AMTRAK CASCADES

Preliminary Service Development Plan

Draft Alternatives Development and Recommendations Report for Public Review

Washington State Department of Transportation

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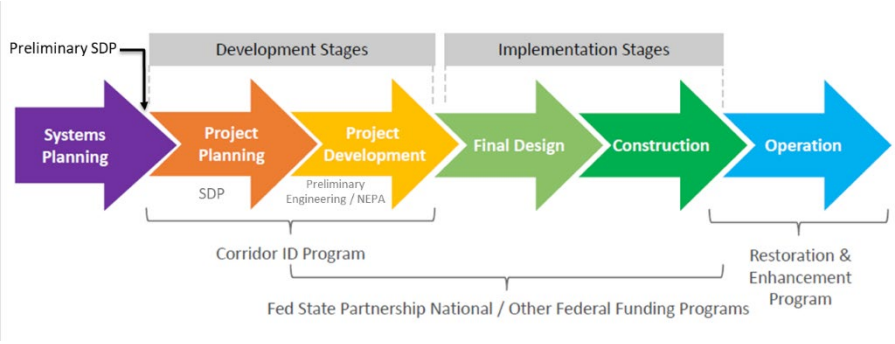
» Why are we developing a Preliminary Service Development Plan?

Well-informed planning for the future of Amtrak Cascades is critical to ensuring that available resources are invested in the wisest ways possible. Much has changed on the Pacific Northwest Rail Corridor (PNWRC)[1] since the 2006 long-range plan was created. A refreshed plan that accounts for growth, operational, and social changes is needed to inform future improvements.

Amtrak Cascades is an intercity passenger rail service operating along a 461-mile corridor connecting 18 cities in the Pacific Northwest, including Vancouver (British Columbia), Seattle, Portland, and Eugene

In 2022, Congress established the Federal Railroad Administration (FRA) Corridor Identification and Development (CID) Program. This new program is a national framework for passenger rail planning and development that will create a pipeline for preferential funding and delivery of intercity passenger rail projects (see below). A Service Development Plan (SDP) is a key requirement of the CID Program. In December 2023, the FRA selected the Amtrak Cascades corridor to be part of the CID Program. Completion of this Preliminary SDP, along with similar planning work in Oregon, gives Amtrak Cascades a head start to participate in this federal investment process.

FRA project life cycle stages and corresponding FRA funding programs



The Preliminary SDP is the first step in developing a comprehensive plan that will serve as a blueprint for the next 20 years for the entire Amtrak Cascades corridor. WSDOT coordinated regularly with Amtrak Cascades service partners (FRA, BNSF, Sound Transit, Canadian National, Amtrak, and ODOT) in the development of this Preliminary SDP. Following federal and state funding, including legislative direction[2], this initial phase allows WSDOT to identify future Amtrak Cascades service goals and initiate analysis of ridership data; different levels of train service; and potential infrastructure improvements to the railroad corridor. This preliminary plan serves as the foundation for future analysis and more robust planning under the CID program. Creating this preliminary plan also allows service partners and interested parties to be involved from the onset.

» What is in this Preliminary Service Development Plan?

The primary work products from the Preliminary SDP are: (1) Preliminary Purpose and Need statement; (2) preliminary alternatives.

[1] The Pacific Northwest Rail Corridor (PNWRC) is one of 11 federally designated high-speed rail corridors in the U.S. In this document, it is also referred to as the Amtrak Cascades corridor.
[2] ESSB 5689, Section 223 (2)

The Preliminary Purpose and Need statement defines the goals for future service improvement and why it is needed. It is used to identify and guide the range of alternatives that will be evaluated; establish criteria to evaluate those alternatives; and ultimately help determine the preferred alternative for service improvement.

The preliminary alternatives were used to address post-pandemic travel trends; assess how different service characteristics could affect ridership; and gain an initial understanding of the additional infrastructure that may be needed to implement them. Some of the preliminary alternatives could be considered incremental improvements implemented in the process of attaining higher service levels. During the next phase of work, the preliminary alternatives will be further analyzed, and more comprehensive examination of needs, costs, and resources will be evaluated.

This Preliminary SDP also includes the results of a scenario analysis WSDOT performed to understand how potential future travel trends could affect Amtrak Cascades ridership for each of the preliminary alternatives.

» How did we conduct outreach?

WSDOT conducted extensive outreach during development of the Preliminary Purpose and Need statement, receiving over 4,000 responses via webpage content, webinars, social media posts, and major employer interviews. Input was incorporated into the statement to strengthen the language and clarify the intent. It was also used to inform development of the preliminary alternatives. Similar feedback was received when the initial results were shared at public webinars in October 2023. The top priorities identified through public feedback are more frequent service, shorter travel times, reliable service, reduced greenhouse gas emissions, and better local connections at stations.

» What were our initial findings?

Five preliminary alternatives, described below, were identified for further analysis. They include a variety of potential service levels that vary depending on service frequency, operating speed, and station stopping patterns. With each preliminary alternative, trips were spread evenly throughout the day as much as feasible. The project team developed an initial list of infrastructure improvements that may be needed to allow for the various levels of service. These need to be further analyzed and discussions will be needed with host railroads and other service partners. Host railroads have not endorsed these improvements and no engineering analysis has been performed to design infrastructure improvements; therefore, no cost estimates are available, nor funding identified.

Summary of Preliminary Alternatives

	Preliminary Alternatives					
	Baseline	**A**	**B**	**C**	**D**	**E**
Seattle – Vancouver, BC daily roundtrips	**2**	**4**	**5**	**6**	**6**	**6**
Local trips	2	2	3	3	2	6
Express trips (13 minutes faster)	-	-	-	-	1	-
Seattle – Bellingham with bus to Vancouver	-	2	2	3	3	-
Seattle – Portland daily roundtrips	**6**	**8**	**10**	**13**	**13**	**16**
Local trips	6	7	10	13	9	16
Limited trips (14 minutes faster)	-	-	-	-	2	-
Express trips (20 minutes faster)	-	1	-	-	2	-
Maximum speed limit[3]	79 mph	79 mph	79 mph	90 mph	79 mph	90 mph
Estimated 2045 annual ridership (in millions)	1.3 M	2.1 M	2.4 M	2.9 M	2.5 M	3.2 M
Minimum number of infrastructure improvements	-	14	15	17	17	19

[3] See "How did we develop timetables for the preliminary alternatives?" at the end of Chapter 3 for more information about how maximum speed limits were assigned to the preliminary alternatives.

» What did we learn?

Service Frequency: Up to 16 Seattle-Portland round trips could meet forecasted travel demand, but a better understanding of the capital investments and operating expenses for the alternatives are needed.

Speed Increases: Shorter travel times could increase ridership. Simply raising the maximum speed to 90 mph may be viable in some locations, but more analysis and host railroad discussions are needed to confirm if these increases are viable. An assessment of opportunities to increase speeds in locations with current speed restrictions through infrastructure investments will be considered in the next phase of work.

Stopping Patterns: Express/limited service showed a negative effect on ridership compared to all local service, but further analysis is needed to better understand revenue performance if higher fares are charged for faster trips.

Seattle-Bellingham Rail Service: More train trips to Vancouver, BC are not viable without support from Canadian partners. However, additional trains to Bellingham, with connecting buses across the border could capture most of the ridership between Seattle and Vancouver, BC and should be analyzed further if infrastructure improvements in Canada become a challenge.

Future Travel Trends: The scenario analysis showed that higher population and employment growth, and supportive rail and transit service improvements are major drivers for further boosting ridership. Less business travel and the continuation of the current teleworking trend could have a strong dampening effect on future ridership. In addition, technology trends such as vehicle automation have the potential to limit ridership growth. Strategies for enhancing the passenger experience should be considered as tools for maximizing ridership as the travel market evolves.

» What are our next steps?

WSDOT was awarded a $500,000 grant from FRA in December 2023. This will be used to scope a work plan for a full and comprehensive corridor-wide SDP in coordination with the Oregon Department of Transportation (ODOT) and FRA.

The comprehensive corridor-wide SDP will further refine and evaluate the preliminary alternatives. It will be based on more extensive and detailed transportation planning analyses that could include:

- Operations analysis
- Ridership and revenue forecasts
- Conceptual engineering
- Capital cost estimates
- Operating and maintenance cost estimates
- Labor and fleet planning
- Station area and access analysis

Additional work under next phase of SDP development also includes:

- Initial environmental planning
- Financial planning and benefits/cost analysis
- Corridor governance
- Phased implementation plan

This work will continue to be coordinated with other transportation planning efforts, including Cascadia High Speed Rail and the I-5 Master Plan.

Public engagement will continue throughout the SDP process, including communities, partners, and stakeholders. Feedback on this Preliminary SDP will be incorporated into future SDP work.

1 Introduction

» What is Amtrak Cascades?

Amtrak Cascades is an intercity passenger rail service operating along a 461-mile corridor connecting 18 cities in the Pacific Northwest, including Vancouver (British Columbia), Seattle, Portland, and Eugene as shown in **Exhibit 1**. The service carried more than 800,000 annual passengers prior to the COVID-19 pandemic, and ridership and revenue performance in 2023 are nearing 2019 (pre-pandemic) levels. Trains operate on railroad tracks owned by BNSF, Sound Transit, Canadian National (CN Railway), and Union Pacific.

Corridor segments	Daily round trips
Vancouver, BC – Seattle, WA	
Seattle, WA – Portland, OR	
Portland, OR– Eugene, OR	

Exhibit 1: Amtrak Cascades map

» What are we doing?

This Preliminary Service Development Plan (Preliminary SDP) was prepared by the Washington State Department of Transportation (WSDOT), to study future potential alternatives for enhancing the Amtrak Cascades service over the next 20 years. This plan, created with coordination and support[4] from the Federal Railroad Administration (FRA), focuses on the corridor between Portland, OR and Vancouver, BC, which is the Washington state segment of the Amtrak Cascades Corridor. This work complements similar planning work undertaken by the Oregon Department of Transportation (ODOT) for the Portland to Eugene portion of the Pacific Northwest Rail Corridor (PNWRC)[5]

The Preliminary SDP explores potential service alternatives (e.g. number of trips, stations served, travel times between stations) and identifies congested locations along the corridor that may need capital improvements before service can be enhanced. The goal is to provide information that informs decisions about what should be analyzed further as the planning process continues, considering travel trends, population growth, community needs, and other service development factors.

» Why are we doing this?

Well-informed planning for the future of Amtrak Cascades is critical to ensuring that available resources are invested in the wisest ways possible. Much has changed on the Amtrak Cascades corridor since the last long-range plan was created in 2006. A refreshed plan that accounts for current conditions is needed to guide future

[4] The plan is funded by a $500,000 Consolidated Rail Infrastructure and Safety Improvements (CRISI) grant awarded to WSDOT by FRA in 2019 and $500,000 of state funds as match.
[5] Oregon Department of Transportation, Oregon Corridor Investment Plan.

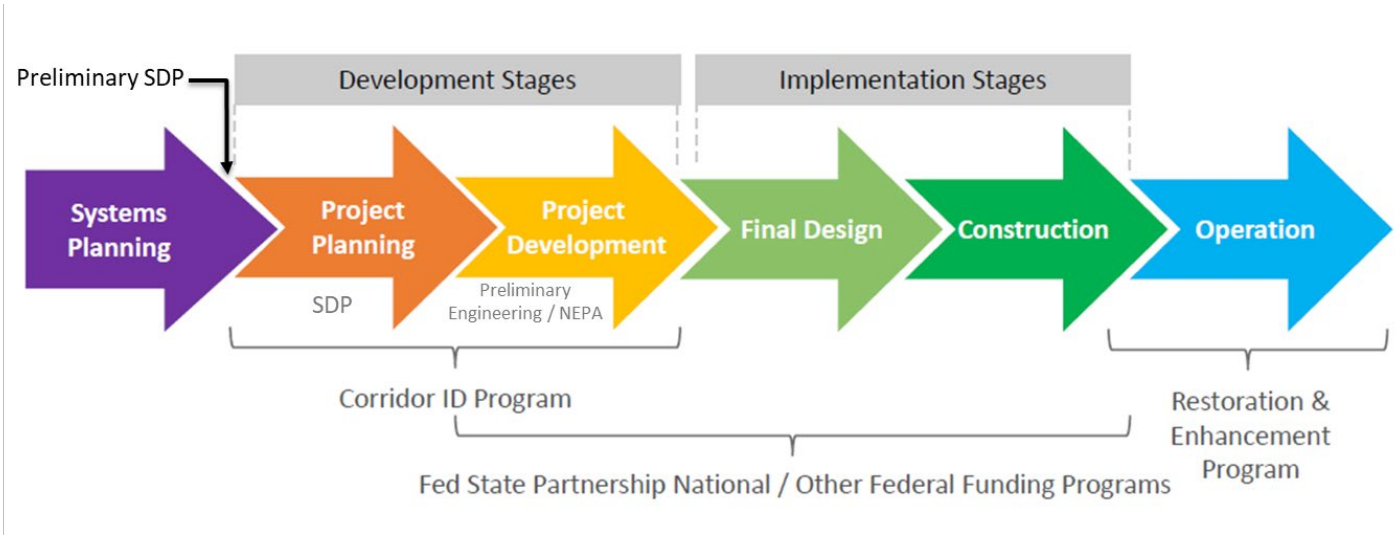
improvements. This Preliminary Service Development Plan is the first phase towards creating a blueprint for improving Amtrak Cascades service for the next two decades.

The 2006 Long-Range Plan for Amtrak Cascades set the stage for securing nearly $800 million in American Recovery and Reinvestment Act (ARRA) and High-Speed Intercity Passenger Rail (HSIPR) funds to create capacity for two additional Seattle to Portland round trips, reduce travel times, and improve on-time performance in the corridor. Building on this achievement, an updated plan is needed to guide practical improvements over the next 20 years based on current rail system conditions and updated federal requirements. In addition, many other factors contribute to the analysis, such as population growth, housing, employment, travel preferences, and environmental initiatives.

