

Appendix F

Washington's Freight System Performance

*2026 Washington State
Freight System Plan*

July 2026



About this Appendix

This appendix presents the performance assessment that supports the Washington State Freight System Plan. It documents the condition, reliability, safety, mobility, resilience, environmental, and economic performance of Washington's multimodal freight transportation system, including key freight corridors, Freight Activity Hubs (FAHs), and critical freight infrastructure across highway, rail, maritime, air cargo, and pipeline networks. The appendix provides the technical analyses, performance measures, supporting data, and methodologies used to evaluate how effectively the freight system supports the movement of goods and the industries that depend upon it.

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Acronyms and Abbreviations

Acronym	Definition
AIS	Automatic Identification System
ATDM	Active Traffic and Demand Management
ATMS	Active Traffic Management System
ATRI	American Transportation Research Institute
BNSF	Burlington Northern Santa Fe Railway
BUILD	Better Utilizing Investments to Leverage Development (federal grant program)
CAD	Computer-Aided Dispatch
CRAB	County Road Administration Board
DPM	Delay per Mile
EAL	Expected Annual Loss
EHD	Environmental Health Disparities (Index)
EOP	Emergency Operations Plan
FAA	Federal Aviation Administration
FAH	Freight Activity Hub
FGTS	Freight and Goods Transportation System
FHWA	Federal Highway Administration
FSP	Freight System Plan
FRA	Federal Railroad Administration
FY	Fiscal Year
GEG	Spokane International Airport
HAR	Highway Advisory Radio
ICS	Incident Command System
ITS	Intelligent Transportation Systems
JOG	Joint Operations Group
JOPS	Joint Operations Policy Statement
MIT	Major Incident Tow
NHS	National Highway System
NOX	Nitrogen Oxides
NRI	National Risk Index
OSM	OpenStreetMap
PHED	Period Hours of Excessive Delay
PHMSA	Pipeline and Hazardous Materials Safety Administration
PM10	Particulate Matter less than 10 microns
PM2.5	Particulate Matter less than 2.5 microns
RCW	Revised Code of Washington

Acronym	Definition
RWIS	Road Weather Information System
SEA	Seattle–Tacoma International Airport
SR	State Route
SRP	State Rail Plan
TMC	Traffic Management Center
TPA	Transportation Partnership Account
TSMO	Transportation Systems Management and Operations
TTTR	Truck Travel Time Reliability Index
UTC	Washington Utilities and Transportation Commission
USDOT	United States Department of Transportation
USACE	United States Army Corps of Engineers
VMS	Variable Message Signs
VMT	Vehicle Miles Traveled

1. Overview and Context

Freight system performance is closely linked to Washington's economic performance because local, regional, national, and international supply chains depend on the reliable movement of goods. This appendix evaluates freight system performance through a supply-chain lens, focusing on how freight transportation supports the movement of goods between production areas, distribution centers, gateways, and markets. The analysis supports federal and state freight planning requirements and is organized around Washington's six statewide transportation policy goals: Preservation, Safety, Stewardship, Mobility, Economic Vitality, and Environment, providing a consistent framework for evaluating performance across modes and regions.

How Performance Affects Supply Chains

The following section summarizes the key ways in which freight system performance influences supply-chain outcomes across Washington. It draws together findings from the detailed analyses presented later in this appendix to illustrate how infrastructure condition, mobility constraints, safety risks, terminal performance, workforce access, and environmental considerations affect the cost, reliability, resilience, and competitiveness of freight movement. The detailed performance evaluation organized around Washington's six statewide transportation policy goals begins in Section 2. Freight System Performance Evaluation.

Recent condition data show that many high-volume freight corridors and first-/last-mile links in Washington are operating with aging pavements and bridges, growing preservation backlogs, and localized weight restrictions, especially on non-Interstate freight routes and short line rail segments.¹ While most Interstate bridges remain in fair or better condition, a rising share of WSDOT owned bridges are posted or nearing the end of their design life, and several short line bridges and track segments have speed or weight limits that constrain modern railcar use.²

From a supply-chain perspective, these constraints:

- Reduce routing flexibility where posted bridges, low-capacity short lines, or at-risk local structures remove otherwise direct truck or rail paths.
- Increase transit times and operating costs when detours or transloading are needed to work around load-restricted assets.
- Create localized single-point-of-failure risks where loss of a single bridge, slope segment, or terminal access road could sever an FAH from the network, particularly in rural areas with few parallel facilities.

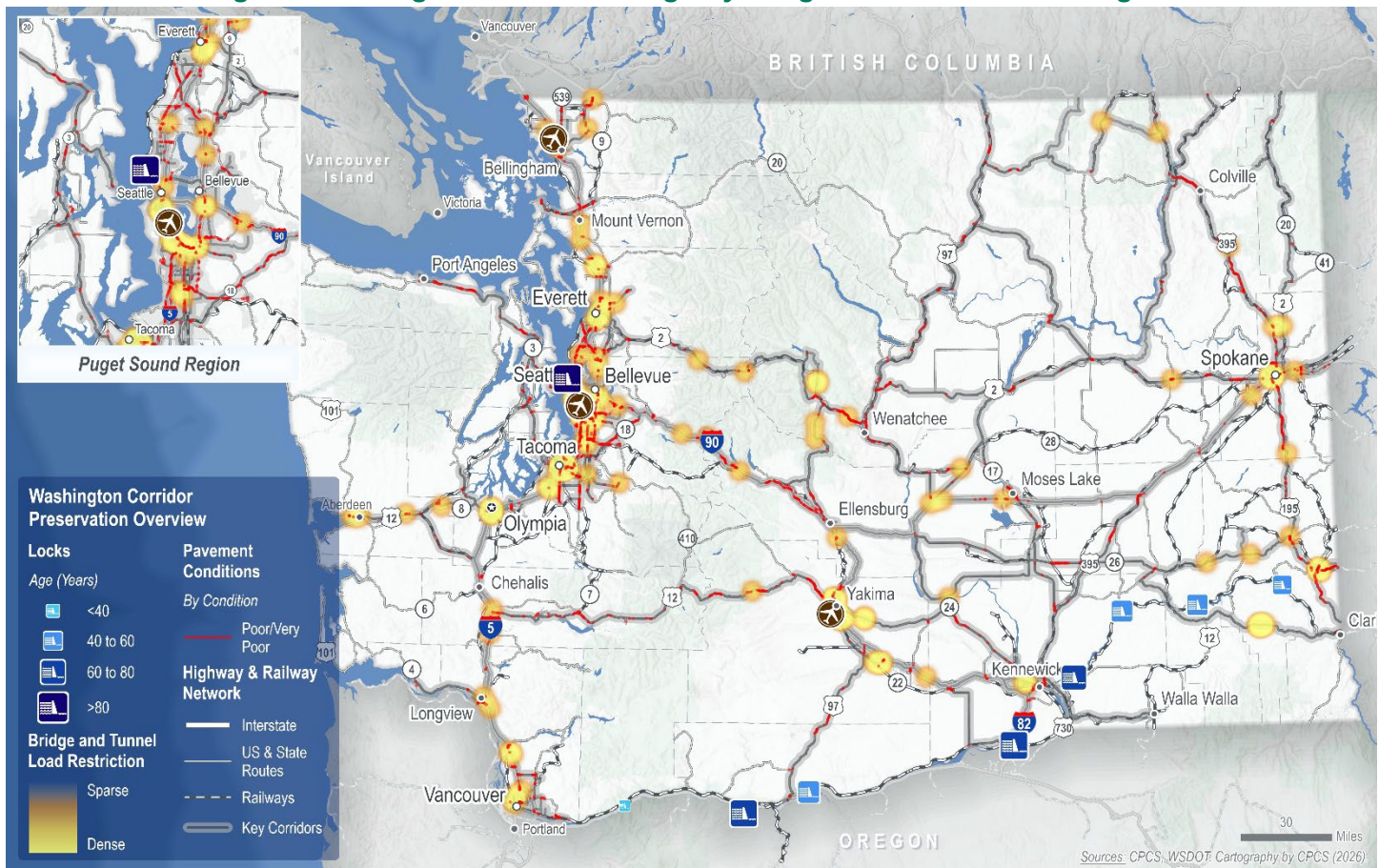
These constraints are especially important for volume-driven agricultural and industrial supply chains, where the economics depend on high-throughput, low-handling corridors and reliable first-/last-mile access to elevators, terminals, and plants. Figure F-1 maps freight condition hotspots along Washington's key freight corridors, highlighting where these risks are most concentrated.

¹ WSDOT, *Gray Notebook*, accessed June 2026. <https://wsdot.wa.gov/about/data/gray-notebook/default.htm>

¹ WSDOT, *Gray Notebook*, accessed June 2026. <https://wsdot.wa.gov/about/data/gray-notebook/default.htm>

² Washington State Department of Transportation, *Ongoing Rail Plan Update – Existing Rail Inventory, Condition, and Performance Technical Memorandum*, June 2025.

Figure F-1: Freight Condition Along Key Freight Corridors in Washington



Safety and operational disruptions

Washington continues to see elevated and geographically concentrated freight-related safety risks. State-level crash data and recent syntheses indicate that large-truck crashes rose during the 2020–2022 period and, while total crashes may have begun to ease slightly from peak levels, serious-injury and fatal outcomes remain near peak level.³ Most truck-involved crashes occur on higher-speed corridors, with notable clusters along I-5, I-90, I-82, and at urban interchanges where freight and general traffic mix.

Rail safety incidents and blocked crossings show a similar pattern of geographical concentration. Grade-crossing incidents and trespasser fatalities in Washington occur disproportionately along busy freight and passenger corridors in the Seattle–Tacoma region and in and around Spokane and other major junctions.⁴ Blocked crossings are heavily concentrated in high-activity rail counties (Spokane, King, Pierce, Lewis), and while the number of reported incidents has declined in some locations, average blockage durations have lengthened as longer trains become more common.

Pipeline incidents remain infrequent relative to road and rail events, and Washington's incident rate per mile for all pipelines has generally been below the national average over the last decade, but hazardous-liquid pipelines have seen an uptick in incident rates compared with the early 2010s. Major incidents on corridors such as the Olympic

³ WSDOT, *Crash Data*, accessed June 2026. <https://wsdot.wa.gov/about/transportation-data/crash-data>

⁴ Federal Railroad Administration, *FRA Safety Data*. <https://railroads.dot.gov/safety-data>

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and Trans Mountain systems underscore the potential for low-frequency, high-consequence disruptions with significant environmental and supply impacts.

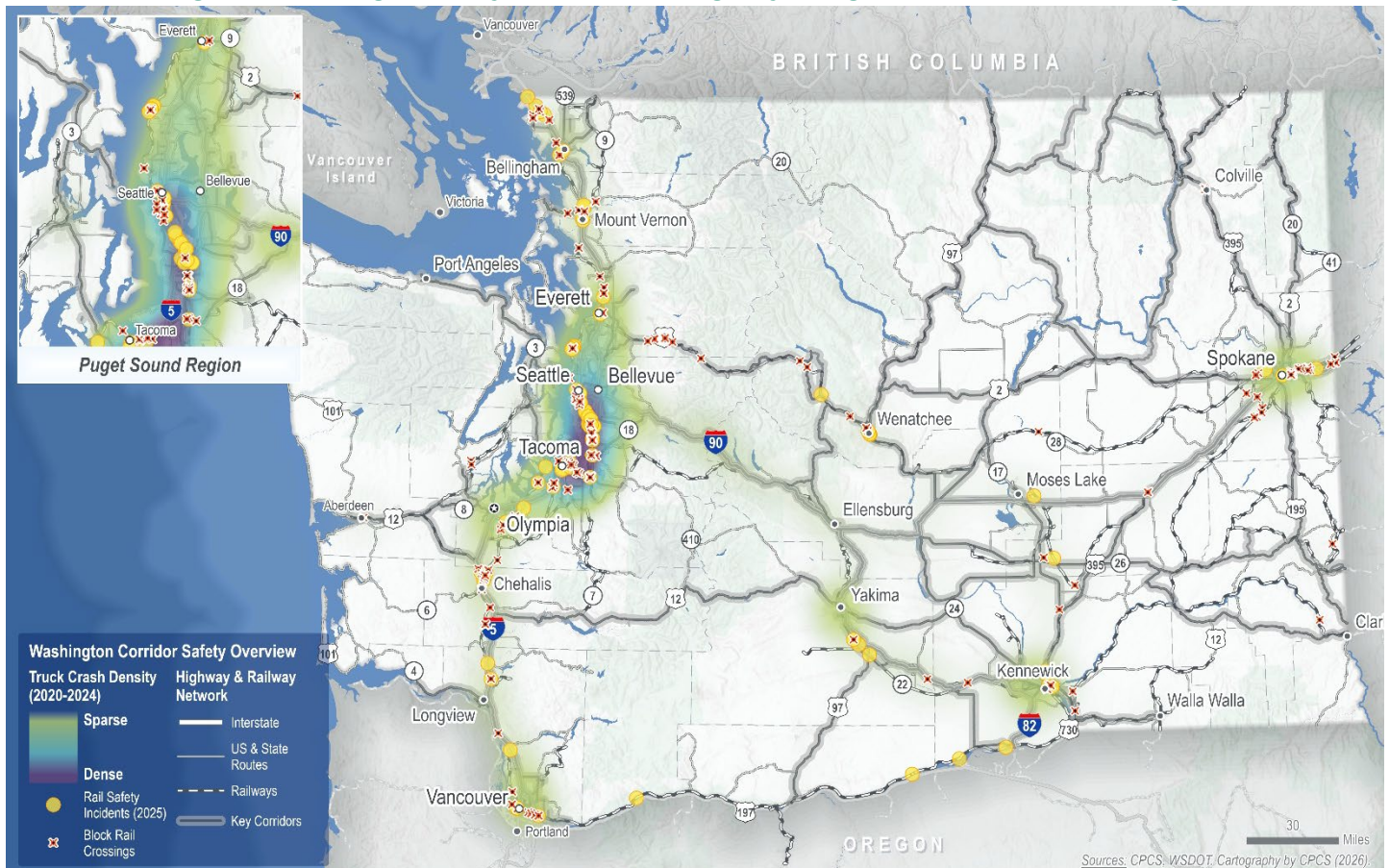
Truck parking shortages can also affect corridor reliability and safety by increasing the likelihood of undesignated parking on shoulders, ramps, and local streets, creating operational challenges for freight movements and other roadway users.

For supply chains, these patterns translate into:

- Higher likelihood of incident-related delay on a small number of corridors and nodes that carry a large share of truck and train movements.
- Localized but recurring reliability problems where crash clusters, truck-parking gaps, or chronic blocked crossings intersect with access routes to FAHs.
- Exposure to rare but severe events, particularly hazardous-materials spills or pipeline failures, that can temporarily remove entire corridors or terminals from service.

Figure F-2 maps multimodal safety hotspots along Washington's key freight corridors. The analysis focuses on highway, rail, and pipeline safety incidents that can be evaluated using geographically specific incident data, while maritime and air cargo safety are discussed elsewhere in this appendix using mode-specific performance indicators.

Figure F-2: Freight Safety Incidents Along Key Freight Corridors in Washington



Mobility constraints and bottlenecks

Across modes, Washington's freight mobility constraints are most pronounced at a small number of high-volume corridors, junctions, and facilities that operate near or at capacity much of the time. These locations are where reliability and delay problems are most likely to affect system-wide performance and where targeted investments can have the greatest benefit.

Key mobility findings along priority freight corridors include:⁵:

- On the NHS, truck reliability and delay concerns are concentrated in urban and port-serving segments of I-5, I-405, and other major corridors, while many rural segments operate with comparatively stable travel times.
- On the rail network, a handful of BNSF mainlines, especially Spokane–Pasco, Roosevelt–Portland, and Tacoma–Ellington, already operate near practical capacity, positioning them as critical determinants of future rail performance.
- On the inland waterway system, major investments have reduced average delay durations at several locks, but the percentage of vessels experiencing some delay remains high, reflecting consistently heavy use of key Columbia and Snake River locks.
- At cargo airports, runway length and airfield capacity influence freight mobility by affecting aircraft size, payload, and routing options. Washington's largest cargo airports generally have infrastructure capable of supporting long-haul cargo operations, while some smaller airports may face operational limitations associated with shorter runways. On the pipeline system, near-peak utilization of the Trans Mountain Puget Sound Pipeline and a stable 38–40 percent pipeline share of oil and crude movements show that pipelines already carry a large share of liquid energy commodities, with limited unused capacity on some key routes.

Figure F-3 summarizes the multimodal mobility hotspots along Washington's key freight corridors.

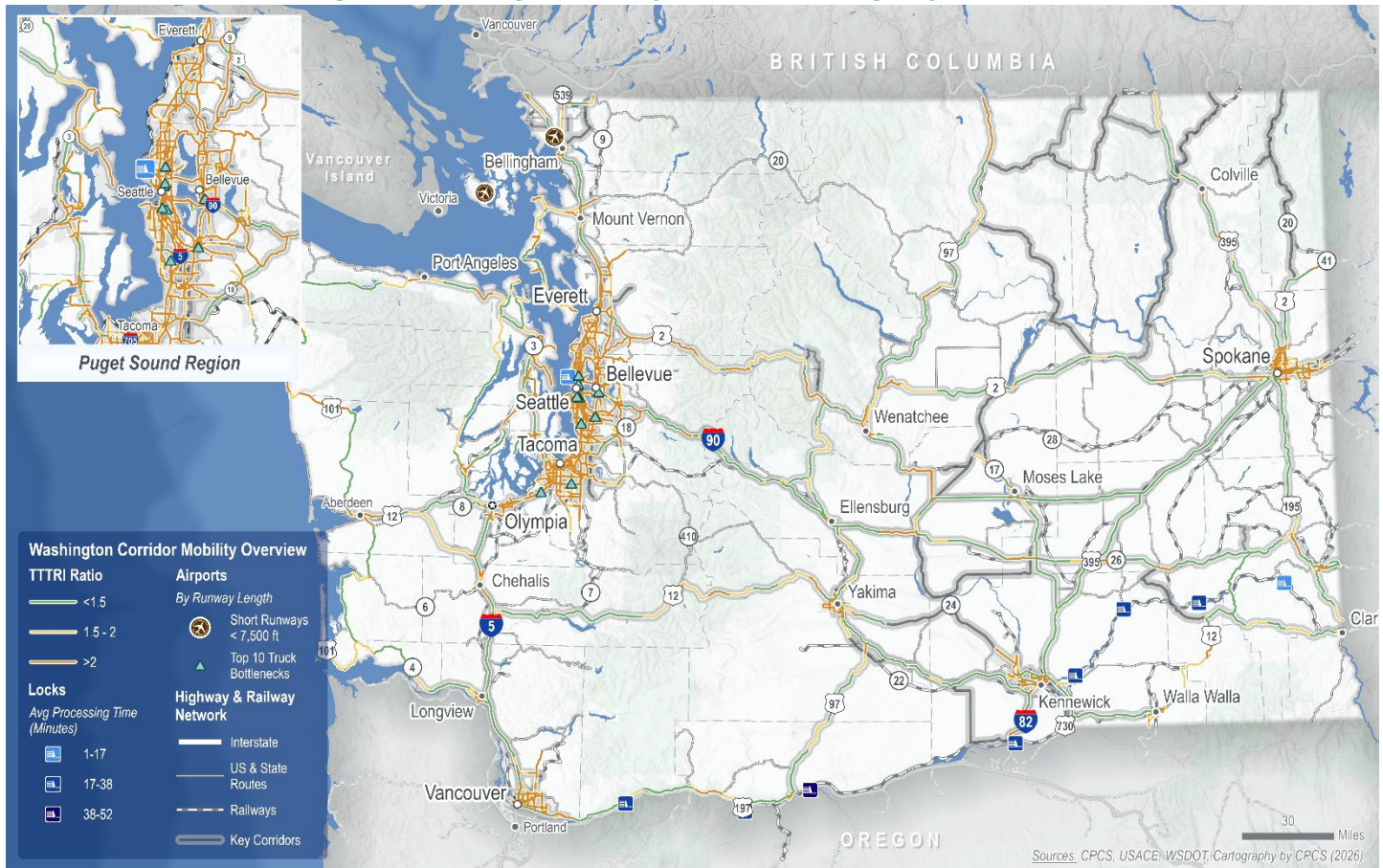
5 WSDOT, *Gray Notebook*, accessed June 2026. <https://wsdot.wa.gov/about/data/gray-notebook/default.htm>

USACE, *Lock Performance Monitoring System*, accessed June 2026. <https://ndc.ops.usace.army.mil/ords/r/lpms/corps-locks/home>

Washington State Department of Transportation, *Ongoing Rail Plan Update - Freight Rail Traffic & Commodity Forecast Technical Memorandum*, December 2025.

Washington Department of Ecology, *Total Oil Moved by Year and Mode 2015-2025*, accessed June 2026. <https://apps.ecology.wa.gov/publications/documents/1708014.pdf>

Figure F-3: Freight Mobility Hotspots Along Key Corridors



Terminal and hub performance

- Selected examples of port and inland terminal performance illustrate how quickly or slowly cargo moves through key nodes. BTS port-performance statistics show that during the 2020–2022 disruption period, average container vessel dwell times at Puget Sound ports rose into the multi-day range at peak, with Tacoma and later Seattle ranking among the slower-performing West Coast gateways before conditions improved. Elevated dwell times during that window contributed to vessel queues, higher demurrage and detention costs, and schedule unreliability for shippers using Washington ports.
- Rail-terminal statistics from the Surface Transportation Board and carrier reports indicate that average terminal dwell times at key inland locations such as Pasco have improved since the early 2020s, with reductions of several hours per car on average and system-wide dwell reductions reported by BNSF in 2025. These improvements increase effective rail capacity and reduce the likelihood that yard congestion will become a primary constraint on inland flows linked to ports or elevators.

For supply chains, these trends mean that:

- Marine gateways remain sensitive to demand spikes and operational disruptions, but recent experience and investments have improved the ability to move back toward normal dwell levels after shocks.
- Inland rail terminals are moving in a positive direction on dwell and velocity, which supports more predictable service for export shuttles, intermodal moves, and regional carload flows.

While these examples focus on Puget Sound marine terminals and the Pasco rail terminal, they illustrate a broader principle reflected throughout the Freight Activity Hub framework: performance at key terminals and intermodal

transfer points can affect the reliability, capacity, and competitiveness of supply chains that extend far beyond the facilities themselves.

Workforce and access constraints

Commuter and corridor analyses show that major freight corridors, especially I-5 through the Puget Sound region and I-90 across central and eastern Washington, carry high volumes of work trips to Freight Activity Hubs in addition to truck flows. In some locations, more than 20,000 daily work trips to FAHs use the same segments that carry large volumes of freight, particularly near large ports, distribution, and industrial clusters.

For supply chains, this overlap implies that:

- Congestion, incidents, or weather-related disruptions on these corridors affect both freight movements and the workforce needed to operate terminals, warehouses, and plants.
- Reliability issues on worker access routes may contribute to workforce-related challenges, particularly for facilities that depend on shift-based operations or workers commuting by automobile. Strategies that improve corridor reliability (e.g., operational improvements, demand management) can deliver dual benefits for freight and labor access.

Environmental and community interface

Environmental health and community feedback analyses show that many of Washington's highest-vulnerability census tracts and community-reported freight conflicts are located along major freight corridors and near FAHs in Everett, Seattle, Tacoma, Spokane, Yakima, and the Tri-Cities. These areas often exhibit both higher Environmental Health Disparities (EHD) scores and elevated PM2.5 exposure, alongside concerns about truck traffic, rail operations, and land-use compatibility.

For supply chains, this interface matters because:

- High existing exposure and community concern can prompt operational restrictions (e.g., time-of-day operational rules), additional mitigation requirements, or resistance to expansion of freight-related facilities in certain corridors.
- Projects that address performance and resilience but do not proactively manage community impacts may face longer delivery timelines or reduced feasibility, limiting the system's ability to add capacity where it is most needed.
- Conversely, community-compatible designs and operations, safer first/last-mile routing, noise and emission mitigation, grade-separation at critical crossings, can help preserve long-term access for freight in high-value, high-sensitivity corridors.

These trends reinforce that Washington's supply-chain strategy must simultaneously address reliability and capacity needs and maintain community and environmental viability along the same critical routes.

Comparative Corridor Roles in Washington Supply Chains

Washington's primary freight corridors, I-5, I-90, and I-82, anchor most of the state's truck-based supply chains and define many of the competitive advantages and vulnerabilities identified above.

- **I-5 corridor.** Connects Puget Sound ports, metro markets, and the Canadian and Oregon borders, carrying a high share of intrastate, interstate, and cross-border truck traffic. It links directly to major deepwater container and bulk ports, giving Washington strong multimodal access to global markets—but also concentrates risk, as eight of the state's top ten truck bottlenecks occur on I-5 and feasible north–south alternates are limited.
- **I-90 corridor.** Provides the only east–west interstate crossing of the Cascades in Washington, linking Puget Sound ports to inland markets in eastern Washington, Idaho, Montana, and beyond. This corridor is essential for containerized freight, bulk exports, and regional distribution but is vulnerable to winter weather closures, chain laws, and steep grades, with few equivalent alternatives in the state.
- **I-82 corridor.** Connects production regions in the Yakima Valley, Columbia Basin, and Tri-Cities directly to I-84 and the national interstate system, supporting time-sensitive and bulk agricultural exports (e.g., apples, hops, wheat, wine) and food processing. Reliable performance on I-82 underpins Washington's competitive position in key agricultural supply chains.

Key Takeaway: A Small Number of Corridors Drive Statewide Freight Performance

A relatively small set of multimodal corridors, gateways, and Freight Activity Hubs carries a disproportionate share of Washington's freight and workforce movements. As a result, disruptions at these locations can have cascading effects across multiple supply chains, increasing transportation costs, reducing reliability, and affecting the movement of goods throughout the state. Improving the performance and resilience of these critical links can provide outsized benefits for freight mobility, economic competitiveness, and supply-chain reliability.

2. Freight System Performance Evaluation

WSDOT's Performance Framework

The freight system performance analysis for the WSDOT's FSP is organized around the six statewide transportation policy goals outlined in Revised Code of Washington (RCW) 47.04.280. These goals, listed in Figure F-4, frame the agency's strategic plan and provide a common structure for evaluating and reporting how WSDOT programs are performing, including in the context of the freight system.

Figure F-4: Washington State Transportation Policy Goals

Washington State Transportation Policy Goals
Preservation: Maintain, preserve, and extend the life and utility of prior investments in transportation systems and services, including the state ferry system.
Safety: Provide for and improve the safety and security of transportation customers and the transportation system.
Stewardship: Continuously improve the quality, effectiveness, resilience, and efficiency of the transportation system.
Mobility: Improve the predictable movement of goods and people throughout Washington, including congestion relief and improved freight mobility.
Economic Vitality: Promote and develop transportation systems that stimulate, support, and enhance the movement of people and goods to ensure a prosperous economy.
Environment: Enhance quality of life through transportation investments that promote energy conservation, healthy communities, and environmental protection.

Source: Washington State Legislature, RCW 47.04.280. <https://app.leg.wa.gov/rcw/default.aspx?cite=47.04.280>

Understanding how Washington's freight system is performing and the condition of its key assets is essential to assessing WSDOT's progress toward these goals and related objectives. These goals guide investment decisions, while the Gray Notebook, WSDOT's quarterly performance reporting system, tracks and communicates results across the goal areas for the transportation system using a standardized set of performance measures.⁶

Approach to 2026 FSP Performance Analysis

The performance analysis for the 2026 FSP concentrates on Freight Activity Hubs (FAH) and the key corridors, including the roadway, rail, maritime, air cargo, and pipeline assets that carry the highest volumes of freight and experience the most significant reliability, safety, and condition issues. Building on the performance assessment in *2022 FSP – Appendix E: Washington's Freight Transportation System Performance*, this analysis integrates findings from prior WSDOT and partner studies, including truck parking evaluations, short line rail assessments, port access and connector studies, and statewide safety and environmental analyses, to provide a cohesive picture of how Washington's freight system is functioning and where targeted investments can most effectively advance the six transportation policy goals.

Network Framework and Measure Crosswalk

The freight system performance analysis applies different network lenses depending on the analytical purpose. Rather than using a single, universal freight network, the analyses are tailored to support trend comparison, corridor assessment, and external benchmarking in ways that are appropriate and interpretable.

⁶ As of March 2026, the Grey Notebook update is paused due to redesigning of the reporting approach. The expected relaunch date is Spring 2026. For updated information, see: <https://wsdot.wa.gov/about/accountability/gray-notebook>

- **Performance analyses** use the consistent freight network reported in the 2022 Freight System Plan, such as the NHS for truck travel time reliability and delay analysis, and state-owned T1–T2 segments for pavement condition analysis. Maintaining consistency with the prior plan network allows observed changes over time to reflect real shifts in freight activity and performance, rather than differences in network definition.
- **Corridor- and Freight Activity Hub–level analyses** use the networks identified through the 2026 Freight System Plan process. This approach links freight performance directly to the corridors and hubs that are most critical to Washington's present and future freight movements, supporting needs identification and investment decision-making.
- **External benchmark comparisons** are conducted on a selective, peer-based basis, comparing a limited number of Washington corridors or gateways to comparable facilities in other states or regions. This approach avoids broad “everything-to-everything” comparisons and instead focuses on meaningful peers, where differences in performance, role, or context can be reasonably interpreted.

Statewide and Legacy Trend Overview

Since their development, WSDOT has used the six policy goals identified in Figure F-4 as the performance framework for the Gray Notebook. In the 2022 FSP, WSDOT chose to give particular focus to the performance measure areas for mobility, infrastructure condition, and safety. This performance tracking was captured in the Gray Notebook.

Today, Gray Notebook is an online, interactive tool that continues to track the agency's quarterly performance and accountability. Quarterly, semi-annual, annual, and biennial updates on key agency functions are tracked and provide in-depth analysis of topics that align with Washington's transportation goals and strategic plan. For many metrics, this report relies on the information provided in the most recent version of the Gray Notebook report (for the quarter ending on December 31, 2024), maintaining reporting consistency across WSDOT plans. Additional measures for the freight system are explored and quantified in this report to further align freight performance with the statewide goals.

Where applicable, to follow the 2022 FSP performance reporting methodology, a comparison of performance between 2022 and 2026 will be used. The table in Figure F-5 provides a list of legacy trends and current values, as well as federally mandated performance management measures.

As shown in Figure F-5, one of the most significant preservation challenges is the condition of non-Interstate NHS pavement. In 2022, 17.4 percent of non-Interstate NHS pavement was classified as being in poor condition, substantially exceeding the state's 5 percent target and indicating significant preservation needs on many freight-supporting corridors outside the Interstate system.

Figure F-5: Transportation system performance measures and trends

Goal Area	Performance Measure	2022 Plan	2026 Plan	Target (Target year)	Trend
Statewide Transportation Policy Goals					
Preservation	Percentage of state highway pavement in fair or better condition by vehicle miles traveled	92.9%	91.0% (2023)	90% (2023)	-1.9%
	Percentage of state bridges in fair or better condition by bridge deck area	93.8%	91.5% (2023)	90% (2023)	-1.5%
Safety	Rate of traffic fatalities per 100 million vehicle miles traveled statewide	0.86	1.123 (2024)	0.8 (2026)	30.6%
Mobility	Highways: Vehicle Miles Traveled (VMT) on state highways	35.4B	-	-	-
Transportation Performance Management					
Highway Safety	Number of traffic fatalities on all public roads	542.8	705.2 (2024)	470.1 (2026)	29.9%
	Rate of traffic fatalities per 100 million vehicle miles traveled (VMT) on all public roads	0.885	1.123 (2024)	0.8 (2026)	26.9%
	Number of serious traffic injuries on all public roads	2,208.6	3,034 (2024)	2022.7 (2026)	37.4%
	Rate of serious traffic injuries per 100 million VMT on all public roads	3.59	5.214 (2024)	3.476 (2026)	45.2%
	Number of non-motorist traffic fatalities plus serious injuries	577	700 (2024)	466.7 (2026)	21.3%
	Highway-railway crossing fatalities	Show Progress	-	-	-
Pavement and Bridges	Percent of interstate pavement on the NHS in good condition	39.8%	-	30% (2025)	-
	Percent of interstate pavement on the NHS in poor condition	1.7%	-	4% (2025)	-
	Percent of non-interstate pavement on the NHS in good condition	45.2%	-	45% (2025)	-
	Percent of non-interstate pavement on the NHS in poor condition	17.4%	-	5% (2025)	-
	Percent of NHS bridges classified in good condition (weighted by deck area)	32.8%	36.1% (2024)	>30% (2025)	3.3%
	Percent of NHS bridges classified in poor condition (weighted by deck area)	7.8%	8.7% (2024)	<10% (2025)	0.9%
Performance, Freight, and Congestion Mitigation & Air Quality	Truck Travel Time Reliability (TTTR) Index	1.54	1.53	1.53 (2025)	-0.6%
	Peak hours of Excessive Delay per capita in the Seattle urbanized area (NHS)	23.2	-	28 (2025)	-
	All Pollutants (kg/day)	1,222.87	-	658.3 (2025)	-
	Carbon Monoxide (CO) (kg/day)	714.7	-	34.928 (2025)	-
	Particulate Matter less than 10 microns (PM10) (kg/day)	274.64	-	447.675 (2025)	-
	Particulate Matter less than 2.5 microns (PM2.5) (kg/day)	56.75	-	5.31 (2025)	-
	Nitrogen Oxides (NOX) (kg/day)	176.77	-	84.12 (2025)	-

Source: CPCS analysis, 2026.



