through the advertising agency under contract by Amtrak and WSDOT. The advertising budget is funded cooperatively by Amtrak and WSDOT.

Media Strategy

The current media strategy is a broad-based reach campaign to educate the total target market about Amtrak *Cascades*. Primary target markets are focused on Seattle and Portland, with secondary targets in Tacoma, Bellingham, and Eugene. Vancouver, B.C. is a primary target as well, but the media strategy has been put on hold due to the fluctuation between U.S. and Canadian currencies and the uncertainty of the second train service.

Current time frame for advertising campaigns remain focused on the spring season (March – May) and the fall season (September – November). These time frames are considered the "shoulder" seasons between the "peak" seasons of the summer and holiday travel periods. Ridership is usually lower during these times and the need to fill seats is greater.

Promotions

Currently, promotions are executed at two levels: grassroots marketing and regional promotions. Amtrak employs two field marketing representatives who work assigned markets, executing grassroots marketing and promotions, and drive trial (sampling) through cooperative marketing efforts with travel and tour operators. Regional promotions, with properties such as professional sports, state and regional tourism bureaus, and hotel chains, are executed through the advertising agency jointly employed by Amtrak and WSDOT.

Promotions allow Amtrak *Cascades* to:

- Drive immediate train ridership in low—or moderate—use periods, or on specific routes with low ridership.
- Stimulate trial (sampling), which could lead to repeat ridership.
- Generate awareness and exposure when no advertising is running.
- Generate awareness and exposure in markets not included in the media buy.
- Extend marketing budget.
- Reward repeat ridership with consumer loyalty/rewards program (Amtrak Guest Rewards).

Customer Service

Customer service is the cornerstone to the success of any service-based business. It is crucial that customer service needs on Amtrak *Cascades* are addressed on a consistent and proactive basis.

Service Reliability – Passenger Guarantee

Service and travel reliability will be paramount to the ongoing success of Amtrak *Cascades*. No other single factor is more critical to the current and future success of Amtrak *Cascades* than on-time performance. In order to continue to be a viable transportation option and to become a preferred method of intercity travel, on-time performance will have to be improved to a level of consistency.

Real-Time Information

In an increasingly wired and wireless society, there is growing expectation that service providers will have the capability to assemble and disseminate real-time schedule information. Amtrak *Cascades* must be able to deliver real-time service information (delays, cancellations, etc.) using the latest technology.

Enhanced Amenity Package

There are a wide range of amenities that could be considered both onboard the trains and at stations that will enhance the customer experience. For business travelers, wireless Internet capability is critical. Vacationing families could choose from a variety of onboard entertainment options (games, movies, and designated play areas) to keep their children occupied for the duration of their trip.

Marketing Action Plan

Option 1: Maintaining Current Operation Strategy

Option 1 investment strategy would maintain the current advertising and promotion levels with a flat budget. In this option, the advertising and promotions budget would continue to be invested strategically with the expectation of diminished returns on our investment due to the annual increase in media costs that cannot be met by our current budget.

Options 2 and 3: Incremental Investment Strategies

Options 2 and 3 investment strategy would require a significant increase in the advertising and promotion budget. With the proposed budget increase, the advertising plan could reach more consumers and develop more targeted campaigns aimed at the business traveler to meet the added service. This would make a significant impact in media reach, brand awareness, and driving demand.

Option 4: Rail as a Long-Term Alternative Strategy – No Financial Constraints

Option 4 investment strategy would require a comparable budget for advertising and promotion as Options 2 and 3. This would continue to reach the mass market while investing in targeted media aimed at the business traveler.

Build Usage and Market Share

- Retain core ridership constituencies through effective service delivery and customer communications.
- Build loyalty and ridership frequency among occasional riders through service improvements, appropriate fare media, and promotional efforts.
- Attract new riders from population segments with viable ridership potential, through targeted promotional programs.

Price

- **Pricing objectives** – pricing should be managed along with market demand (what the market will bear) and operational costs.
- **Sales promotion** – promotional pricing should be used as an incentive to drive trial (sampling) and promote brand awareness.

Promotion and Public Relations

- Maintain an ongoing image campaign to educate the general public about Amtrak *Cascades*.
- Use aggressive public relations efforts to maximize positive media coverage and news media support.
- Leverage brand awareness by developing cooperative promotion opportunities.

Advertising

A combination of radio, outdoor, online, and newspaper are used to provide message continuity throughout the advertising campaigns.

Financial Forecast

Option 1: Maintaining Current Operation Strategy

Option 1 investment strategy would maintain the current advertising and promotion levels with a flat budget. The current advertising and promotion budget is $600,000 annually and has not changed since the inception of the service. In this option, the current budget would remain static while

media costs will continue to increase annually, which will result in diminishing returns on our advertising investment.