This analysis also aligns with FRA's new foundation for a long-term intercity passenger rail program: the Corridor Identification and Development (CID) Program. It was established by FRA in 2022 as part of the federal Infrastructure Investment and Jobs Act. CID is a national framework for passenger rail planning and development that will create a pipeline for funding and delivery of intercity passenger rail projects. **Exhibit 2** illustrates how accepted corridors progress through the CID process.

This Preliminary SDP is part of Systems Planning and positions Amtrak Cascades to formally enter FRA's Development and Implementation Stages in the CID Program. This document is being done now to provide a thorough initial analysis of alternative concepts as the first step in developing a comprehensive and full SDP for the entire PNWRC, laying the structural groundwork for the next stage of analysis in Project Planning.

Exhibit 2: FRA project life cycle stages and corresponding FRA funding programs



» Preparing for future rail investment opportunities

During the development of this Preliminary SDP, WSDOT and ODOT submitted an application seeking entry into the FRA CID program for the Amtrak Cascades corridor and were successfully accepted into the CID program in December 2023. As part of the CID program moving forward, a more comprehensive Service Development Plan must be developed that includes scoping, planning, and development for the entire PNWRC corridor. This corridor-wide plan then must be approved by FRA. Additional requirements, direction, and guidance from FRA are anticipated in the future as the CID Program grows and develops. In the meantime, work with FRA and our service partners continues as we undertake further analysis that is required for federal funding of future rail investments on the Amtrak Cascades corridor.

» Planning and policy context

Statewide transportation policy

Service planning for Amtrak Cascades is guided by Washington's six statewide transportation policy goals defined by statute[6] and the Washington Transportation Plan.[7]

Washington's Statewide Transportation Policy Goals

Safety: To provide for and improve the safety and security of transportation customers and the transportation system.

Economic Vitality: To promote and develop transportation systems that stimulate, support, and enhance the movement of people and goods to ensure a prosperous economy.

Preservation: To maintain, preserve and extend the life and utility of prior investments in transportation systems and services.

Mobility: To improve the predictable movement of goods and people throughout Washington, including congestion relief and improved freight mobility.

Environment: To enhance Washington's quality of life through transportation investments that promote energy conservation, enhance healthy communities and protect the environment.

Stewardship: To continuously improve the quality, effectiveness and efficiency of the transportation system.

State Rail Plan

Amtrak Cascades service planning is aligned with the 2019 State Rail Plan, including the rail system vision statement. Information from this Preliminary SDP and the subsequent full SDP will be integrated into future versions of the State Rail Plan to meet federal[8] and state[9] requirements.

Vision for Washington's Rail System

As an integral part of Washington's multimodal transportation network, the rail system provides for the safe, reliable and environmentally responsible movement of freight and passengers to ensure the state's economic vitality and quality of life.

Other transportation planning

Planning for Amtrak Cascades will continue to be coordinated with other transportation planning efforts, including Cascadia High Speed Rail and the I-5 Master Plan.

[6] RCW 47.04.280
[7] https://wsdot.wa.gov/construction-planning/statewide-plans/washington-transportation-plan
[8] The federal requirements for a state rail plan are outlined in 49 USC 22705 and 49 CFR 266.15 which implement the Passenger Rail Investment and Improvement Act of 2008 and the FAST Act of 2015.
[9] The State Rail Plan meets several state requirements:

- State Rail Plan required in RCW 47.76.220
- Intercity Passenger Rail Plan required in RCW 47.06.090
- Rail Passenger Plan required in RCW 47.79.040

» What is in this Preliminary Service Development Plan?

The Preliminary Service Development Plan is the first step in developing a comprehensive plan for the entire Amtrak Cascades corridor. Given the available level of resources, this initial phase was limited to two main work products. It allowed WSDOT to develop the goals for future Amtrak Cascades service and to begin analysis of ridership data; different levels of train service; and potential infrastructure improvements to the railroad corridor.

This preliminary plan will serve as the foundation for further analysis and more robust planning activities as the final Service Development Plan is undertaken. Publishing this preliminary plan allows interested parties to be involved from the onset in the continued development of the final plan. Engaging communities, partners, and stakeholders in creating the program goals ensured WSDOT received valuable feedback on the issues of greatest importance in planning for the future of the service. Sharing the preliminary analysis of data and service configurations provided additional opportunities for input as the process continues.

The two primary work products included in this preliminary plan are: (1) Preliminary Purpose and Need statement and (2) preliminary alternatives. During the next phase of work, the alternatives will be further analyzed, and a more comprehensive examination of needs, costs, impacts, and resources will be evaluated. More details on those activities can be found in the “Next Steps” section of this report.

Preliminary Purpose and Need

The Preliminary Purpose and Need statement defines the goals for future service improvement and why it is needed. It is used to identify and guide the range of alternatives that will be evaluated; establish criteria to evaluate those alternatives; and ultimately help determine the preferred option for service improvement. It is intended to transition into the Purpose and Need statement for subsequent environmental analysis under the National Environmental Policy Act, if the analysis requires one.

Preliminary alternatives

WSDOT developed preliminary alternatives to address post-pandemic travel trends; assess how different service characteristics could affect ridership; and gain an initial understanding of the additional infrastructure that may be needed to implement them. Some of the preliminary alternatives could be considered incremental improvements implemented in the process of attaining higher service levels.

To develop preliminary alternatives, the project team:

- Reviewed recent literature and data to understand post-pandemic travel trends
- Created a wide range of service options based on the Preliminary Purpose and Need, public feedback and travel market data
- Assessed initial service options using criteria, including ridership projections, to narrow them down to five preliminary alternatives
- Conducted capacity analysis of rail corridor capacity, identifying potential investments needed to support the service levels of preliminary alternatives
- Undertook a scenario analysis to gain insights into how future uncertainties may shift ridership projections

WSDOT will carry the preliminary alternatives forward as development of a full SDP continues in the next phase of work.

2 Public input

The public outreach process provided several opportunities for feedback and engagement from individuals and organizations throughout the corridor.

The public outreach activities sought to:

- Provide an opportunity for public participants to engage in the service planning process and give relevant input to the project
- Focus public input in a structured manner to allow decisions to be made based on public involvement
- Ensure elected officials, agencies, stakeholders, and the public were informed about the project and its implications for their communities so that potential concerns could be addressed and resolved
- Receive feedback from people representing a wide range of perspectives in the corridor, including those not historically engaged in transportation planning activities

The project team engaged many audiences, including:

- Current and future riders of Amtrak Cascades
- Amtrak Cascades service partners (BNSF, Sound Transit, CN Railway, Amtrak, ODOT, FRA)
- Communities along the corridor, particularly those in underserved communities
- Elected officials
- Federal, state, regional, and local agencies
- Tribes
- Advocacy and special interest groups

Key public outreach activities are described below in **Exhibit 3**.

Exhibit 3: Key public outreach activities

Project activity	Outreach activities
Preliminary Purpose and Need statement	• Amtrak Cascades email distribution list notifications • Social media posts (translated into Chinese, Spanish, Vietnamese) • Text messages to limited-English speakers and low-income populations • Informational website, with project fact sheets into Spanish, Russian, Vietnamese, Korean, Chinese, Somali, and Arabic. • Webinars (local and regional agencies, passenger rail advocacy organizations, members of the public) • Online comment form (translated into Chinese, Spanish, and Vietnamese)
Preliminary alternatives	• Major employer interviews • Technical working group meetings with service partners • Amtrak Cascades email distribution list notifications • Website update • Webinars (local and regional agencies, passenger rail advocacy organizations, members of the public)
Final report	• Notifications through the Amtrak Cascades email distribution list • Website update

Some key themes WSDOT heard during the outreach process are listed below in **Exhibit 4** and **Exhibit 5**. These themes were considered by the project team while developing the alternatives. More information about public outreach can be found in **Appendix B**.

Exhibit 4: Key themes from Preliminary Purpose and Need outreach

More service	Increasing the number of trips would make Amtrak Cascades more convenient and encourage people to use it more.
Faster trips	Shorter travel times would eliminate one of the perceived advantages of driving and make taking the train a more attractive option.
Better reliability	Better on-time performance would encourage people to take the train more, especially for trips that require arrival by a specific time.
Improvements to first- and last-mile connections	Better connections to other transportation options at stations would make it easier for people to get to and from their destinations
Emission reductions	Service improvements could encourage people to take the train instead of using an option with higher greenhouse gas emissions, helping Washington meet emission reduction goals

Exhibit 5: Areas of potential improvement cited in major employer interviews

Efficiency and reliability	Travel times faster than driving, or if similar, with more convenience and opportunities for increased work productivity.
Round trips with fewer stops	Faster travel times using express or limited-stop trains.
Enhanced business class features	Amenities to increase work productivity during the journey, such as reliable broadband Wi-Fi (e.g., for video calls), comfortable seating, worktables, and specific cars designated for phone calls.
Improvements to first- and last-mile connections	Reliable, frequent transit connections at stations will help address the post-pandemic unreliability of rideshare services and a lack of secure long-term parking at stations.
Convenient and expedited border crossings	More efficient border crossing via Amtrak would increase the attractiveness of train travel given the long wait times for autos at the Canadian border.

3 Development of preliminary alternatives

» Preliminary Purpose and Need statement

The Preliminary Purpose and Need statement served as the foundation for the Preliminary Service Development Plan and guided the identification and evaluation of service options._Input was sought from the public and stakeholders that was incorporated into this statement to strengthen the language and clarify the intent.

The purpose of the proposed Project is to enhance intercity passenger rail service for travelers along the existing route used for the Washington state segment of the PNWRC[10].

The Project would meet the following transportation needs:

- Meet growing intercity travel demand with more frequent, reliable and customer-focused service
- Strengthen multimodal connections to improve accessibility and provide better travel options
- Support greenhouse gas reduction goals
- Support the economic vitality of communities served by PNWRC passenger service
- Address transportation system equity issues along the corridor
- Ensure the rail corridor has the capacity to support needs of all passenger and freight rail service providers

Additionally, the project will:

- Avoid or minimize negative community and environmental impacts
- Be a cost-effective investment

More detailed information about the Preliminary Purpose and Need can be found in **Appendix A**.

» Market data and information

In addition to the Preliminary Purpose and Need statement and public input, WSDOT used travel market data and information gathered during the preliminary alternatives development process to identify travel trends (**Exhibit 6**).

[10] The Pacific Northwest Rail Corridor (PNWRC) is one of 11 federally designated high-speed rail corridors in the U.S. The 462-mile (742-kilometer) PNWRC serves the most densely populated areas of the Cascadia megaregion, linking Vancouver, BC to Seattle, Portland, and Eugene. In this document, it is also referred to as the Amtrak Cascades corridor.

Exhibit 6: Summary table of travel trends and service planning implications

	Trends	Implications
Underlying Travel Market Shifts	▪ **Trip purpose** – Less business/commute travel, more discretionary travel. ▪ **Trip distance** – Shorter- and mid-distance trips (50–250 miles) are increasing, while long-distance trips are not recovering.	▪ More travel in the off-peak and weekends, leading to a more **balanced service plan** (and potentially less congestion). ▪ Service plans should accommodate **intermediate markets** with ideas like express and local stopping patterns, shorter run segments. ▪ **New connections** for outlying cities to urban job centers, potential **coordination with commuter rail**.
Changing Demand	▪ Urban auto trips have been slower to return, and suburban and rural auto trips have grown faster ▪ **Amtrak Cascades ridership has steadily increased** since 2020 as service has been incrementally restored. ▪ **Future travel demand will continue to increase**, driven by strong population and employment growth.	▪ Maintain **competitive travel times** with auto. ▪ Ridership is likely to continue to increase with service restoration and planned increases.

Travel market shift in the region

Trip purpose

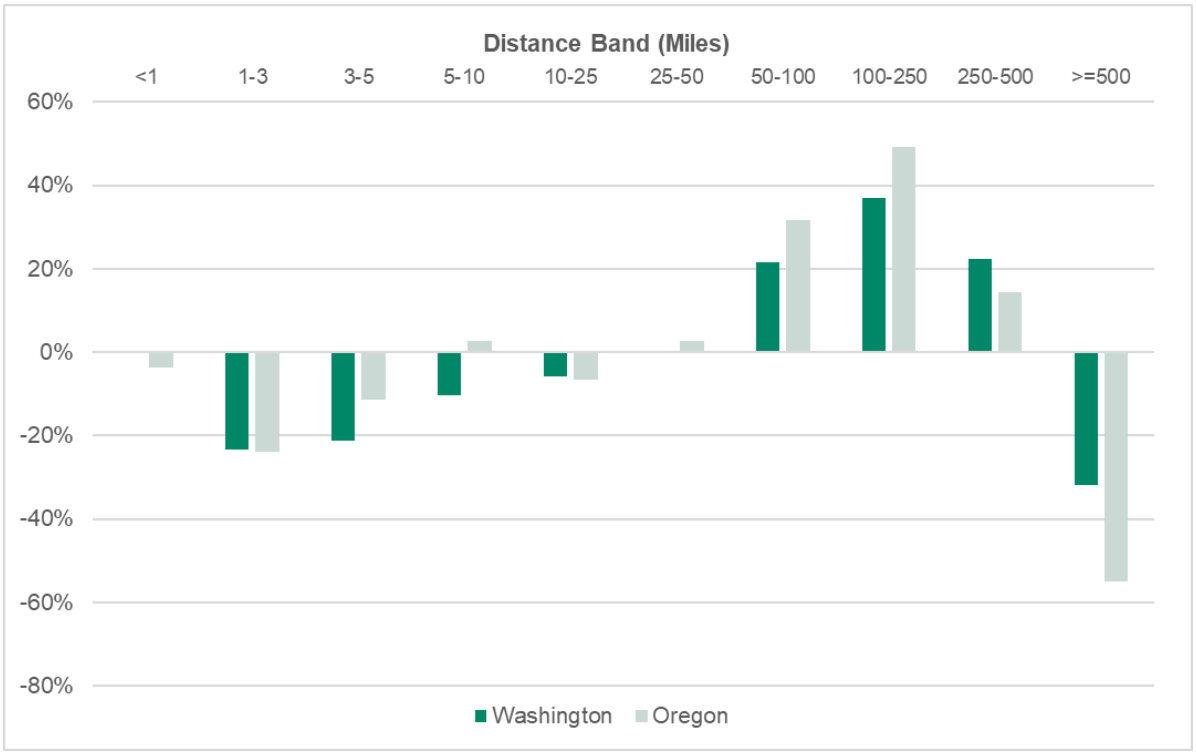
Mid and long-distance trips (longer than 64 miles) in the PNWRC region[11] are shifting from work related activities toward discretionary travels from 2019 (pre-pandemic) to 2022. The share of work-related travel dropped from 24% to 20%, while the combined share for 'eat and shop' and 'recreation' categories increased from 61% to 72%. The pandemic's impacts on business travel in the region is consistent with national trends. Morning Consult's 2022 survey of thousands of U.S. adults[12] found that "the share of U.S. adults who say they travel for business is now 18% lower" than in typical pre-pandemic years, with "high-frequency business travelers [showing] the biggest decline".[13] While business travel continues to be down relative to pre-pandemic levels, intercity passenger rail service can better capture discretionary travel by accommodating discretionary trips during off-peak periods and weekends.