Metric following desired trend



Metric not following desired trend

- No Data Available

Freight Corridor Performance

Preservation

Preservation indicates how well WSDOT maintains pavements, bridges, and other freight-supporting infrastructure in a state of good repair. Preservation performance measures help track asset condition over time, identify emerging investment needs, and evaluate whether current funding levels are sufficient to maintain reliable freight corridors. These measures also help WSDOT communicate the potential freight-system implications of deferred maintenance and asset deterioration.

System Preservation and Freight

Preservation of the infrastructure components that make up the transportation system is critical to freight because it ensures that the system's existing infrastructure can enable the safe, reliable, and efficient movement of goods. Maintaining assets such as highways, bridges, rail crossings, and intermodal facilities can reduce unexpected delays and disruptions to the freight system, which in turn can improve supply chain performance and help businesses by reducing associated shipping costs. Prioritizing preservation can help to extend the lifespan of a state's key freight corridors, support reliable travel times through those corridors, and avoid the more expensive reconstruction projects that can become necessary when ongoing maintenance projects are neglected.

Pavement conditions

WSDOT's 2022 Transportation Asset Management Plan (TAMP) reports on statewide pavement condition, including include the percentage of pavement in fair or good condition, asset sustainability ratio, remaining service life, and deferred preservation liability.

As shown in Figure F-5, one of the most significant preservation challenges is the condition of non-Interstate NHS pavement. In 2022, 17.4 percent of non-Interstate NHS pavement was classified as being in poor condition, substantially exceeding the state's 5 percent target and indicating significant preservation needs on many freight-supporting corridors outside the Interstate system.

Figure 6 shows the pavement condition ratings in Washington according to data collected and analyzed by WSDOT's Pavement Office through 2023. Since 2020, these condition measures have generally declined: the share of pavement in fair or good condition dropped from 93 percent to 91.6 percent, remaining service life fell from 47 percent to 44.4 percent, while the deferred preservation backlog increased to roughly \$1 billion.⁷

⁷ WSDOT, *Transportation Asset Management Plan*, June 2022. <https://wsdot.wa.gov/sites/default/files/2021-10/Washington-State-DOT-Transportation-Asset-Management-Plan.pdf>

Figure F-6: Pavement performance trends through 2023

Pavement Performance Measure	2020	2021	2022	2023	2023 Target
Pavement in Fair or Good Condition (percent of pavement in fair and good condition)	93.0%	92.0%	91.2%	91.6%	90%
Asset Sustainability Ratio (years of pavement service life added to the pavement network through rehabilitation in a given year divided by the service life consumed in that year)	0.84	0.49	0.47	0.33	0.90 – 1.10
Remaining Service Life (average percentage of original total useful life remaining before rehabilitation or replacement is needed; average years remaining before rehabilitation or replacement is needed)	47.1%	47.5%	43.5%	44.4%	45 – 55%
Deferred Preservation Liability (an estimate of the accumulated cost (in current dollars) to fund the backlog of past-due (deferred) pavement rehabilitation work)	\$478M	\$524M	\$460M	\$1B	\$0

Source: WSDOT Pavement Office, 2026. Notes: WSDOT's deferred preservation liability was updated for the 2023 reporting cycle due to increasing costs. Chip seal cost estimates went from \$50,000 to \$115,000 per lane mile, and asphalt treatments increased from \$250,000 to \$300,000 per lane mile.

Figure F-7 summarizes pavement condition by FGTS corridor type for 2025. T-1 corridors, which carry the highest freight volumes, comprise about 1,112 miles and are largely in good condition (75%), with relatively little mileage in poor condition (3%) and a modest share with unknown condition (11%). In contrast, T-2 corridors and other tiers have substantially lower shares in good condition and much higher proportions of mileage with unknown condition, over half for T-2 corridors, indicating greater uncertainty and potential need for further assessment. Overall, across all tiers, most FGTS freight corridor mileage has an unknown condition rating, limiting the ability to assess pavement performance consistently across the statewide freight network.

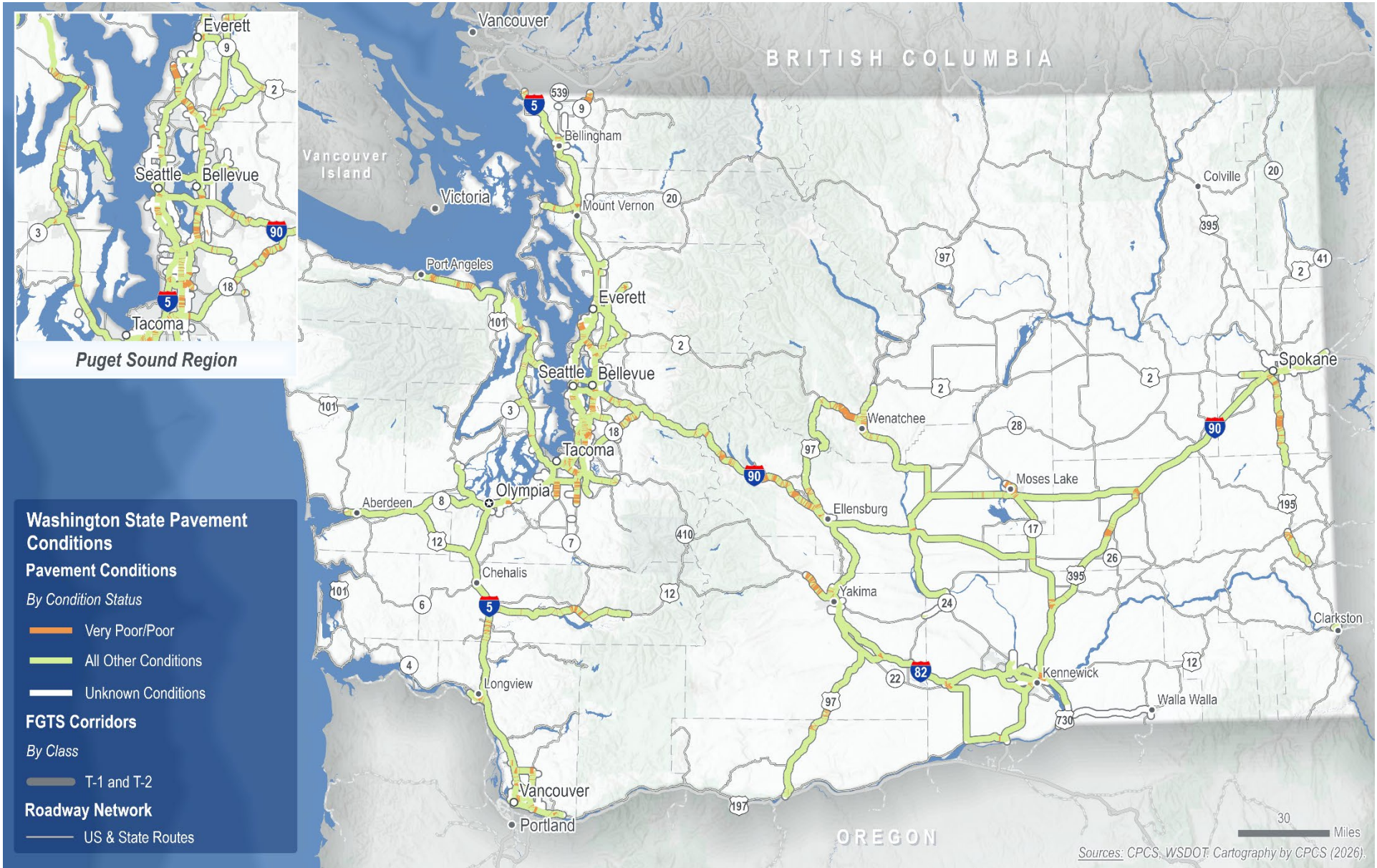
Figure F-7: FGTS freight corridor pavement performance

Freight Corridor Tier	FGTS Centerline Mileage	% In Good Condition	% In Fair Condition	% In Poor Condition	% With Unknown Condition ¹
T-1 corridors (>~10M tons/year)	1,112	75%	11%	3%	11%
T-2 corridors (4–10M tons/year)	1,309	30%	11%	5%	54%
Other Tiers	19,704	13%	3%	1%	83%
Total	22,125	19%	4%	2%	75%

Source: CPCS analysis of WSDOT Pavement Office data, 2025. Note that the pavement percentages are an estimate based on available data.

¹No pavement condition data available for these segments

Figure F-8: Pavement conditions in Washington on the FGTS



Bridge conditions

WSDOT owns more than 3,000 of Washington's 7,700 vehicle-carrying bridges over 20 feet, and the average WSDOT bridge is now over 50 years old. About 315 bridges are 80 years or older, making preservation critical to preventing weight restrictions and closures on key freight routes.

Bridge condition ratings are defined by WSDOT as:⁸

- **Good** - Bridges in good condition have no or only minor deterioration of structural elements.
- **Fair** - Bridges in fair condition are structurally sound but show minor deterioration, such as cracking or spalling.
- **Poor** - Bridges in poor condition have advanced deficiencies in key components, and while they remain safe for travel, they may require weight restrictions.

WSDOT's goal for bridge conditions was to have at least 90 percent of the bridges by deck area in good or fair condition in 2024.⁹ As of 2024, 91.5 percent of WSDOT-owned bridge deck area meets this standard, but the share of deck area in poor condition has grown from 6.2 percent in 2020 to 8.5 percent, and the number of poor-condition bridges increased from 164 to 229 over the same period (Figure F-9). On the NHS system overall, 8.7 percent of bridge deck area and 6.3 percent of bridges are in poor condition, with both state and locally owned bridges contributing to this total.

Weight restrictions are a visible indicator of how bridge conditions affect freight operations. As of 2024, 133 WSDOT-owned bridges longer than 20 feet are load-restricted or load-posted, up from 130 in 2020. The number of bridges identified as needing rehabilitation or replacement in the next 10 years has more than doubled, from 118 in 2020 to 295 in 2024, raising the risk of longer truck detours, higher freight costs, and more frequent disruptions if preservation needs are not addressed in time (Figure F-10).

WSDOT conducts load rating evaluations through its bridge inspection program to confirm that bridges can safely support current traffic and apply weight restrictions when bridges are weakened by deterioration, damage, or outdated design standards. The agency first limits or prohibits overweight permit vehicles and, if needed, posts lower truck weight limits or closes bridges until repairs are completed, which protects safety but can significantly affect freight mobility and supply chain reliability.

Figure F-9: Structural condition of WSDOT-owned bridges

	Structural Condition Rating	FY2020	FY2021	FY2022	FY2023	FY2024
Good	Bridge deck area	21.2	20.8	20.6	20.4	20.6
	Percent of deck area	37.5%	37.0%	36.7%	36.1%	36.1%
	Number of bridges	1,726	1,725	1,719	1,702	1,742
Fair	Bridge deck area	31.8	31.5	31.4	32.1	31.5
	Percent of deck area	56.3%	56.2%	55.9%	56.7%	55.4%
	Number of bridges	1,452	1,461	1,457	1,469	1,441
Fair or Better	Bridge deck area	52.3	52.3	52.0	52.5	52.1
	Percent of deck area	93.8%	93.2%	92.6%	92.8%	91.5%
	Number of bridges	3,178	3,186	3,176	3,171	3,183
Poor	Bridge deck area	3.8	3.8	4.2	4.1	4.9
	Percent of deck area	6.2%	6.7%	7.4%	7.2%	8.5%
	Number of bridges	164	179	199	213	229
Total	Bridge deck area	56.5	56.1	56.2	56.6	57.0
Total	Number of bridges	3,365	3,365	3,375	3,384	3,412

⁸ WSDOT Website Bridge and Structure Preservation, accessed April 2026. <https://wsdot.wa.gov/construction-planning/preserving-our-roads-bridges/bridge-structure-preservation>

⁹ WSDOT, Gray Notebook, accessed April 2026. <https://wsdot.wa.gov/about/data/gray-notebook/gnbhome/preservation/bridges/condition.htm>

Source: WSDOT Bridge and Structures Office, WSDOT Local Programs Office.

Figure F-10: Washington bridge rehabilitation and replacement needs

	Number of Bridges	Number of Bridges	Deck Area (sq. ft.)	Deck Area (sq. ft.)
Bridge Status	2020	2024	2020	2024
Contract work – Active	6	9	63,838	571,357
Replacement currently needed	12	29	104,464	471,149
Rehabilitation currently needed	18	33	540,608	2,118,574
Border bridges	1	1	102,700	160,271
Rehabilitation/ replacement needed within 10 years	81	223	405,578	6,775,898
Total 10-year needs	118	295	1,217,188	10,097,249

Source: Gray Notebook, WSDOT, 2026.

Rail track classification

The Federal Railroad Administration’s Track Safety Standards define nine track classes, each with maximum allowable speeds for freight and passenger trains. In Washington, most freight service operates on Class 1-4 track; higher-class track supports faster, more reliable movements, while lower-class track requires slower speeds and can indicate deferred maintenance or lower investment levels.¹⁰

FRA regulations cap freight train speeds based on their track class of Excepted, Class 1, Class 2, Class 3, or Class 4, and Class 5. Figure F-11 shows the FRA-designated speed restrictions for freight trains by Class. Railroads are responsible for designating the class of each track segment and maintaining track to the standards of its assigned class, and they face penalties if they operate above the speed limits for that class or fail to maintain required conditions.

Figure F-11: Freight train track class speed restrictions

Track Class	Speed Limit
Excepted Track	10 mph
Class I Track	10 mph
Class 2 Track	25 mph
Class 3 Track	40 mph
Class 4 Track	60 mph
Class 5 Track	80 mph

Source: U.S. Department of Transportation Federal Railroad Administration, Track Safety Standards, § 213.9 Classes of track: operating speed limits.

In Washington, speed-related constraints are concentrated on short line railroads rather than Class I main lines. Survey data collected for the State Rail Plan update (Figure F-12) indicate that 11 of 18 reporting short lines have Excepted or Class 1 segments, where freight trains are limited to 10 mph; on these segments, service times can at least double relative to higher-class track, increasing operating costs and limiting opportunities to shift freight from truck to rail. Many of these short lines provide critical connections to agricultural production areas, grain elevators, processing facilities, ports, and Freight Activity Hubs, meaning that track-speed restrictions can affect the efficiency and competitiveness of supply chains that rely on rail access to national and international markets.

¹⁰ U.S. Department of Transportation Federal Railroad Administration, “Track,” accessed March 24, 2027. <https://railroads.dot.gov/railroad-safety/divisions/track/track>

Figure F-12: Track miles by FRA track class, Washington state shortline railroads

Railroad		Excepted	Class 1	Class 2	Class 3	Class 4	Class 5
BDTL	Ballard Terminal Railroad	3	-	-	-	-	-
CWRR	Central Washington Railroad	8	3.3	35.3	-	-	-
CBRR	Columbia Basin Railroad	23.6	1.2	59.1	-	-	-
CWW	Columbia Walla Walla Railway	54	14	15	-	-	-
KET	Kennewick Terminal Railroad (Port of Benton)	N/A	N/A	N/A	N/A	N/A	N/A
RS	Rainier Rail	17	63.25	-	-	-	-
YCR	Yakima Central Railroad	22	-	-	-	-	-
RYAL	Washington Royal Line	26	-	-	-	-	-
CSCD	Cascade and Columbia River Railroad	N/A	N/A	N/A	N/A	N/A	N/A
OYLO	Olympia and Belmore Railroad	N/A	N/A	N/A	N/A	N/A	N/A
PSAP	Puget Sound and Pacific Railroad	N/A	N/A	N/A	N/A	N/A	N/A
MVT	Mount Vernon Terminal Railway	-	-	-	1.5	-	-
WERR	Washington Eastern Railroad	31	62	22	-	-	-
LVSW	Longview Switching Company	N/A	N/A	N/A	N/A	N/A	N/A
SSP	Spokane, Spangle & Palouse Railway	27.9	-	37.6	-	-	-
KFR	Kettle Falls International Railway	-	34.4	-	-	-	-
CLC	Columbia & Cowlitz Railway	-	36	-	-	-	-
POVA	Pend Oreille Valley Railroad	-	-	22.9	-	-	-
PVJR	Chelatchie Prairie Railroad	24	15	-	-	-	-
STPP	St Paul & Pacific Northwest Railroad	-	-	83.5	-	-	-
TMBL/ TRMW	Tacoma Rail	-	41	3	15.6	-	-
GRNW	Great Northwest Railroad	-	10.46	-	67.1	-	-
PCC8F*	Palouse River & Coulee City Railroad	62.7	55	73.8	-	-	-

Source: WSDOT, Ongoing State Rail Plan Update – Existing Inventory, Condition, and Performance Technical Memorandum, June 2025. * Only partial data was received via survey for PCC regarding track class.

Upgrades made to Palouse River and Coulee City (PCC) short-line rail system

Serving as a critical link in Eastern Washington's wheat supply chain, the PCC is the longest state-owned short-line freight rail system in Washington. Managed by WSDOT, the system is split into three branch lines, with each operated by private railroad companies. WSDOT is conducting a multi-phase rehabilitation on the Palouse and Coulee City short-line rail system in response to operational needs.

In 2023, WSDOT received over \$70 million from the U.S. Federal Railroad Administration to design and construct upgrades along the PCC. The purpose of the upgrades is to enable the short line to handle heavier, faster rail cars and to be more resilient to extreme weather conditions. In 2024, WSDOT received over \$37 million for final design and construction of rehabilitation of the PCC. Together, this funding has been used to improve the speed and reliability of this freight rail line, further supporting Washington's wheat farmers.

Source: U.S. Senator Patty Murray, Washington Rail Systems to Receive \$115M in Infrastructure Upgrades, accessed June 11, 2026. <https://www.murray.senate.gov/washington-rail-systems-to-receive-115m-in-infrastructure-upgrades/>
U.S. Senator Maria Cantwell, Wahington Rail System to Receive \$76.8M in Infrastructure Upgrades Thanks to Cantwell-Championed Program, accessed June 11, 2026. <https://www.cantwell.senate.gov/news/press-releases/washington-rail-systems-to-receive-768m-in-infrastructure-upgrades-thanks-to-cantwell-championed-program>

Rail track weight limit

Track weight limits indicate the maximum loaded weight each railcar can safely carry on a given line and reflect the structural capacity of track, bridges, and supporting infrastructure. On North American freight railroads, the current industry standard is 286,000 pounds per car (“286k”), and lines that cannot accommodate 286k cars require lighter loads, shorter trains, or more complex handling. Rail track weight limits are a critical factor in freight supply chains because they are a determining factor for how much cargo can be carried on each railcar. This, in turn, affects the efficiency and cost of moving goods. As higher weight limits are enacted on rail lines, those lines are able to take heavier loads per train, which can reduce the number of trains needed, and ultimately lower the cost of transportation for shippers.

The Class I railroads in Washington generally support 286k railcars on their main routes in the state, and most of these mainline segments also operate at FRA Class 2 speeds (25 mph) or higher. By contrast, some short line railroads have segments that are either weight-restricted below 286k or must operate at low track classes, particularly on older infrastructure serving rural and agricultural areas.

For shippers and operators, sub-286k limits and low track classes reduce the amount of freight that can be moved per train, increase switching and re-handling, and can make rail service less competitive with trucking. These impacts are particularly important for agricultural supply chains in Eastern Washington, where grain hubs such as Ritzville, Endicott, McCoy, and other production and distribution hubs depend on efficient rail connections to export gateways. Weight restrictions can increase transportation costs, reduce rail competitiveness, and affect the movement of grain, food products, and other bulk commodities to ports and processing facilities. Similar constraints can affect industrial and manufacturing supply chains that rely on short line rail connections to access Class I railroad networks. From a preservation perspective, maintaining and upgrading short line infrastructure to support 286k at higher track classes can help avoid load restrictions, reduce the risk of service disruptions, and improve the resilience of rail-served freight corridors (Figure F-13)¹¹

Figure F-13: Short line weight capacity

Rail Line Name	Total Track Miles	286k lb.-capable Track Miles	% 286k lb.-capable Track Miles
Central Washington Railroad	50.6	37.9	75%
Columbia – Walla Walla Railway	83	78	94%
Columbia Basin Railroad	83.9	64.6	77%
Columbia Rail	1	1	100%
CW Branch of PCC	107.6	22	20%
Great Northwest Railroad	77.56	77.56	100%
Hooper Branch	52.1	51.8	99%
Kettle Falls International Railway	34.4	34.4	100%
Pend Oreille Valley Railroad	22.9	22.9	100%
Port of Benton	17	17	100%
PV Branch	31.7	0	0%
Rainier Rail	80.25	80.25	100%
Royal Line	26	26	100%
St. Paul & Pacific Northwest Railroad	83.5	83.5	100%
Washington Eastern Railroad	14	0	0%
YAK Rail	22	22	100%

¹¹ Washington State Department of Transportation, *Ongoing Rail Plan Update – Existing Rail Inventory, Condition, and Performance Technical Memorandum*, June 2025.

Source: Washington State Department of Transportation, Ongoing Rail Plan Update – Existing Rail Inventory, Condition, and Performance, June 2025.

Lock age and service life

Inland navigation infrastructure on the Columbia–Snake River System and at the Ballard Locks is a critical part of Washington’s multimodal freight network, especially for grain, bulk commodities, and project cargo. Ballard Locks also serves as the home port for Seattle’s commercial fishing fleet. Most U.S. navigation locks were originally designed for service lives of roughly 50–75 years, but many structures have now been in operation for several decades beyond those expectations.

The Columbia–Snake River System is a 465-mile inland waterway with eight major federal locks that collectively lift vessels about 740 feet from the Pacific Ocean to Lewiston, Idaho. While this system is younger than many locks on the Mississippi or Ohio rivers, most Columbia–Snake locks are now between about 50 and 70 years old and are entering a phase where major rehabilitation is needed, often at multiple sites in the same period. The Bonneville navigation lock’s effective service life was partially reset when a new lock was completed in 1993, and the Lower Monumental lock received a critical gate replacement in 2011, extending its useful life relative to the rest of the system.

The Ballard (Hiram M. Chittenden) Locks on the Lake Washington Ship Canal opened in 1916 and have far exceeded their original design life. To keep this asset in service, the U.S. Army Corps of Engineers is undertaking major rehabilitation, including replacement of the century-old large-lock center gates in a multi-year project that requires periodic closures.¹²

Figure F-14 shows Washington’s lock ages spatially and in table form, also showing the service life estimate. Figure F-15 demonstrates the locks as a system – when one lock is impacted or delayed due to construction or maintenance, the entire inland waterway freight system is affected. The lock infrastructure ranges from 32 to 108 years, with the majority of the lock systems operating between 50 and 80 years of service.

Figure F-14: Washington lock ages

Body of Water	Lock	Year Opened	Age (as of 2026)	Service Life Estimate (years remaining, 60-year baseline)
Lake Washington Ship Canal	Ballard (Hiram M. Chittenden)	1916	110	50 years beyond service life
Columbia River	McNary	1954	72	12 years beyond service life
	The Dallas	1957	69	9 years beyond service life
	Bonneville	1993*	33	27
	John Day	1968	58	2
Snake River	Lower Monumental	1969	57	3
	Ice Harbor	1962	64	4 years beyond service life
	Little Goose	1970	56	4
	Lower Granite	1975	51	9

Source: CPCS Analysis, U.S. Army Corps of Engineers (USACE) Districts Data *The original lock opened in 1938, but the current navigation lock (which the USACE data refers to) was completed and opened in 1993.

¹²Large Lock Large Lock Center Gate Replacement at Chittenden Locks Begins October 2023, September 15, 2023. <https://www.nws.usace.army.mil/Media/News-Releases/Article/3520889/large-lock-center-gate-replacement-at-chittenden-locks-begins-october-2023/>

Figure F-15: Washington lock ages



Runway conditions

Washington’s air cargo system includes 22 airports, with Seattle-Tacoma International Airport (SEA) and King County International Airport–Boeing Field (BFI) handling the largest volumes of freight. Runway condition is a key factor in safe and efficient cargo operations, affecting allowable aircraft loads, reliability during adverse weather, and long-term maintenance needs.

The Federal Aviation Administration (FAA) and related guidance classify runway pavement condition on a scale from excellent to failed, based on the type and extent of surface distress such as cracking, raveling, and patching. In this plan, runway conditions are summarized into three categories (good/excellent, fair, and poor) to align with broader preservation and safety metrics used across modes (Figure F-16).

Most of Washington’s major air cargo airports have runways in good or excellent condition, including SEA, Spokane International (GEG), Paine Field (PAE), Bellingham International (BLI), and Grant County International (MWH). King County International (BFI) and Tri-Cities Airport (PSC) each have at least one runway in fair condition, and Yakima Air Terminal–McAllister Field (YKM) is the only major air cargo airport with a primary runway rated in poor condition.

For freight, these conditions mean that the state’s highest-volume cargo hubs currently have runways that support reliable operations, while fair and poor ratings at a small number of airports may limit growth, trigger operational constraints, or require more intensive maintenance in the future. Maintaining runway conditions at these key airports is important to preserving air cargo capacity.

Figure F-16: Airport runway condition for the top nine air cargo facilities

Airport	Runway	Surface Type	Runway Condition
SEA International Airport (SEA)	16C/34C	Concrete	Excellent
	16L/34R	Concrete	Excellent
	16R/34L	Concrete	Excellent
King County International Airport (BFI)	14L/32R	Asphalt	Fair
	14R/32L	Asphalt	Good
Spokane International Airport (GEG)	03/21	Asphalt/Concrete	Good
	08/26	Asphalt	Good
Paine Field Airport (PAE)	16L/34R	Asphalt	Good
	16R/34L	Asphalt/Concrete	Good
Yakima Air Terminal McAllister Field (YKM)	04/22	Asphalt	Poor
	09/27	Asphalt	Excellent
Tri-Cities Airport (PSC)	03L/21R	Asphalt	Good
	03R/21L	Asphalt	Fair
Bellingham International Airport (BLI)	16/34	Asphalt	Good
Grant County International Airport (MWH)	04/22	Concrete	Good
	09/27	Concrete	Good
	14L/32R	Concrete	Good
	14R/32L	Concrete	Good
	18/36	Asphalt	Good
Friday Harbor Airport (FHR/FRD)	16/34	Asphalt	Good

Source: Federal Aviation Administration Airport Data and Information Portal, 2026.

Pipeline conditions

Pipelines are a crucial part of Washington's multimodal freight and energy system, transporting natural gas, refined petroleum products, and emerging fuels such as renewable natural gas and hydrogen. More than 47,000 miles of pipelines and dozens of operators move energy products that support households, industry, ports, and transportation, making preservation and safety central to system resilience.¹³

Intrastate pipeline safety is overseen by the Washington Utilities and Transportation Commission (UTC) in coordination with the federal Pipeline and Hazardous Materials Safety Administration (PHMSA), while interstate pipelines are regulated directly by PHMSA. Strong conditions and oversight requirements have been shaped by major incidents in Washington's history, most notably the 1999 Olympic Pipeline explosion in Bellingham, when a ruptured gasoline pipeline released more than 270,000 gallons of fuel into Whatcom Creek, causing three fatalities and significant environmental damage.

More recent events underscore the importance of ongoing inspection and maintenance (as highlighted under the safety section in Figure F-30). In December 2023, a corroded component on the Olympic Pipeline near Conway led to a spill of about 21,000 gallons of gasoline, sending thousands of gallons into a nearby fish-bearing stream and prompting temporary school closures; the operator faces a \$3.8 million penalty and additional cost recovery for the spill. These incidents illustrate how pipeline failures can have large environmental and community impacts even when they do not directly injure people.

¹³ Washington Utilities and Transportation Commission, Pipeline Safety, accessed March 25, 2026. www.utc.wa.gov/public-safety/pipeline-safety

Safety

Safety performance analysis tracks outcomes such as fatalities and serious injuries to understand the freight system's impact on people using or living near freight corridors. These measures help WSDOT and partners identify high-risk locations, select projects with demonstrated crash-reduction benefits, and assess whether investments are improving outcomes over time.

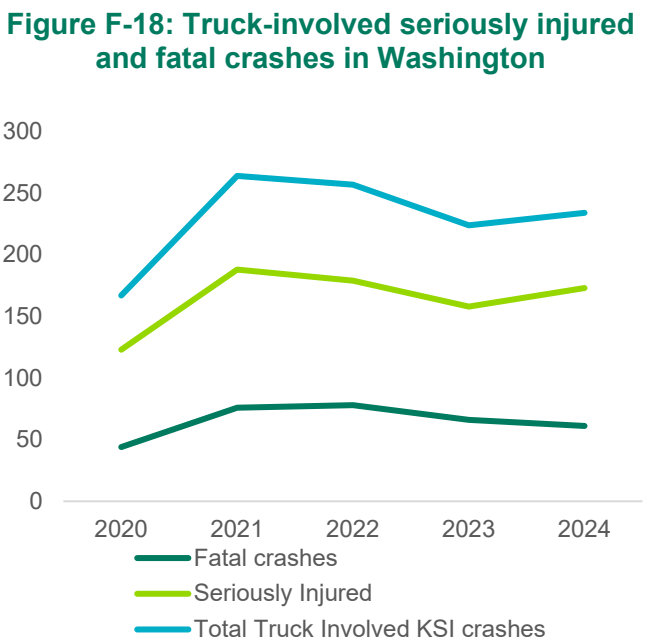
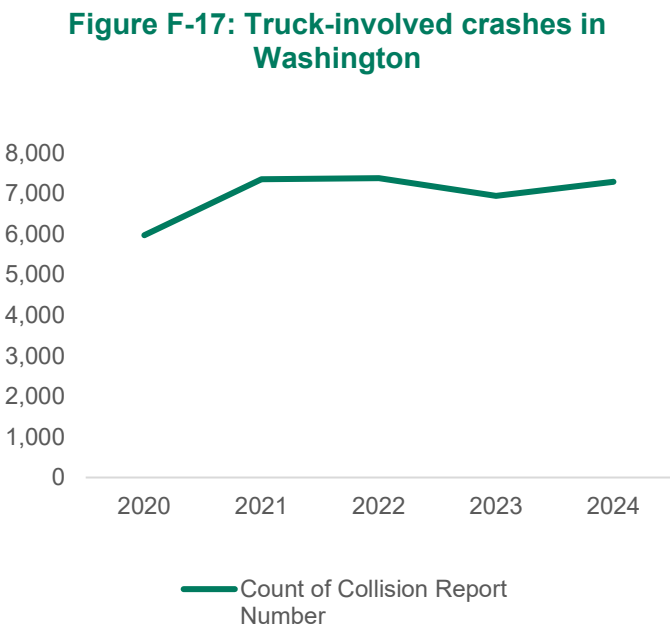
Tracking safety outcomes also supports transparency and public trust by showing where locations exist with the potential for crash reduction based on the contributing factors and how resources are being directed to reduce severe crashes. Using consistent, outcome-based metrics helps align safety improvements across highways, rail corridors, pipelines, and freight nodes.

The Importance of System Safety

Fundamental to the freight system is the ability to move goods safely, as it directly affects the well-being of drivers, workers, and the general public. Safer freight corridors enable a reduction in crashes, cargo loss, and service disruptions, events which otherwise can lead to expensive time delays and supply chain inefficiencies. The prioritization of safety investments supports more reliable freight movements throughout a region or state and enhances the overall system performance.

Truck-involved crashes

Truck-involved crashes in Washington have increased from 5,977 in 2020 to 7,299 in 2024, an almost 22% increase as seen in Figure F-17. Seriously injured and fatal crashes involving trucks have also increased from 167 in 2020 to 234 in 2024, as seen in Figure F-18.