Options 2 and 3: Incremental Investment Strategies

Options 2 and 3 investment strategies would require a significant increase in the advertising and promotion budget. In order to effectively reach our consumers, raise awareness levels of the service expansion, and develop demand for the service, the advertising investment must be seriously considered. As Exhibit 9-1 shows, the amount of advertising investment is significantly larger in Options 2, 3, and 4 as compared to Option 1. This is because the advertising investment has not changed in the last 14 years, although media costs have risen at approximately 7 percent annually. In order to meet the rising costs of today's (and future) advertising opportunities and drive demand, the budget must grow with the service.

Option 4: Rail as a Long-Term Alternative Strategy – No Financial Constraints

Option 4 investment strategy would require a comparable budget for advertising and promotion as Options 2 and 3.

Exhibit 9-1: Proposed Marketing Budget

FY	Option 1	Option 2	Option 3	Option 4
2010	$600,000	$915,000	$915,000	$915,000
2011	$600,000	$940,000	$940,000	$940,000
2012	$600,000	$989,000	$1,054,000	$949,000
2013	$600,000	$1,032,000	$1,095,000	$1,078,000
2014	$600,000	$1,038,000	$1,100,000	$1,109,000
2015	$600,000	$1,035,000	$1,097,000	$1,228,000
2016	$600,000	$1,030,000	$1,091,000	$1,221,000
2017	$600,000	$1,030,000	$1,151,000	$1,222,000

Performance Measurements

- Reviewing monthly ridership and revenue reports can help determine if the marketing message is effective.
- Market research using focus groups, surveys, and advertising awareness research will help gain insight to the effectiveness of our campaigns.
- Obtain feedback from customers using comment cards and on-board surveys to gather information about key attributes such as service reliability, personal safety, employee presentation and

helpfulness, condition of equipment and facilities, and quality and availability of customer information.

- Operating statistics such as on-time performance and customer service ratings are important performance indicators related to the execution of the advertising strategy and marketing promotions, and the effectiveness of customer service delivery.

Washington State Department of Transportation

Chapter 10: Financing Amtrak *Cascades* Service: The Challenges and Opportunities

The 2006 long-range plan identified various construction projects for infrastructure improvements, equipment requirements, capital investments, and operating expenditures for providing and expanding Amtrak *Cascades* services. The *Amtrak Cascades Mid-Range Plan* outlines the implementation options and steps for each option to achieve additional services over the next eight years. Capital and operating investments that improve capacity and service are developed for the four mid-range plan options. The benefits and costs of these options are assessed.

The options analyzed in the mid-range plan provide information for policymakers to consider in how Amtrak *Cascades* service can be funded. The implementation of improved Amtrak *Cascades* service will depend on funding availability.

This chapter discusses how the Amtrak *Cascades* was funded in the past and what the challenges and opportunities are to fund Amtrak *Cascades* services in the future. This chapter includes three sections:

Funding History

The states of Washington and Oregon, Amtrak, Sound Transit, the Province of British Columbia, the federal governments of the United States (U.S.) and Canada, railroads, other participating organizations and agencies, and passengers that use the service are all direct or indirect sources of funding to the Amtrak *Cascades*.

Since Washington State began providing public funds for intercity passenger rail service in April 1994, it has been assumed that major capital construction projects, which are needed to support expanded Amtrak *Cascades* service, would be funded in the following manner:

- Projects necessary to provide faster, more frequent Amtrak *Cascades* service, between downtown Portland, OR and the Columbia River, would be funded by the state of Oregon, with potential funding coming from the U.S. federal government and Amtrak.

- Projects necessary to provide faster, more frequent Amtrak *Cascades* service, between the Columbia River and the Canadian

border, would be funded by the state of Washington, with potential funding coming from the U.S. federal government and Amtrak.

- Projects needed to improve Amtrak *Cascades* service in British Columbia would be funded by the Province of British Columbia, the Canadian federal government, and regional transportation agencies.

- Train sets and locomotives would be funded by the states of Washington and Oregon, with additional funds provided by the U.S. federal government and Amtrak.

- Projects necessary for increased Sounder commuter rail service in the Central Puget Sound would be funded by Sound Transit and the federal government.

Funding of the Amtrak *Cascades* program and related projects is listed by funding entity in Exhibit 10-1:

Exhibit 10-1: Amtrak *Cascades* Investment History: 1994-2007

Capital Investments
Portland, OR-Seattle-Bellingham-Vancouver, B.C.