Trip distance

Short to mid-distance trips[14] (50-250 miles) increased 20% to 50% between 2019 and 2022 in Washington and Oregon (**Exhibit 7**). This trip distance market is ideal for rail travel and indicates potential for a higher modal split toward rail. Conversely, for long-distance journeys exceeding 500 miles, both Washington and Oregon experienced pronounced declines more than 30%, indicating that long-distance travel had yet to rebound in the early post-pandemic period.

[11] Source: Replica data for 2019 and 2022. Replica is an enterprise data platform and a data source relating to travel factors and patterns: https://replicahq.com/
[12] "Report: Business, but Not As Usual." Morning Consult. February 2023
[13] "Business Travel Will Never Bounce Back To Pre-Pandemic Levels, Studies Say." Forbes. April 2023.
[14] U.S. Department of Transportation, Transportation Statistics Annual Report 2022. Trips encompass various transportation modes such as driving, rail, transit, and air: https://data.bts.gov/Research-and-Statistics/Trips-by-Distance/w96p-f2qv/data

Exhibit 7: Change in percentage of trips by distance from 2019 to 2022

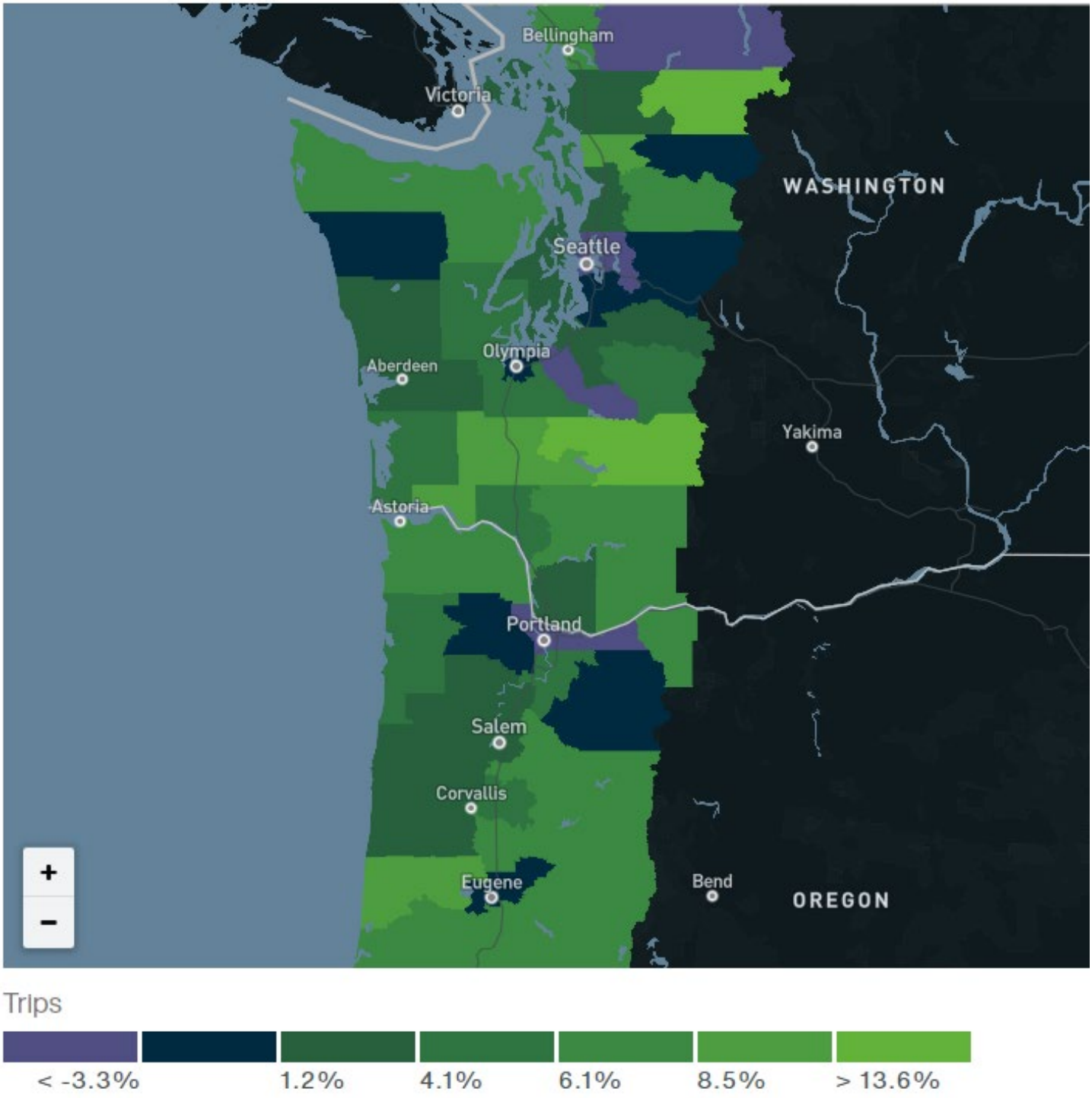


Changing demand

Shift in automobile trips

Trip-making patterns within the PNWRC shifted because of COVID-19, with urban automobile trips slow to return to pre-pandemic levels. As shown in **Exhibit 8**, compared to 2019 levels, daily automobile trips in 2022 were 5% lower in Seattle and 4% lower in Portland. In contrast, there has been an overall increase in suburban and rural automobile trips, especially in the area between Seattle and Portland. This includes Lewis County (15% increase) and Cowlitz County (11% increase).

Exhibit 8: Change in total automobile trips along the PNWRC (July 2019 and July 2022)

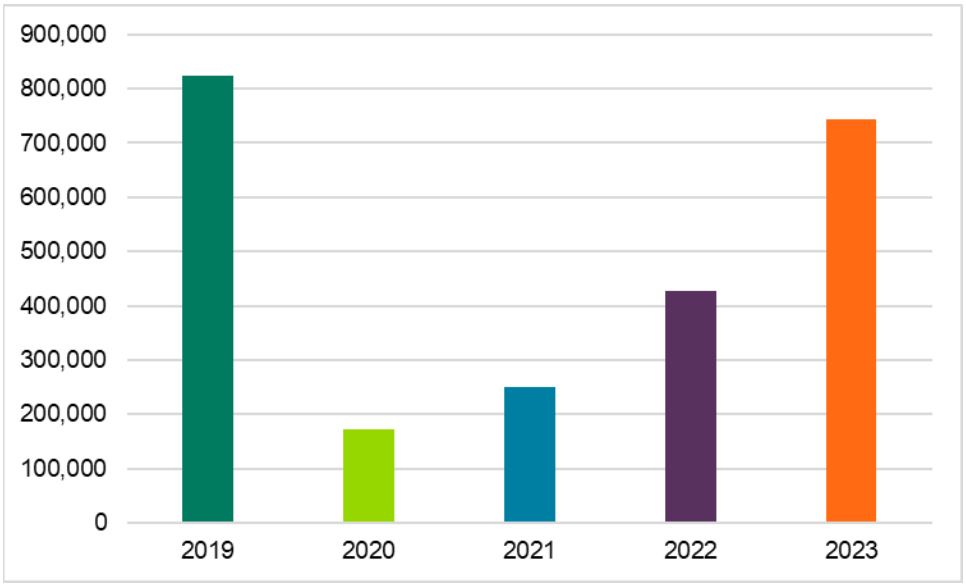


Source: Replica trends data https://replicahq.com/

Robust recovery for Amtrak Cascades ridership

The recent ridership trend indicates a robust recovery for Amtrak Cascades travel since COVID-19 (**Exhibit 9**). In 2020, Amtrak Cascades ridership plummeted to just 21% of the 2019 level, primarily due to significant service reductions and travel restrictions. It has rebounded steadily since then. In 2022, ridership increased nearly 70% compared to 2021. With service fully restored to pre-pandemic levels in March 2023, ridership continued the strong upward trend and increased by 74% compared to 2022.

Exhibit 9: Amtrak Cascades annual ridership from 2019 to 2023

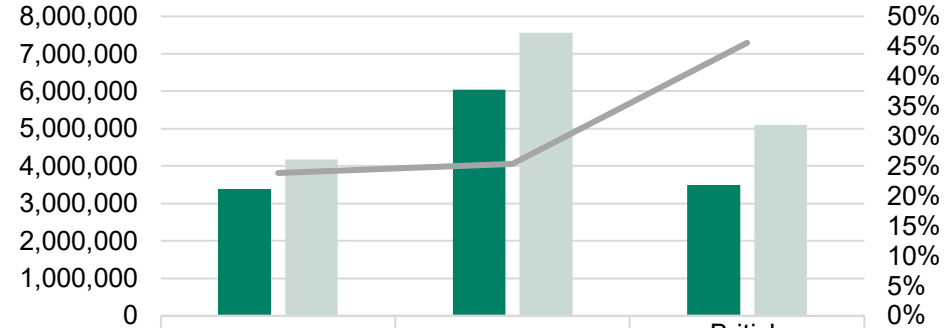


* Note: Service between Seattle and Vancouver, BC was restarted in September 2022 with one daily roundtrip, and full service of two daily roundtrips was restored in March 2023.

Population and employment trends

Between 2020 and 2045, population in counties along the PNWRC is forecast to grow between 24% to 46%, and employment is forecasted to grow by 18% to 35%, which will drive the regional travel demand for all modes, including Amtrak Cascades (**Exhibit 10**).

Exhibit 10: Population growth in the PNWRC corridor [15]



	Oregon	Washington	British Columbia
2020	3,377,625	6,036,519	3,501,631
2045	4,183,179	7,569,479	5,098,192
Growth	24%	25%	46%

[15] Sources: Washington-Office of Financial Management; Oregon-Bureau of Economic Analysis (for the current year), Portland State University (for 2045 / other counties along the rail corridor in Oregon not including Portland MSA), The Metro Council(for 2045 / Portland MSA only); British Columbia-Statistics Canada (current year), BCStats (for 2045)

» Service option definition and screening

WSDOT defined initial service options based on key service characteristics and selected a subset to carry forward as preliminary alternatives for further analysis. This section documents the three service characteristics and their values that were used to define initial service options, and the service option screening process and criteria.

Service options for Amtrak Cascades refer to potential configurations of future service, defined by key characteristics including service frequency, operating speed, and station stopping patterns. The preliminary alternatives represent a short list of refined service options and the corresponding infrastructure improvements that are advanced to the next phase of SDP work.

Σ> *What key service characteristics define the initial service options?*

The key service characteristics used to define the 13 initial service options included service frequency, stopping patterns, and the potential for speed increases (**Exhibit 11**). These three characteristics and their values are summarized in the table below and then discussed in detail. The process leading to 13 initial service options is also described at the end of this section.

The detailed list of 13 initial service options is documented in **Appendix C**.

Exhibit 11: Key service characteristics and values for service option definition

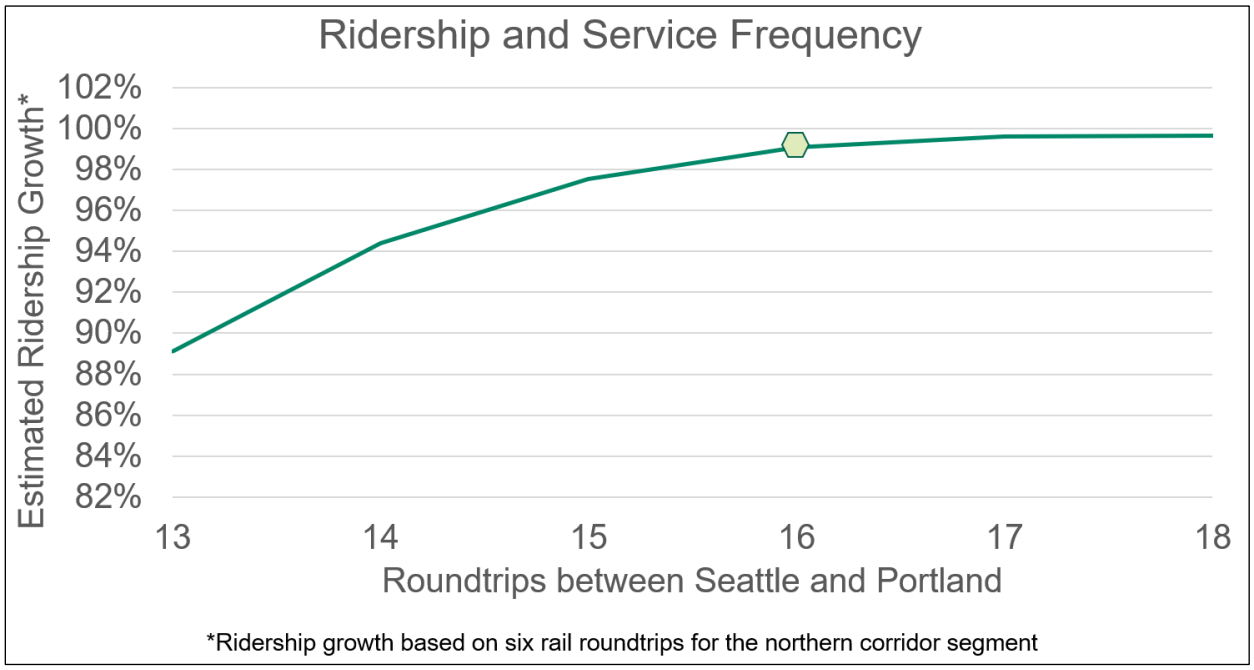
Service frequency *Increased frequency beyond 2023 levels*	▪ Frequency from 2006 Long-Range Plan (13 daily round trips between Seattle and Portland) ▪ Lower service frequency options (minimum of 8 daily round trips for Seattle-Portland, 3 for Seattle – Vancouver BC) ▪ Higher service frequency options (up to 16 daily round trips for Seattle-Porland, 6 for Seattle – Vancouver BC)
Stopping patterns *Skipping intermediate stops for shorter trip times or introducing integrated bus/rail service*	▪ Local (stop at all stations) ▪ Express (*non-stop*) ▪ Limited (*stops in Seatle, Tacoma, Vancouver, WA and Portland*) ▪ Partial rail service for new Seattle–Vancouver, BC trips (*rail for Seattle–Bellingham, bus for Bellingham–Vancouver*)
Speed increases *Faster operating speeds to reduce travel times*	▪ Increasing maximum speed from 79 mph to 90 mph in straight sections ▪ Removing or reducing current speed restrictions (to be considered in next phase of SDP work)