Source: CPCS analysis of WSDOT crash data, 2026

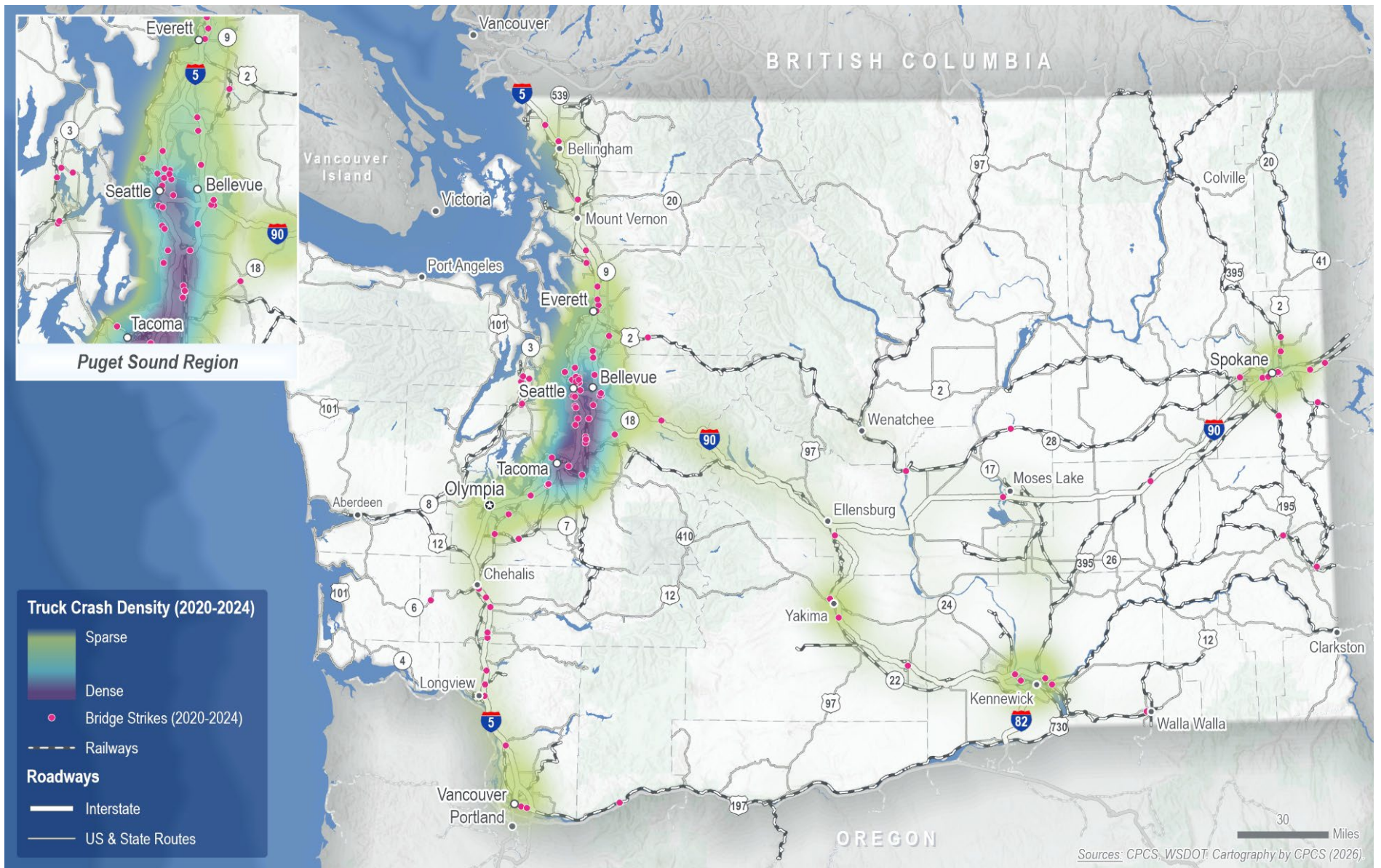
Source: CPCS analysis of WSDOT crash data, 2026

Figure F-19 highlights truck-involved crash density across Washington, with crashes concentrating in urban areas and along major freight corridors such as I-5, I-90, and I-82. The analysis identifies locations where truck-involved crashes are most concentrated and helps illustrate recurring safety challenges along key freight routes.

Bridge Strikes

Bridge strikes can create damage and failure of structures, injuries to motorists and freight drivers, and exposure to workers repairing the structures. They are evaluated separately using reported strike counts. Between 2020 and 2024, two notable clusters of recurring bridge strikes emerged. In the Spokane region, bridge strikes were concentrated at railroad overpasses along the BNSF Spokane Subdivision, which experienced more than 65 strikes across multiple bridges during the study period. In Kirkland, nearly 50 bridge strikes were recorded between 2020 and 2024 on Kirkland Way at the Cross Kirkland Corridor bridge, which has a posted clearance of 11 feet 6 inches.

Figure F-19: Truck-involved crash density and bridge strikes



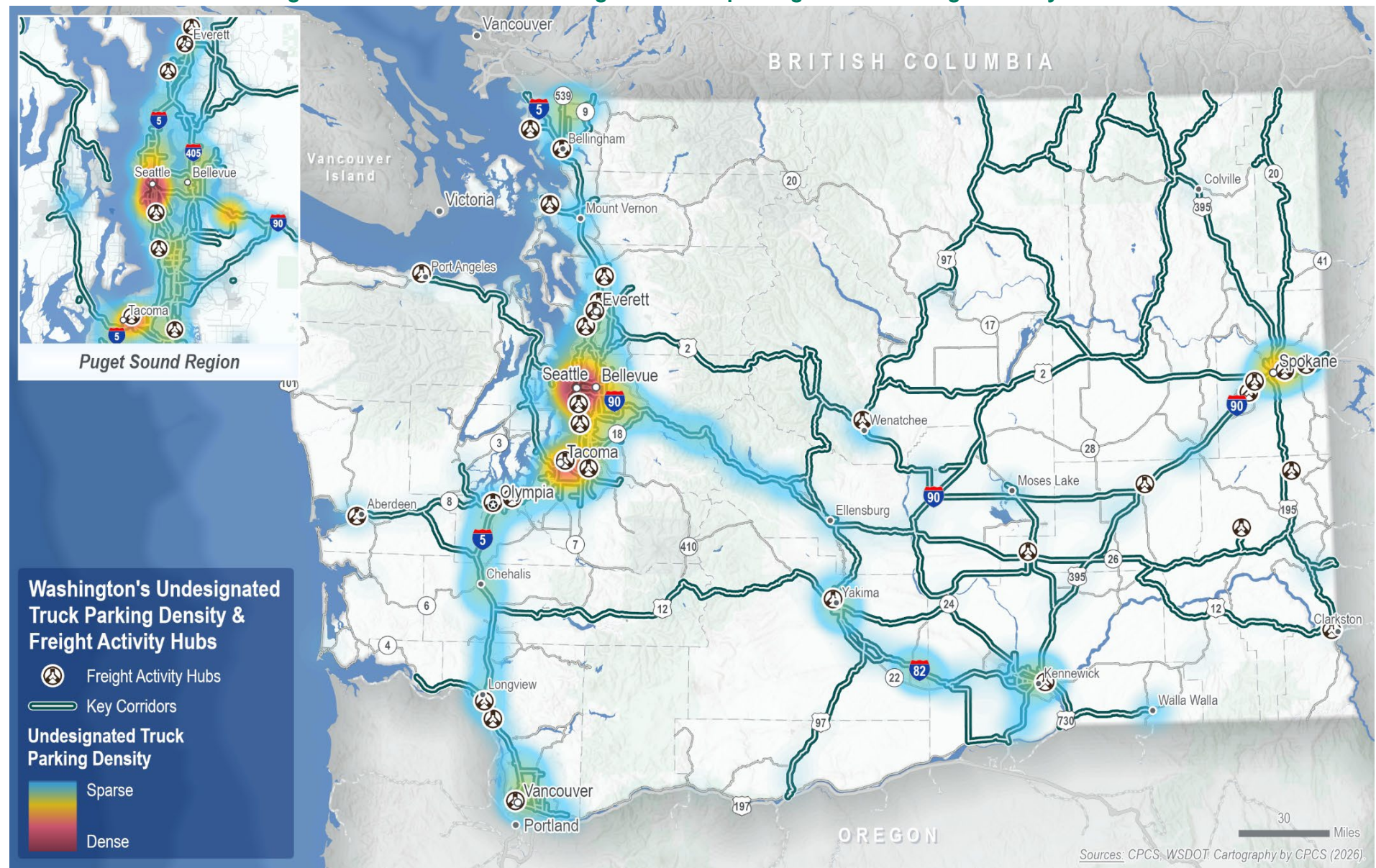
Undesignated Truck Parking

One factor that can affect the safety outcomes of people using or living near freight corridors is undesignated truck parking. This occurs when drivers park outside of formal truck parking facilities, such as along road shoulders, ramps, or local streets, typically due to limited availability of designated spaces. Parking in these locations can affect both truck drivers and other roadway users by reducing sight distance, obstructing travel lanes or shoulders, and increasing the potential for crashes involving moving vehicles and parked trucks. Figure F-20 illustrates the density of undesignated truck parking in relation to freight activity hubs and key freight corridors.

Key takeaways from Figure F-20:

- The highest density of undesignated truck parking occurs in the Puget Sound region, particularly in the Seattle and Tacoma urban areas. This pattern likely reflects high demand for truck parking driven by nearby FAHs, combined with limited designated parking capacity and urban road networks that are not designed to accommodate truck staging, increasing the likelihood that drivers park in informal or unintended locations.
- The Spokane region shows moderate levels of undesignated truck parking density, influenced by its location along I-90 and its role as the largest urban center in eastern Washington. As a major node on a high-volume east–west freight corridor, Spokane experiences concentrated truck activity relative to surrounding areas, and the available supply of designated truck parking may not fully meet demand, particularly near FAHs.
- Sparse undesignated truck parking is observed along I-82 east of the Puget Sound region, consistent with the characteristics of this corridor. This segment primarily supports through-travel rather than local freight staging, resulting in lower overall parking demand. When drivers do need to stop for meals or to comply with hours-of-service requirements, mountainous terrain and long stretches of rural or remote land limit the availability of gas stations or rest areas with designated truck parking, which can lead trucks to park along roadway shoulders or other informal locations.

Figure F-20: Locations of undesignated truck parking relative to freight activity hubs

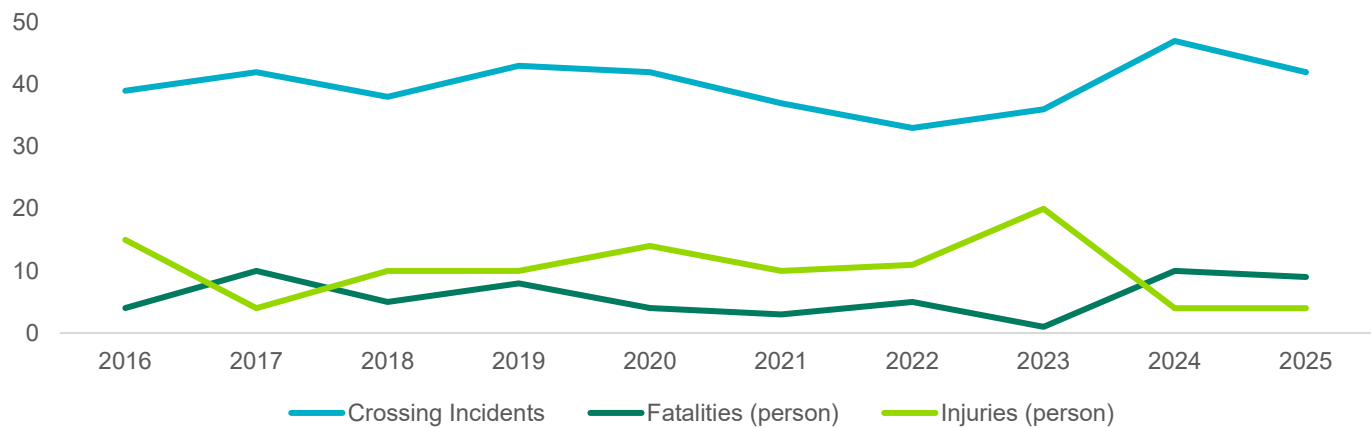


Rail safety incidents

Rail safety incidents in Washington State are monitored by the Washington Utilities and Transportation Commission (UTC), which has regulatory authority over rail safety. Rail incidents in the state range from major passenger train derailments to vehicle-train collisions at highway-rail grade crossings. These types of collisions can stem from speed violations, driver error, or infrastructure issues at crossings, and given the weight, size and speed of trains often lead to injury crashes and fatalities.

Between 2016 and 2025, there were 399 highway-rail grade crossing incidents in Washington, resulting in 59 fatalities and 102 injuries (Figure F-21). The majority of these incidents (297) occurred at public highway-rail crossings, with the remainder at private crossings. Over this period, annual incident counts were generally steady or declining until 2022, after which incidents and fatalities increased, including 10 fatalities in 2024 and nine in 2025.

Figure F-21: Highway-rail grade crossing incidents, 2016-2025



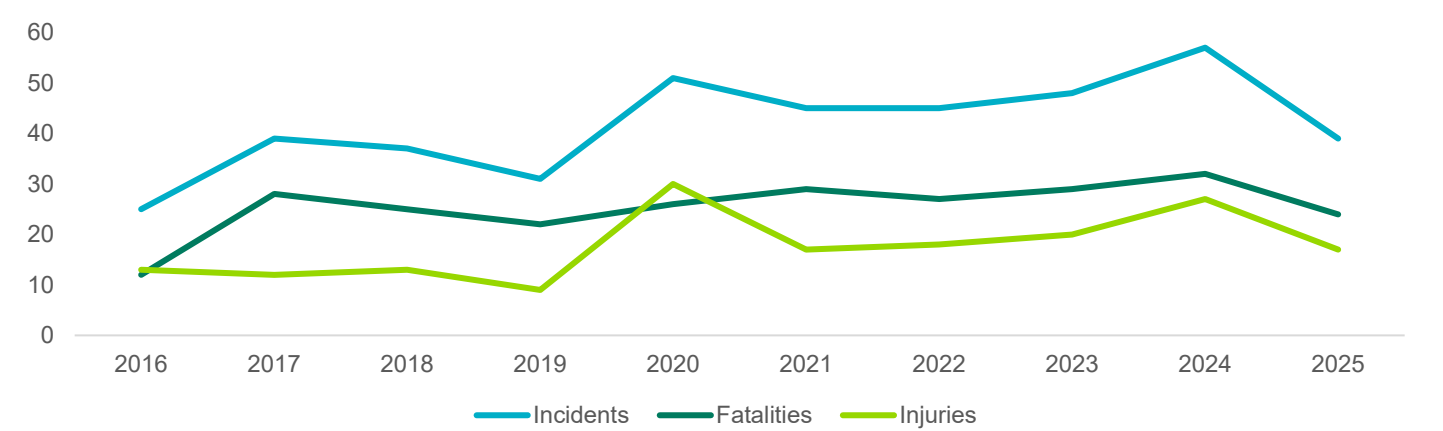
Source: CPCS analysis of FRA Safety Data, 2026.

Trespassing-related rail incidents generally trended upward between 2016 and 2024, with a pronounced spike in 2020 driven by an increase in reported injuries (Figure F-22). Total trespassing incidents rose from 45 in 2021 to 57 in 2024, a 26.6 percent increase, during which 117 fatalities and 82 injuries were recorded. In 2025, trespassing incidents, fatalities, and injuries all declined, reaching their lowest levels since 2019 (39 incidents, 24 fatalities, and 17 injuries).

Injuries associated with trespassing incidents vary more from year to year than fatalities, resulting in greater volatility in annual injury counts. Overall, trespassing incidents occur every year and consistently result in a significant number of fatalities and injuries.

Figure F-22 also reveals that the number of injuries related to trespassing is more volatile than the number of fatalities. As such, injuries fluctuate more year to year compared to the number of fatalities. Overall, trespassing incidents occur consistently every year and result in a steady number of fatalities and injuries annually.

Figure F-22: Trespassing trends



Source: CPCS analysis of FRA Safety Data, 2026.

Figure F-23 illustrates the geographic distribution of rail-related incidents and casualties in Washington. Analysis shows that incidents are concentrated in and around urbanized areas, particularly where rail corridors intersect dense populations and higher levels of roadway and pedestrian activity. The most prominent cluster occurs along the Seattle–Tacoma corridor, with additional clusters near Spokane, Bellingham, and Vancouver, Washington.

Outside major metropolitan areas, smaller but still notable clusters appear along key freight rail corridors and junction points. This pattern indicates that rail incidents are not limited to large urban centers. The spatial distribution suggests that incident frequency is influenced by factors such as train volumes, the number and type of crossings, and the proximity of tracks to nearby communities. These findings underscore the importance of focusing rail safety interventions on high-incident corridors while continuing to monitor locations with fewer incidents .

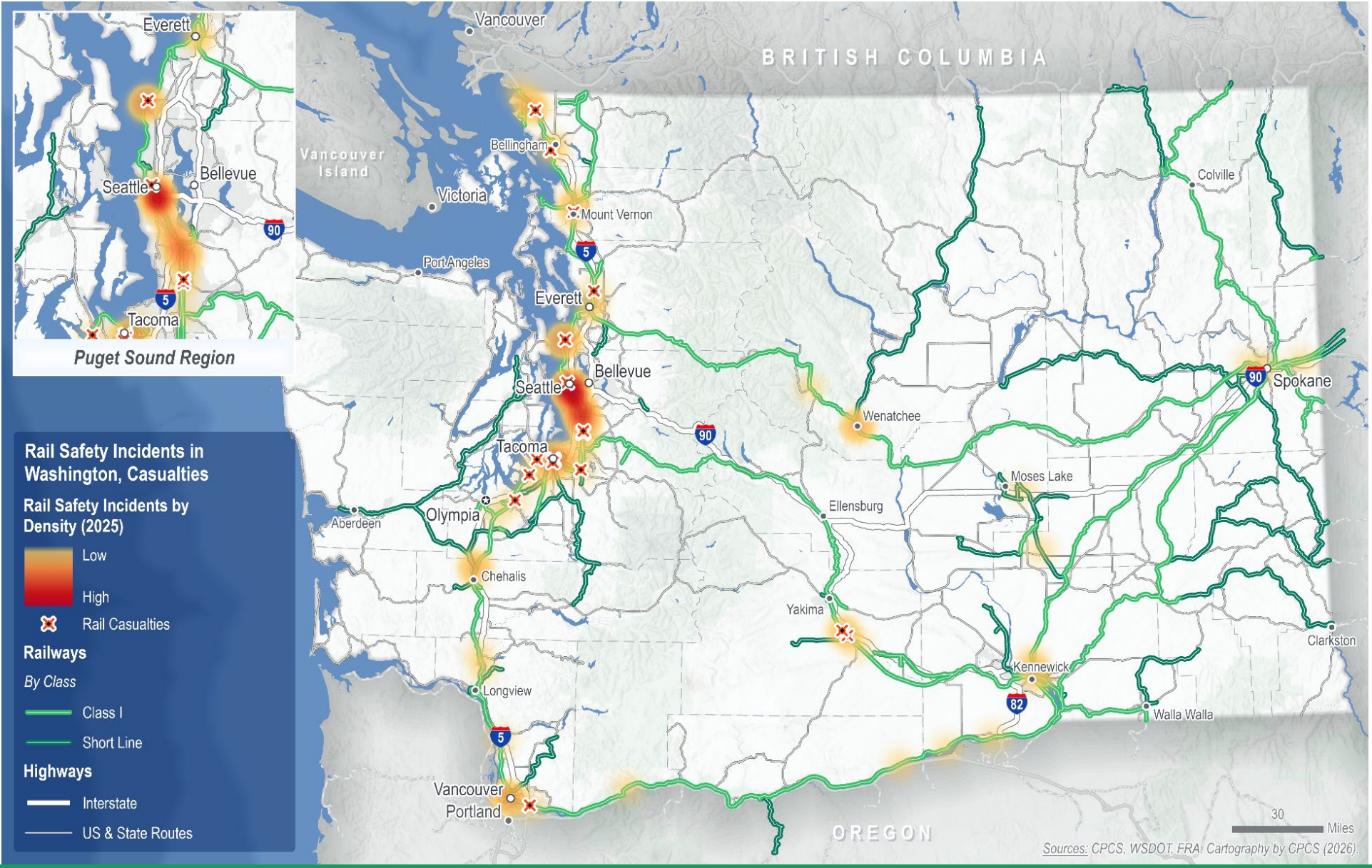
Rail Safety Investments in Washington State

In January 2025, the UTC approved nearly \$20,000 in grant funding for safety upgrades to reduce trespassing and improve safety at the Sunset Junction, which is located west of downtown Spokane.

This project closes the three remaining access points to the BNSF tracks, where there are often crossing incidents. Investments such as these improve safety outcomes and help to limit trespassing incidents.

Source: Washington Utilities and Transportation Commission, "UTC approves nearly \$20,000 for rail safety upgrades in Spokane," January 16, 2025. <https://www.utc.wa.gov/news/2025/utc-approves-nearly-20000-rail-safety-upgrades-spokane>

Figure F-23: Rail safety incidents in Washington



Blocked crossing incidents

Blocked rail crossings occur when a train occupies a roadway-rail grade crossing for an extended period, preventing vehicles, pedestrians, cyclists, and other roadway users from passing through the crossing. Blocked crossings are most common along high-volume freight corridors, near rail yards and industrial areas, and on lines with limited capacity or operational flexibility.

Blocked crossings affect communities and the broader transportation system in several ways. They can delay emergency response by restricting access for fire, police, and medical services, particularly where alternate routes are limited.¹⁴ They also disrupt local traffic, increasing travel times and driver frustration, and can contribute to unsafe behavior such as drivers going around gates or pedestrians attempting to pass between stopped railcars, as witnessed in Edmonds, Washington, when a coal train blocked access to the waterfront (Figure F-24).

Figure F-24: Coal train blocks waterfront access in Edmonds, WA



Source: My Edmonds News, "Scene in Edmonds: Disabled train briefly blocks waterfront access Wednesday," December 17, 2025. <https://myedmondsnews.com/2025/12/scene-in-edmonds-disabled-train-briefly-blocks-waterfront-access-thursday/>

The Federal Railroad Administration's (FRA's) Public Blocked Crossing Incident Reporter allows the public to report blocked crossing incidents, including duration and perceived cause. From March 2025 to March 2026, Spokane, King, and Pierce counties experienced the highest number of reported blocked crossings in Washington, with Spokane accounting for nearly one-quarter of statewide reports (Figure F-25). The top four counties—Spokane, King, Pierce, and Lewis—accounted for over 70 percent of all reports, indicating that blocked crossings are geographically concentrated and associated with specific high-activity rail corridors rather than evenly distributed across the state.

¹⁴ U.S. Department of Transportation Federal Railroad Administration, "Blocked Crossings Fast Facts," November 2021, accessed March 18, 2026. <https://railroads.dot.gov/sites/fra.dot.gov/files/2021-11/Blocked%20Crossings%20Fast%20Facts%20110921.pdf>

Figure F-25: Count of annual blocked crossings by county, March 2025 – March 2026

County	Count of Blocked Crossings	% of Total	County	Count of Blocked Crossings	% of Total
Spokane	47	23.15%	Benton	3	1.48%
King	38	18.72%	Chelan	3	1.48%
Pierce	34	16.75%	Mason	3	1.48%
Lewis	30	14.78%	Stevens	3	1.48%
Snohomish	11	5.42%	Cowlitz	2	0.99%
Whatcom	6	2.96%	Franklin	2	0.99%
Adams	4	1.97%	Whitman	2	0.99%
Clark	4	1.97%	Grant	1	0.49%
Skagit	4	1.97%	Grays Harbor	1	0.49%
Thurston	4	1.97%	Yakima	1	0.49%
Total Count of Blocked Crossings Reported: 203					

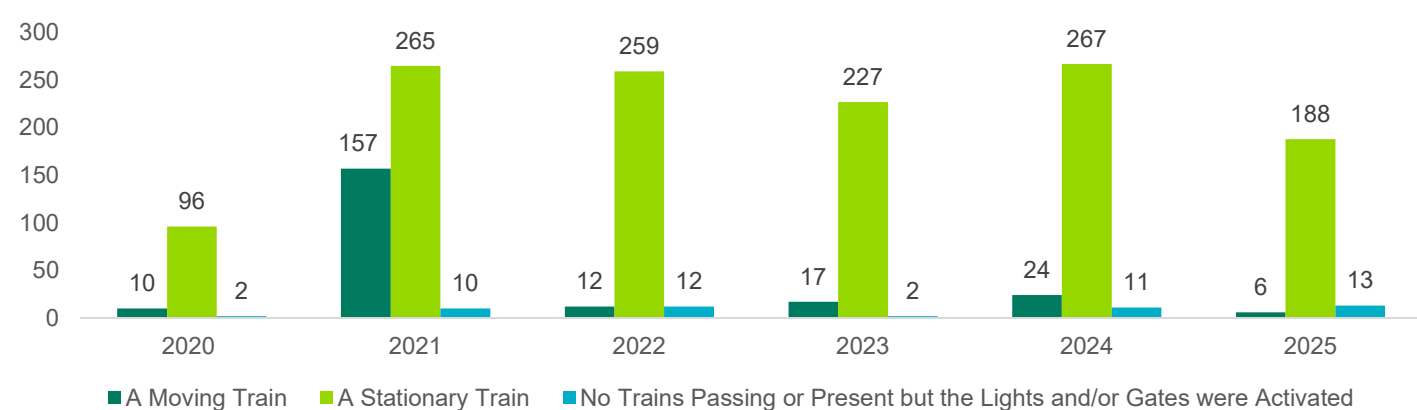
Source: CPCS analysis of FRA Blocked Crossing Database, 2026.

Between 2020 and 2025, stationary trains accounted for most reported blocked crossings in Washington, often representing 80 to 95 percent of incidents each year (Figure F-26 and Figure F-27). Reports involving moving trains remained relatively low, except for a spike in 2021, when total reported blocked crossings increased to 432 compared with an average of 229 in other years. This spike was driven by a higher number of reports associated with moving trains in 2021.

Average blockage duration from 2020 to 2025 ranged from 34 to 49 minutes, with most years clustered between 35 and 43 minutes (Figure F-27). From 2024 to 2025, the number of reported blocked crossings fell by 31.5 percent, while the average duration increased by about seven minutes. This indicates fewer reported events overall, but with longer durations when blockages did occur.

From a safety perspective, blocked crossings present both direct and indirect risks. Active warning devices, such as gates and lights, reduce the risk of vehicle–train collisions, but extended closures can increase the likelihood of risky driver or pedestrian behavior and can delay emergency responders. Understanding where and why blocked crossings occur helps guide safety and mobility investments and supports coordination among railroads, state agencies, and local jurisdictions.

Figure F-26: Cause of blocked crossings in Washington, 2020-2025



Source: CPCS analysis of FRA Blocked Crossing Database, 2026

Figure F-27: Washington's blocked crossings reports and reasons

Year	Reason for Blocked Crossing			Total	Average Blocking Duration (minutes)
	A Moving Train	A Stationary Train	No trains passing or present, but the lights and/or gates were activated		
2020	10	96	2	108	49
2021	157	265	10	432	34
2022	12	259	12	283	37
2023	17	227	2	246	42
2024	24	267	11	302	36
2025	6	188	13	207	43

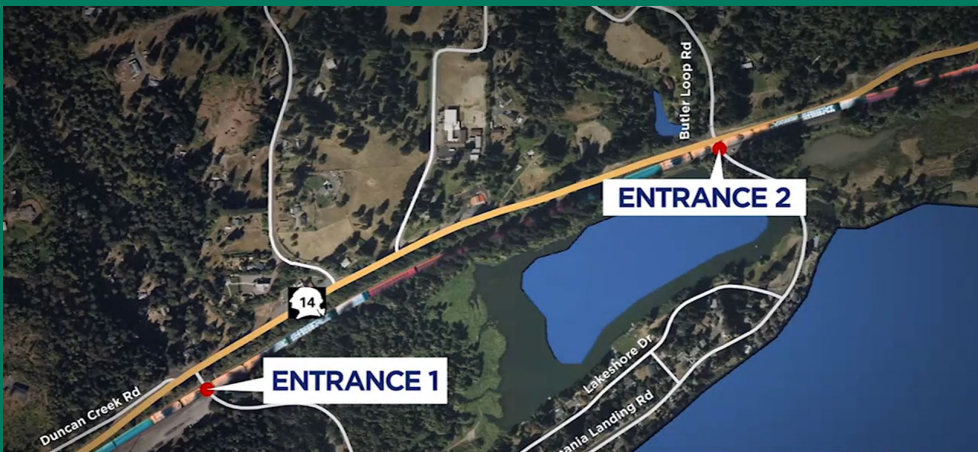
Source: CPCS analysis of FRA Blocked Crossing Database, 2026.

Figure F-28 shows that blocked crossings are most concentrated in Washington's major population centers and along heavily used freight corridors. The Puget Sound region, particularly the freight rail corridor between Seattle and Tacoma, experienced the highest density of blocked crossings in 2025, reflecting the convergence of high train volumes, multiple at-grade crossings, and intense freight activity near ports, yards, and industrial areas. Additional clusters appear in the Spokane and Tri-Cities areas. While many crossings experience relatively short-duration blockages, some locations see closures exceeding one hour, particularly in urbanized areas and select rural corridors with few alternate routes. These longer events can have disproportionate impacts on local mobility and emergency access.

Blocked Crossings in the Columbia River Gorge Impact Emergency Response Times

In February 2024, a freight train blocked access roads to the Skamania Landing community near Stevenson, Washington. When a resident experiencing internal bleeding called 911, first responders from a nearby fire station attempted to respond but were unable to reach the neighborhood because a freight train was stopped across the only access crossing. Dispatch had to contact the railroad to clear the track. It ultimately took 90 minutes for the ambulance to reach the patient.

Local residents and officials reported that blocked crossings in the area can last 30 minutes to two hours, and concerns have been raised that the crossings could delay emergency response times for residents whose only access route is across the rail line.



Source: Fox12 Oregon, "Trapped by trains: Blocked railroad crossings impact Skamania County community," May 6, 2024. <https://www.kptv.com/2024/05/06/trapped-by-trains-blocked-railroad-crossings-impact-skamania-county-community>



Hazmat spill events

Pipeline hazardous materials spills to water occur when a transmission line or related infrastructure fails, releasing substances such as gasoline or oily water into rivers, streams, and other sensitive waterways. These spills are most common at refinery nodes or along major transmission pipelines and can contaminate drinking-water sources, harm aquatic and terrestrial wildlife, and damage surrounding habitats. In addition to environmental impacts, spills often require expensive, multi-year cleanup and restoration efforts and can result in substantial property damage and penalties for operators. The Washington Legislature has acted to reduce these risks through measures such as the 2015 Oil Transportation Safety Act and earlier directives, including a 2005 goal of achieving zero oil spills.¹⁵

Relative to the US overall and most other states, Washington has experienced few pipeline spills in recent years. Between 2021 and 2025, reported spills included a one-gallon oily-water spill at the Puget Sound Refinery in Anacortes (2021), a major spill of approximately 25,300 gallons from the Olympic Pipeline near Conway (2023), and a transmission-pipeline fuel spill of more than 2,000 gallons near Everett (2025) (Figure F-29).

Figure F-29: Pipeline system hazardous material spills, 2021-2025

Source	Date	Location	Volume	Material Type
Refinery	November 2021	Puget Sound Refinery in Anacortes	1 gallon	Oily water mixture
Transmission Pipeline	December 2023	Olympic Pipeline near Conway	25,326 gallons	Oily water mixture
Transmission Pipeline	November 2025	Olympic Pipeline near Everett	>2,000 gallons	Fuel

Source: CPCS analysis of Washington Department of Ecology Reported Spills data, 2026

Critical Freight Fuel Supply Disruption

In November 2025, a failure on the Olympic Pipeline near Everett, Washington, was uncovered and forced the shutdown of the pipeline. This pipeline serves as the primary source of jet fuel to the Seattle-Tacoma International Airport (SEA), thus disrupting a key energy supply chain in the region that supports aviation and air cargo.

Emergency measures were implemented to waive truck driver hour limits, which enabled large-scale trucking to sustain airport operations. This disruption and the role trucking played in its solution highlight the freight system’s reliance on flexible trucking capacity during times of disruption or emergency.