Funding Source	Types of Projects	Amount
BNSF Railway Company	Track and signal work to support reintroduction of rail service between Seattle and Vancouver, B.C.	$ 9.4 million
State of Washington (WSDOT and the Washington State Transportation Improvement Board)	Traffic control and safety systems; rail replacement and track relocations; crossovers; siding extensions; storage tracks; train sets; station restorations and improvements.	124.4 million
Amtrak	Track relocation; train sets; locomotives; Seattle Maintenance Facility; station improvements.	62.0 million
Federal Funds (non-Amtrak, Federal Transit Administration, and Federal Railroad Administration)	Station renovations and improvements; crossing signals and closures.	44.1 million
Sound Transit and the Federal Transit Administration	Capacity improvements between Everett and Tacoma that benefit commuter, intercity passenger, and freight services.	284.3 million
	Capacity improvements between Tacoma and Lakewood that benefit commuter and intercity passenger service.	165.7 million
Oregon (Union Station to the Columbia River)	Traffic control system; track adjustments; improvements at Portland's Union Station.	13.7 million
Local/Other	Station improvements.	13.6 million
Total Capital Investment		**$717.2 million**

Operating Subsidies
Portland, OR-Seattle-Bellingham-Vancouver, B.C.

Funding Source	Amount
State of Washington	$176.0 million
Amtrak	91.4 million
Total Operating Funds	**$267.4 million**

Total Capital and Operating Investments for Amtrak *Cascades*
Portland, OR-Seattle-Bellingham-Vancouver, B.C.

Total	**$984.6 million**
Washington State Share of Total	**$300.4 million**

Source: WSDOT State Rail and Marine Office

Current Funding Status

The primary source of funding for the Amtrak *Cascades* capital and operating programs are state funds. These funds, which are generated from non-fuel tax revenues such as licenses, permits and fees, rental car tax, vehicle weight tax, and a portion of the sales tax on new and used vehicles, are deposited in the Statewide Multimodal Account. The state constitution restricts the use of motor vehicle fuel tax revenues exclusively to highway related expenditures.

The Washington State Legislature provided up to $29 million in the 2007-2009 biennial budget for Amtrak operations of Amtrak *Cascades* and for the maintenance of Talgo train sets attributable to state-supported services.

The state legislature has provided direction on capital investments with an approved project list and 10-year spending plan for rail capital investment. Currently programmed passenger rail investments are $360.4 million through 2025. The approved project list provides funding for several major projects, including the Vancouver – Rail Bypass and W. 39th St. Bridge, the Tacoma – Bypass of Point Defiance Phase 1, and a $49 million phase of the Kelso-Martin's Bluff project, as discussed earlier in this mid-range plan.

Limited federal funds have been available for intercity passenger rail development. The Pacific Northwest Rail Corridor (PNWRC), between Vancouver, B.C. and Eugene, OR, is one of 11 regional corridors identified by the USDOT for high-speed rail development. The corridor is one of the original five corridors designated in 1992. An average of $690,000 per year has been made available through the federal "High-Speed Rail Grade Crossing and Hazard Elimination" program. In September 2008, the Federal Railroad Administration announced the award of a $6 million grant to WSDOT for intercity passenger rail capital assistance. This grant will be used to partner with Sound Transit to help fund the Tacoma – Bypass of Point Defiance project.

Challenges and Opportunities

The mid-range plan focuses on infrastructure and operating improvements in the "highest transportation demand" segment of the PNWRC, Seattle to Portland, a segment that is traditionally funded by the state of Washington.

Challenges

- **Limited Multimodal Funding:** The Statewide Multimodal Fund, the primary source of state funding that is available for investment in the Amtrak *Cascades* program, also provides funding for transit, the Washington State Ferries system, bike, pedestrian, and some

highway activities. The amount of funds available is tied to vehicle registrations, various fees, and a percentage of the sales tax on new and used vehicles. The recent economic recession, witnessed by unprecedented volatility of capital market, may adversely impact the overall funding available for multimodal activities. Meanwhile, policies to heavily invest in infrastructure, which are often used by governments to stimulate the economy in prolonged economic recession or depression, could create emerging opportunities in passenger rail funding given its multiple benefits to society. In addition, there will be tremendous competition for available funds due to budget shortfalls and increased costs. Policymakers will be challenged to prioritize the limited resources. This mid-range plan attempts to provide comprehensive information through both quantitative and qualitative analyses to help policymakers make informed decisions.

- **No Dedicated Federal Funding:** Historically, there has not been a dedicated multi-year source of federal funding to provide a partnership similar to other modes of surface transportation.