Service frequency

Higher service levels was the priority for future service improvements most often mentioned during Preliminary Purpose and Need outreach, with 35% of nearly 3,000 respondents requesting additional daily trips. To determine a basis for service frequency, the following was considered:

- WSDOT's 2006 Long-Range Plan, which identified 13 daily round trips between Seattle and Portland
- All service options include six future round trips between Portland and Eugene, consistent with ODOT's *Oregon Passenger Rail Tier 1 Draft and Environmental Impact Statement (2020)* and the *Oregon Passenger Rail Service Development Plan (2021)*
- Most importantly, the upper limit of 16 roundtrips for Seattle-Portland service was determined based on an early ridership sensitivity analysis using a simplified version of the ridership forecast model. As shown in **Exhibit 12**, potential ridership growth for the PNWRC begins leveling off at approximately 16 daily round trips between Seattle and Portland

Exhibit 12: Ridership as a function of service frequency



Source: AECOM

Speed increases

Shorter travel times was another high priority identified during public outreach. The existing maximum speed limit allowed on the corridor is 79 mph. Operating Amtrak Cascades trains at higher speeds will require negotiations with the host railroads. BNSF has indicated a maximum speed limit of 90 mph may be feasible but very challenging to implement.

As part of this Preliminary SDP, the project team made an initial assessment of locations where there may be opportunities to reduce travel times through higher speeds. A higher maximum speed limit was only considered for sections where the speed limit can be raised using higher maintenance standards. Increasing speeds in locations with current speed restrictions through infrastructure investments will be considered as part of conceptual engineering during the next phase of SDP work.

Further engineering analysis and discussions with host railroads are required to better understand the feasibility, benefits, and impacts of increasing speeds on the corridor.

Stopping patterns

Currently, all trains stop at every station. To provide shorter travel times or introduce additional service more quickly, the following alternate stopping patterns were considered:

- *Express or limited-stop services* to provide shorter travel times between the busiest stations.
  - *Express services* with no intermediate stops between Seattle and Portland, OR, as well as between Seattle and Vancouver, BC. The three stations in those cities are the busiest in the corridor, serving 68% of all rider boardings along the PNWRC.
  - *Limited-stop service* between Seattle and Portland OR with intermediate stops at the Tacoma and Vancouver, WA stations. Tacoma and Vancouver WA were the next two busiest stations for Amtrak Cascades service in 2019. In addition, Portland – Tacoma, and Seattle – Vancouver, WA were the third and fourth most popular station pairs by number of trips in 2019.
- *Additional rail service between Seattle and Bellingham*, with connecting bus service between Bellingham and Vancouver, BC was also considered as an option when looking at reduced infrastructure investments in Canada. This allows service increases within Washington until additional service and investments can be implemented in Canada.

Initial service option definition

WSDOT developed four groups of service options based on the level of service frequency: low, medium, high, and highest as shown in **Exhibit 13**. Except for the highest service option group, each group identifies four service options, combining different station stopping patterns and service frequency. Low, medium, and high service option groups consider various stopping patterns such as express/limited service, all local service, and connecting bus service between Bellingham and Vancouver BC.

Exhibit 13: Initial service option groups

Service option group	Low	Medium	High	Highest
Number of service options	4	4	4	1
Service frequency – Portland to Seattle	8 roundtrips	10 roundtrips	13 roundtrips	16 roundtrips
Service frequency – Seattle to Vancouver BC	3 and 4 roundtrips	5 and 6 roundtrips	6 roundtrips	6 roundtrips
Service frequency – Eugene to Portland	6 roundtrips			

The highest service option group includes a single option with the highest number of roundtrips and maximum number of station stops. This option is based on the result of the initial ridership sensitivity analysis that generates the highest ridership.

Adding up the four service options groups results in an initial list of 13 service options. This initial list assumes 79 mph as the maximum speed to estimate trip runtime for service option screening process. A higher maximum speed limit of 90 mph is examined later as part of the timetable development to refine the remaining service options.

⋗ *Screening and evaluation of service options*

The service option screening analysis assessed 13 service options representing different combinations of service characteristics. The following process was employed for the service option screening:

- Develop five evaluation criteria based on the Preliminary Purpose and Need: high-level ridership growth[16], feasibility, multimodal connectivity, equity, and travel time improvements
- Evaluate and score each service option using these five criteria
- Choose at least one highest scoring option from each service level group to advance as preliminary alternatives

WSDOT consulted with Amtrak Cascades service partners (FRA, BNSF, Sound Transit, Canadian National, Amtrak, and ODOT) regularly throughout the service option screening process.

This process resulted in identifying the five highest scoring service options, including 1 from the low service level group, 1 from the medium group, 2 from high group, and 1 from highest service level group. Those five are advanced for further detailed operational, infrastructure, and ridership analysis. The evaluation criteria and methods for ranking the service options are shown in **Exhibit 14.** The results are documented in **Appendix C.**

[16] These initial ridership estimates did not use the full ridership model for the service options. Given there were 13 initial service options to consider, the approach was to conduct what is referred to as “ridership sensitivity testing”, which provides initial estimates based on a simple approach. In lieu of fully developed timetables, runtimes used for the ridership sensitivity testing were determined using train performance characteristics based on data about the rail line geometry and how that affects train operating speeds, the performance characteristics of assumed trainset types (the Airo trainsets currently being manufactured for Amtrak Cascades was assumed), and the current freight train operating speeds. These initial ridership estimates were one of several factors considered in the screening the long list of possible service options.

Exhibit 14: Evaluation criteria descriptions

Criteria	Description
 **Ridership**	Projected high-level ridership increases over the existing service
 **Feasibility**	Existing corridor constraints and magnitude of service improvements that affect feasibility
 **Equity**	Service options stopping at all existing stations provide more equitable access to Amtrak Cascades service
 **Multimodal Connectivity**	Service options with higher frequency create more opportunities to use complementary transportation systems
 **Travel Time Improvement**	Service options with express and/or limited-stop service patterns provide travel time improvements compared to local service

» What are the preliminary alternatives?

The 13 initial service options were pared down, with five service options and their associated infrastructure improvements selected for further analysis as preliminary alternatives that are described in detail below in **Exhibit 15** and **Exhibit 16**. All alternatives are preliminary concepts subject to further analysis and refinement. All alternatives include six daily round trips between Eugene and Portland, as identified in ODOT's Service Development Plan.

Exhibit 15: Existing service diagram

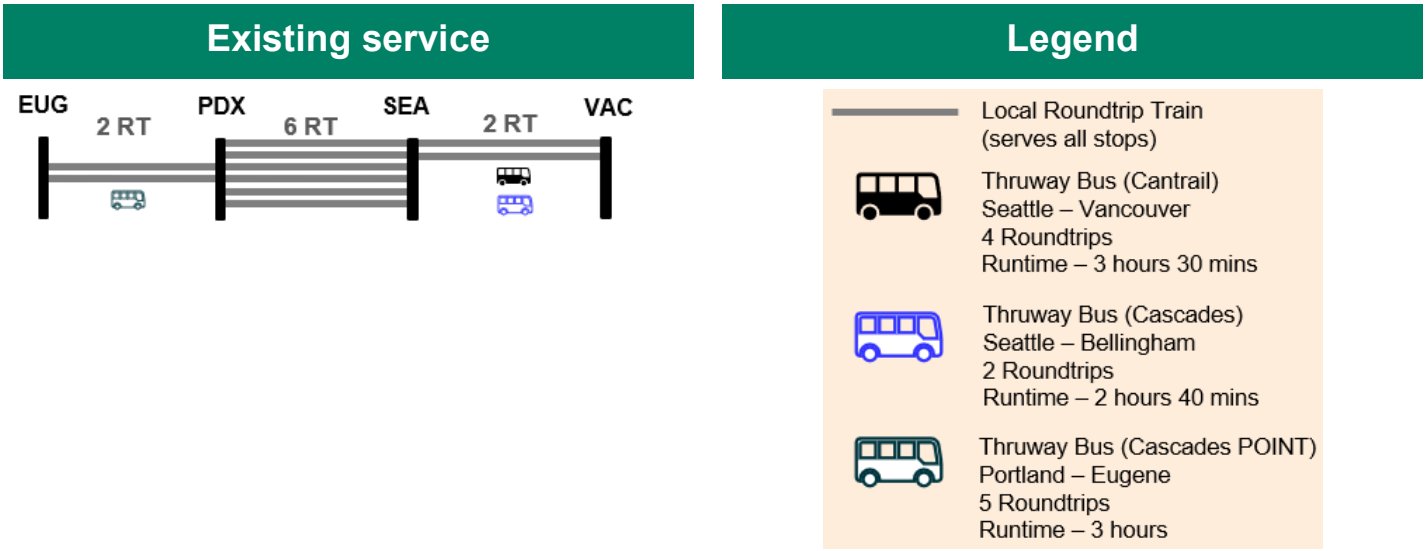
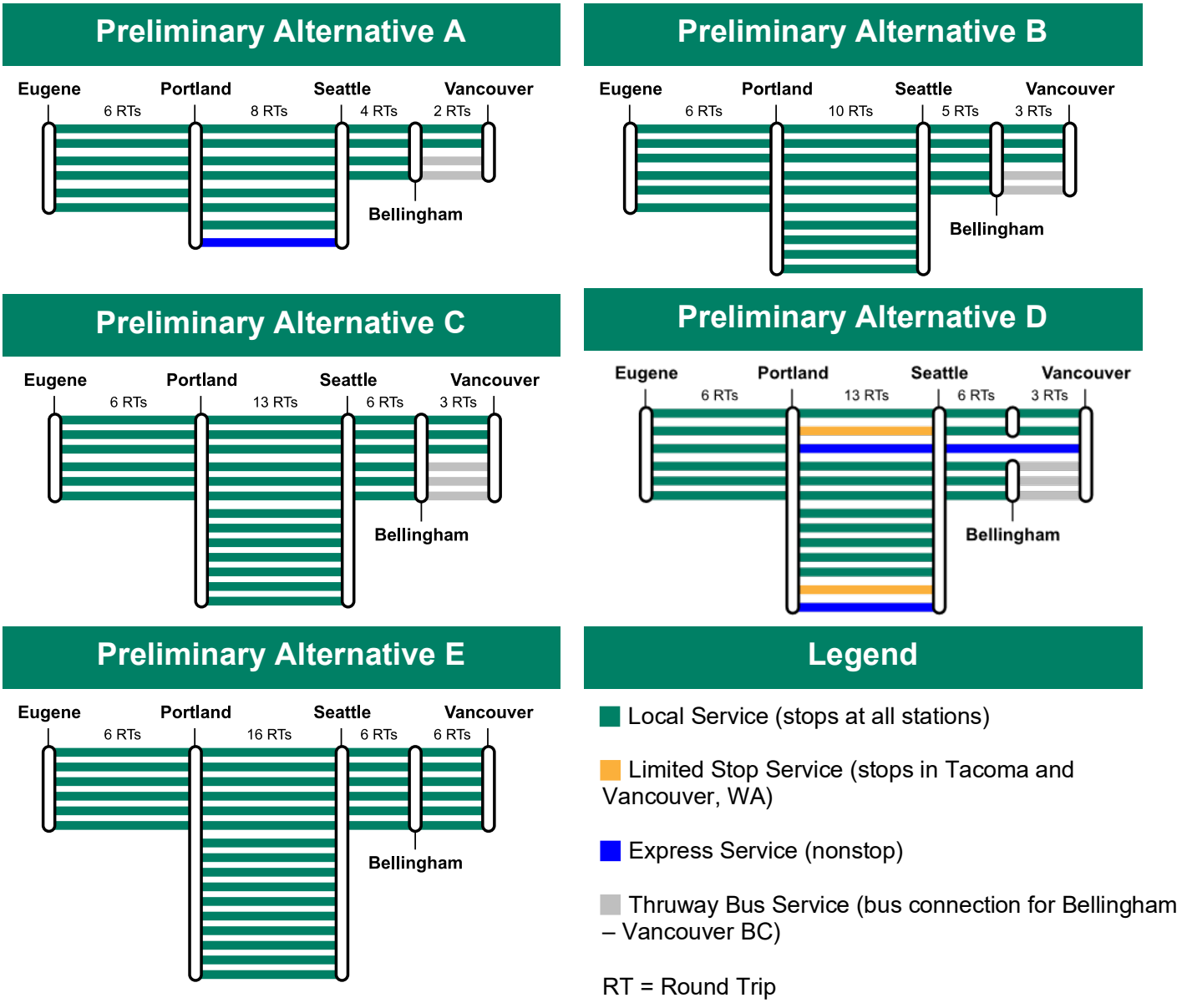


Exhibit 16: Preliminary alternative service diagrams



» How did we develop timetables for the preliminary alternatives?