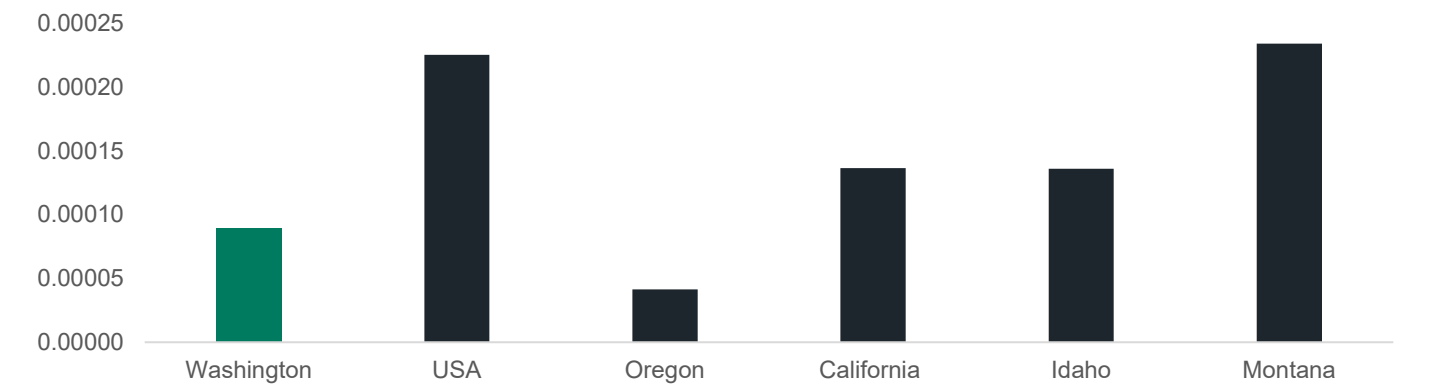
Source: Washington Governor’s Office, 2025. <https://governor.wa.gov/news/2025/governor-ferguson-issues-emergency-proclamation-addressing-olympic-pipeline-shutdown-fuel-deliverySwi>

AP News, Washington’s governor declares emergency so Seattle airport will get fuel despite pipeline leak, November 2025. <https://apnews.com/article/washington-oregon-fuel-pipeline-leak-supply-e262206824cc62dc04c812275465c1ce>

¹⁵ Washington Department of Ecology, Oil transportation and data studies, accessed April 2026. <https://ecology.wa.gov/spills-cleanup/spills/oil-spill-prevention/oil-transportation-in-washington>

Figure F-30 shows the average number of reportable pipeline incidents per mile between 2016 and 2025 for Washington, selected western states, and the U.S. overall. Over this period, Washington recorded fewer incidents per mile than the national average and most neighboring western states, although Oregon's incident rate was lower.

Figure F-30: Average number of incidents per pipeline mile, 2016-2025



Source: CPCS analysis of USDOT Pipeline and Hazardous Materials Safety Administration's Pipeline Miles and Facilities 2016+ and All Reported Incidents data, 2026. Note: Pipeline miles and incidents are for all pipeline types (gas distribution, gas gathering, gas transmission, hazardous liquid) and all pipeline types (gas, hazardous liquid, LNG, etc.). Values are calculated by year and then averaged.

The charts below focus on hazardous liquid pipelines only. Between 2016 and 2025, Washington's hazardous-liquid incident rate per mile increased compared with the 2011–2020 period and was higher than the U.S. average and several western states. However, the average number of barrels spilled per mile remained below the U.S. average, and only slightly higher than in some neighboring states. Among nearby states, Oregon and Idaho performed somewhat better on this barrels-spilled metric, but the difference compared with Washington was modest.

Figure F-32: Average number of hazardous spill incidents per liquid pipeline mile, 2016-2025

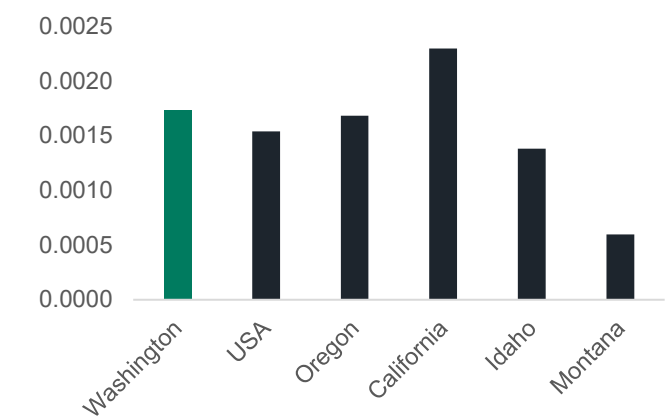
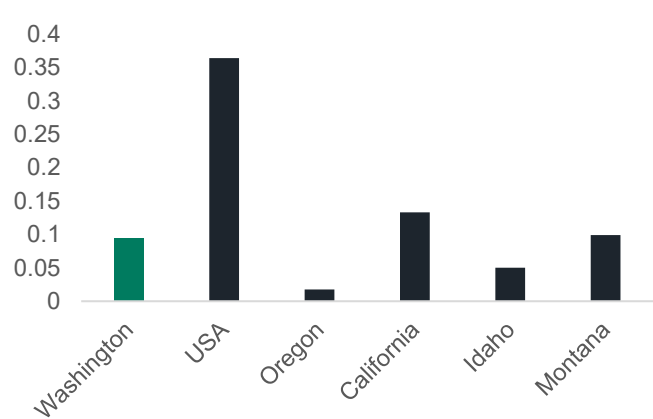


Figure F-31: Average barrels spilled per liquid pipeline mile, 2016-2025



Source: CPCS analysis of USDOT Pipeline and Hazardous Materials Safety Administration's Pipeline Miles and Facilities 2016+ and All Reported Incidents data, 2026. Note: Pipeline miles and incidents are for hazardous liquids only (crude oil, refined PP, H.V.L. flammable toxic, CO2, biofuel). Values are calculated by year and then averaged.

Stewardship

Stewardship reflects the agency's responsibility to protect, manage, and get the most value from Washington's existing transportation investments over time, not just to build new infrastructure. In WSDOT's planning framework, stewardship is defined as "continuously improving the quality, effectiveness, resilience, and efficiency of the transportation system."¹⁶

System Stewardship and Freight Infrastructure

Stewardship of the system ensures that freight infrastructure investments are managed responsibly and are positioned to deliver long-term value to system users, including the freight industry and the public. By emphasizing cost-effective planning, asset management, and lifecycle performance, stewardship helps to maximize the return on investment while maintaining the state's critical freight networks. This helps ensure that the freight system remains in good operating condition over time.

As a performance measure, stewardship shows how well WSDOT is taking care of what the public already owns. It connects preservation, efficient delivery, resilience, fiscal responsibility, and public trust, and helps evaluate whether WSDOT is delivering sustainable transportation outcomes over time. This is important for the freight system, as it ensures that the infrastructure required to move goods from its origin to its destination are being maintained in a state of good repair or updated as needed. Planning for the caretaking of these vital components is integral to maintaining the efficiency of the freight system.

Washington funds highway improvements through several major state investment programs. The Transportation Partnership Account (TPA) and Nickel programs, authorized in 2003 and 2005, focus on targeted highway improvements across the state. Connecting Washington, authorized in 2015, is a larger and more recent package that funds capacity, safety, and preservation projects on state highways. Within these programs, "Projects" are managed at the program level by WSDOT, while "Contracts" are the individual construction contracts used to deliver those projects and may be tracked separately for budget and schedule performance.

¹⁶ Washington State Transportation Commission, "Washington Transportation Plan, Vision 2050: Building the Future We Want, Together", August 2025.

Figure F-33: Cumulative Nickel, Connecting Washington, and TPA Projects Completed on Budget (Actual Cost Compared to Last Approved Project Budget), 2021–2024

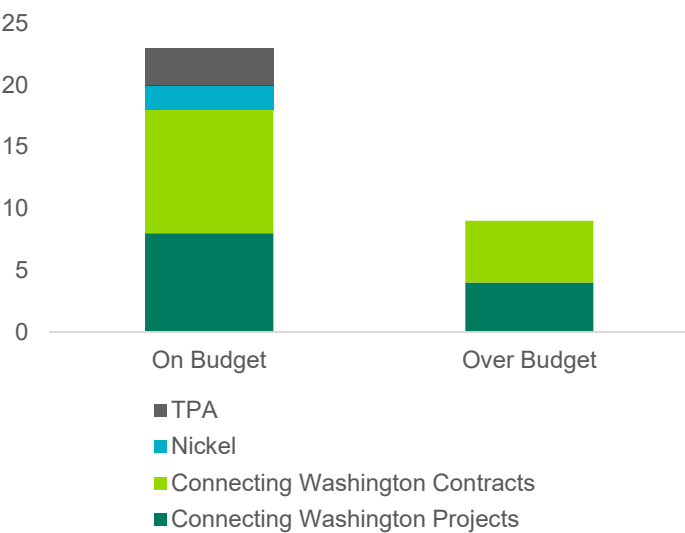
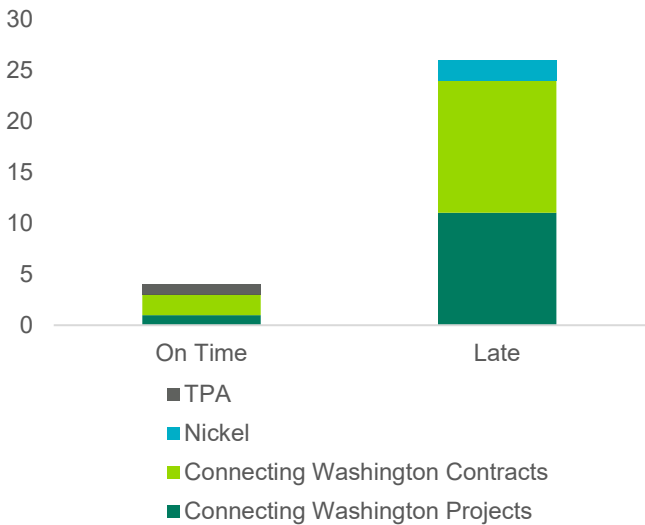


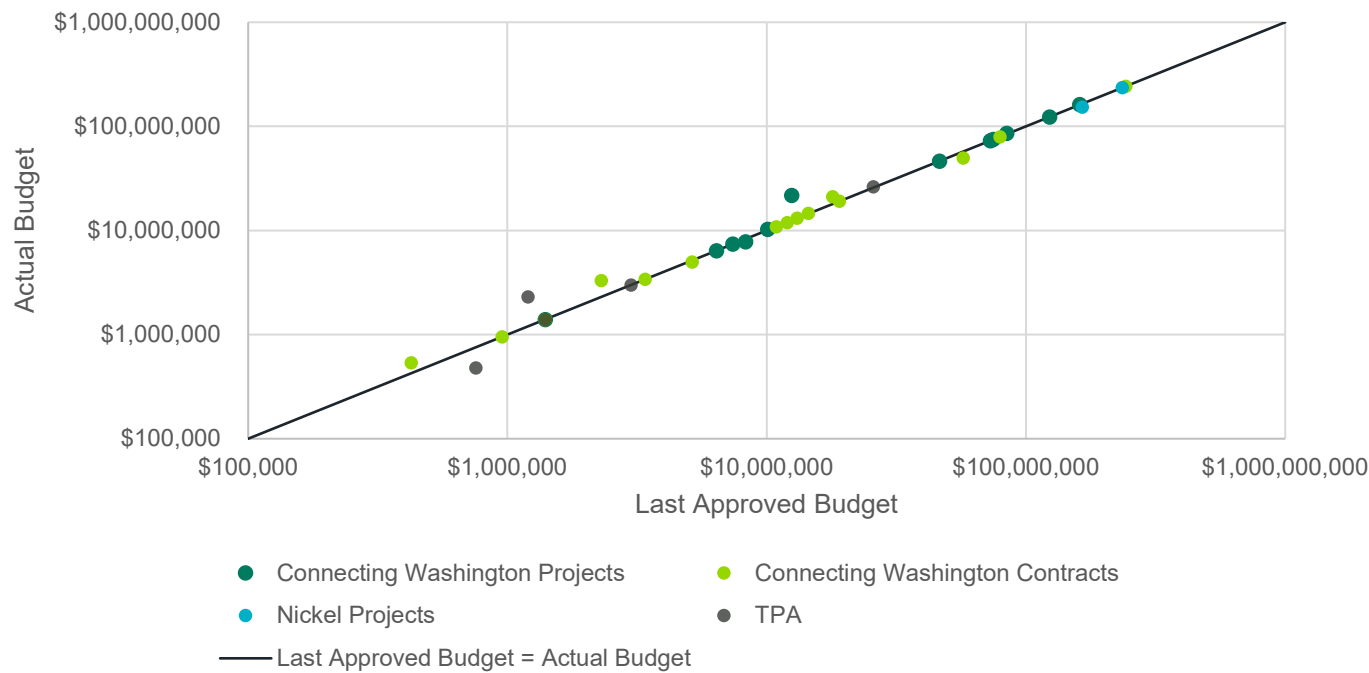
Figure F-34: Cumulative on-Time Performance of Completed Nickel, Connecting Washington, and TPA Projects, 2021–2024



Source: WSDOT Grey Notebook, 2024. <https://wsdot.wa.gov/about/data/gray-notebook/default.htm>

Figure F-33 and Figure F-34 summarize completed WSDOT projects delivered between 2021 and 2024, grouped by budget and schedule performance and by program type. Over this period, most completed projects were delivered on budget, with a smaller share exceeding their last approved budgets, and Connecting Washington accounts for the largest number of completed, on-budget projects. Schedule performance over the same period shows that relatively few projects were completed on time; most finished later than originally planned, with late completions most common among Connecting Washington projects and smaller numbers among Nickel and TPA projects.

Figure F-35: Actual Project Costs Compared to Last Approved Budgets for Completed Nickel, Connecting Washington, and TPA Projects, 2021–2024



Source: WSDOT Grey Notebook, 2024. <https://wsdot.wa.gov/about/data/gray-notebook/default.htm>

Figure F-35 illustrates individual project cost variances for completed Nickel, Connecting Washington, and TPA projects from 2021 to 2024. Of the 34 completed projects, 22 finished on budget and 7 came in under budget, together representing more than 85 percent of the portfolio. Among the 11 projects that exceeded their last approved budgets, 6 had overruns of less than 2 percent, while 5 showed larger overruns concentrated in smaller contracts and emergency or condition-driven work, and most projects clustered near the 1:1 line, indicating strong overall cost control across programs.

Mobility

Measuring freight mobility allows WSDOT to compare how well different parts of the system actually move goods and to prioritize projects that reduce delay, improve reliability, and support freight-dependent industries, rather than focusing only on infrastructure inputs. Mobility metrics provide a consistent, outcome-focused basis for communicating performance and investment tradeoffs to the Legislature, partners, and the public.

Freight System Mobility

Mobility is essential to freight as it reflects the ability of goods to move efficiently and predictably through the transportation network. A system with a high level of mobility is one with reduced congestion, improved travel time reliability, and ability to enable just-in-time delivery. All of these are important for supply chain performance, which in turn helps to support economic productivity and access to markets.

Truck travel time reliability

The Truck Travel Time Reliability Index (TTTR) expresses how much longer truck trips take under the worst regular congestion compared to typical conditions on the National Highway System. A TTTR of 1.50, for example, means

trucks should plan for trips to take 50 percent longer during the most congested periods than they do on a typical day.

Figure F-36 shows WSDOT's four-year TTTR targets and actual results for the Interstate portions of the NHS. The 2021 four-year actual of 1.49 outperformed the 1.75 target, and future targets for 2023 (1.51) and 2025 (1.53) are set at similarly moderate levels of unreliability rather than dramatic increases. This indicates that, while congestion remains a concern on key freight corridors, overall truck reliability has remained within a relatively stable band that WSDOT expects to maintain through incremental operational and capital improvements.

Figure F-36: Truck Travel Time Reliability Index

Performance measures by program area	4-year actuals for 2021	Current	2-year targets (2027)	4-year targets (2029)
Truck Travel Time Reliability (TTTR) Index	1.49	1.53	1.75	1.75

Source: WSDOT Gray Notebook, 2024.

Truck travel time delay

Truck Travel Time Delay quantifies how many hours trucks spend traveling below a reasonable speed threshold during weekday peaks, normalized as Delay per Mile (DPM) for each segment. Using NPMRDS data, delay is calculated where truck speeds fall below 60 percent of the posted speed limit, then weighed by truck volumes to emphasize heavily used freight links.

Figure F-37 illustrates truck travel time reliability across Washington's freight network using the Truck Travel Time Reliability (TTTR) Index. Higher TTTR values indicate greater variability in travel times and less reliable truck movements, while lower values indicate more consistent travel conditions. The map shows that reliability challenges are concentrated on major urban corridors, particularly within the Puget Sound region along I-5, I-90, SR-167, and SR-18, where freight volumes, commuter traffic, and recurring congestion overlap. Outside the Puget Sound region, most interstate and rural freight corridors exhibit more reliable travel conditions, although localized segments show moderate reliability challenges near major freight hubs and border gateways.

Figure F-38 maps DPM on the NHS and shows that truck delay is most intense on high-volume urban and gateway corridors, especially I-5 and I-405 through Seattle, Tacoma, and Olympia, I-5 and SR 503 near Vancouver, WA, and major approaches to Spokane. Delay “hot spots” align closely with the state’s largest population and employment centers, reinforcing that congestion affecting trucks is heavily concentrated around major freight origins and destinations rather than evenly distributed across the network.

Truck bottlenecks

The truck bottleneck metric combines DPM and TTTR into a single Delay-TTTR Index to identify locations where trucks face both heavy delay and unpredictable conditions. A higher Delay-TTTR Index indicates a segment where congestion is both severe and variable, creating planning and reliability challenges for shippers and carriers.

Figure F-39 lists the top 10 truck bottlenecks, nearly all on I-5 or nearby facilities in the Puget Sound Region. These short segments carry high truck volumes (often over 10,000 trucks per day) and experience very high annual truck delay hours per mile alongside TTTR values in the 5–12 range, producing very large Delay-TTTR Index scores. This concentration of the most severe bottlenecks on a small number of urban interchanges and junctions suggests that targeted improvements at these locations could yield outsized benefits for statewide truck mobility.

The American Transportation Research Institute (ATRI) conducts a similar analysis nationally, publishing an annual Top 100 Truck Bottlenecks list based on billions of anonymized truck GPS records at more than 325 freight-critical highway locations. ATRI's methodology uses a speed-and-volume algorithm to measure truck-involved congestion and creates year-over-year mobility profiles for each location, allowing changes in congestion intensity and reliability to be tracked over time. A few of Washington's bottlenecks in this analysis align with ATRI's national list, including

the I-5/I-90 interchange (ranked 48th) and I-90/I-405 interchange (ranked 84th) on recent ATRI rankings. This overlap shows that these locations are not only among Washington's worst freight chokepoints but also register as nationally significant constraints on truck-based supply chains.¹⁷

¹⁷ American Transportation Research Institute, Washington State Has Six Of The Nation's Worst Bottlenecks, 2024. www.prnewswire.com/news-releases/washington-state-has-six-of-the-nations-worst-bottlenecks-302060277.html

Figure F-37: Truck Travel Time Reliability Index

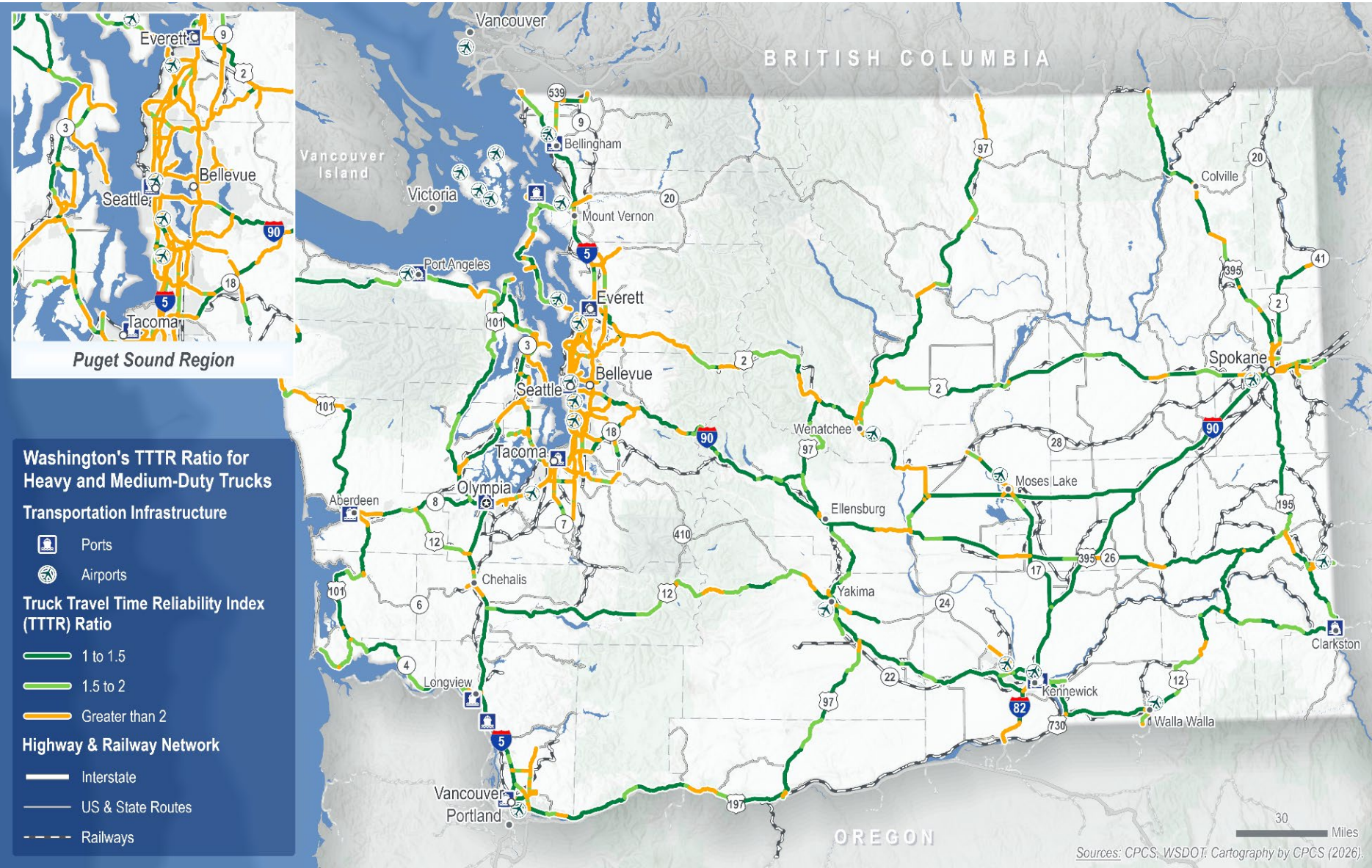


Figure F-38: Truck Travel Time Delay

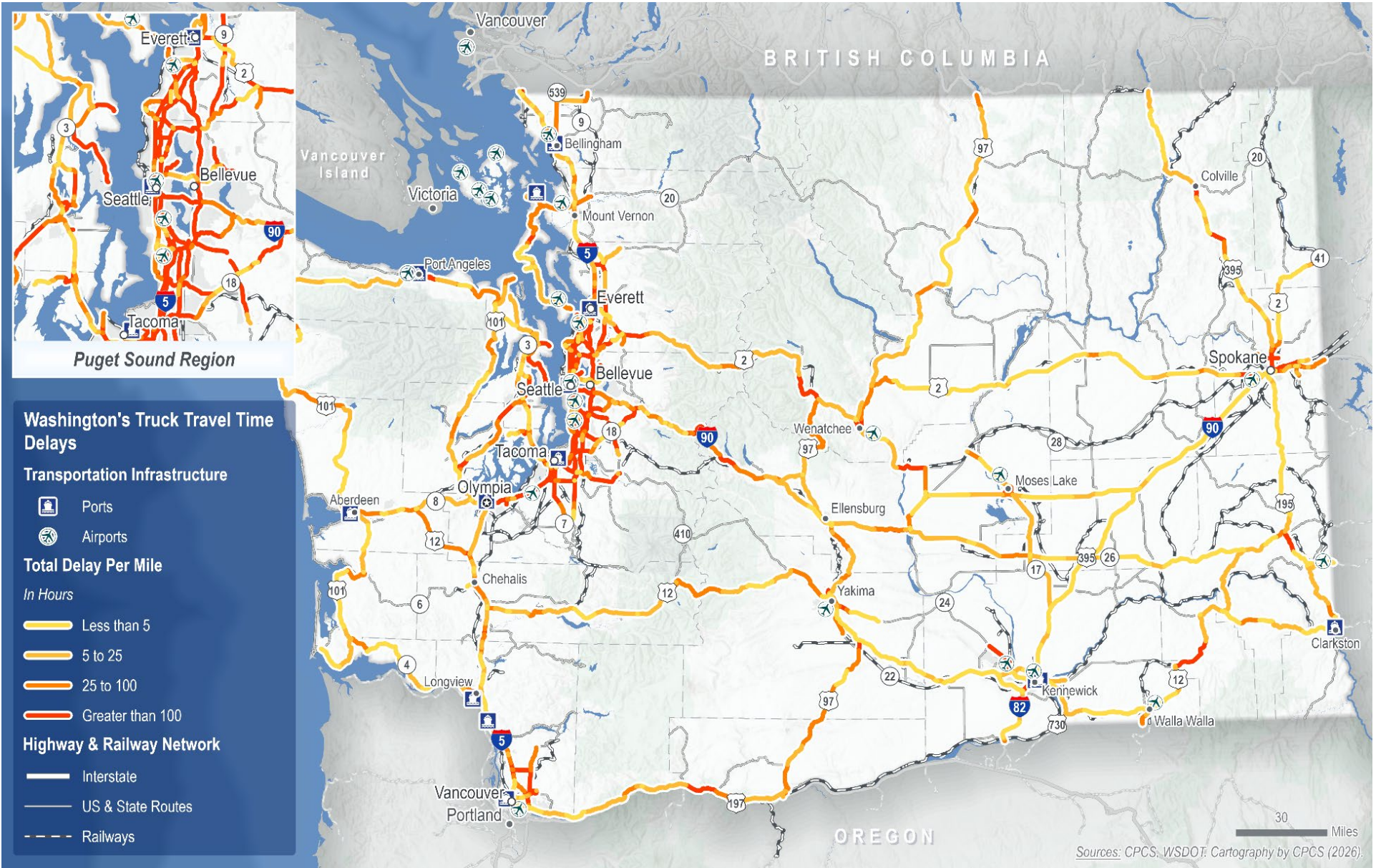


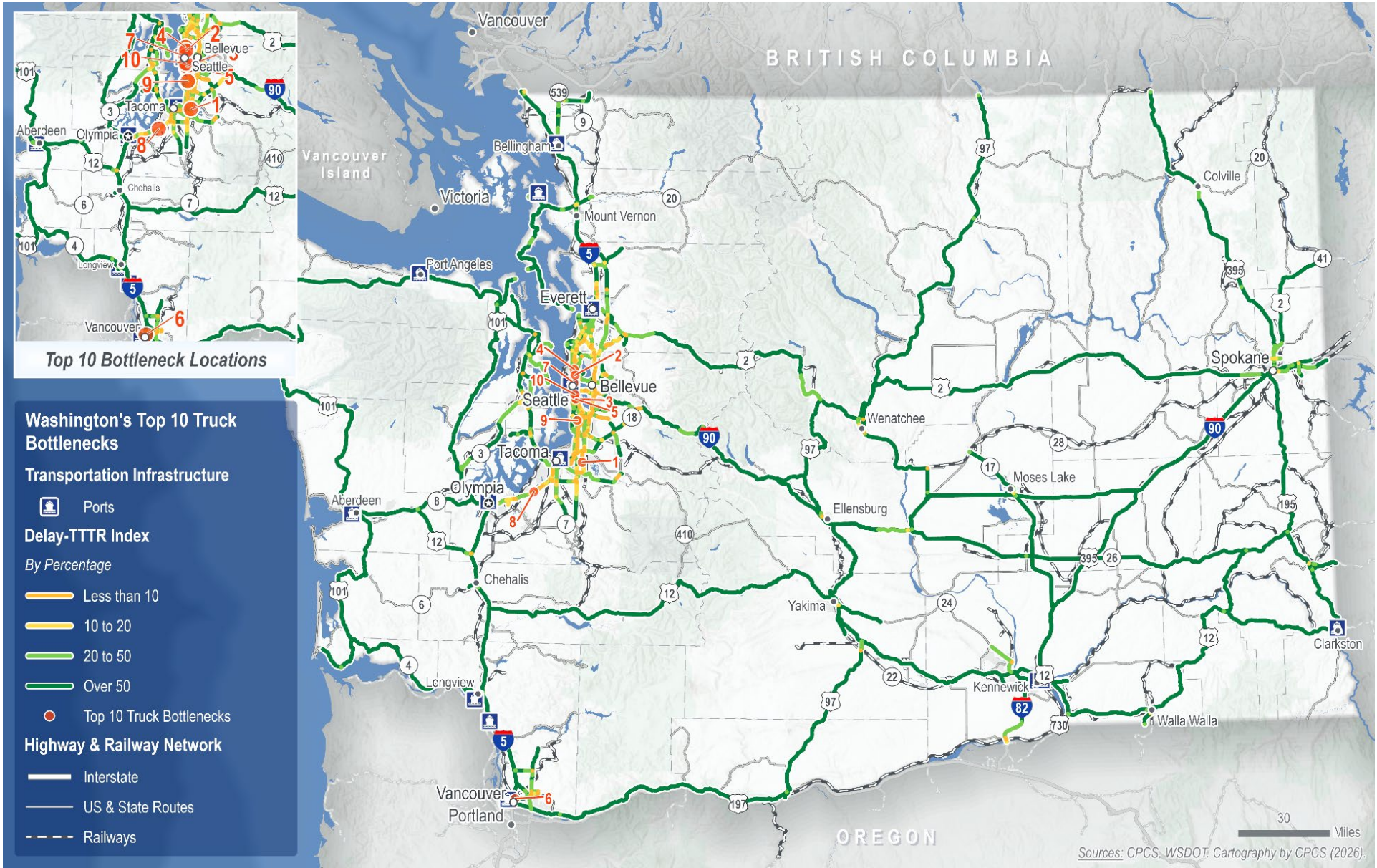
Figure F-39: Top 10 Truck Bottlenecks in Washington

Rank	Corridor Name	Location (County)	Segment	Segment Length (miles)	Annual Average Daily Truck Traffic	Annual Truck Delay Hours per Mile (DPM)	TTTR Index	Delay-TTTR Index
1	WA-518	King	Airport Expy Southbound	0.82	3,655	38,572	2.34	90,171
2	I-5 S	King	North Nothgate Way to Mercer Street Exit	5.90	4,949	14,347	5.57	79,949
3	I-5 N	King	Swift Avenue South to I-90	4.09	7,592	22,276	3.53	78,633
4	I-5 S	King	41st Division Drive to Murray Road Southwest	3.34	7,052	11,937	6.29	75,130
5	I-405 N	Pierce	Talbot Road South to Maple Valley Highway	1.56	3,806	15,651	4.23	66,172
6	I-405 S	King	Northeast 8th Street to I-90	3.01	4,755	14,026	4.57	64,161
7	S Spokane St	King	East Marginal Way South to 6th Avenue South	0.65	3,528	22,817	2.68	61,218
8	I-5 N	King	East Olive Way to Mercer Street	0.72	5,174	7,247	8.00	57,984
9	Canyon Rd E	Pierce	WA-512 EB to WB	0.20	3,026	19,031	2.88	54,873
10	I-5 N	King	Boytston Avenue East	0.24	5,406	7,267	6.89	50,069

Source: CPCS Analysis of NPMRDS, 2026

Figure F-40 maps the top truck bottlenecks, reinforcing how tightly clustered they are along the I-5 spine through the Puget Sound region. The geographic clustering on this figure highlights where recurring truck delays on a few critical segments can influence travel times and reliability across multiple regional and interstate freight corridors.

Figure F-40: Truck Bottlenecks in Washington



Freight rail volumes and bottlenecks

Washington's freight rail network is a core component of the state's multimodal freight system, linking farms, industries, ports, and distribution centers across the region. Freight rail mobility indicates how much rail lines can carry reliably, a measure that is increasingly important as long-haul truck corridors face congestion and as export volumes grow.