- **Capital Funding in Oregon and Canada:** The availability of capital funding for improvements south of the Columbia River and north of the U.S./Canadian border is uncertain. Each of those entities needs to participate in rail capacity and reliability projects, if there is to be Amtrak *Cascades* service expansion, as described in the long-range plan.

Opportunities

Future Capital Funding Opportunities

After many years of deliberation, in October 2008, the US Congress passed the Rail Safety and Investment Act of 2008. This legislation provides, for the first time, a multi-year federal matching program with the states to fund intercity rail passenger capital projects. The legislation authorizes $1.9 billion in federal grants over five years. This 80 percent federal and 20 percent state program will allow WSDOT the opportunity to use state funds as leverage for federal funds for rail capital projects (infrastructure and equipment) in a manner that is similar to how other modes of surface transportation have been supported at the federal level. This program, if and when funds are actually appropriated, would need to be an essential component for the future development of Amtrak *Cascades*.

Provisions in the legislation allow states like Washington to use state investments as a 20 percent match for federal funds, up to a maximum of

$15 million per year, applying for up to $60 million in federal capital funds annually—prior to expending "new" state capital funds. The ability to use state funds as a match will be an important factor to consider when policymakers make determinations on future program funding levels.

Funding for Future Amtrak *Cascades* Operations

Ticket-buying passengers, the states of Washington and Oregon, and Amtrak currently fund the operating costs for Amtrak *Cascades* service in the PNWRC. It is assumed that any proposed increases in service as provided for in this mid-range plan, which focuses on enhanced Seattle to Portland service, would be funded by ticket buying passengers and by the state of Washington. Projected additional operating costs for each of the options presented in this plan are described in Chapter 6.

One of the major challenges is how to capture the opportunity of strong ridership growth to make the program more self-funded. Currently the farebox recovery ratio is about 50 percent—with strong ridership growth this year, it could reach a higher level. A 50 percent farebox recovery is considered very good for publicly-funded transportation. Policymakers need to determine the appropriate balance of farebox and public costs. It is possible that policymakers could view the many benefits of rail transportation as worthy of an appropriate level of public support. There are several factors that could drive a long-term growth of ridership.

- **High Energy Prices:** Rising fuel costs and the environmental advantages of rail passenger service have contributed to strong ridership growth. As Washington State and other entities in the region attempt to reduce greenhouse gas emissions and make environmentally responsible infrastructure choices, intercity passenger rail development as a method of travel should receive stronger consideration in the future. The mid-range plan options provide information on environmental impacts of multimodal investments for consideration.

- **Reliability Improvements:** There is tremendous opportunity to improve Amtrak *Cascades* service reliability through targeted investments in capital and in enhanced maintenance as discussed in this report. On-time performance can be expected to improve from the current 60+ percent to more than 90 percent in the next several years with investments outlined in this plan.

- **Reduced Travel Times:** Mid-range plan options for investment can reduce scheduled travel times in the range of 4 to 30 minutes due to infrastructure and reliability improvements, boosting

ridership by providing a more attractive and dependable rail transportation option in our region.

- **High Frequency of Train Service:** Higher frequency of train services, along with higher reliability (on-time performance and time savings) could trigger significant growth as business travelers start to use reliable train service. The mid-range plan did not forecast such growth due to lack of data. However, experiences in other corridors show this is a likely scenario as Amtrak *Cascades* operates at a service level of eight daily round trips.

Higher ridership could create a strong opportunity for the program to reduce net public costs.

- Higher ridership could increase occupancy that in turn decreases cost per passenger mile. If ticket prices hold, the lower costs mean lower public costs.

- If higher ridership is met by higher levels of service, economy of scale of running train services could also lead to lower costs per passenger mile.

This plan uses conservative estimates in analyzing ridership and farebox recovery. Actions proposed in the plan could lead to further improvements of revenue and cost performance.

- **Marketing Concepts:** For the first time, the mid-range plan includes marketing concepts that lay out actions to expand market reach to targeted customers. With the right marketing concepts, ridership fluctuation caused by seasonality could be improved and the average occupancy rate could be higher. Consequently, state support could be lowered. An investment in marketing could be fruitful in support of infrastructure and operation improvements. More people seek alternative transportation choices for many reasons, including concerns about high energy prices, congestion, and the environment.

- **Increased Ticket Prices:** Higher prices could lead to higher revenue, if the demand is not price sensitive for such a price increase. As the cost of using other modes (auto and airplane) increases sharply due to the fuel price hikes, people might select less expensive modes, such as rail and bus. This creates an opportunity for price increases. A study is proposed in the operation plan to further explore such an opportunity.

- **Improve Revenue Opportunity:** Revenues could be increased by improvements to onboard service quality, improving existing amenities such as the food and beverage service.