WSDOT further defined each preliminary alternative by creating timetables, which identify train arrival and departure times and the runtime between stations. The timetables for the preliminary alternatives serve as key input data for predicting Amtrak Cascades ridership and assessing crew and equipment needs at a high-level, which are described in Chapter 4. Performance characteristics of the new Siemens Airo train sets expected to be operating in the PNWRC in 2026 were used to calculate runtimes between stations. The timetables are conceptual, not an Amtrak Cascades service operations plan for implementation. They have not been approved by the host railroads. Further detailed analysis and discussions with service partners will be needed to develop an operations plan before any additional service can be implemented.

The timetables were developed by applying a slot catalog concept, which is a structured set of time slots allocated for the operation of trains on a rail corridor. Each slot represents a designated period during which a train is scheduled to travel. The slot catalog accounts for operational and infrastructure constraints along the corridor. It is designed to prevent conflicts between Amtrak Cascades, Sounder commuter trains, and long-distance passenger trains. An example of a slot catalog concept is shown in **Exhibit 17**.

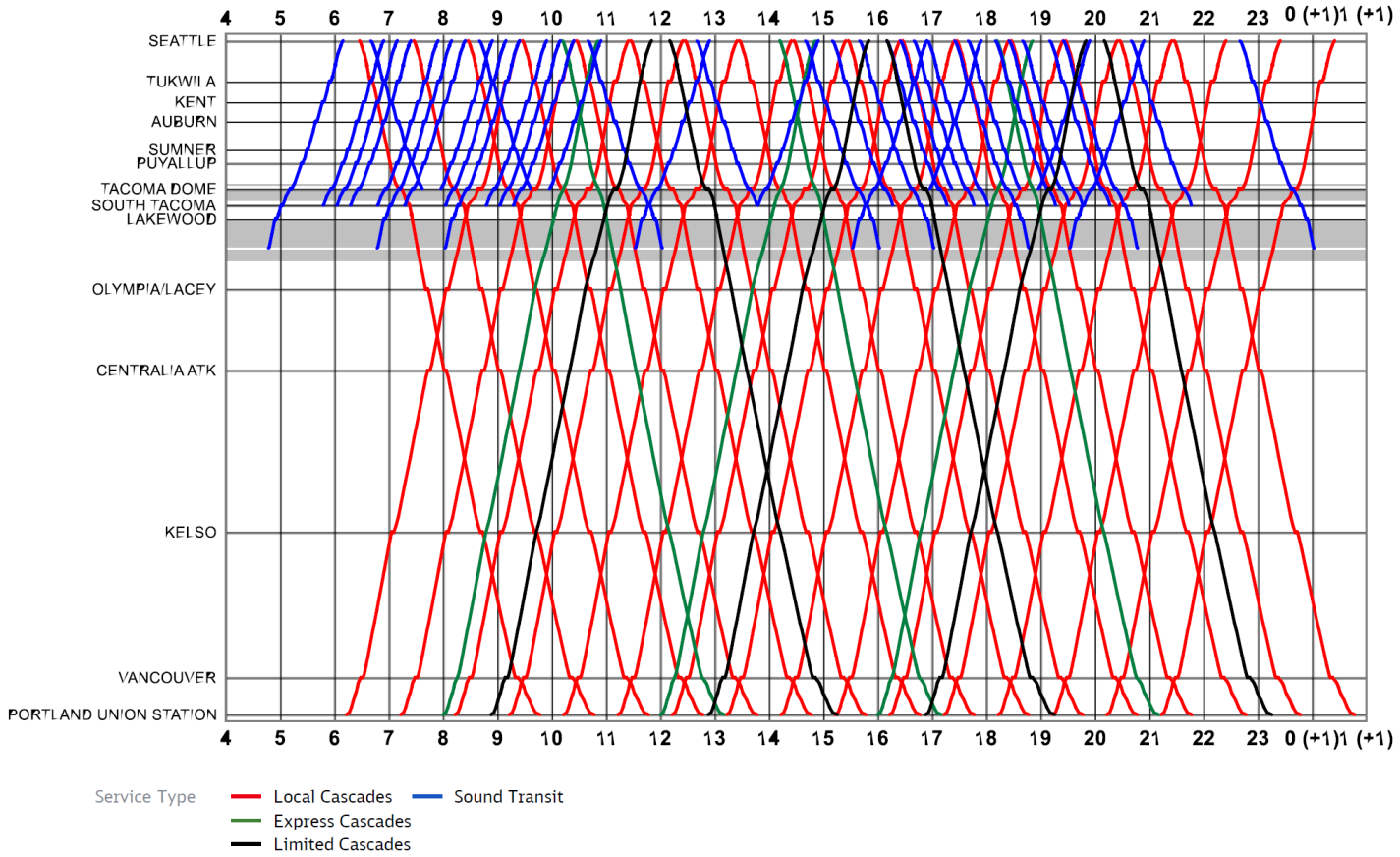


Exhibit 17: Example of slot catalog concept South of Seattle[17]

Due to the variable nature of freight operations, the slot catalog does not include specific schedules for freight trains to avoid conflicts. Freight trains are accounted for in the infrastructure analysis, described in Chapter 4, which addresses the capacity needed for all types of passenger and freight traffic to move through the corridor.

The following principles guided the slot catalog and timetable creation:

- Use clockface departures (i.e., departures that are at the same time within each hour throughout the day, such as 10:15 a.m., 11:15 a.m., 12:15 p.m., etc.) from the Seattle, Portland and Vancouver, BC stations

[17] *X axis represents the time of day, and the Y axis represents the Amtrak Cascades and Sounder stations.*

- Provide continuous all-day service between early morning and late evening and spreading trips throughout the day
- Maximize the opportunity for trains to operate through Seattle and Portland, maintaining the convenience of traveling on a single train rather than transferring at these stations.
- Maintain current layover times in Seattle (30 minutes) and Portland (15 minutes)
- Schedule the morning express and limited train departures close to 8 a.m., and the afternoon express and limited train departures at or after the evening rush hour to better serve daytrip travelers

Two slot catalogs were created through this process: 1) a baseline slot catalog with a 79-mph maximum speed limit, reflecting existing track alignment, speed restrictions and operating rules as in 2022; 2) an upgraded slot catalog with a 90-mph maximum speed limit, assuming track class 5 upgrades to certain sections. Compared to baseline slot catalog, the upgraded slot catalog could theoretically achieve runtime savings of about 13 minutes through the entire corridor between Portland and Vancouver, BC (7 minutes south of Seattle, and 6 minutes north of Seattle). Detailed engineering analysis and further discussion with the host railroads will be required during the next phase of planning work to evaluate the feasibility and impact of increasing maximum speed limit on those sections.

Preliminary Alternative	Selected Slot Catalog
A	Baseline – 79 mph
B	Baseline – 79 mph
C	Upgraded – 90 mph
D	Baseline – 79 mph
E	Upgraded – 90 mph

WSDOT chose to apply the baseline slot catalog of 79-mph to Preliminary Alternatives A and B, and upgraded slot catalog of 90-mph in some locations to Preliminary Alternatives C and E. The rationale was that the advantage of shorter travel times would benefit more train trips and more riders for alternatives with higher service frequency.

Preliminary Alterative D was the exception to this because it provides shorter travel times by using limited-stop and express service for some trips. The Baseline slot catalog was used for this preliminary alternative to provide a clear contrast to the approach of using higher maximum speed limits to provide shorter travel times.

Run times for each preliminary alternative can be found at the end of Chapter 4, in the summary of the preliminary alternative analysis.

4 Analysis of preliminary alternatives

This chapter provides the Cascades ridership projections and infrastructure improvement needs identified for the five preliminary alternatives. A summary of these alternatives, along with key analysis results, is included at the end of the chapter.

» *Ridership analysis*

Ridership forecasting approach

WSDOT developed Amtrak Cascades ridership forecasts using AECOM's National Intercity Model. The model incorporates all major travel modes for passenger trips, including auto, air, bus, and rail, and uses a two-stage process for ridership forecasting:

- First it forecasts the growth in the total number of person trips
- Next it predicts the share of total person travel by mode and produces a ridership forecast for Amtrak Cascades

The model used 2019 as the baseline year for data input and 2045 as the forecast year. WSDOT chose 2019 as the baseline year because it was the last year when a full service level operated. Amtrak Cascades service was significantly reduced during 2020 in response to the pandemic, with full restoration of service not occurring until 2023. WSDOT also used travel market scenario analysis to assess potential long-term impacts on ridership projection resulting from COVID and other external factors (see chapter 5). The geographic area for ridership modeling covers the counties along the PNWRC, stretching from south of Eugene, OR to north of Vancouver, BC, to capture total ridership for entire route.

Key data inputs collected for ridership modeling include existing and future population, employment and income data, service characteristics (travel time, cost, and frequency), and trip tables for all modes including auto, air, bus, and rail. Replica and StreetLight data was used to create the base auto trip table, and Amtrak rail ridership data was used to create rai trip table for the model. The ridership forecasting does not factor in the zero-fare policy for riders 18 and under and any induced demand associated with this new policy.

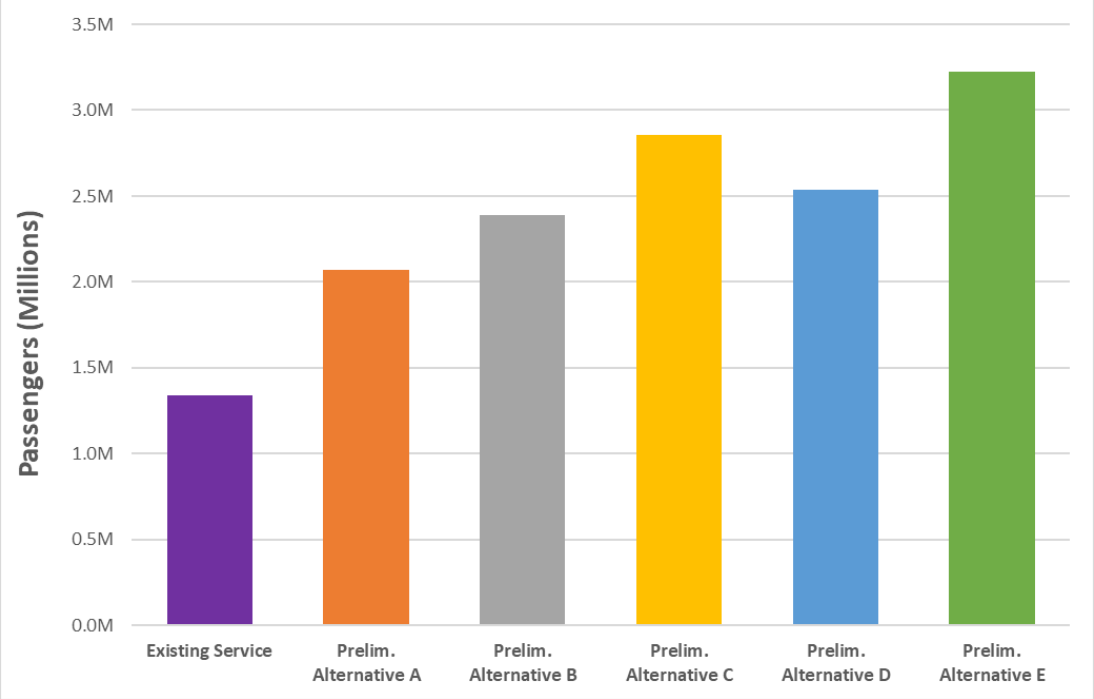
More information about ridership forecasting can be found in **Appendix C**.

Ridership forecasting results

The existing service is forecasted to serve approximately 1.3 million riders in 2045. The five preliminary alternatives are projected to increase the total ridership by 54% to 140% compared to the existing service (**Exhibits 18 and 19**):

- Preliminary Alternative E, which has the highest service frequency and faster travel time, is forecasted to serve approximately 3.2 million passengers in 2045, 140% higher than the existing service.
- Preliminary Alternative C is projected to achieve 12% higher ridership than Preliminary Alternative D, despite having an equal number of daily Cascades trains. This suggests that skipping intermediate stations (Preliminary Alternative D) has a negative effect on total ridership.
- Portland-Seattle segment is expected to have the highest number of trips among all segments, constituting about 61 to 64% of all trips across five alternatives.
- About 9-13% of projected trips will traverse more than one segment.

Exhibit 18: Forecasted annual corridor-wide ridership in 2045 by preliminary alternative



Note: * includes some connecting bus trips between Bellingham and Vancouver BC
includes some limited/express trips

Exhibit 19: Forecasted annual ridership in 2045 by segment and preliminary alternative

Segment	Baseline Service (Existing)	Preliminary Alternative A	Preliminary Alternative B	Preliminary Alternative C	Preliminary Alternative D	Preliminary Alternative E
Vancouver–Seattle	374,300	686,500	845,200	1,076,700	907,800	1,295,900
Seattle–Portland	935,500	1,267,900	1,483,400	1,821,600	1,578,800	1,994,000
Portland–Eugene	151,800	360,700	353,700	354,300	350,300	355,800
Total corridor-wide trips	**1,342,700**	**2,072,300**	**2,391,200**	**2,853,900**	**2,535,200**	**3,221,400**
Ratio of total trips in segments to total corridor-wide trips	109%	112%	112%	114%	112%	113%
Percent growth over existing service	**--**	**54%**	**78%**	**113%**	**89%**	**140%**

⧁ *What did we learn from the ridership analysis?*

In addition to providing forecasts for the preliminary alternatives, the ridership analysis provided insight into the effect of different service characteristics.

Service frequency

The ridership forecasts showed that increasing service also increased ridership, up to a point. Ridership between Seattle and Portland leveled off with service increases beyond 16 daily roundtrips. Further analysis during the next phase of work could provide a better understanding of the costs involved with increasing service levels.

Ridership between Seattle and Portland leveled off with service increases beyond 16 daily roundtrips

Speed increases

Providing faster trips by increasing the maximum speed limit from 79 mph to 90 mph in selected locations had a positive effect on ridership. The ridership results from Preliminary Alternative C variations showed that a 13-minute (3%) runtime reduction in travel time resulted in a 6% to 7% increase in corridor wide ridership. The travel time savings identified from increasing the maximum speed limit is a best-case outcome. WSDOT needs to have more discussions with the host railroads (BNSF and Sound Transit) and perform more detailed analysis to better understand the opportunities for higher maximum speeds.

A 13-minute runtime saving from higher maximum speed limit, results in 6% to 7% increase in total ridership.