Figure F-42 compares 2023 daily freight train volumes with 2050 low, baseline, and high growth scenarios on major BNSF routes. Along the Spokane–Vancouver corridor, daily freight trains increase from 44 in 2023 to between 75 and 82 trains per day across the forecast scenarios, showing that this line is expected to absorb substantial additional demand across all futures. This pattern illustrates how growth is not evenly distributed: some mainlines remain moderately loaded, while a small number of corridors emerge as future “backbones” of the system and potential bottleneck locations if capacity is not expanded.¹⁸

Improvements to Key Rail Interchange Support Rail Movements in Washington

The Connell rail interchange is located in Eastern Washington, where the Columbia Basin Railway (CBRW) intersects with BNSF's Lakeside Subdivision line, which runs between Spokane and Pasco. This rail interchange is currently undergoing a \$19 million improvement project.

Improvements include relocating and reconfiguring the interchange south of the City of Connell. The improvements will allow long trains heading west on the BNSF line to be routed to CBRW's lines without breaking the train apart, which is time-consuming and leads to extensive blocked crossings in the area. The interchange reconfiguration will also allow for the simultaneous accommodation of an inbound and outbound train without one locomotive blocking the other. Addressing these issues will improve rail mobility in Eastern Washington.

Source: Tri-Cities Area Journal of Business, “Funding secured to improve key rail interchange,” May 16, 2024. <https://www.tricitiebusinessnews.com/articles/connell-rail-interchange>

Figure F-41: Train Approaches Connell, Washington



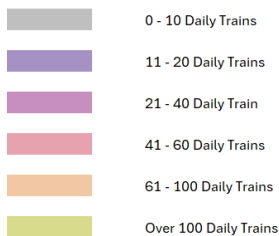
Image Source: Connell Rail Interchange Coalition

¹⁸ Washington State Department of Transportation, *Ongoing Rail Plan Update - Freight Rail Traffic & Commodity Forecast Technical Memorandum*, December 2025.

Figure F-42: Daily Trains by Railroad Segment, 2023 and 2050 Scenarios

Segment	Rail Owner	Passenger Daily Train 2023	Freight Daily Train 2023	Total Daily Train 2023	Passenger Daily Train 2050	Freight Daily Train Forecast Low	Total Daily Train Forecast Low	Passenger Daily Train 2050	Freight Daily Train Forecast Baseline	Total Daily Train Forecast Base	Passenger Daily Train 2050	Freight Daily Train Forecast High	Total Daily Train Forecast High
Idaho Boarder to Spokane	BNSF	2	42	44	2	73	75	2	75	77	2	80	82
Spokane to Pasco	BNSF	2	23	25	2	34	36	2	34	36	2	36	38
Pasco to Roosevelt	BNSF	2	18	20	2	28	30	2	28	30	2	30	32
Roosevelt to Portland	BNSF	2	26	28	2	38	40	2	38	40	2	40	42
Spokane to Wenatchee	BNSF	2	19	21	2	39	41	2	40	42	2	43	45
Wenatchee to Everett	BNSF	2	19	21	2	39	41	2	40	42	2	43	45
Pasco to Ellensburg	BNSF	0	4	4	0	5	5	0	5	5	0	5	5
Ellensburg to Auburn	BNSF	0	4	4	0	5	5	0	5	5	0	5	5
Vancouver to Nisqually	BNSF	14	40	54	34	58	92	34	59	93	34	61	95
Nisqually to Tacoma	BNSF	0	36	36	0	55	55	0	56	56	0	58	58
Tacoma to Ellingson	BNSF	40	22	62	68	33	101	68	34	102	68	35	103
Ellingson to Tukwila	BNSF	40	22	62	68	33	101	68	34	102	68	35	103
Tukwila to Black River	BNSF	40	31	71	68	46	114	68	47	115	68	48	116
Black River to Seattle	BNSF	40	37	77	68	60	128	68	61	129	68	64	132
Seattle to Everett	BNSF	14	30	44	22	53	75	22	55	77	22	57	79
Everett to International Boarder	BNSF	4	9	13	12	13	25	12	14	26	12	14	26
Oregon Boarder to Idaho Boarder	UP	0	5	5	0	9	9	0	9	9	0	10	10
Tacoma to Tukwila	UP	0	10	10	0	12	12	0	12	12	0	12	12

Source: Washington State Department of Transportation, Ongoing Rail Plan Update, December 2025.



Growing freight volumes also affect how operators run their systems. Many railroads, especially short lines, have indicated that accommodating higher volumes will likely require more trains and longer trains. Longer trains can stress sidings and yards that were designed for shorter trains, reducing flexibility for meets, passes, and recovery from incidents and increasing the risk of network-wide delay if key nodes are constrained.¹⁹

The left portion of Figure F-43 defines capacity utilization thresholds, ranging from “Below Capacity” (0–60% utilization) through “Near Capacity” (60–80%), “At Capacity” (80–100%), and “Above Capacity” (over 100%). These categories explain how intensively rail lines are used and at what point routine maintenance and incident recovery become difficult, providing a common frame for discussing rail bottlenecks and resilience.

The right part of Figure F-43 applies these thresholds to key BNSF and UP corridors in 2023. Three BNSF segments—Spokane–Pasco (83% utilization), Roosevelt–Portland (93%), and Tacoma–Ellingson (83%)—operate at or near practical capacity, while other high-volume segments such as Vancouver–Nisqually (72%) are classified as Near Capacity. This pattern shows that most of Washington’s mainlines still have operational headroom, but that

¹⁹ Washington State Department of Transportation, Ongoing Rail Plan Update - Freight Rail Traffic & Commodity Forecast Technical Memorandum, December 2025.

specific east–west and north–south segments already function as “choke points” where growth will quickly translate into reduced flexibility and higher risk of delay.

These 2023 conditions serve as the baseline for the Washington State Rail Plan capacity analysis, which evaluates how the same segments are expected to perform under low, baseline, and high-growth scenarios by 2050.

Segments that are already “Near” or “At Capacity” in the base year are the most likely to experience reliability challenges over time unless capacity, operations, or routing patterns change.²⁰

Figure F-43: Capacity Utilization Thresholds and Estimation, 2023

Description		Capacity Utilization
Below Capacity	Train volumes are low to moderate, with sufficient flexibility for maintenance activities and recovery from service disruptions.	0% to 20%
		20% to 40%
		40% to 60%
Near Capacity	High train volumes with some remaining flexibility; routine maintenance and recovery are possible, but increasingly constrained	60% to 80%
At Capacity	Very high train volumes with minimal operational flexibility; recovery from incidents becomes difficult.	80% to 100%
Above Capacity	Train volumes exceed practical capacity, resulting in unstable operations and a high likelihood of service delays or breakdowns.	> 100%

Source: Washington State Department of Transportation, Ongoing Rail Plan Update – Rail System Capacity Analysis Technical Memorandum, December 2025.

Segment	Owner	Capacity (trains / day)	2023 Capacity Utilization
Idaho Border to Spokane	BNSF	75	59%
Spokane to Pasco	BNSF	30	83%
Pasco to Roosevelt	BNSF	30	67%
Roosevelt to Portland	BNSF	30	93%
Spokane to Wenatchee	BNSF	30	70%
Wenatchee to Everett	BNSF	30	70%
Pasco to Ellensburg	BNSF	30	13%
Ellensburg to Auburn	BNSF	30	13%
Vancouver to Nisqually	BNSF	75	72%
Nisqually to Tacoma	BNSF	75	48%
Tacoma to Ellingson	BNSF	75	83%
Ellingson to Tukwila	BNSF	133	47%
Tukwila to Black River	BNSF	133	53%
Black River to Seattle	BNSF	133	58%
Seattle to Everett	BNSF	75	59%
Everett to International Border	BNSF	30	43%
Idaho Border to Oregon Border	UP	30	17%
Tacoma to Tukwila	UP	30	33%

Source: Washington State Department of Transportation, Ongoing Rail Plan Update – Rail System Capacity Analysis Technical Memorandum, December 2025.

²⁰ Washington State Department of Transportation, Ongoing Rail Plan Update – Rail System Capacity Analysis Technical Memorandum, December 2025.

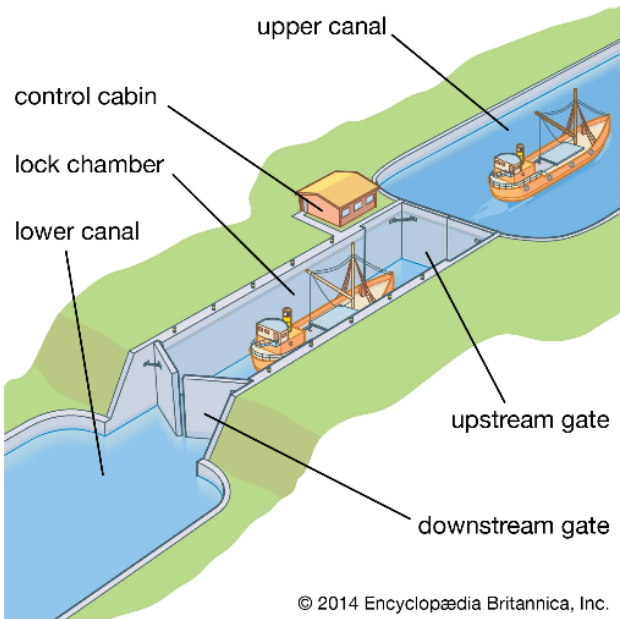
Inland waterway delays

The Columbia–Snake River System is a nationally significant inland waterway corridor that supports barge movements of grain, bulk commodities, and project cargo to and from export terminals. The system’s single-chamber locks create a series of interdependent gateways; performance at any one lock affects through movements along the entire chain (Figure F-44).²¹

Figure F-46 provides a 2025 snapshot of traffic levels, lockage activity, average processing times, and unscheduled downtime for each of the eight locks. The snapshot shows a highly utilized system in which locks process large numbers of commercial vessels while maintaining relatively short processing times, but where even modest unscheduled downtime at one lock can ripple along the system due to the linear, single-chamber configuration.

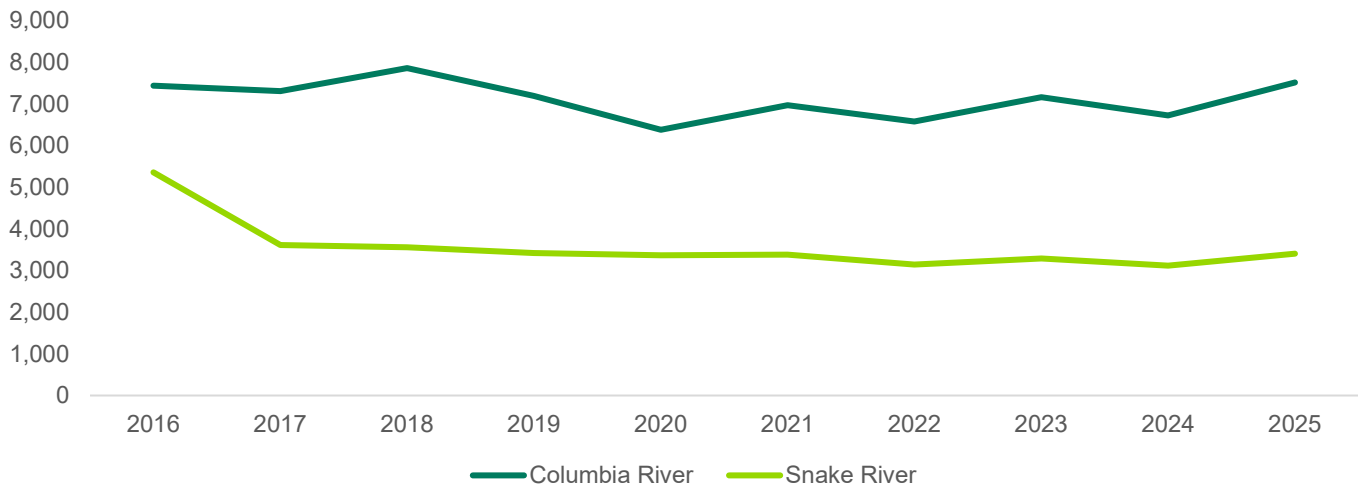
Figure F-45 tracks total annual lockages, showing a decline between 2016 and 2020 that coincides with intensive maintenance projects, followed by a recovery in lockage volumes. This pattern highlights the tradeoff between planned outages for repairs and upgrades and near-term system throughput. Following completion of major maintenance activities, lockage volumes recovered while subsequent performance metrics show shorter delays and improved reliability at several locations.

Figure F-44: Single-Chamber Lock Diagram



© 2014 Encyclopædia Britannica, Inc.
Source: Encyclopedia Britannica, 2014.

Figure F-45: Total Lockage Trend Columbia and Snake Rivers (2015-2026)



Source: CPCS Analysis, U.S. Army Corps of Engineers (USACE) Lock Performance Monitoring System, 2026.

²¹ Pacific Northwest Waterways Association (PNWA), Columbia Snake River System Facts, <https://www.pnwa.net/wp-content/uploads/2025/10/Columbia-River-Facts-250827.pdf>

Figure F-46: Locks Along the Columbia and Snake River System 2025 Snapshot

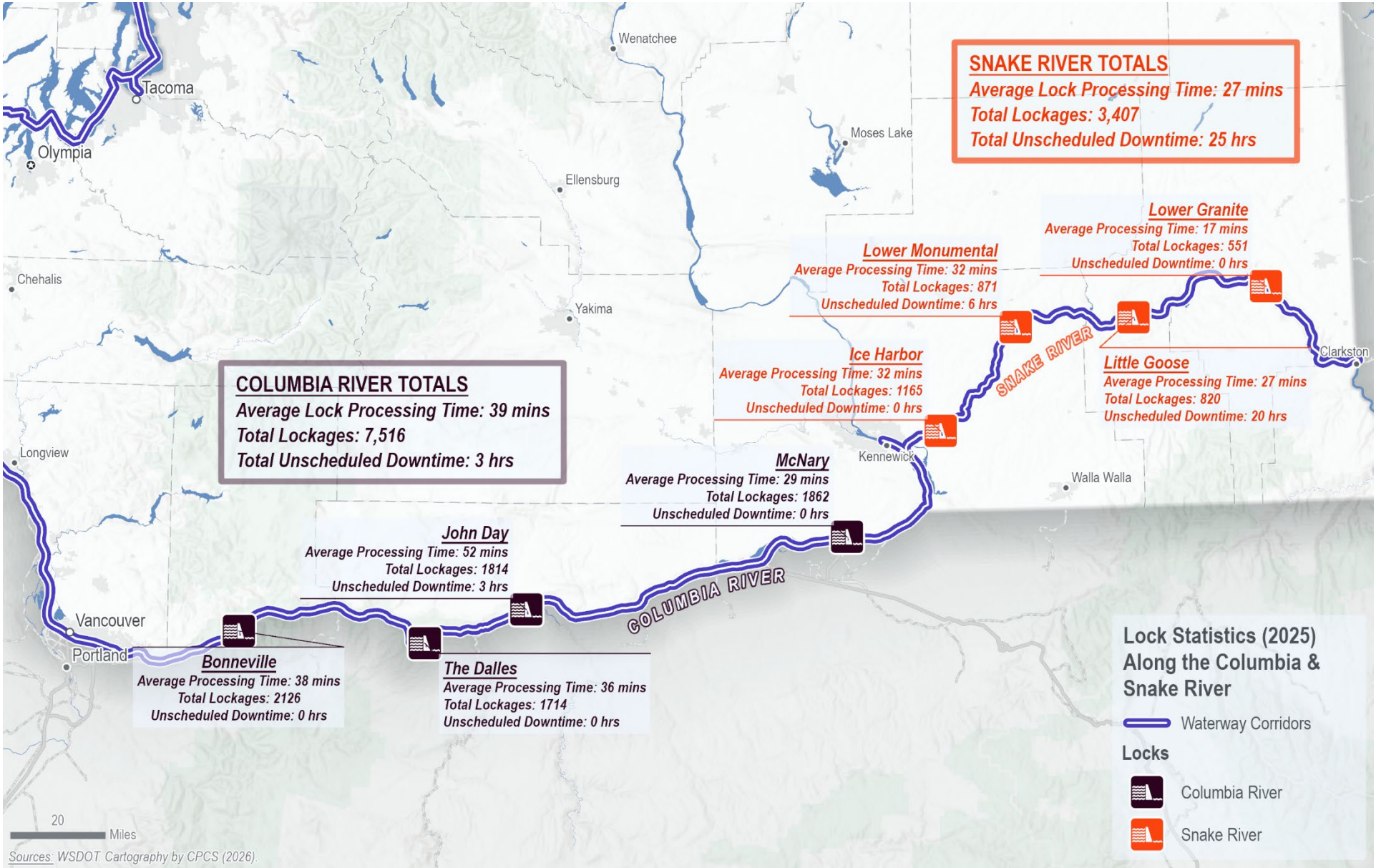


Figure F-47 compares average delay times, processing times, and the percentage of vessels delayed at each lock in 2020 and 2025. The most striking change is at McNary Lock, where average delay time drops from nearly 100 minutes to just over 6 minutes, while processing times also improve. Several Snake River locks similarly show shorter delays, but the percentage of vessels delayed remains high at many locks, indicating that while delays are now typically shorter when they occur, they still occur frequently across the system.

Figure F-47: Columbia and Snake Rivers Lock queue time, percent of vessels delayed

River	Lock	Average Delay time (minutes)		Average Processing time (minutes)		Percent of Vessels Delayed	
		2020	2025	2020	2025	2020	2025
Columbia River	Bonneville	9.13	14.3	39.4	37.05	77%	73%
	The Dalles	56.3	32.8	41.7	35.35	86%	85%
	John Day	6.3	19.3	57.6	51.56	17%	76%
	McNary	99.6	6.2	40.8	28.27	74%	90%
Snake River	Ice Harbor	5.7	6.6	30.5	31.4	88%	88%
	Lower Monumental	28.5	6.5	42.2	31.3	91%	95%
	Little Goose	18.3	4.1	33	26.8	86%	60%
	Lower Granite	2.1	2.1	23.5	16.8	37%	36%
Lake Washington Ship Canal	Ballard	71.4	41.7	2.2	2.8	40%	31%

Source: CPCS Analysis, U.S. Army Corps of Engineers (USACE) Lock Performance Monitoring System, 2026

Figure F-48 shows scheduled downtime for each lock, emphasizing major maintenance years such as 2016 on the Snake River and 2022 on the Columbia River, when planned outages reached roughly 2,500 hours. Following these intensive interventions, scheduled downtime declines and availability improves, suggesting that concentrated maintenance windows have helped stabilize lock performance and reduce the need for frequent smaller outages.

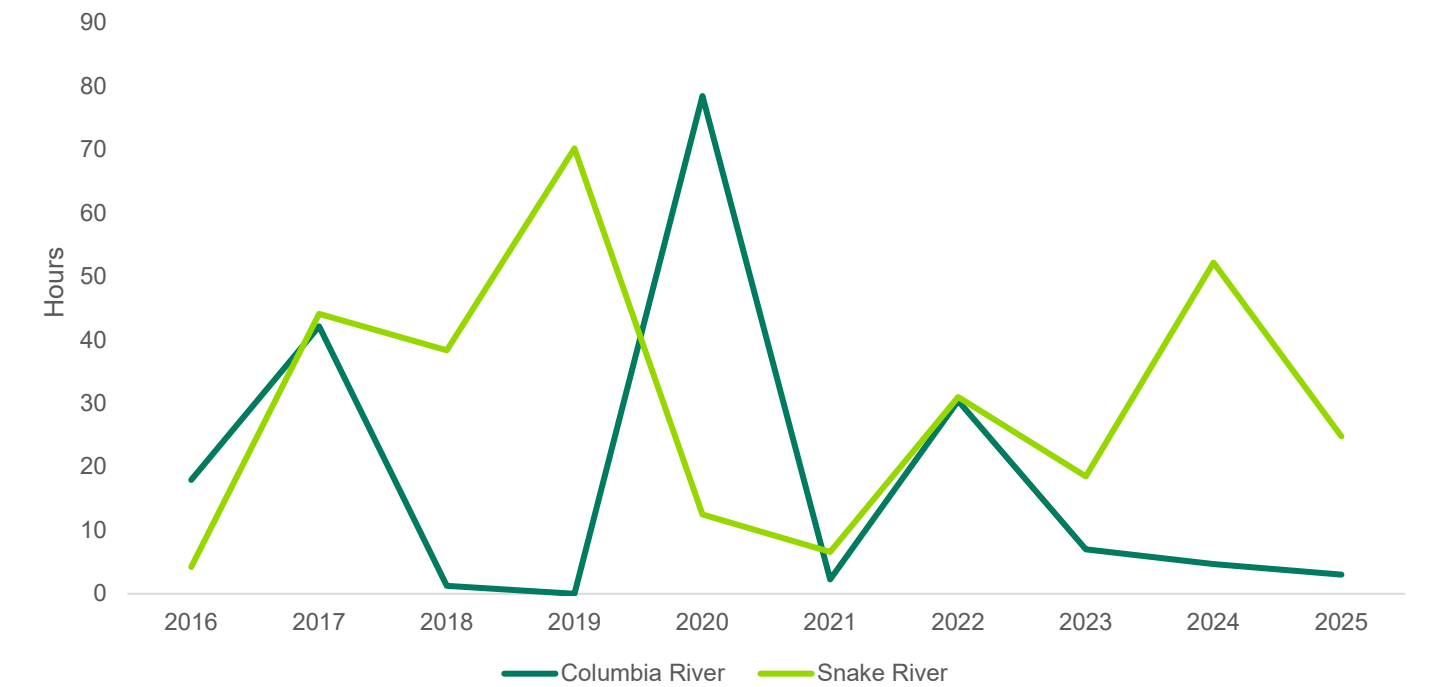
Figure F-48: Total Scheduled Lock Downtime Columbia and Snake Rivers (2016-2025)



Source: CPCS Analysis, U.S. Army Corps of Engineers (USACE) Lock Performance Monitoring System, 2026

Figure F-49 shows trends in unscheduled downtime, which serves as an indicator of infrastructure reliability and mechanical stress. The Columbia River exhibits a peak around 2020, followed by a trend toward lower, more stable unscheduled downtime, while the Snake River shows more volatility and spikes as recently as 2024. The extended closure from January through March 2024 at John Day, McNary, Lower Monumental, Little Goose, and Lower Granite dams, while planned, underscores how work at multiple locks in a short period can temporarily constrain the system even as it supports long-term reliability.

Figure F-49: Total Unscheduled Lock Downtime Columbia and Snake Rivers (2016-2025)



Source: CPCS Analysis, U.S. Army Corps of Engineers (USACE) Lock Performance Monitoring System, 2026.

Figure F-50 through Figure F-51 break out queue time and percent delayed by individual lock for the Columbia and Snake Rivers. Across these charts, queue times generally decline between 2015 and 2025, indicating progress in reducing how long vessels wait to transit the locks, especially at historically delay-prone locations such as Bonneville and McNary. At the same time, the share of vessels experiencing some delay remains elevated at several locks, indicating that operational constraints and periodic congestion continue to affect system performance even as average delay durations have improved.

Figure F-50: Columbia River Lock Queue Time

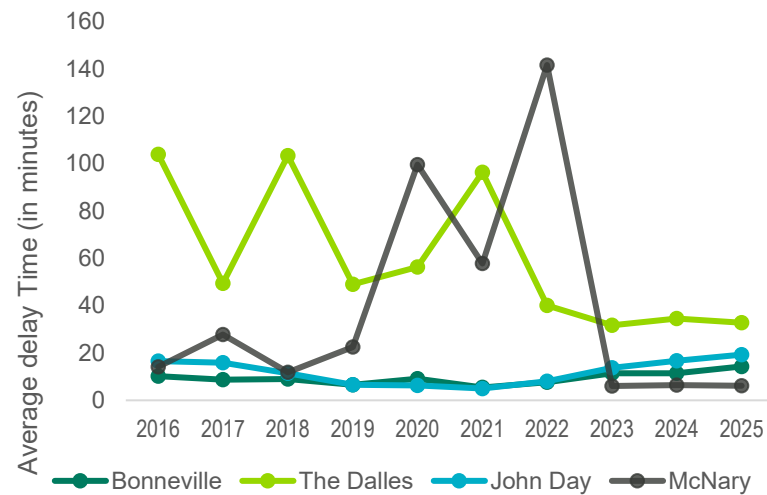


Figure F-52: Columbia River Percent of Vessels Delayed

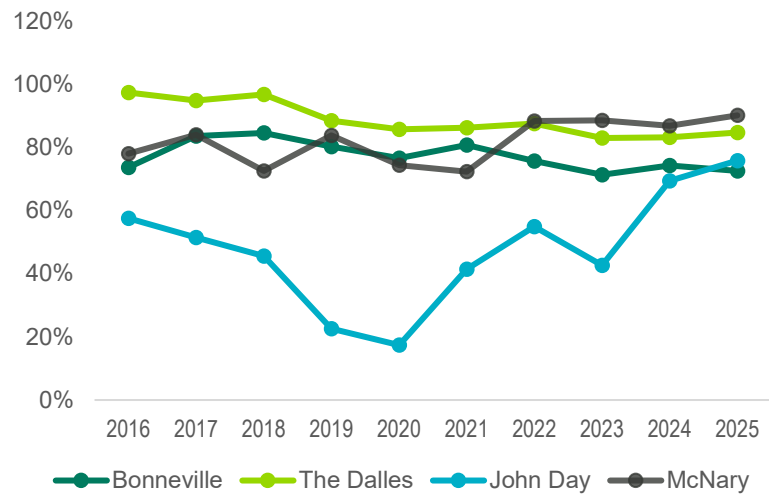


Figure F-51: Snake River Lock Queue Time

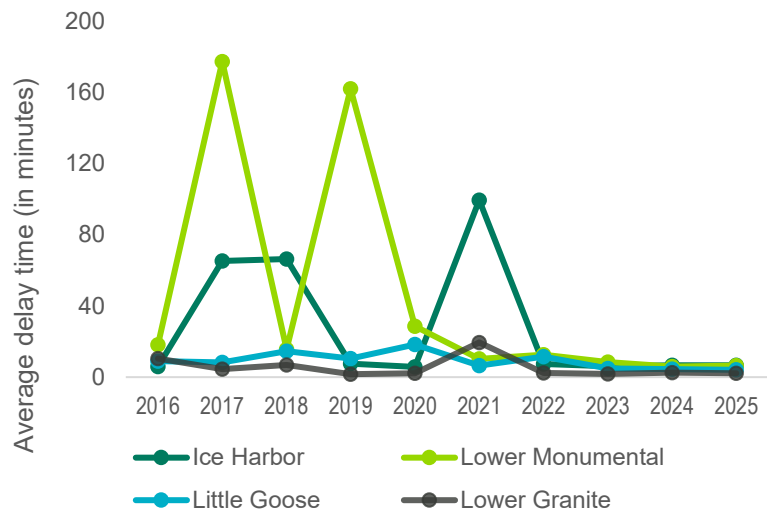
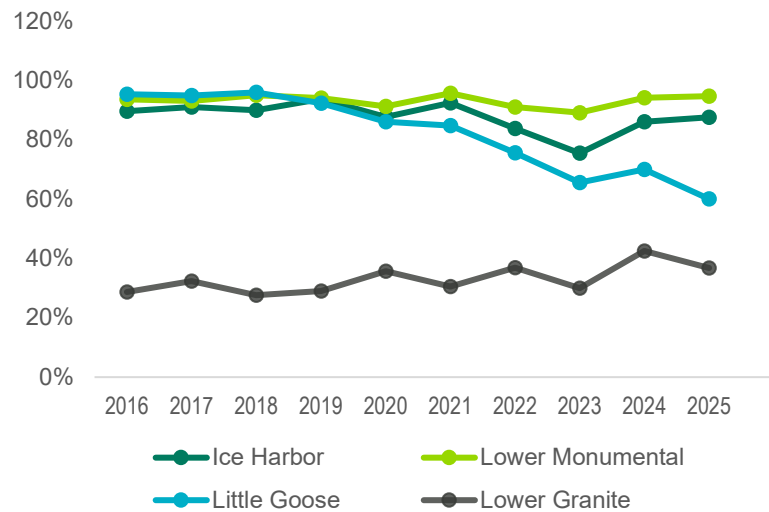


Figure F-53: Snake River Percent of Vessels Delayed



Source: CPCS Analysis, U.S. Army Corps of Engineers (USACE) Lock Performance Monitoring System, 2026

Runway length

Runway length sets the basic envelope for which aircraft can safely operate at a given airport and under which loading and weather conditions. Longer runways accommodate larger aircraft and higher takeoff weights, enabling more cargo per flight and more flexible routing, while shorter runways limit aircraft size, payload, and in some cases the ability to serve long-haul markets.

Figure F-54 summarizes runway lengths at major air cargo airports, including Seattle–Tacoma International Airport (SEA), King County International Airport (BFI), Spokane International (GEG), Paine Field (PAE), Yakima (YKM), Tri-Cities (PSC), Bellingham (BLI), and Grant County International (MWH). The table highlights the contrast between airports with multiple long runways over 9,000 or 10,000 feet, well-suited to wide-body freighters and heavily loaded aircraft, and smaller facilities where runways under roughly 7,500 feet constrain aircraft choice and cargo throughput.

Figure F-54: Airport Runway Length in Washington's Top Cargo Airports

Airport	Runway	Dimensions
Seattle-Tacoma International Airport (SEA)	16C/34C	9426 ft. x 150 ft.
	16L/34R	11901 ft. x 150 ft.
	16R/34L	8500 ft. x 150 ft.
King County International Airport (BFI)	14L/32R	3709 ft. x 100 ft.
	14R/32L	10007 ft. x 200 ft.
Spokane International Airport (GEG)	03/21	11002 ft. x 150 ft.
	08/26	8199 ft. x 150 ft.
Paine Field Airport (PAE)	16L/34R	3004 ft. x 75 ft.
	16R/34L	9010 ft. x 150 ft.
Yakima Air Terminal McAllister Field (YKM)	04/22	3835 ft. x 150 ft.
	09/27	7604 ft. x 150 ft.
Tri-Cities Airport (PSC)	03L/21R	7707 ft. x 150 ft.
	03R/21L	4423 ft. x 75 ft.
Bellingham International Airport (BLI)	16/34	6700 ft. x 150 ft.
Grant County International Airport (MWH)	04/22	10000 ft. x 100 ft.
	09/27	3500 ft. x 90 ft.
	14L/32R	13503 ft. x 200 ft.
	14R/32L	2936 ft. x 75 ft.
	18/36	3327 ft. x 75 ft.
Friday Harbor Airport (FHR/FRD)	16/34	3402 ft. x 75 ft.

Source: Federal Aviation Administration Airport Data and Information Portal, 2026.

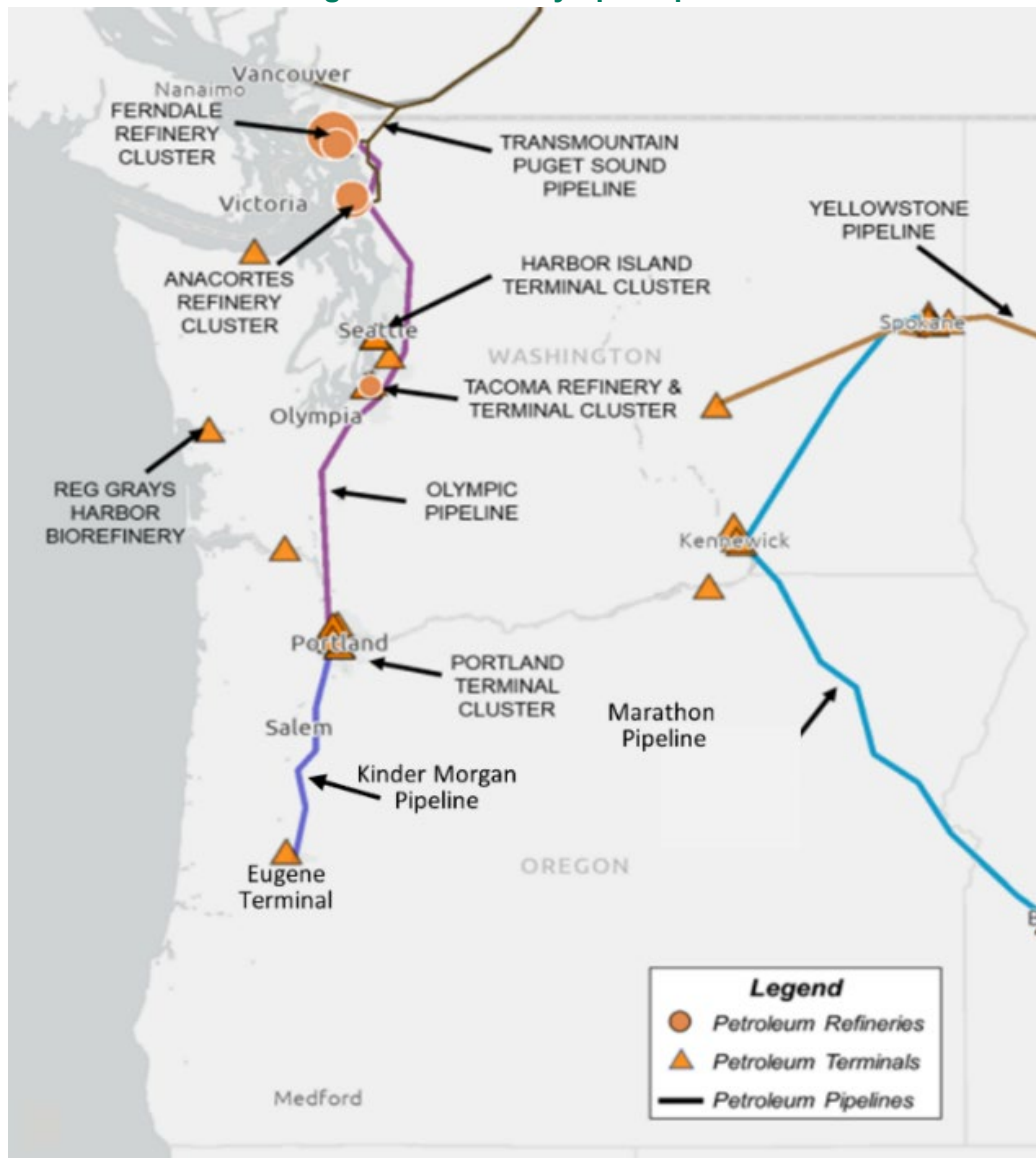
Pipeline flows and capacity

Pipelines move a large share of Washington’s refined products and crude oil, providing relatively stable, high-volume capacity between refineries, terminals, and markets. Understanding both capacity and utilization helps characterize how much room remains to accommodate shifts in demand or disruptions to other modes.

The BP Olympic Pipeline is a 400-mile refined product system in a 299-mile corridor between Whatcom County and Portland that transports gasoline, diesel, and jet fuel to terminals in Seattle, Tacoma, and Portland. The pipeline’s estimated capacity is approximately 325,000 barrels per day, and there are no publicly announced expansion projects; detailed utilization and capacity expansion data are not routinely published by the operator.

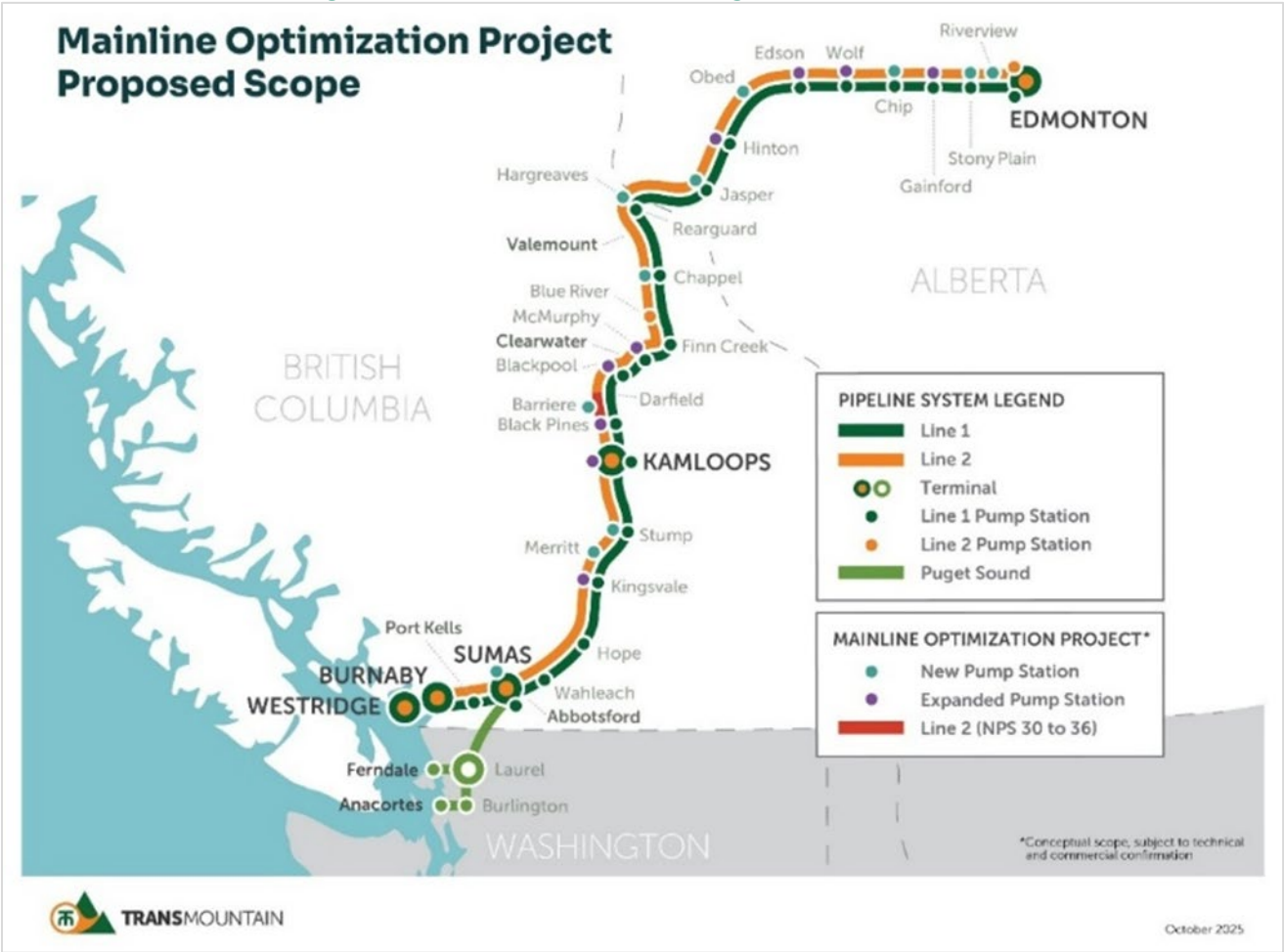
Trans Mountain Puget Sound Pipeline connects to the Puget Sound Pipeline, which delivers crude oil and refined products to refineries at Anacortes, Cherry Point, and Ferndale. This 69-mile, 16- to 20-inch pipeline has a capacity of about 240,000 barrels per day. In the fourth quarter of 2025, approximately 232,000 barrels per day were delivered to Washington State via this system, leaving roughly 8,000 barrels per day of unused capacity and indicating near-peak utilization. Trans Mountain has launched a bidding process for potential expansions along the existing corridor that could increase overall system throughput from roughly 890,000 barrels per day to about 1,190,000 barrels per day within the next several years.

Figure F-55: BP Olympic Pipeline



Source: DOE, Arc GIS Products, accessed April 2026.

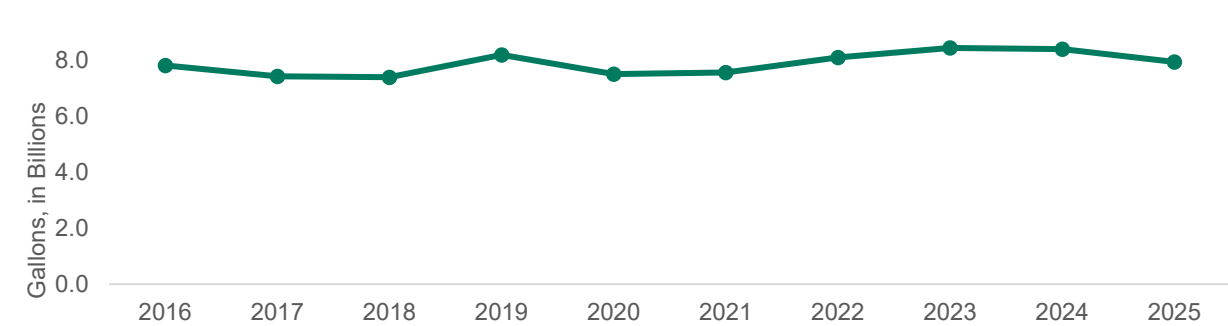
Figure F-56: Trans Mountain Puget Sound Pipeline



Source: Trans Mountain, 2025.

Figure F-57 shows that total oil movements of all types by pipeline in Washington rose gradually from about 7.5 billion gallons in 2020 to nearly 8.5 billion gallons, then eased below 8 billion gallons in the most recent year. This pattern suggests strong but not continuously accelerating use of pipelines for oil transport during the last five years.

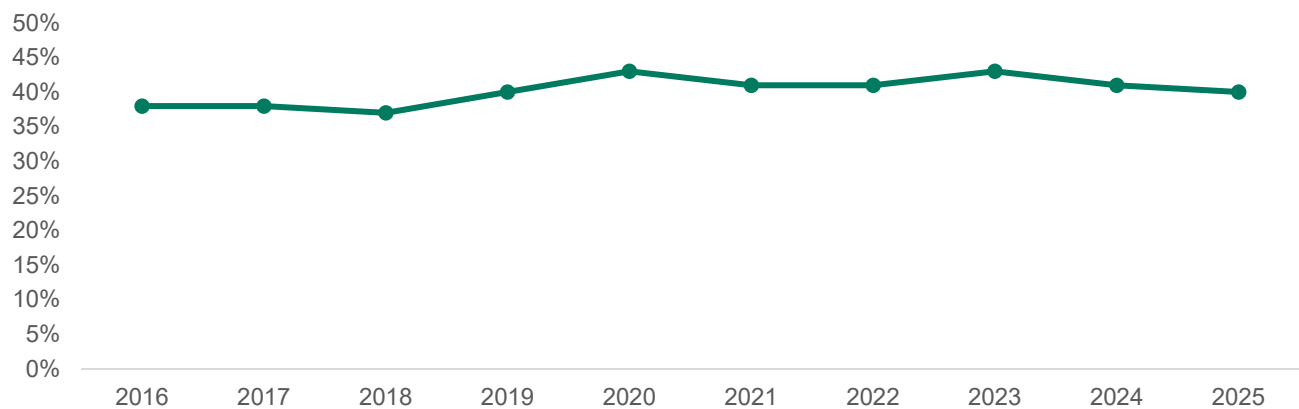
Figure F-57: Volume of oil (of any kind) movements by pipeline in Washington, 2016-2025



Source: CPCS analysis of State of Washington Department of Ecology, Total Oil Moved by Year and Mode 2015-2025.

Figure F-58 tracks the percentage of all oil (of any kind) moved by pipeline compared to rail and vessel. Since 2020, pipelines have consistently carried at or above roughly 40 percent of all oil movements by volume, underscoring their role as the single largest mode for oil transport in the state.

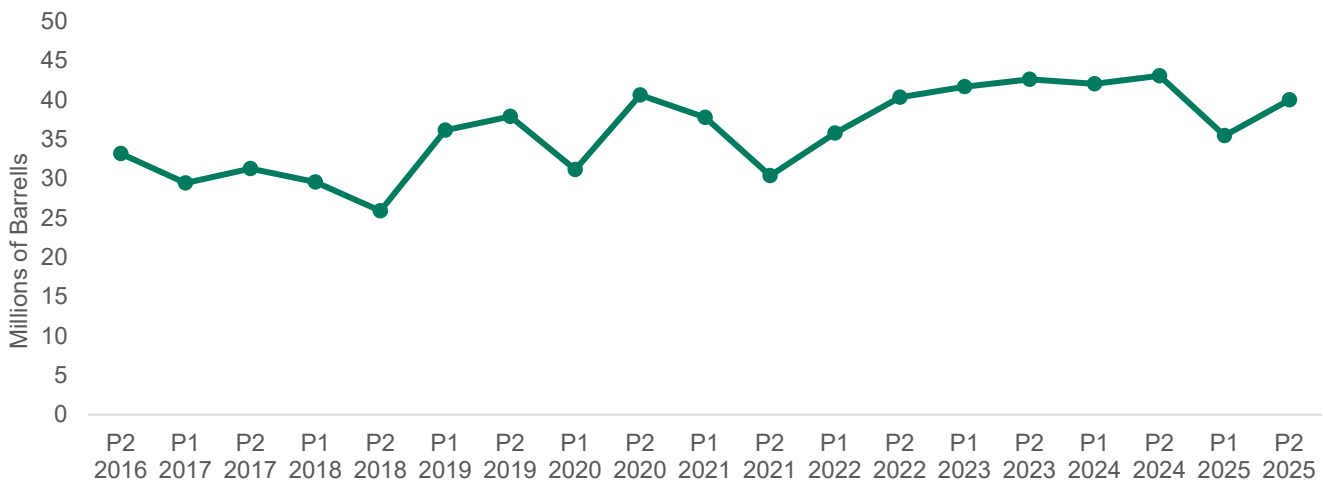
Figure F-58: Percentage of all oil (of any kind) movements in Washington carried by pipeline, 2016-2025



Source: CPCS analysis of State of Washington Department of Ecology, Total Oil Moved by Year and Mode 2015-2025

Figure F-59 focuses specifically on crude oil volumes moved by pipeline between 2016 and 2025. Crude volumes increased from about 30 million barrels to 40 million barrels between 2021 and 2024, with subsequent fluctuations and a reported total of more than 75 million barrels moved by pipeline in 2025 across the half-year “P” reporting periods. These data highlight that crude flows can vary substantially from year to year, but that pipeline transport has become an increasingly important channel for crude movements over the last decade.

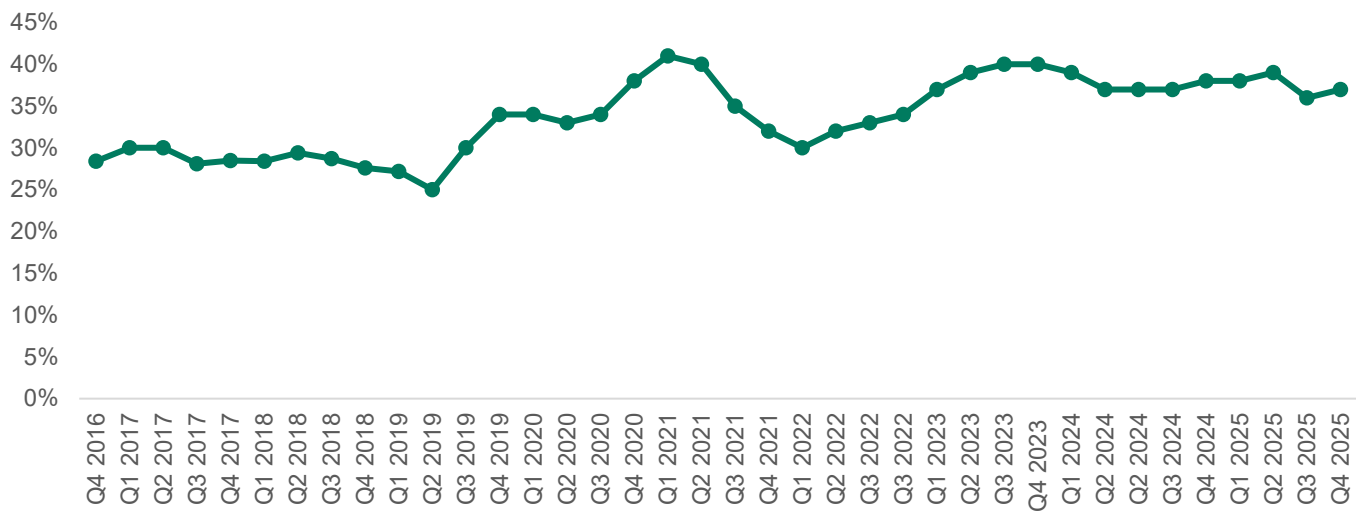
Figure F-59: Volume of crude oil movements by pipeline in Washington, 2016-2025



Source: CPCS analysis of Washington Department of Ecology Crude Oil Movement by Rail and Pipeline Quarterly Reports, various, 2026. Note: P here stands for “period.” Data recorded in half-year increments.

Figure F-60 shows the percentage of total crude oil movements carried by pipeline since 2016. While the COVID-19 period brought noticeable swings in mode share, pipelines have carried an average of about 38 percent of crude movements since 2023, indicating a stable but not exclusive role in the state’s crude oil logistics.

Figure F-60: Percentage of all crude oil movements in Washington carried by pipeline, 2016-2025



Source: CPCS analysis of Washington Department of Ecology Crude Oil Movement by Rail and Pipeline Quarterly Reports, various, 2026.

Economic vitality

Measuring economic vitality in this context focuses on how the transportation network supports freight-related employment rather than only how it moves goods. The freight industry plays an integral role in many markets, supporting a wide range of occupations involved in the production, transportation, distribution, and post-delivery handling of goods. This extensive labor demand spans the entire supply chain, from manufacturing and logistics to warehousing and final delivery, underscoring the industry’s broad economic impact.

Connecting Economic Vitality and the Freight System

The freight system is one of the cornerstones of Washington’s economic vitality, as it enables the movement of goods that support industries, jobs, and regional competitiveness. Efficient freight networks reduce the costs for businesses, help facilitate trade, and attract investment to the state by ensuring reliable access to the domestic and global markets that businesses require. Improvements to freight system performance in turn contribute to the economic growth and resilience of Washington’s local, regional, and state-wide economies.

Workforce access to freight markets

Workforce access to freight markets describes how well the transportation system connects workers to freight-reliant jobs at logistics centers, ports, terminals, and industrial hubs. When these connections are strong, employers can draw from a wider labor pool and freight-reliant industries can operate more efficiently.

The map in Figure F-61 links three elements: the location of Freight Activity Hubs (FAHs), the volume of work trips made to those hubs in 2023, and the primary roadway corridors used for those commutes. The map highlights that workforce access to FAHs is not evenly distributed; instead, work trips concentrate along a limited number of high-capacity highway corridors that also function as core freight routes.

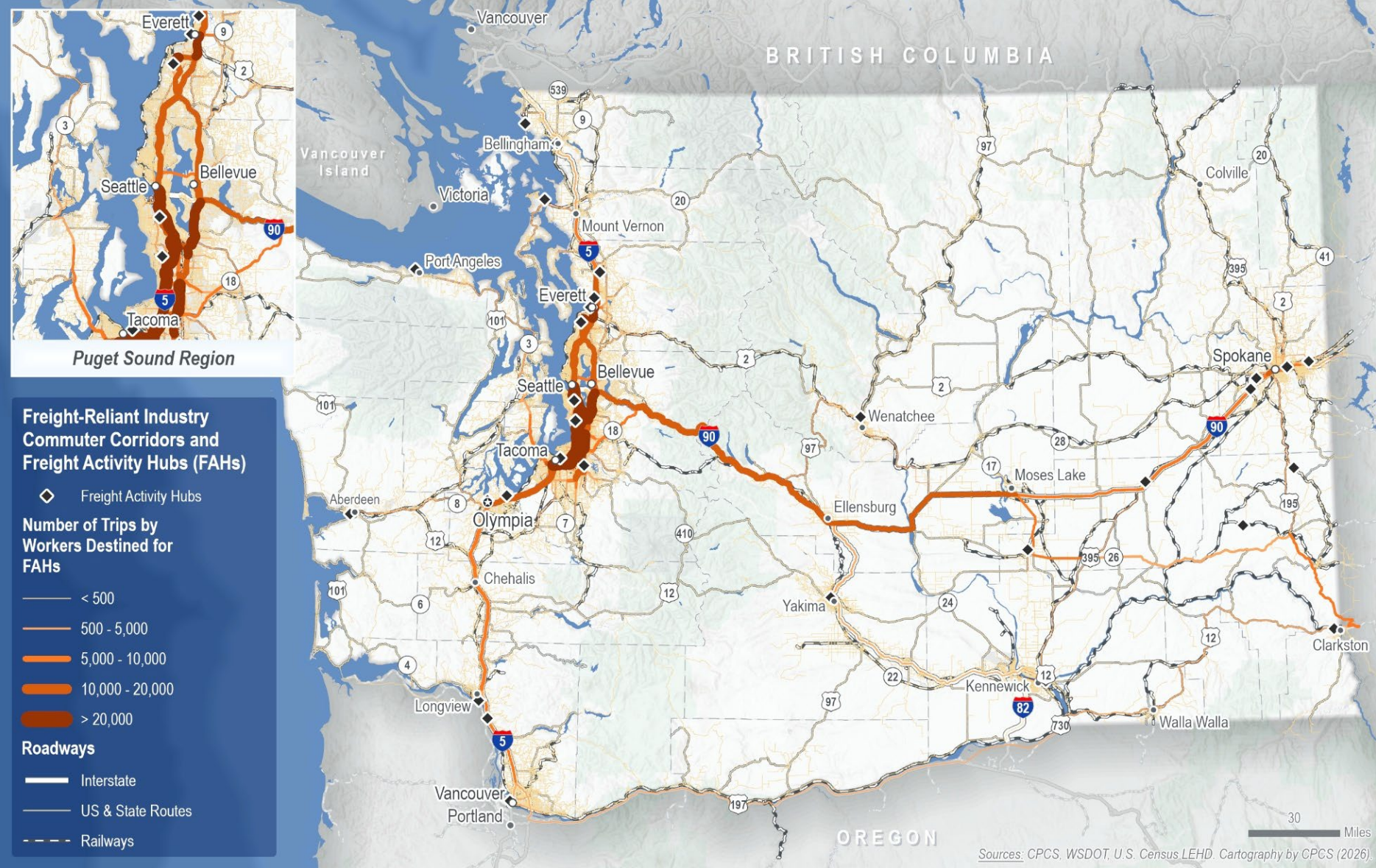
The map combines Freight Activity Hub locations with modeled commuter trip patterns derived from origin-destination travel data and roadway network assignments. Work trips associated with freight-reliant employment at FAHs were assigned to the roadway network to illustrate the primary corridors used by workers traveling to these hubs.

As the map shows:

- **Highway corridors as dual-purpose links.** Major highways serve both as freight corridors and as primary commuter routes to FAHs, illustrating that the same infrastructure underpins goods movement and access to freight-reliant jobs.
- **Dependence of FAHs on corridor reliability.** Freight Activity Hubs rely on these corridors to provide consistent access for their workforce; when travel on these links becomes unreliable, the effects are felt not only in truck flows but also in shift coverage and labor availability.
- **I-5 as the primary workforce spine.** Among all corridors, I-5 carries the highest volume of work trips to FAHs, with more than 20,000 worker trips in 2023, underscoring its central role in connecting regional labor markets to major ports and logistics centers.²²
- **I-90 as a key east–west labor connector.** I-90 supports between 10,000 and 20,000 work trips to FAHs, indicating that many freight hubs draw workers from communities beyond their immediate vicinity and depend on regional east–west corridors to make those commutes viable.

²² U.S. Census, LEHD Origin–Destination Employment Statistics (LODES), <https://lehd.ces.census.gov/data/>.

Figure F-61: Freight-Reliant Industry Commuter Corridors and Freight Activity Hubs (FAHs) in 2023



Environment

Environmental indicators focus on how freight activity intersects with existing environmental burdens and vulnerabilities across Washington's communities. The analyses draw on the Washington Environmental Health Disparities (EHD) Map, which combines pollution, socioeconomic, and demographic data to highlight neighborhoods that face higher cumulative risk.

Environmental Considerations and the Freight System

Environmental considerations play an increasingly central role in freight planning, as the movement of goods contributes emissions, energy consumption, and community impacts to surrounding areas. Improving freight system efficiency can help to minimize the environmental impacts of freight movements while maintaining system performance.

Environmental Health Disparities Index

The Environmental Health Disparities (EHD) Index ranks each census tract in Washington from 1 (lowest) to 10 (highest) based on cumulative environmental, socioeconomic, and demographic risk factors. It incorporates indicators such as diesel exhaust and PM2.5 exposure, proximity to heavy traffic, housing and neighborhood conditions, income, race, and English language ability to identify communities more vulnerable to environmental health impacts.²³

Figure F-62 is a bivariate map that displays census tracts with higher EHD overall rankings alongside total population, with Freight Activity Hubs included for context. The map emphasizes tracts at the higher end of the EHD scale and distinguishes between areas where high vulnerability coincides with large populations and areas where vulnerability is high, but populations are smaller. This combined view highlights where environmental health disparities affect the greatest number of residents and where smaller communities near freight infrastructure experience elevated risk.

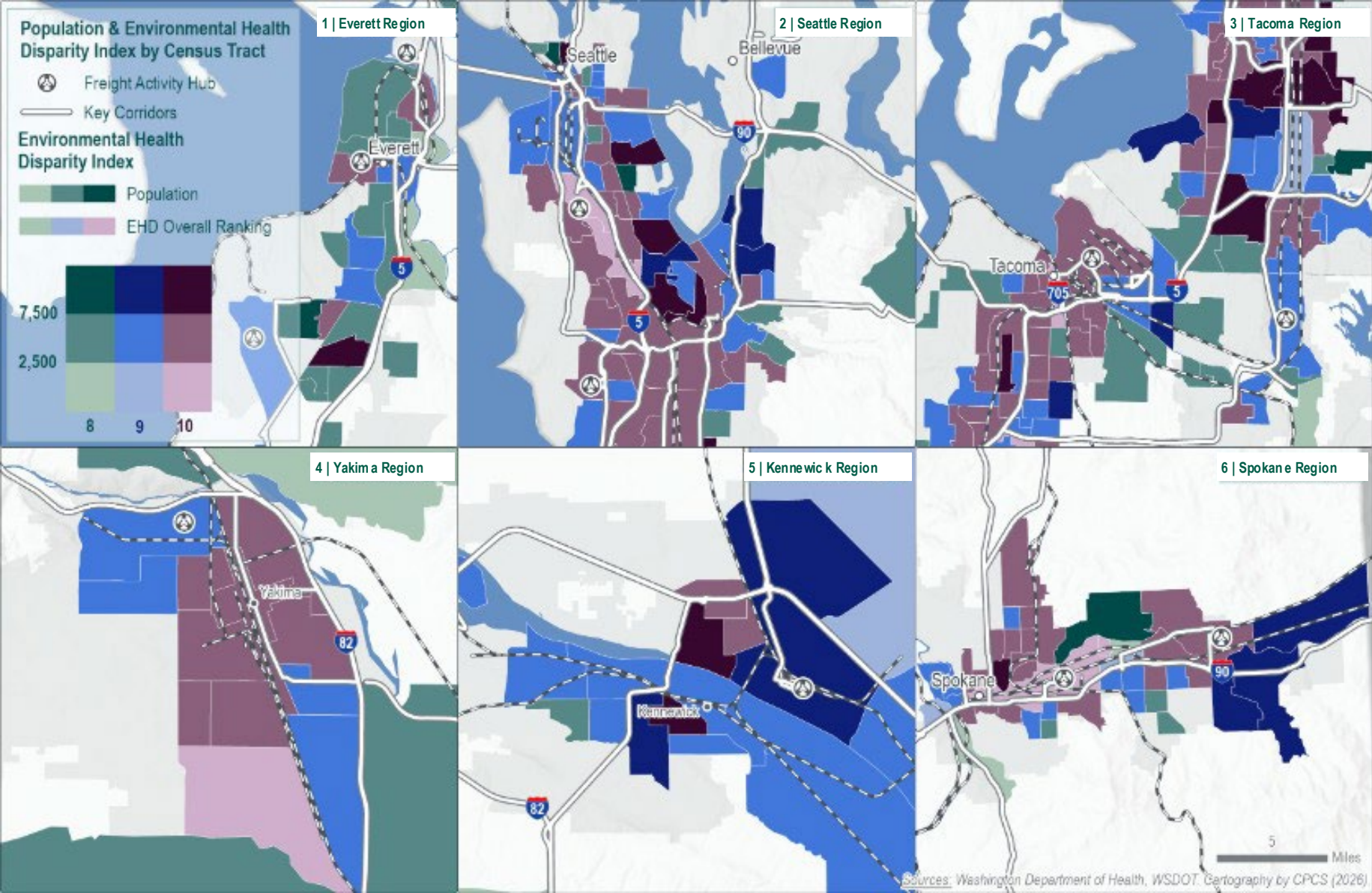
Key takeaways from Figure F-62 include:

- Across regions, census tracts that have both larger populations and higher EHD overall ranks are commonly located along major highway corridors and near Freight Activity Hubs, reflecting the overlap between freight corridors and communities facing higher cumulative environmental risk.
- In the Everett area, tracts with the highest EHD scores cluster near freight hubs and I-5, illustrating how port-oriented freight and regional traffic increase environmental burden for nearby neighborhoods.
- In the Seattle region, tracts with both higher population and higher EHD ranks concentrate along I-5 and I-90 and around Freight Activity Hubs, while some lower-population tracts along I-5 also show high EHD rankings, indicating that significant environmental health disparities occur in both densely and sparsely populated areas adjacent to freight corridors.
- In the Kennewick area, the single Freight Activity Hub sits near several tracts that combine high EHD rankings with larger populations, pointing to a localized cluster where concentrated freight activity and residential exposure coincide.

²³ University of Washington Department of Environmental & Occupational Health Sciences, & Washington State Department of Health, *Washington Environmental Health Disparities Map: Cumulative impacts of environmental health risk factors across communities of Washington State (Technical Report Version 2.0)*, 2022, https://doh.wa.gov/sites/default/files/2022-07/311-011-EHD-Map-Tech-Report_0.pdf.

These patterns show how freight corridors and hubs intersect with communities that already face higher cumulative environmental burdens, providing a spatial context for considering equity in freight-related decisions.

Figure F-62: Environmental Health Disparities and Population in Census Tract



Air quality impacts of freight

Air quality impacts from freight activity are captured in this section through EHD indicators related to heavy traffic volumes and PM_{2.5} emissions. Diesel-powered trucks, locomotives, and equipment are significant sources of NO₂ and fine particulate matter, and communities located near major freight routes often experience higher exposure levels.

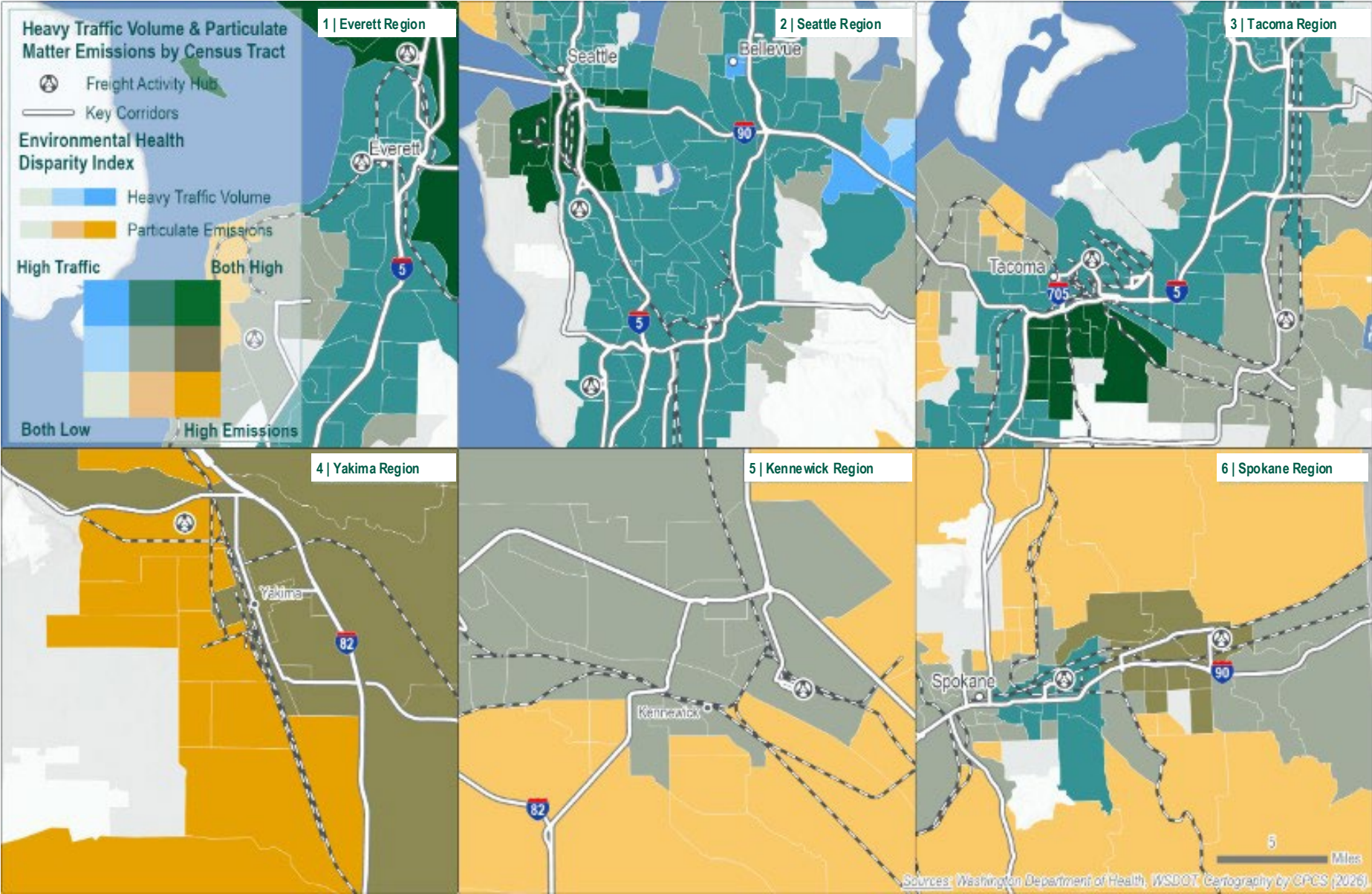
Figure F-63 uses a bivariate mapping approach to show census tracts where heavy traffic volumes and PM_{2.5} emissions are high, again with Freight Activity Hubs overlaid for context. The map highlights tracts where both traffic intensity and particulate emissions are elevated, as well as tracts where only one of these factors is high. This provides a more nuanced picture of how freight-related traffic and associated emissions align (or diverge) across different parts of the state.