Speeding up slow sections could attain similar travel time reductions and have lower operating expenses

Speeding up slower parts of the corridor instead of increasing the maximum speed could attain similar travel time reduction results. That could avoid the long-term increase in operating expenses needed for additional track maintenance that is required when operating at higher maximum speeds. This will require conceptual engineering analysis to identify and define those opportunities and could be studied during the next phase of work.

Stopping patterns

Express or limited-stop services

The ridership analysis showed that eliminating some or all intermediate stops to reduce travel times did not improve ridership as much as increasing the maximum speed limit.

Preliminary Alternative C (all local service) and Preliminary Alternative D (some express and limited-stop trains) each provided the same level of service frequency but have different stopping patterns and maximum speed limits. Preliminary Alternative D is projected to result in 11% lower ridership than Preliminary Alternative C. A variation of Preliminary Alternative D, changing maximum speed limit assumption from 79 to 90 mph, still results in 5% lower ridership than Preliminary Alternative C.

Increasing the maximum speed limit improves ridership more than eliminating intermediate stops, but would be more expensive to operate

Limited and/or express service may yield better revenue performance if higher fares were charged

While it may be possible to optimize the schedules of the express and limited trips to improve ridership, this is unlikely to produce equivalent or better ridership than Preliminary Alternative C. However, a service option with limited and/or express service would be more cost effective than increasing maximum speed limit for faster service. Charging higher fares for express service may also yield better revenue performance. Preliminary Alternative D allows for further analysis of these factors in the next phase of work.

Seattle-Bellingham service

Ridership sensitivity results indicated a slightly lower ridership growth potential north of Seattle for options with Seattle-Bellingham trips compared to those with Seattle-Vancouver, BC trips during development of the service options.

Preliminary Alternative C has three Seattle-Vancouver, BC rail trips and three Seattle-Bellingham rail trips that have connecting bus service to Vancouver, BC.

Ridership in the Seattle-Vancouver segment was 13% higher for all rail service

In the sensitivity analysis, a service option with identical service frequency but all rail service between Seattle and Vancouver, BC instead of rail-bus trips was projected to have 13% higher ridership than Preliminary Alternative C, and 4% higher corridor-wide ridership. This analysis suggests that providing Seattle-Bellingham rail service should be studied further in the next phase of work if providing additional rail service to Vancouver, BC is not viable in the near term.

Full corridor ridership was only 4% higher with Seattle-Bellingham rail service instead of Seattle-Vancouver rail service

» Capacity analysis

A capacity study was performed to analyze the operational capacity of the corridor and identify infrastructure improvements necessary to support the service levels of the preliminary alternatives. The capacity study considered both the proposed Amtrak Cascades service and the needs of host railroads and other service providers through 2045. The goal of the capacity study was to identify the least amount of new infrastructure needed to effectively address capacity issues in the future.

During this study, WSDOT coordinated with its Amtrak Cascades service partners regularly, including conducting technical working group meetings every other week to present results and receive feedback. These meetings were attended by representatives of:

- BNSF Railway
- Canadian National Railway
- Sound Transit
- Amtrak
- Oregon Department of Transportation
- Federal Railroad Administration

The infrastructure improvements identified in this capacity study are a preliminary assessment of what may be needed for each preliminary alternative. Further analysis, as well as discussions with host railroads and other stakeholders, will be required to determine the improvements necessary for service to be increased. While the results of this capacity analysis represent the collaborative efforts of the service partners, it does not indicate endorsement of the capacity study findings by the host railroads.

Canadian National Railway participated in the Preliminary SDP process but elected not to provide the detailed data needed for the capacity study at this time. Infrastructure needs in Canada between the Fraser River bridge and Pacific Central Station in Vancouver will need to be addressed in the next phase of SDP work. Because of this, the list of infrastructure needs north of Seattle is considered incomplete.

No engineering design work has been performed to develop cost estimates for the needed infrastructure at this stage of the process. That work will be undertaken in the next phase of the SDP work.

⧁ *How did we identify preliminary capacity improvements needed to support the potential service options?*

WSDOT worked with its service partners to examine current and future capacity on the route, identify areas expected to be over-capacity, and develop preliminary infrastructure needs to support each of the identified service options.

The capacity analysis was based on 2019 data documenting train movements and extrapolated out to 2045. On BNSF's recommendation, the study assumed all freight traffic would grow 2% annually. On Sound Transit's recommendation, the study assumed that Sounder service would include 21 roundtrips south of Seattle and 4 roundtrips north of Seattle in 2045. Amtrak long-distance trains in the corridor were kept at the existing service level, with one daily roundtrip for both the Empire Builder and the Coast Starlight. Additional long-distance service being considered in FRA's Amtrak Daily Long-Distance Service Study was not included in the analysis and may require additional capacity improvements.

Capacity measurement

WSDOT measured capacity in units derived from the performance characteristics of a standard train applied to the characteristics of the route. The standard train is based on the average characteristics of trains in the 95th percentile of length (and associated performance) in 2019. This conservative assumption about train length and performance was developed in cooperation with BNSF to ensure that capacity on the corridor was not overstated.

In addition to using this unit of capacity to measure consumption by train operations, it was also used to allocate capacity for the following activities:

- Maintenance of way (track maintenance)
- Mainline staging
- Yard and facility entry/exit[18]
- Variability[19]

General assumptions about these activities were made for the capacity analysis. More detailed assessment of corridor capacity, including dynamic simulation, may be required during the next phase of SDP work.

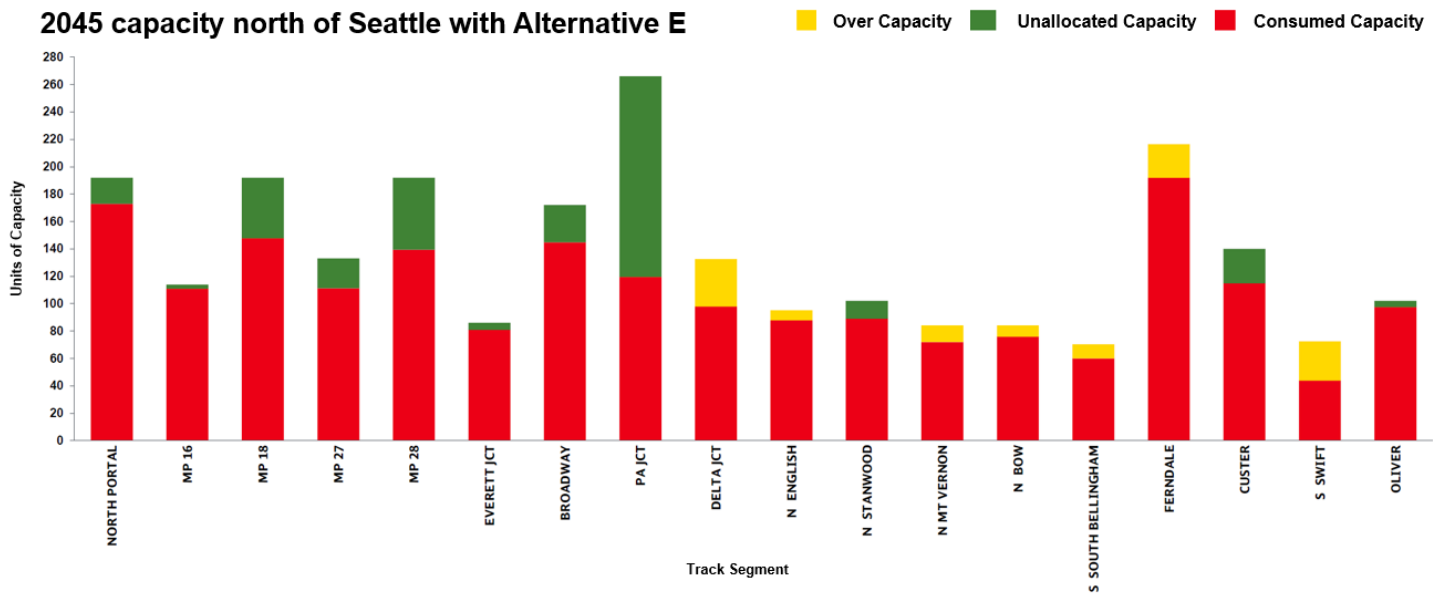
In general, capacity is most constrained at yards, customer facilities and junctions. These are all locations where trains enter or exit the main track.

More information about the capacity analysis is available in **Appendix D**.

Capacity improvements

The infrastructure improvements necessary for each preliminary alternative were identified by applying the future traffic volumes anticipated for Amtrak, Sound Transit, and BNSF in 2045 to determine locations where the anticipated traffic would exceed capacity. An example of this analysis is shown graphically in **Exhibit 20,** with the units of capacity shown by track segment**.** This capacity chart is based on Preliminary Alternative E, which has the highest increase in Amtrak Cascades service. **Exhibit 20** shows anticipated 2045 traffic in comparison to existing capacity by each individual track segment between Vancouver, BC and Portland, OR. The yellow bar indicates that the anticipated rail traffic in 2045 exceeds current capacity, and the green bar indicates there is enough capacity to accommodate 2045 traffic. **Exhibit 20** illustrates the locations of rail segments that have capacity constraints and need improvements to support future traffic volume. Additional locations that need more capacity may be identified during future analysis.

[18] While the impact of trains entering/exiting yards is considered in the study, operations within yard limits are not.
[19] Variability accounts for factors such as temporary track speed restrictions, track work windows, terminal congestion issues, other line congestion issues, delays holding off from grade crossings, or drawbridges opening for water traffic.



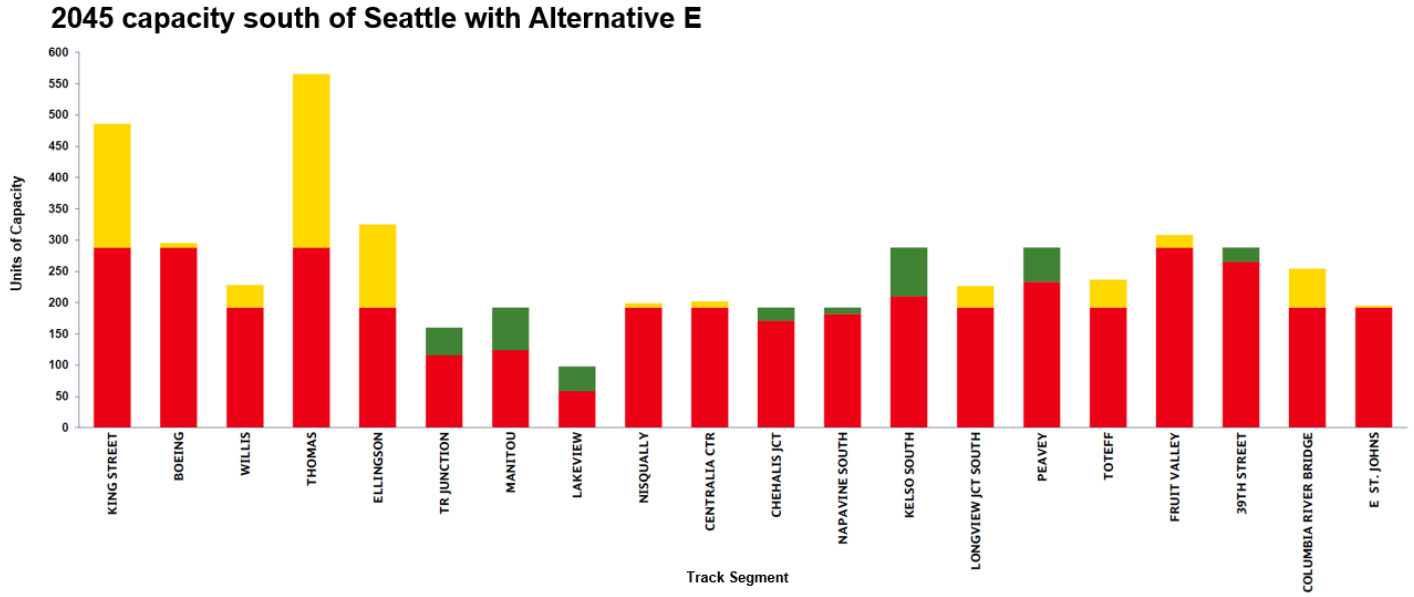


Exhibit 20: Example rail capacity chart showing where improvements may be needed

X axis should be read from left to right – i.e., the North Portal bar captures capacity for track segment between North Portal and MP 16. While the results of this capacity analysis represent the collaborative efforts of the service partners, it does not indicate the endorsement of the capacity analysis findings by the host railroads.

The infrastructure improvements were designed to support the estimated future traffic volumes with the minimal amount of new construction. The amount of infrastructure improvements needed increases with the addition of more Amtrak Cascades trains. It is possible to undertake infrastructure improvements incrementally over time, allowing for the attainment of increased service levels such as those identified in Alternatives A and B, then moving forward with additional improvements for higher service levels in the future.

An overview of the infrastructure needs identified for each preliminary alternative is shown in **Exhibit 21** provided below.