Below are some key takeaways from Figure F-63:

- **In the Everett, Seattle, and Tacoma region**, Census tracts with both high PM_{2.5} emissions and high heavy traffic volumes are located near FAHs, interstate corridors, and rail lines, indicating that freight-related traffic concentrations are a major contributor to elevated particulate exposure in these urban areas.
- **In the Yakima region**, some tracts exhibit high PM_{2.5} emissions despite comparatively lower heavy traffic volumes, suggesting that particulate levels in these locations reflect multiple sources, such as freight operations, regional travel patterns, and other non-traffic contributors, rather than corridor traffic alone.
- **In the Spokane region**, tracts closest to FAHs tend to show both higher PM_{2.5} emissions and higher heavy traffic volumes, while tracts farther away generally show moderate emissions and lower traffic volumes, illustrating how air quality impacts diminish with increasing distance from major freight infrastructure.

By pairing EHD metrics with the geography of freight corridors and hubs, these figures highlight where freight-related air quality burdens and community vulnerability overlap, helping to inform strategies that improve freight mobility while addressing environmental health disparities.

Figure F-63: Freight Activity and Air Quality Impacts: Traffic Volume and Particulate Emissions by Census Tract



Localized and Freight Activity Hubs Performance

Freight Activity Hubs (FAHs) perform different roles within Washington's freight system, shaped by their function, infrastructure, industry base, and surrounding land use context. As a result, performance cannot be assessed uniformly across all hubs. Instead, this section evaluates localized performance by combining statewide trends with hub-specific observations, drawing on partner outreach, survey inputs, and available quantitative data.

The analysis distinguishes between:

- **Cross-cutting system conditions** that affect multiple hubs, including infrastructure preservation, safety, and community impacts; and
- **Hub-specific performance patterns**, particularly for mobility and economic vitality, where data availability varies by hub type.

This approach highlights how localized conditions at individual hubs contribute to broader system performance and reliability.

Statewide Cross-Cutting Performance

Preservation

Infrastructure conditions emerged as a consistent and statewide determinant of freight performance. Partner engagement insights, particularly input provided by freight system users such as trucking operators, indicate that maintaining assets in a state of good repair is critical to sustaining reliability, particularly in a system where freight activity is concentrated at specific nodes and corridors.

As highlighted in the Washington Transportation Plan²⁴ and confirmed by freight partners in Washington, deferred maintenance and aging infrastructure increase the likelihood of outages, weight or speed restrictions, and other service interruptions that can disrupt freight movements and supply chains. These risks are particularly acute at key freight access points, such as intermodal connectors and first- and last-mile links, where there are few alternative routes and where local bottlenecks can have wider network effects.

Key modal observations include:

- **Road infrastructure:** Industrial access roads in areas such as Quincy, Moses Lake, and Warden are experiencing accelerated deterioration due to sustained heavy truck traffic. In many cases, these facilities were not designed for current freight demands, resulting in localized bottlenecks and reliability risks.
- **Rail infrastructure:** Aging rail assets, particularly on short-line and branch-line networks, pose reliability challenges. Partners emphasized the importance of maintaining these lines as redundant during highway disruptions, even when utilization levels fluctuate.
- **Maritime infrastructure:** Several ports identified long-standing deferred maintenance of docks, piers, and wharves, increasing vulnerability to operational disruptions and environmental stressors.
- **Airports:** Inland freight-supporting airports, including Grant County International Airport, were identified by partners as critical logistics and emergency response assets (wildfire response, FEMA staging, and Cascadia Subduction Zone recovery), yet face ongoing funding constraints for maintenance and rehabilitation.

²⁴ WSTC, *Washington Transportation Plan - Vision 2050: Building the Future We Want, Together*, 2024. [Washington Transportation Plan - Vision 2050](#)

Safety

Safety performance at FAHs is strongly influenced by truck activity on first- and last-mile connectors, where freight and passenger traffic interact most intensively. Analysis of truck-involved crashes provides insight into how safety risks are evolving over time and space.

Spatial and temporal clustering analysis identifies several distinct hotspot patterns, including emerging, intensifying, stable, and improving clusters. These patterns provide a more nuanced understanding of safety conditions than aggregate crash counts alone.

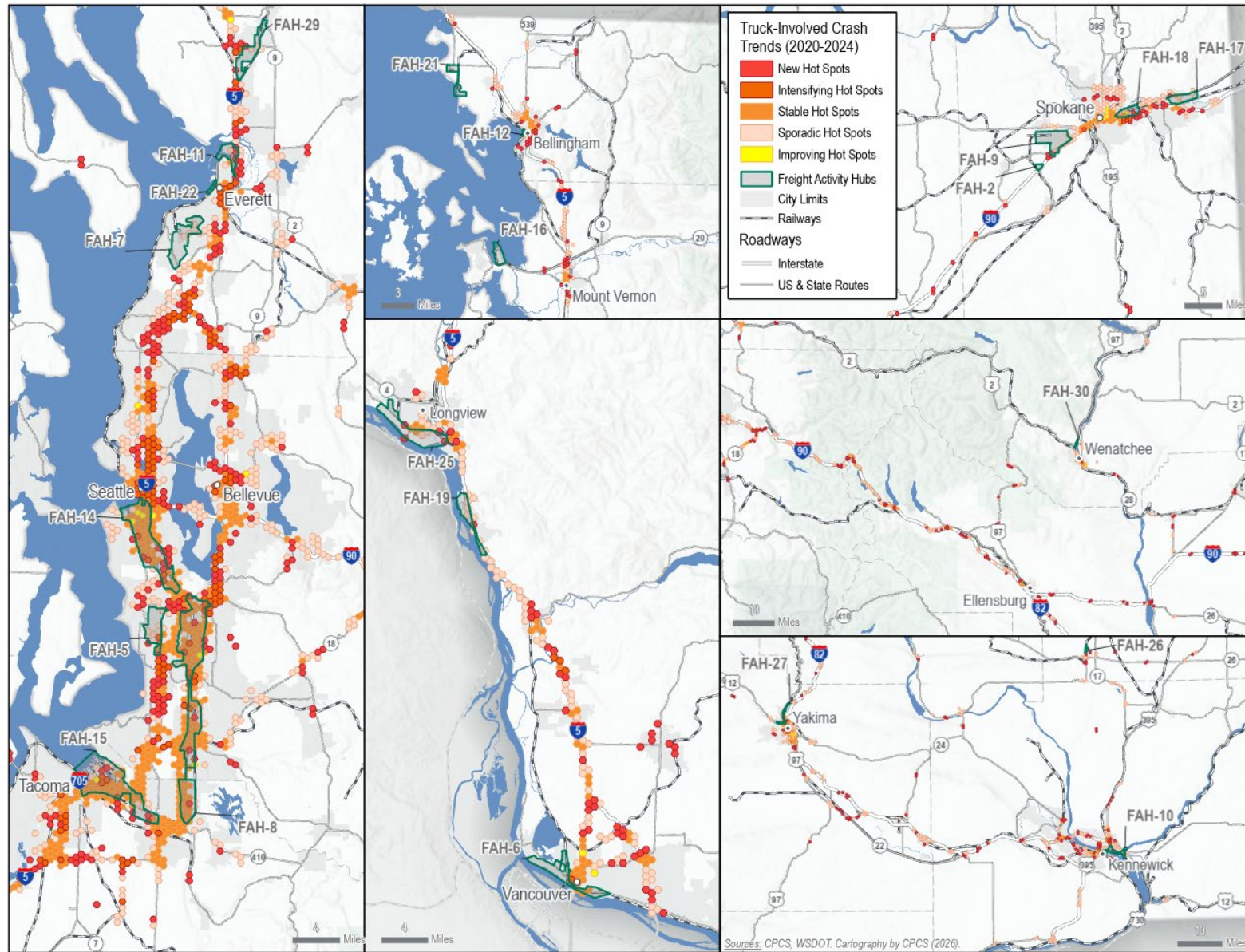
Figure F-64 shows where truck-involved crashes between 2020 and 2024 are most concentrated.²⁵ Statewide patterns indicate that:

- **Urban regions**, particularly the Seattle–Tacoma area, exhibit a high concentration of stable hotspots, reflecting persistent exposure to high truck volumes along congested corridors.
- **Emerging and intensifying hotspots** in Everett correspond with recent expansions in port and industrial activity, suggesting that increases in freight demand are influencing localized safety conditions.
- **Rural and inland regions**, such as Spokane, exhibit more sporadic hotspot patterns, likely due to seasonal and commodity-driven fluctuations in truck traffic.

Overall, truck-involved crashes are more concentrated near major population and employment centers, where traffic volumes, network complexity, and multimodal interactions are highest.

²⁵ This analysis was developed using ArcGIS's "Emerging Hot Spot Analysis Tool." Truck crash data were aggregated into 0.25-square-mile hexagons and evaluated across a five year period (2020-2024) to identify statistically significant clustering using hot spot analysis. Locations with consistently higher-than-expected crash activity were classified as hot spots. Trends over time were then assessed to determine whether these hot spots are emerging, intensifying, stable, sporadic, or improving, based on how the level and consistency of clustering changes across periods.

Figure F-64: Truck-Involved Crash Trends by Region



Truck Parking Access

Freight-reliant industries directly depend on trucks to move goods along the supply chain, including transport from agricultural fields to processing facilities and from manufacturing plants to ports and airports. Safe, legal truck parking is a critical part of that system because it enables drivers to comply with federal hours-of-service rules and to rest, eat, or wait for appointments without parking in unsafe or undesignated locations. Persistent parking shortages (documented nationally under Jason's Law and in industry surveys)²⁶ force many drivers to detour off-route, stop driving earlier than needed, or park in inappropriate locations, which undermines both safety and freight efficiency.

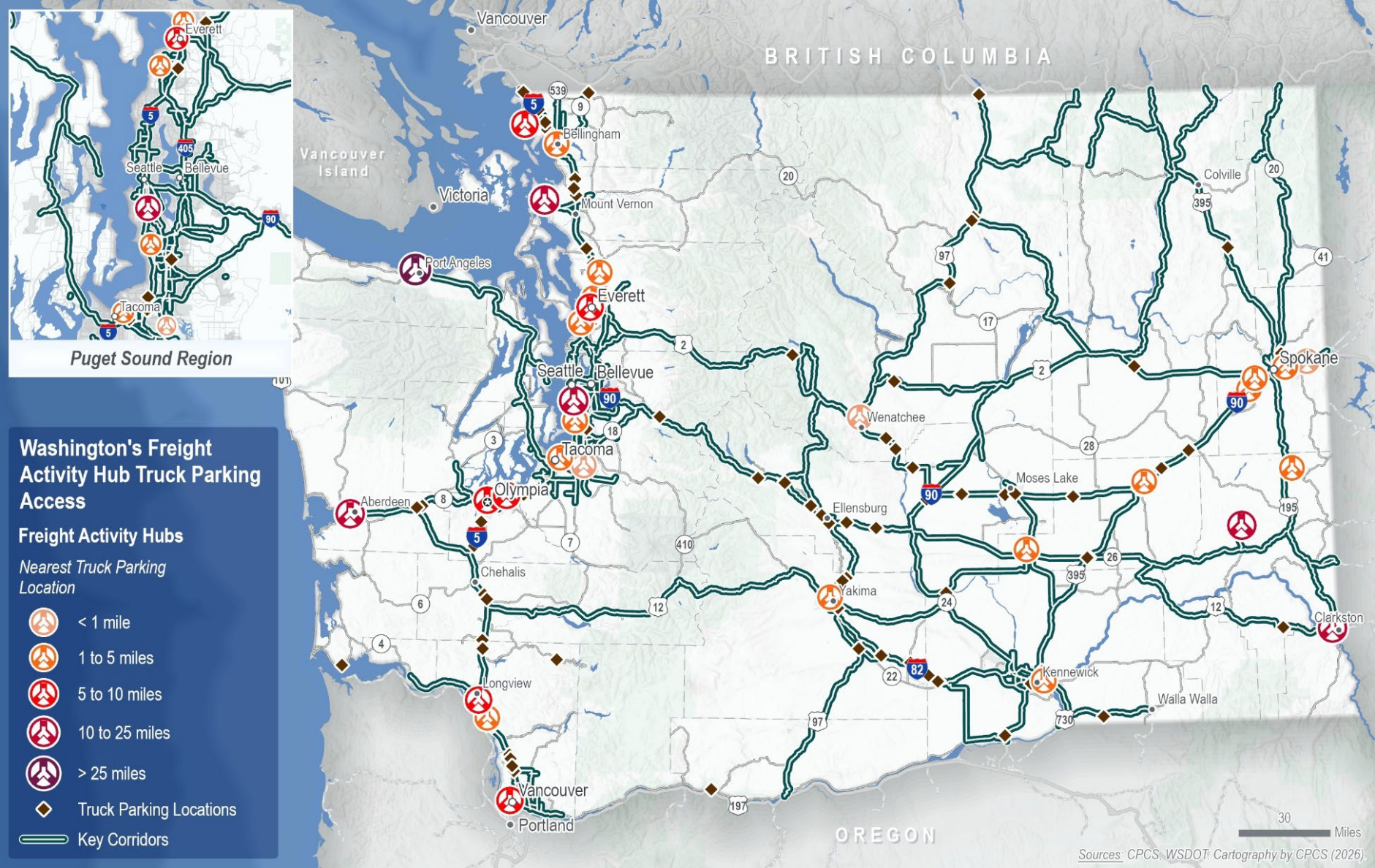
Figure F-65 shows where truck parking facilities are located across Washington relative to FAHs and classifies each hub by its distance to the nearest parking location. This provides a system-level view of how easily drivers serving each hub can reach parking areas before or after their trips.

Key takeaways include:

- Along the I-5 corridor in the Puget Sound region, FAHs have highly variable access to truck parking. Several hubs are 10 to 25 miles from the nearest facility, which under free-flow conditions equates to roughly 10 to 30 minutes of travel time, but recurring urban congestion can substantially lengthen these trips and reduce drivers' ability to reach parking when they need to stop for rest or hours-of-service compliance.
- Other Puget Sound FAHs are located within roughly 1 to 5 miles of truck parking, giving drivers more flexibility to stage near their destinations, adjust to terminal schedules, and find parking without significant out-of-route travel.
- The only FAH more than 25 miles from the nearest truck parking is at the Port of Port Angeles. This distance likely requires drivers to park well outside the immediate port area, increasing out-of-route miles and reducing flexibility for tightly timed port calls, which can add time and cost to port-related truck moves.
- On the eastern side of the state, two FAHs near State Routes 195 and 12 are 10 to 25 miles from the nearest parking location. These more rural corridors typically experience less congestion, so travel times are more predictable, but the additional distance still increases operating costs and limits options for staging or resting close to freight facilities.

²⁶ Federal Motor Carrier Safety Administration, *Hours of Service (HOS) Website*, Accessed May 2026.
<https://www.fmcsa.dot.gov/regulations/hours-of-service>

Figure F-65: Distance to Truck Parking from Freight Activity Hubs



Environment and community impacts

Freight activity can create local impacts when truck routes and industrial access roads run through or adjacent to residential and mixed-use areas. **For this FSP, the survey responses and interactive-map comments were used to identify where these conflicts are most frequently reported and how they relate to first- and last-mile freight movements.**

Partners, including local governments, ports, Tribes, freight operators, and community organizations, consistently raised three main issues:

- Conflicts between truck traffic and pedestrian or bicycle safety on local streets.
- Noise, congestion, and livability concerns in neighborhoods adjacent to freight routes.
- Land use incompatibility where industrial truck traffic interfaces directly with residential areas.

Respondents from communities such as Bridgeport, Walla Walla, and Warden reported that through-truck traffic on downtown or residential streets reduces perceived safety and neighborhood quality. In several locations, partners also noted that indirect routing and congestion contribute to unsafe driving behaviors, such as illegal passing, as trucks move through constrained local networks.

These findings reinforce the importance of integrating freight and Complete Streets principles when planning and operating transportation facilities. In many communities, the same corridors must accommodate truck movements, local business access, transit, pedestrians, and bicyclists. Effective solutions often focus on improving freight access while enhancing safety and comfort for all users through context-sensitive design, targeted operational improvements, and strategic routing of heavy vehicles.

Several recent WSDOT projects have incorporated both freight-mobility and Complete Streets objectives by improving truck access while also addressing pedestrian, bicycle, and community connectivity needs. These examples demonstrate that freight efficiency and community livability can often be advanced together rather than treated as competing goals.

- **SR 509 Completion Project** (Puget Sound Gateway Program) improves freight access between the Ports of Seattle/Tacoma and the regional highway system while also incorporating new shared-use paths, local street connections, and multimodal access improvements that benefit surrounding communities.²⁷
- **SR 167 Completion Project** (Puget Sound Gateway Program) is primarily a freight-mobility investment supporting port access and truck movements, but it also includes active transportation and local connectivity elements that improve access for non-motorized users.²⁸

Commonly suggested mitigation strategies provided through the survey included:

- Constructing truck bypass routes around downtown and designating dedicated freight or industrial truck corridors, and
- Improving separation between industrial and residential land uses through access management and planning.

²⁷ WSDOT, "Puget Sound Gateway Program," Accessed July 2026, <https://wsdot.wa.gov/construction-planning/major-projects/puget-sound-gateway-program>

²⁸ WSDOT, "SR 167 Completion Project," Accessed July 2026, <https://wsdot.wa.gov/construction-planning/search-projects/sr-167-completion-project>

Figure F-66 presents example locations where first- and last-mile freight routes intersect with residential and mixed-use areas. The map illustrates how truck access to ports, industrial districts, or agricultural facilities is currently provided via local streets and main streets, highlighting specific corridors where reported community concerns align with freight access needs.

Figure F-66: Example Impacts of First/Last Mile Freight on Local Communities



Key Takeaway: Freight and Complete Streets

Freight corridors often serve multiple functions, connecting businesses and industrial facilities while also providing access for residents, workers, pedestrians, bicyclists, and transit users. Washington's experience shows that freight mobility and Complete Streets objectives are not inherently in conflict. Projects that improve freight access, enhance safety, and support community connectivity can provide benefits to both the movement of goods and quality of life in surrounding communities.

Hub-Specific Performance by Typology

Gateways and Intermodal Hubs

Gateway and intermodal hubs serve as Washington's primary connections to global and domestic supply chains. Their performance is characterized by high freight volumes, international trade flows, and sensitivity to congestion and operational efficiency.

Access to markets (economic vitality)

Access to markets is a practical way to describe economic vitality for Washington's gateways and intermodal hubs. Washington's seaports and airports are embedded in regional, trans-Pacific, and global networks that connect local producers and consumers to key trading partners.

Figure F-67 through Figure F-72 show the ports most frequently visited by ships before and after calling at the Port of Vancouver, WA, Port of Tacoma, Port of Seattle, Port of Longview, Port of Kalama, and Port of Bellingham based on ship movements between 2019 and 2025. The marine gateway maps use AIS vessel data from IMF PortWatch to show the most frequent "upstream" ports (visited before a Washington port) and "downstream" ports (visited afterward), ranked by the total capacity of vessels on those routes.²⁹ Each Washington port is drawn as a node with arcs to its top partner ports, distinguishing between regional West Coast connections and long-haul trans-Pacific links.

- The Port of Vancouver, WA and Port of Longview maps (Figure F-67 and Figure F-70, respectively) emphasize their roles in bulk and breakbulk trades. Their connections concentrate on a smaller set of high-volume routes to ports such as Busan, Kashima-Ibaraki, and Kure in Japan, paired with strong linkages to Portland, Kalama, and other Columbia River and West Coast ports. This pattern reflects trade flows dominated by commodities such as grain, forest products, and bulk materials, moving through integrated river, coastal, and trans-Pacific networks.
- The maps for the Ports of Tacoma and Seattle (Figure F-68 and Figure F-69, respectively) show dense bundles of routes tying these hubs to major Asian container ports, including Busan, Tokyo, Kaohsiung, and Yantian. These arcs represent high-capacity liner services that connect Washington directly into trans-Pacific supply chains serving manufacturing and consumer markets in East and Southeast Asia. The insets highlight strong ties to other West Coast gateways such as Los Angeles/Long Beach, Oakland, and Vancouver, British Columbia, underscoring that Tacoma and Seattle function not just as standalone ports but as key nodes in a broader West Coast gateway system.
- The Port of Kalama map (Figure F-71) shows a similar configuration; a few high-capacity routes to Japan and China combined with tight ties to nearby ports along the lower Columbia and Puget Sound. Together, these maps illustrate that Washington's larger and mid-sized marine gateways serve as part of a coordinated system: regional coastal movements link into a smaller number of deep sea services that carry Washington-origin and Washington-bound cargo across the Pacific.
- The Port of Bellingham map (Figure F-72) shows a more specialized pattern; Bellingham's strongest upstream and downstream connections are to Dutch Harbor and selected ports in South and Southeast Asia, such as Singapore, Cai Mep, Chittagong, and Haldia, reflecting its role in fisheries, project cargo, and niche international

²⁹ IMF Port Watch, Port Monitor, Accessed April 2, 2026, <https://portwatch.imf.org/pages/port-monitor>.

trades rather than high-frequency container services. The smaller number of arcs and their concentration on particular partners underscore that economic vitality at some Washington ports is tied to specific commodity chains and trading relationships rather than broad, global coverage.

Taken together, the marine gateway maps show that:

- Tacoma and Seattle anchor Washington's participation in high-capacity trans-Pacific container networks.
- Vancouver, Longview, and Kalama support major bulk commodity and breakbulk movements tied to the Columbia River and West Coast trades.
- Bellingham and other smaller ports play focused roles in specialized international and regional markets.

These patterns collectively demonstrate a diversified port system in which different facilities contribute to economic vitality through distinct, but complementary, trade relationships.

Figure F-67: Top Ports Visited by Ships Before and After Calling at the Port of Vancouver

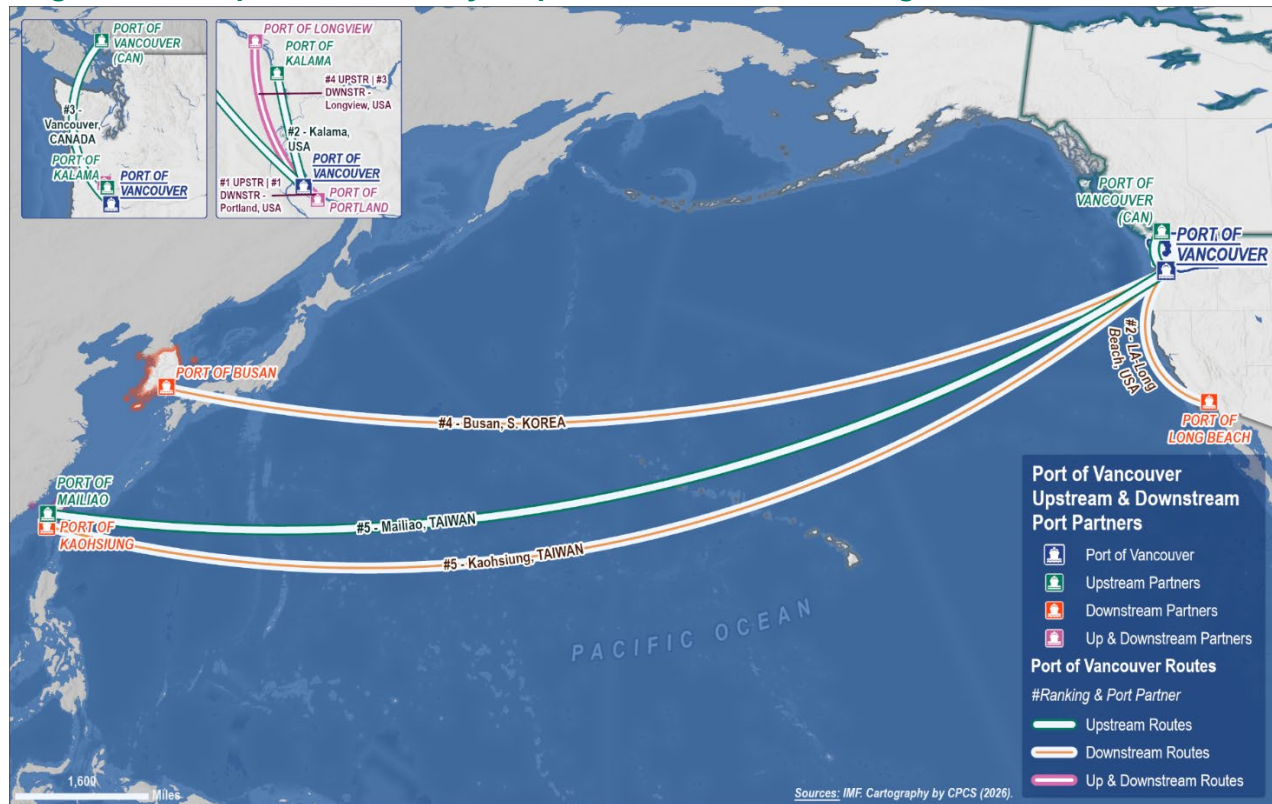


Figure F-68: Top Ports Visited by Ships Before and After Calling at the Port of Tacoma

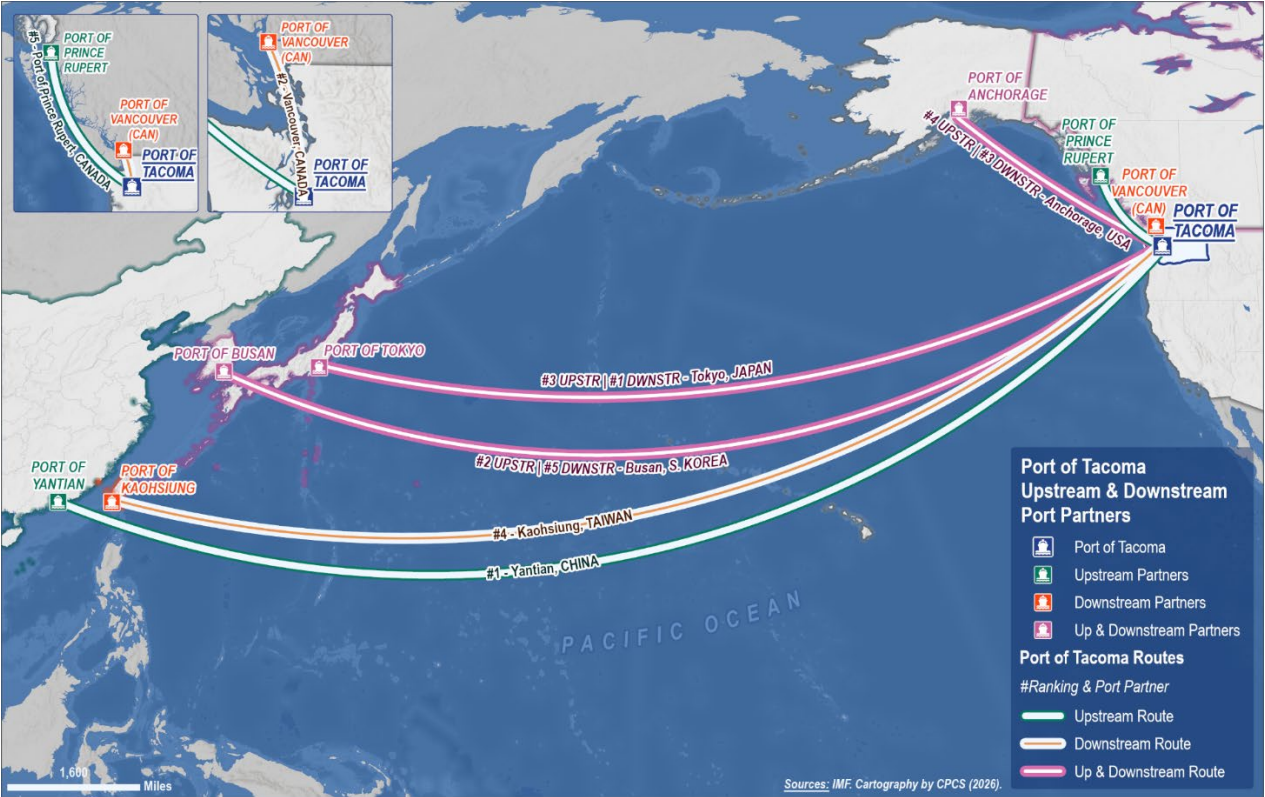


Figure F-69: Top Ports Visited by Ships Before and After Calling at the Port of Seattle

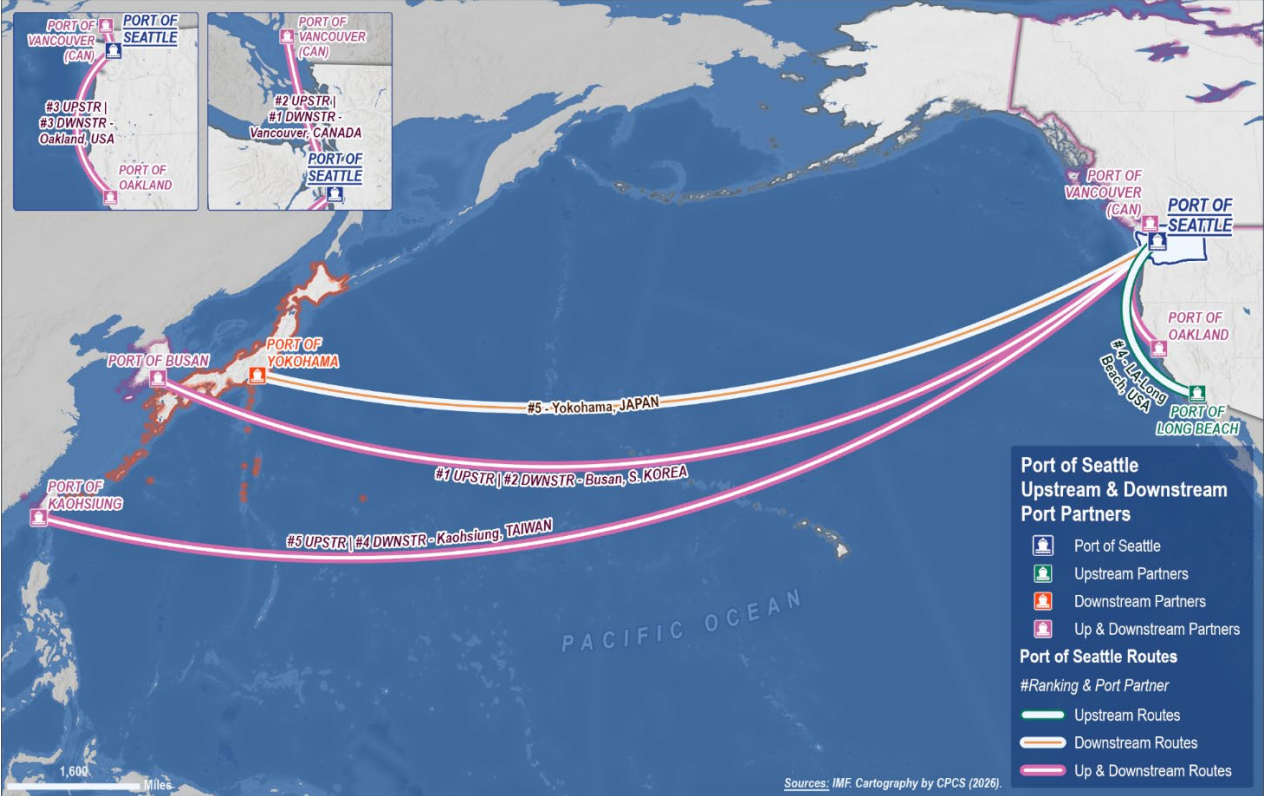


Figure F-70: Top Ports Visited by Ships Before and After Calling at the Port of Longview