Exhibit 21: List of preliminary capacity improvements*

	Improvement type	Location	Host Railroad	Preliminary Alternatives				
				A	B	C	D	E
North of Seattle**	Controlled siding (0.5 miles)	White Rock, BC	BNSF	✓	✓	✓	✓	✓
	Extend double track (2.3 miles)	Custer	BNSF	✓	✓	✓	✓	✓
	Extend double track (2.2 miles)	Ferndale	BNSF		✓	✓	✓	✓
	Extend siding (2 miles)	South Bellingham	BNSF	✓	✓	✓	✓	✓
	Expand yard facilities	Everett (Delta Yard)	BNSF	✓	✓	✓	✓	✓
South of Seattle	Controlled siding (3.3 miles)	Seattle (Georgetown/Boeing Field)	BNSF	✓	✓	✓	✓	✓
	Controlled siding (2.9 miles)	Seattle (Boeing Field/Renton)	BNSF					✓
	Extend triple track (2.8 miles)	Kent–Auburn	BNSF	✓	✓	✓	✓	✓
	Expand yard facilities	Auburn Yard	BNSF	✓	✓	✓	✓	✓
	Extend triple track (8.5 miles)	Sumner–Tacoma	BNSF	✓	✓	✓	✓	✓
	Controlled siding (2.2 miles)	Tacoma	ST	✓	✓	✓	✓	✓
	Controlled siding (0.2 miles)	DuPont	ST	✓	✓	✓	✓	✓
	Controlled siding (2.9 miles)	Chehalis	BNSF			✓	✓	✓
	Extend triple track (3.1 miles)	Longview	BNSF	✓	✓	✓	✓	✓
	Extend triple track (2 miles)	Vancouver, WA (Vancouver Yard)	BNSF			✓	✓	✓
	Expand yard facilities	Vancouver Yard	BNSF			✓	✓	✓
	Reconfigure junction	Portland, OR (North Portland Junction)	BNSF	✓	✓	✓	✓	✓
	Extend triple track (1.9 miles)	Portland, OR (Willbridge Yard)	BNSF					✓

** This listing of infrastructure improvements does not constitute funding availability or endorsement of the improvements by the host railroads*

***Does not include any necessary improvements in Canada between the Fraser River Bridge and Pacific Central Station in Vancouver, BC*

No engineering analysis has been performed to design these improvements; therefore, no cost estimates are available. These infrastructure improvements are an initial assessment of what may be needed for each preliminary alternative. Additional detailed analysis and discussions with host railroads and other service partners will be required about infrastructure and operational impacts to existing capacity and velocity for current and future growth of freight and passenger traffic on the PNWRC. *The listing of infrastructure improvements in this Preliminary SDP does not constitute funding availability or endorsement of the improvements by the host railroads*.

» Equipment needs

WSDOT made a preliminary estimate of the minimum additional train sets and train crews necessary to operate the service proposed in each preliminary alternative. The analysis uses the performance characteristics of the new Siemens Airo train sets expected to be operating in the PNWRC in 2026. The ability

to acquire more trainsets for the service is dependent on the manufacturer's schedule, with several years lead time needed before funding, manufacturing and delivery is possible.

The train set estimates were based on the number of scheduled trips each set could make, including at least 20 minutes at terminals to prepare a train set for the next trip. These estimates do not include train sets used as spares to replace sets that are out of service or additional time for maintenance needs. The minimum additional train sets needed for each preliminary alternative is shown in **Exhibit 22**.

Exhibit 22: Minimum additional train sets required (not including spares)

Preliminary Alternative	Minimum additional train sets
A	6
B	6
C	9
D	11
E	9

Preliminary Alternative D requires more additional train sets than either Preliminary Alternative C (which has the same number of trips) or Preliminary Alternative E (which has more trips). This is due to inefficiencies in the use of the train sets for multiple daily trips when they are used for express and limited-stop trips.

» Summary of the preliminary alternatives analysis

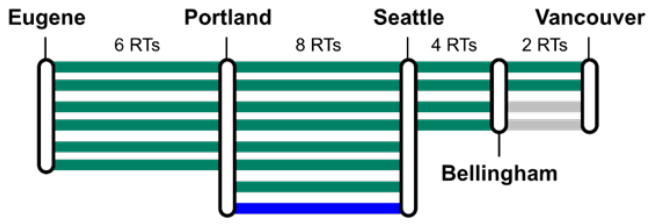
The characteristics of each preliminary alternative are listed below, with a summary of the analysis results for each.

Preliminary Alternative A

Conceptual schedule and service levels

	Travel Time	Roundtrips
Vancouver – Seattle		**4**
■ Local	3h 46m	2
■ Express	—	—
■ Local + ■ Thruway bus	4h 07m	2
Portland – Seattle		**8**
■ Local	3h 11m	7
■ Limited	—	—
■ Express	2h 51m	1

Trips are generally on a clockface schedule and evenly spread throughout the day as much as feasible



Highlights

- Projected preliminary ridership 54% over the existing service
- Highest speeds of 79 mph
- Minimum of 6 more train sets needed
- Travel time reduction via service patterns (express service)
- Potential building block service option

Conceptual list of capacity improvements

- White Rock, BC siding
- South Bellingham siding extension
- Custer double track extension
- Delta Yard (Everett) expansion
- Georgetown/Boeing Field siding
- Kent–Auburn triple track
- Auburn Yard expansion
- Sumner-Tacoma triple track
- Tacoma siding
- DuPont siding
- Longview Junction-Peavey triple track
- North Portland Junction reconfiguration

The travel times listed above are not the anticipated schedule times and only should be used for comparing the alternatives. Schedules will need to be negotiated with Amtrak and the host railroads prior to adding new service.

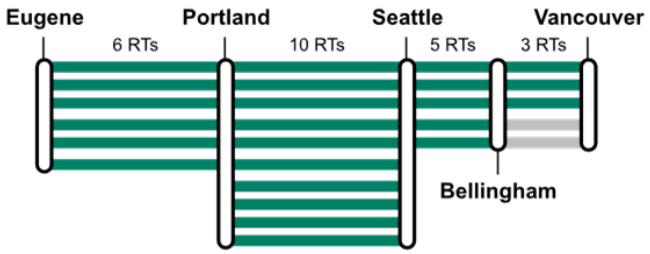
The conceptual list of capacity improvements is preliminary, subject to further analysis and discussion with host railroads.

Preliminary Alternative B

Conceptual schedule and service levels

	Travel Time	Roundtrips
Vancouver – Seattle		**5**
■ Local	3h 46m	3
■ Express	—	—
■ Local + ■ Thruway bus	4h 07m	2
Portland – Seattle		**10**
■ Local	3h 11m	10
■ Limited	—	—
■ Express	—	—

Trips are generally on a clockface schedule and evenly spread throughout the day as much as feasible



Highlights

- Projected preliminary ridership 78% over the existing service
- Highest speeds of 79 mph
- Minimum of 6 more train sets needed
- Potential building block service option

Conceptual list of capacity improvements

- White Rock, BC siding
- Custer double track extension
- Ferndale double track extension
- South Bellingham siding extension
- Delta Yard (Everett) expansion
- Georgetown/Boeing Field siding
- Kent–Auburn triple track
- Auburn Yard expansion
- Sumner-Tacoma triple track
- Tacoma siding
- DuPont siding
- Longview Junction-Peavey triple track
- North Portland Junction reconfiguration

The travel times listed above are not the anticipated schedule times and only should be used for comparing the alternatives. Schedules will need to be negotiated with Amtrak and the host railroads prior to adding new service.

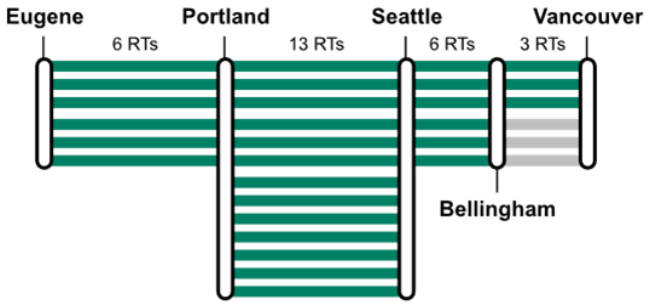
The conceptual list of capacity improvements is preliminary, subject to further analysis and discussion with host railroads.

Preliminary Alternative C

Conceptual schedule and service levels

	Travel Time	Roundtrips
Vancouver – Seattle		**6**
■ Local	3h 39m	3
■ Express	—	—
■ Local + ■ Thruway bus	4h 00m	3
Portland – Seattle		**13**
■ Local	3h 05m	13
■ Limited	—	—
■ Express	—	—

Trips are generally on a clockface schedule and evenly spread throughout the day as much as feasible



Highlights

- Projected preliminary ridership 112% over the existing service
- Highest speeds of 90 mph
- Minimum of 9 more train sets needed
- Second highest ridership performance
- Travel time reduction via track improvements

Conceptual list of capacity improvements

- White Rock, BC siding
- Custer double track extension
- Ferndale double track extension
- South Bellingham siding extension
- Delta Yard (Everett) expansion
- Georgetown/Boeing Field siding
- Kent–Auburn triple track
- Auburn Yard expansion
- Sumner-Tacoma triple track
- Tacoma siding
- DuPont siding
- Centralia-Chehalis siding
- Longview Junction-Peavey triple track
- Fruit Valley-Vancouver Yard triple track
- Vancouver Yard expansion
- North Portland Junction reconfiguration

The travel times listed above are not the anticipated schedule times and only should be used for comparing the alternatives. Schedules will need to be negotiated with Amtrak and the host railroads prior to adding new service.

The conceptual list of capacity improvements is preliminary, subject to further analysis and discussion with host railroads.

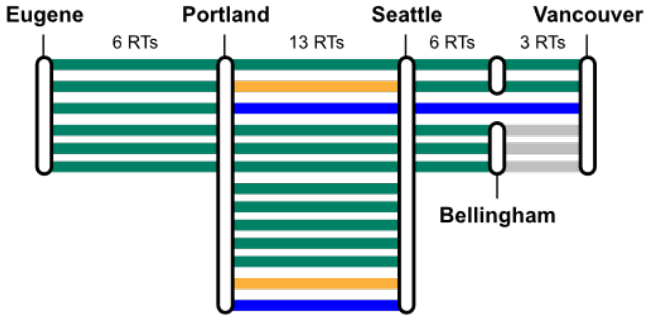
1

Preliminary Alternative D

Conceptual schedule and service levels

	Travel Time	Roundtrips
Vancouver – Seattle		**6**
■ Local	3h 46m	2
■ Express	3h 33m	1
■ Local + ■ Thruway bus	4h 07m	3
Portland – Seattle		**13**
■ Local	3h 11m	9
■ Limited	2h 57m	2
■ Express	2h 51m	2

Trips are generally on a clockface schedule and evenly spread throughout the day as much as feasible



Highlights

- Projected preliminary ridership 89% over the existing service
- Highest speeds of 79 mph
- Minimum of 11 more train sets needed
- Travel time reduction via service patterns (express and limited stop service)
- Express and limited trains serve major markets in both directions
- Potential for phased travel time reductions

Conceptual list of capacity improvements

- White Rock, BC siding
- Custer double track extension
- Ferndale double track extension
- South Bellingham siding extension
- Delta Yard (Everett) expansion
- Georgetown/Boeing Field siding
- Kent–Auburn triple track
- Auburn Yard expansion
- Sumner-Tacoma triple track
- Tacoma siding
- DuPont siding
- Centralia-Chehalis siding
- Longview Junction-Peavey triple track
- Fruit Valley-Vancouver Yard triple track
- Vancouver Yard expansion
- North Portland Junction reconfiguration

The travel times listed above are not the anticipated schedule times and only should be used for comparing the alternatives. Schedules will need to be negotiated with Amtrak and the host railroads prior to adding new service.

The conceptual list of capacity improvements is preliminary, subject to further analysis and discussion with host railroads.

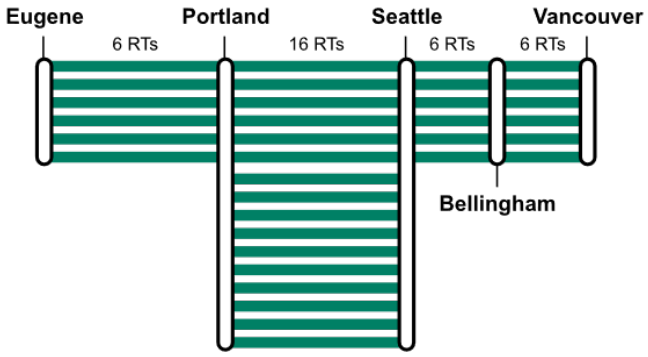
1

Preliminary Alternative E

Conceptual schedule and service levels

	Travel Time	Roundtrips
Vancouver – Seattle		**6**
■ Local	3h 39m	6
■ Express	—	—
■ Local + ■ Thruway bus	—	—
Portland – Seattle		**16**
■ Local	3h 05m	16
■ Limited	—	—
■ Express	—	—

Trips are generally on a clockface schedule and evenly spread throughout the day as much as feasible



Highlights

- Projected preliminary ridership 140% over the existing service
- Highest speeds of 90 mph
- Minimum of 9 more train sets needed
- Highest overall ridership growth

Conceptual list of capacity improvements

- White Rock, BC siding
- Custer double track extension
- Ferndale double track extension
- South Bellingham siding extension
- Delta Yard (Everett) expansion
- Georgetown/Boeing Field siding
- Boeing Field-Renton siding
- Kent–Auburn triple track
- Auburn Yard expansion
- Sumner-Tacoma triple track
- Tacoma siding
- DuPont siding
- Centralia-Chehalis siding
- Longview Junction-Peavey triple track
- Fruit Valley-Vancouver Yard triple track
- Vancouver Yard expansion
- North Portland Junction reconfiguration
- Willbridge Yard (Portland) triple track

The travel times listed above are not the anticipated schedule times and only should be used for comparing the alternatives. Schedules will need to be negotiated with Amtrak and the host railroads prior to adding new service.

The conceptual list of capacity improvements is preliminary, subject to further analysis and discussion with host railroads.

1

5 Travel market scenario analysis

The purpose of the scenario analysis is to gain a deeper understanding of how uncertainties in the future landscape of the travel market, transportation policies, and investments might impact the ridership projections and other performance measures for Amtrak Cascades service across the five preliminary alternatives. The results of the scenario analysis were not employed to refine or alter the preliminary alternatives.

» Future travel market scenarios

WSDOT identified four major factors to define future travel market scenarios (**Exhibit 23**). The factors address external trends such as post-pandemic travel behavior and varying demographic growth, supporting service enhancements to Amtrak Cascades, and policy initiatives that could influence mode choice.

Exhibit 23: Factors considered in scenario definition

External trends	Supporting service enhancements	Policy initiatives	Future investment
▪ *Population and employment growth* ▪ *Post-pandemic travel behavior change (work and recreational)* ▪ *Emerging technologies (electric vehicles, automated vehicles)* ▪ *Land use changes*	▪ *Additional transit service* ▪ *Station accessibility* ▪ *Improved amenities* ▪ *Border crossing time reduction* ▪ *Transit/rail fare integration* ▪ *Reliability improvement*	▪ *Vehicle miles traveled (VMT) pricing* ▪ *Parking restrictions* ▪ *Ridesharing service promotion* ▪ *Reduced fare programs*	▪ *Current air travel forecasts*

Based on those major factors, WSDOT established six travel market scenarios (**Exhibit 24**), including two bookends to represent extremes, and four additional scenarios to evaluate how those scenarios may enhance or dampen future Amtrak Cascades ridership.

Exhibit 24: Future travel market scenarios

Two plausible scenarios as bookends to represent extremes	**Scenario 1:** Higher demographic growth and improved rail and transit services **Scenario 2:** Lower demographic growth and improved highway travel conditions
Four additional scenarios addressing the following major factors	**Scenario 3:** Urban growth shifts to suburban and rural areas and telework trend continues **Scenario 4:** Potential improvements to enhance rail service (station accessibility, reliability, amenities) **Scenario 5:** Possible improvements to enhance transit service **Scenario 6:** Air travel increases as forecasted in the corridor

Future travel market scenarios analysis results

WSDOT applied Mobilitics[20] scenario planning tool in combination with the intercity passenger rail ridership model to evaluate the possible impacts of each scenario on Amtrak Cascades ridership and other measures across the five preliminary service alternatives.

All the preliminary alternatives show growth in 2045 for each scenario, as shown in **Exhibit 25**. However, the extent of growth varies across the scenarios. The scenario analysis results show that future uncertainties could result in a range of a 39% decrease to a 43% increase compared to the 2045 Amtrak Cascades ridership forecast presented in **Exhibit 18,** depending upon specific scenarios. The scenario analysis also shows that higher population and employment growth, supportive rail service enhancements, and transit service improvements are major drivers for further boosting ridership, while less business travel and the continuation of the current teleworking trend could have a strong dampening effect on future ridership. In addition, technology trends such as vehicle automation have the potential to limit ridership growth.

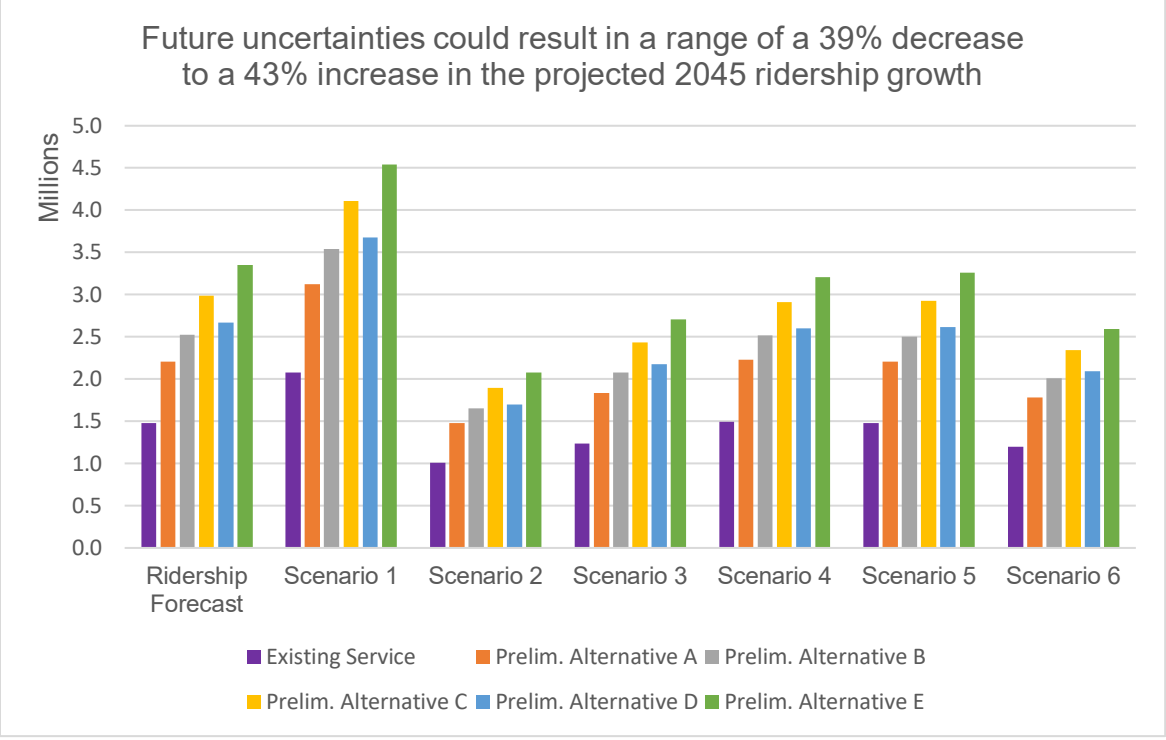
Travel trends with a positive effect on ridership:

- higher population and employment growth
- supportive rail service enhancements
- transit improvements

Travel trends with a negative effect on ridership:

- less business travel
- higher teleworking rates
- vehicle automation

Exhibit 25: 2045 ridership estimates for future travel market scenarios by preliminary alternative



The results below describe the ridership sensitivity to underlying demographic and population growth, travel behaviors, policy incentive and other factors by individual scenario. Ridership sensitivity reflects the percentage difference in 2045 ridership estimates between a specific scenario and the ridership forecast in **Exhibit 18** for corresponding alternatives.

[20] Mobilitics is AECOM's scenario-planning tool designed to help clients understand long-range transportation and land use planning scenarios.

Ridership uncertainty

Scenario 1

This scenario represents an optimistic bookend for developments that could boost Amtrak Cascades ridership and is the only scenario yielding a significantly higher ridership estimate (36% to 43% higher than ridership forecast in **Exhibit 18**):

- Assumptions for higher population and employment growth (17% higher) and a 30% increase in transit service frequency and coverage are the main drivers for high ridership in this scenario
- Higher parking costs in the central business districts of major cities and implementing a per-mile charge based on the number of miles driven[21] have relatively small impacts on boosting Cascades ridership
- Telework has negative impact on ridership and restrains ridership from reaching even higher levels

Scenario 2

This scenario represents the pessimistic bookend and yields the lowest estimated ridership (33% - 39% less than the ridership forecast in **Exhibit 18**). Main drivers contributing to lower ridership include:

- Slower population and employment growth (13% less)
- Continuation of current teleworking patterns and less business travel
- Improvements in highway capacity and vehicle automation

Scenario 3

This scenario assumes that 25% of urban growth will be shifted to more suburban and rural areas, and yields an estimated ridership 17%-20% less than the ridership forecast in **Exhibit 18**:

- Estimated ridership falls between that for the ridership forecast (**Exhibit 18**) and Scenario 2, highlighting how important urban areas are for Amtrak Cascades.
- Reductions in business travel and a continuation of current teleworking patterns also dampen ridership.

Scenario 4

This scenario includes many assumptions that are supportive of rail service, yet estimated Amtrak Cascades ridership is still slightly less than ridership in the ridership forecast in **Exhibit 18** (1% higher to 5% lower). This is due to positive impact on ridership resulting from improvements in rail-related attributes (amenities, reliability, costs) is offset by the negative impacts of reductions in business travel and a continuation of current teleworking trends.

Scenario 5

Estimated Amtrak Cascades ridership for this scenario is similar to the ridership forecast in **Exhibit 18** across the preliminary alternatives (0% to 3% lower than the ridership forecast in **Exhibit 18**). This is due to positive impacts on ridership from increased parking restrictions, expanded transit service, and improved rail station accessibility are offset by the negative impacts of reductions in business travel and a continuation of current teleworking trends.

Scenario 6

Estimated ridership in Scenario 6 falls between ridership in the ridership forecast in **Exhibit 18** and in the pessimistic Scenario 2 (19%-23% lower than the ridership forecast in **Exhibit 18**). This is driven by continuation of telework patterns, and increased air service diverting some rail trips.

[21] The per-mile charge was assumed to be a 5% increase in vehicle operating costs based on the 2023 federal IRS mileage rate of 65.5 cents/mile.

Implications on other performance measures

The scenario analysis also evaluated performance measures such as mode shares, vehicle miles traveled (VMT), greenhouse gas (GHG) emissions in the future years, as compared to the results for the preliminary alternatives in the ridership forecast (**Exhibit 18**) :

Mode Shares

As service for each preliminary alternative increases, the number of people choosing to travel by train increases and shifts travel from bus and air to rail. More people tend to shift to train travel in Scenarios 1, 4, and 5 because these scenarios have assumptions about conditions and policies (e.g., increased likelihood to select rail, expanded transit service coverage and increase frequencies, improved rail station accessibility) that are more favorable to rail compared to assumptions in other scenarios. The increase in air service in Scenario 6 reduces the rail and bus passenger numbers between major markets.

Vehicle Miles Traveled (VMT)

Scenario 1 is the only scenario in which the number of miles traveled in vehicles is expected to increase over the VMT projection for the preliminary alternatives in the ridership forecast (**Exhibit 18**), because of higher population growth. Scenarios 4 and 5 are expected to have the best chance of lowering VMT of all scenarios provided that certain conditions are met. There is relatively little difference in the total number of miles driven within the study area under each of the preliminary alternatives since there are substantially more people driving vehicles than riding the trains.

Greenhouse Gas Emissions

Greenhouse gas (GHG) emissions are expected to be much lower under all scenarios as compared to the emissions for the preliminary alternatives in the ridership forecast (**Exhibit 18**). As more people travel by train rather than in vehicles, GHG emissions decrease. However, most of the GHG emissions decrease is a result of new electric vehicle sale policies for Washington state.

6 Future Work and Next Steps

» Future work

Preliminary alternatives

WSDOT is planning to carry forward the preliminary alternatives developed and analyzed in this Preliminary SDP into the next phase of the full corridor-wide SDP development process, following guidance provided by FRA. Further refinement and screening of alternatives will occur during that process. The completion of the full SDP will advance Amtrak Cascades in the pipeline for further federal infrastructure funding from the Federal Railroad Administration.

Service characteristics

Service frequency

The preliminary analysis shows that up to 16 daily roundtrips between Seattle and Portland is viable from the perspective of travel demand. Additional detailed analysis and discussions with host railroads and other service partners is needed to better understand what capital investments and ongoing operating expenses will be required to support reliable operation of the different service levels.

Speed increases

The forecasted ridership increased when the maximum speed limit raised to 90 mph on some segments of the corridor. The travel time savings identified from increasing the maximum speed limit is a best-case outcome. WSDOT needs further discussions with the host railroads (BNSF and Sound Transit) and to perform more detailed analysis to understand the feasibility of higher maximum speeds. Other options for reducing travel times, such as increasing speeds in lower speed sections of the corridor, need to be explored as part of the conceptual engineering analysis planned in the next phase of work. Several different strategies for reducing the travel time of trains can be a part of an alternative.

Stopping patterns

Express or limited-stop service

Skipping intermediate stations to reduce travel time has a negative impact on total ridership. While ridership may be lower, it could result in better revenue performance if higher fares were changed for the service. This will be addressed in the revenue analysis performed for the full SDP.

Seattle-Bellingham rail service

Initial results suggest that adding train service between Seattle and Bellingham captures most of the ridership possible between Seattle and Vancouver, BC. This service pattern warrants continued analysis, possibly as a phased implementation approach.

Future travel market scenarios

The scenario analysis shows that higher population and employment growth, and supportive rail and transit service improvements, are major drivers for further boosting ridership. Future planning should place a high priority on improving rail service amenities and the experience of passengers getting to and from Amtrak Cascades stations.

Less business travel and the continuation of the current teleworking trend could have a strong dampening effect on future ridership. In addition, technology trends such as vehicle automation have the potential to limit

ridership growth. WSDOT could try mitigating the negative effect of teleworking by implementing service amenities that make Amtrak Cascades a desirable travel choice for remote workers who make infrequent trips to the office. Examples include high-speed internet access and quiet spaces on the trains that would enable people to be productive while traveling.

Connectivity

Analysis of the connectivity between Amtrak Cascades and other modes of transportation will be done in the next phase of SDP analysis. This work will be performed consistent with the legislative direction given to WSDOT to continue coordinating all different types of transportation modes, with the goal of maximizing system performance in the most cost-effective manner. WSDOT has received direction from the Legislature[22] that this coordination must include but is not limited to:

- The Interstate 5 highway corridor
- Existing rail infrastructure
- A future high-speed rail alignment
- Commercial aviation capacity

» Next steps

Corridor Identification and Development (CID) Program

In December 2023, both Amtrak Cascades and Cascadia High-Speed Rail were accepted into FRA's newly established CID Program. The CID Program includes three steps in sequence that Amtrak Cascades corridor must complete before moving into design and construction of infrastructure improvements:

- Step 1 – develop scope, schedule and budget for corridor SDP
- Step 2 – develop the SDP
- Step 3 – complete preliminary engineering and NEPA (National Environmental Policy Act) environmental review for capital projects

Project advancement is contingent on FRA approvals, as well as funding availability for Steps 2 and 3.

The next task for Amtrak Cascades is to implement CID Step 1 activities for a corridor-wide SDP between Vancouver, British Columbia and Eugene, Oregon in partnership with Oregon DOT and in close coordination with Cascadia High-Speed Rail Program. Upon FRA's approval, Step 1 will be completed as quickly as possible so the planning activities can advance to Step 2 of the CID Program.

Service Development Plan preparation

The next phase of SDP work will include further refinement, analysis, and screening of alternatives to determine the alternative that will move forward to implementation as funding becomes available. Some of the work will involve additional iterations of the technical analysis started with this Preliminary SDP.

Alternative analysis will expand upon the analysis performed under Preliminary SDP to further refine and evaluate service options and investment packages. This analysis will be based on more extensive and detailed transportation planning analyses that could include:

- Operations analysis
- Ridership and revenue forecasts
- Conceptual engineering

[22] Engrossed Substitute House Bill (ESHB) 1125 Sec. 219 (10)

- Capital cost estimates
- Operating and maintenance cost estimates
- Labor and fleet planning
- Station area and access analysis

Additional work under next phase of SDP development also includes:

- Initial environmental planning
- Financial planning and benefits/cost analysis
- Corridor governance
- Phased implementation plan

Public engagement will continue throughout the SDP process, including communities, partners, and stakeholders. Feedback on this Preliminary SDP will be incorporated into future SDP work.

Washington State
Department of Transportation

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