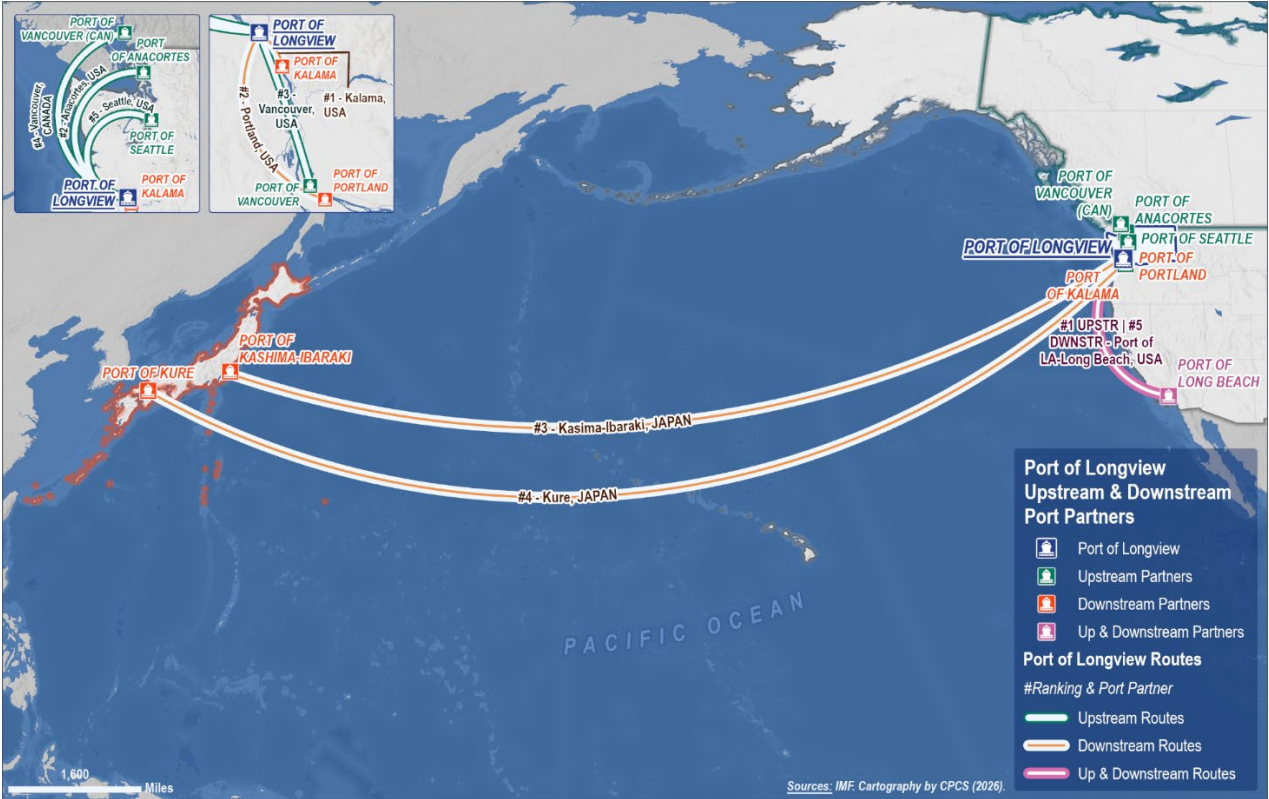


Figure F-71: Top Ports Visited by Ships Before and After Calling at the Port of Kalama

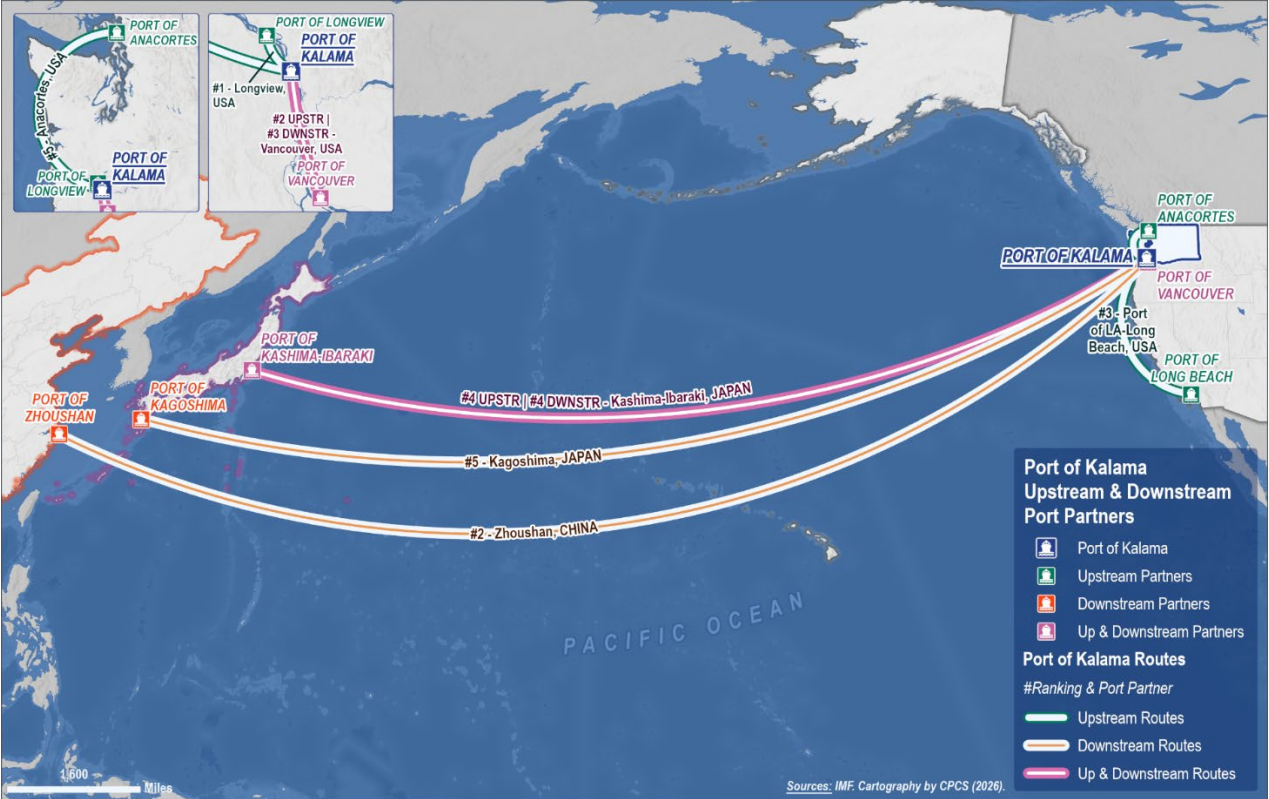
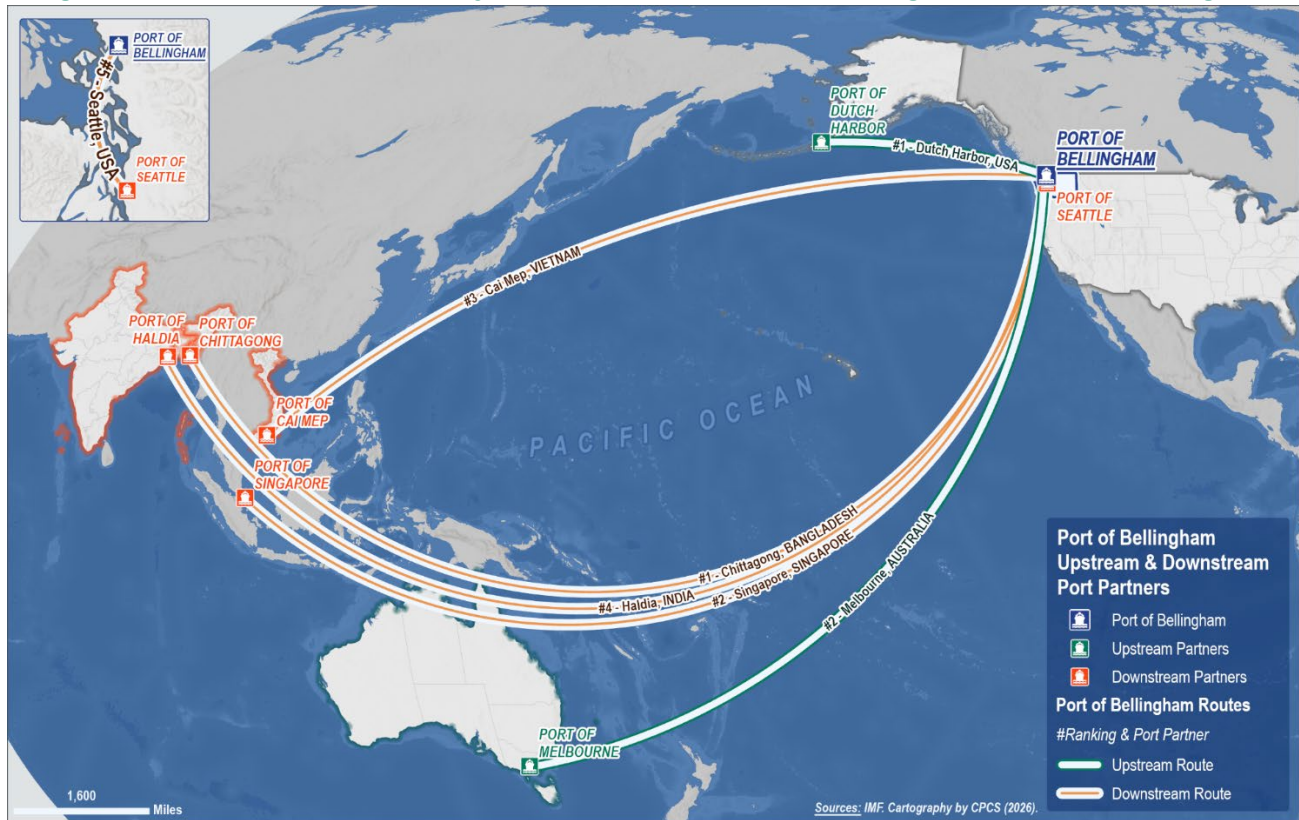


Figure F-72: Top Ports Visited by Ships Before and After Calling at the Port of Bellingham



The air cargo maps in Figure F-73 and Figure F-74 focus on Seattle–Tacoma International Airport (SEA) and Spokane International Airport (GEG), highlighting how each airport connects Washington businesses and consumers to time-sensitive markets.

Figure F-73 plots curved flows between SEA and its top import and export partners by value, with line thickness indicating trade magnitude. Major import flows originate from Malaysia, the United Kingdom, China, and Viet Nam, while export flows concentrate on the Netherlands, Japan, Germany, and Ireland; Taiwan appears as a top partner on both sides, emphasizing deep two-way trade.

The map's geography shows:

- Strong east-west air cargo links across the Pacific to East and Southeast Asia, supporting electronics, aerospace, and advanced manufacturing supply chains.
- Direct trans-Atlantic connections to key European logistics hubs, reinforcing SEA's role in high-value, time-sensitive trades with Europe.
- This pattern positions SEA as Washington's primary global air cargo gateway, allowing firms in the Puget Sound region and statewide to reach high-value markets on tight schedules.

Meanwhile, the GEG map (Figure F-74) illustrates airport connections associated with Spokane International Airport (GEG), using concentric distance bands to show destinations served by multiple carriers across eastern Washington and neighboring states, including Seattle, Yakima, Moses Lake, Walla Walla, Lewiston, La Grande, Pendleton, and East Wenatchee. These connections demonstrate the geographic reach of air-cargo services linked to GEG and its role in connecting eastern Washington to other regional aviation facilities and larger air-cargo gateways such as Seattle and Boeing Field. The map is intended to illustrate network connectivity rather than cargo volume or cargo value; therefore, it should not be interpreted as indicating the relative magnitude or economic importance of individual airport-to-airport freight movements.

Figure F-73: Seattle–Tacoma International Airport: Top Air Trade Partners by Value

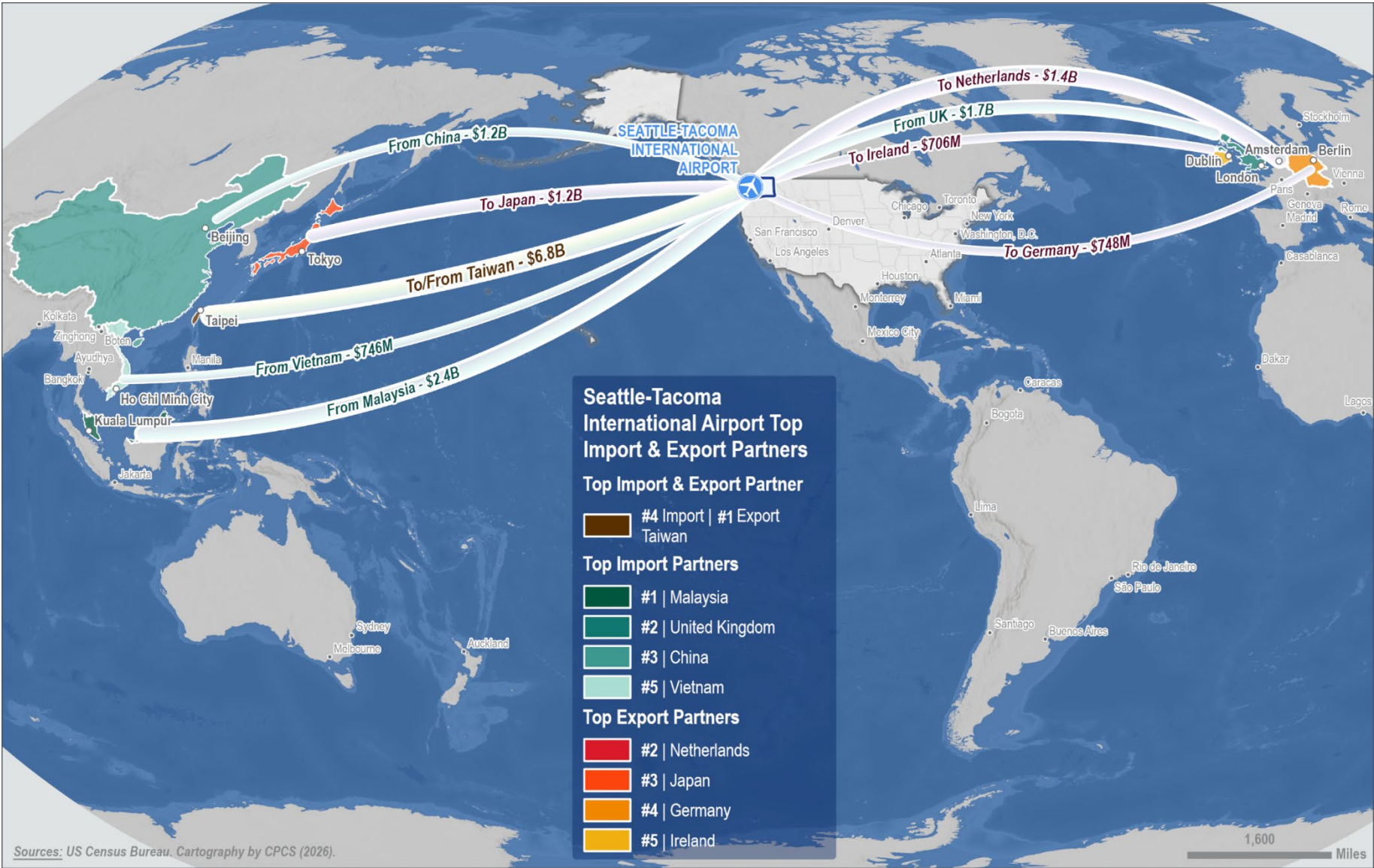
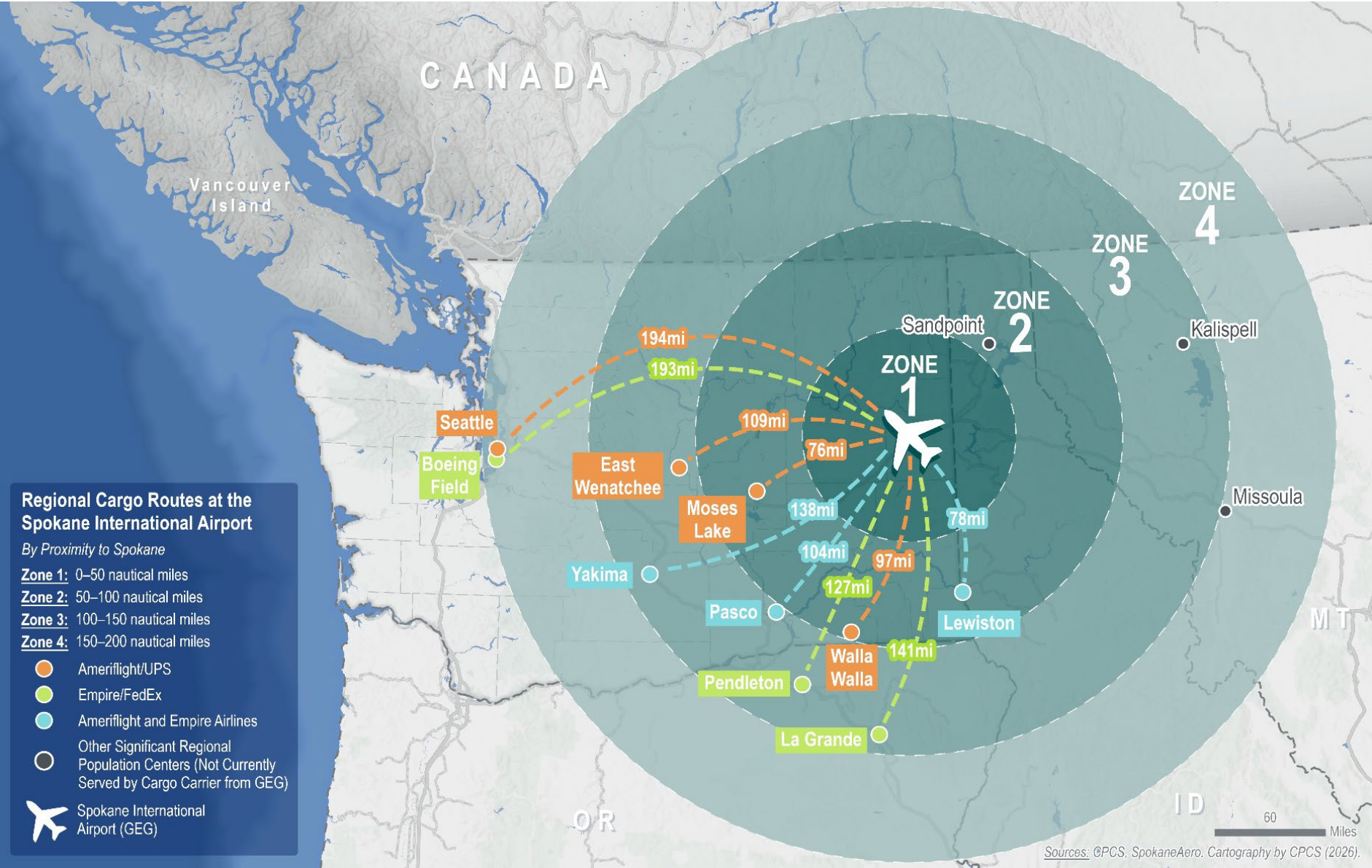


Figure F-74: Regional Cargo Routes at the Spokane International Airport



Port trade values and employment impacts (economic vitality)

International trade value and related employment measures in this section highlight how Washington's ports and airports contribute to economic vitality compared with regional and West Coast peers.

Trade value, measured as the dollar value of imports and exports, complements tonnage by indicating the economic significance of the commodities moving through each gateway. It helps distinguish ports that specialize in high-value manufactured goods from those focused on bulk commodities, and it shows how Washington's ports compare with neighboring states.

The port comparison table in Figure F-75 summarizes the 2025 international vessel trade value for ports designated as Gateway & Intermodal Freight Activity Hubs, along with selected peer ports on the West Coast. It also reports each port's change in total trade value since 2019 and the primary driver of that change (higher or lower imports or exports).

- Puget Sound is a major, but not the largest, West Coast gateway. Among the Washington ports shown, the Port of Tacoma handles the highest total trade value at approximately \$43.2 billion in 2025, followed by the Port of Seattle at about \$24.6 billion, reflecting the concentration of containerized and higher-value cargo in the Puget Sound gateway.³⁰
- Southern California ports remain much larger in scale: the Port of Long Beach and Port of Los Angeles together handle several times the trade value of any individual Washington port, four times the trade value of the Port of Seattle and six times the trade value of the Port of Tacoma, underscoring their role as the dominant U.S. container gateways on the West Coast.
- Smaller Washington ports comparable to regional peers. Outside Puget Sound, mid-sized Columbia River and coastal ports—Vancouver, WA, Kalama, Longview, Bellingham, and Grays Harbor—handle total trade values in the low- to mid-single-digit billions, similar in scale to regional peers such as Portland and Anchorage. These ports play a more specialized role in bulk exports and regional commodity movements rather than high-volume container trade.
- Export-oriented growth at some Washington gateways. Since 2019, Port of Longview and Port of Bellingham have seen notable increases in total trade value (+34 percent and +21 percent, respectively), driven largely by higher export values. This growth underscores their role in supporting export-oriented industries such as agriculture, forest products, and project cargo.

Declines at several Washington ports illustrate how changes in trade patterns affect gateways differently. While the largest percentage decline occurred at the Port of Grays Harbor (-36 percent), the reductions at Seattle (-6 percent) and Tacoma (-11 percent) are particularly significant because these gateways handle substantially larger volumes of the state's international trade. Lower exports contributed more to Seattle's decline, while lower imports drove Tacoma's. Taken together, these changes indicate that shifts in major import and export markets can have outsized effects on Washington's overall freight system performance. Grays Harbor also experienced a substantial decline in trade value, primarily reflecting reduced export activity and demonstrating the sensitivity of some ports to changes in specific commodity markets. As shown in Figure F-75, the trade value comparison shows a tiered system: Southern California ports operate at a much larger scale; Seattle and Tacoma form a major, but smaller, Pacific Northwest gateway; and Washington's other seaports function as mid-sized regional gateways comparable to Portland and Anchorage.

Figure F-75: Port Economic Vitality Comparison³¹

Port	Total Trade \$ (2025)	Change in Total Trade Since 2019	Major Driver	Direct Jobs Supported
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³⁰ CPCS Analysis of U.S. Census Bureau, U.S. Trade Online, 2026.

³¹ Variations may occur in reported direct employment figures due to differences in how individual ports define and report this metric.

Port of Grays Harbor (FAH-13)	\$1.6B	-36%	Lower Exports	N/A
Port of Longview (FAH-25)	\$2.8B	+34%	Higher Exports	1,247
Port of Bellingham (FAH-12)	\$3.2B	+21%	Higher Exports	N/A
Port of Kalama (FAH-19)	\$3.8B	No change	N/A	1,220
Port of Vancouver (FAH-6)	\$4.2B	-11%	Both	3,849
Port of Seattle (FAH-14)	\$24.6B	-6%	Lower Exports	15,065
Port of Tacoma (FAH-15)	\$43.2B	-11%	Lower Imports	14,400
Port of Anchorage	\$5.8B	+20%	Higher Imports	575
Port of Portland	\$12.0B	+8%	Higher Imports	62,000
Port of Long Beach	\$106.1B	+14%	Higher Imports	N/A
Port of Los Angeles	\$300.7B	+9%	Higher Imports	43,400

Source: CPCS Analysis of U.S. Census Bureau, U.S. Trade Online, 2026; Port of Kalama Official Site, Port of Longview Official Site, Port of Vancouver Official Site, The Northwest Seaport Alliance, Port of Tacoma, and Port of Seattle-Economic Impact Analysis, 2026, Port of Alaska in Anchorage Employment Impacts, The Economic Impact of Oregon’s Public Ports, California Labor Market Information, 2026.

Figure F-75 also shows port-related employment as a complementary view of economic vitality by showing how trade activity translates into jobs at and around each gateway. These employment figures compile direct jobs reported in recent economic impact analyses for selected ports, showing:

- **Large job bases at Puget Sound ports.** The Port of Seattle supports the largest number of direct jobs among Washington ports listed, followed closely by the Port of Tacoma, reflecting the scale and diversity of their container, cruise, and other maritime operations. Some peer ports, such as Portland, report even higher direct job totals, illustrating differences in local industrial composition and how broadly each port’s activity is defined in economic impact studies.
- **Labor-intensive operations at mid-sized ports.** The Port of Vancouver, WA supports a comparatively large number of direct jobs relative to its total trade value, suggesting a more labor-intensive operational profile linked to bulk, breakbulk, and manufacturing-oriented cargoes. Ports such as Kalama and Longview similarly sustain meaningful local employment bases despite handling far less trade value than Seattle or Tacoma.

Airport-related employment (Economic Vitality)

Air cargo adds another dimension to economic vitality at Washington’s gateways. Figure F-76 summarizes the total jobs and labor income supported by Seattle–Tacoma International Airport (SEA) and Spokane International Airport (GEG), including direct on-airport employment and related visitor and supply-chain jobs:

- SEA supports approximately 174,950 jobs and \$10.5 billion in labor income, reflecting its role as the state’s primary international air passenger and cargo gateway and as a critical hub for advanced manufacturing, aerospace, and technology sectors that rely on time-sensitive shipments.
- GEG supports more than 11,500 jobs and roughly \$549 million in labor income, demonstrating that regional air cargo and passenger services play a significant role in the economy of eastern Washington and neighboring areas.

The employment and labor-income values shown represent total airport-supported economic activity and are not limited to air-cargo-related employment.

Figure F-76: Employment Supported by Selected Airports

Airport	Jobs Supported	Labor Income
Seattle-Tacoma International Airport (FAH-5)	174,950	\$10.5B
Spokane International Airport (FAH-9)	11,566	\$548.7M

Source: 2020 WSDOT Airport Economic Impact Study, The Northwest Passage Seaport Alliance, Port of Tacoma, and Port of Seattle Economic Impact Analysis, 2026.

Container and vessel dwell time (mobility)

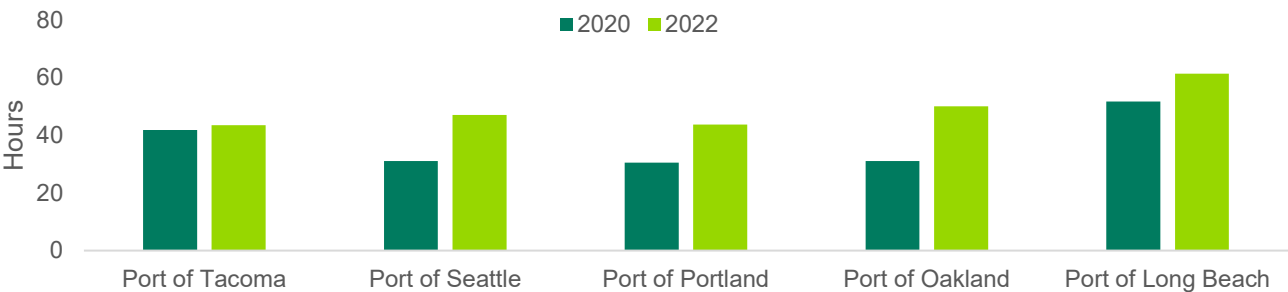
Container and vessel dwell time is a key mobility indicator for marine gateways because it reflects how long container ships spend in port between arrival and departure, combining time waiting for a berth and time alongside for cargo operations. Longer dwell times generally signal congestion, limited berth capacity, or operational constraints that can slow supply chains and reduce overall port efficiency.

Figure F-77 compares average container vessel dwell times at Washington's major container ports with selected West Coast peers, using Bureau of Transportation Statistics Port Performance data for a limited set of ports, including Oakland, Long Beach, and Portland. Annual averages are examined for 2020, during the peak period of pandemic-related supply chain disruption, and for 2022, when ports had adjusted operations but faced continued pressure from elevated demand.

Below are some key takeaways:

- In 2020, the Port of Tacoma recorded the highest average container vessel dwell time among Washington ports, at roughly 41.9 hours, indicating more severe congestion than at Seattle. Tacoma's dwell time was also higher than Oakland and Portland and was exceeded only by the Port of Long Beach among the comparison ports, placing Tacoma among the more congested West Coast gateways during the height of disruption.
- By 2022, average container vessel dwell time at the Port of Seattle had risen to about 47.1 hours, making it the slowest-performing Washington port in the comparison. Seattle's dwell time remained below that of Long Beach but exceeded Portland's, suggesting that congestion had shifted within the region
- Note: Port comparisons are based on average vessel dwell time only. Differences in cargo volumes, vessel calls, terminal capacity, and operating conditions are not reflected in this metric and should be considered when comparing port performance.

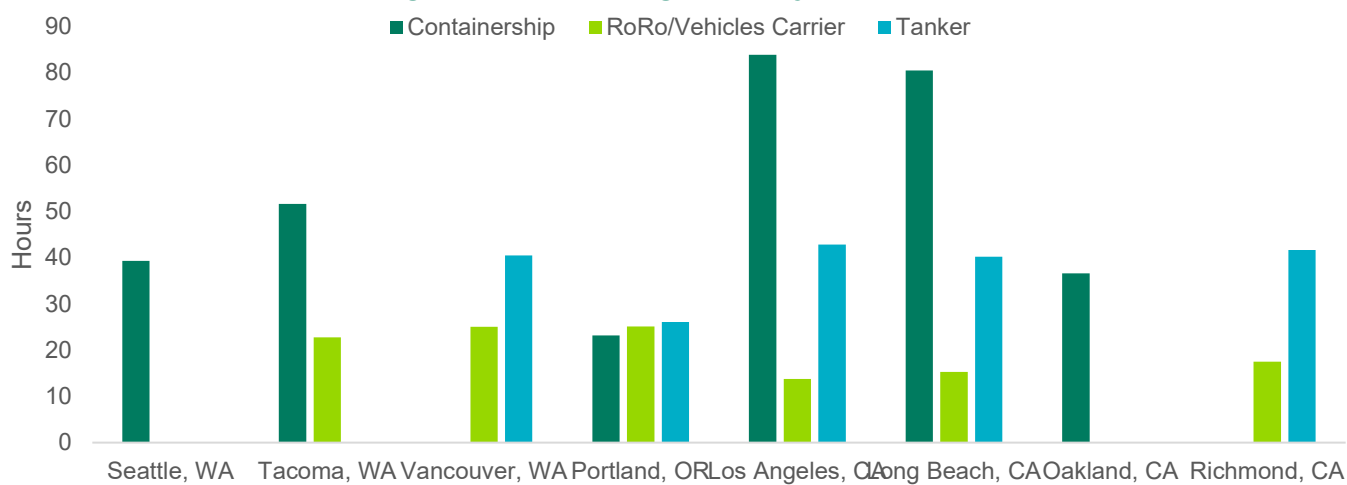
Figure F-77: Annual Average Container Vessel Dwell Time by Port, (2020 vs 2022)



Source: CPCS Analysis of Bureau of Transportation Statistics, Port Profiles, 2026.

Figure F-78 further breaks down how long vessels spend at berth, providing additional context on whether dwell time is driven more by waiting for a berth or by the duration of loading and unloading once alongside. Together with dwell time, this measure shows that Washington's primary container ports experienced significant congestion during the recent disruption period and that vessel processing speeds remain an important factor in regional freight mobility and supply chain reliability.

Figure F-78: Berthing Times by Port (2024)



Source: CPCS analysis of Bureau of Transportation Statistics Port Performance Freight Statistics, 2026.

Regional Logistics & Industrial Hubs

Regional logistics and industrial hubs support domestic distribution, manufacturing, and specialized production, with performance closely tied to local industry mix and regional labor markets. This section highlights how major employers, freight-reliant sectors, and rail terminal operations shape economic vitality and mobility at these hubs.

Employment impacts (economic vitality)

Figure F-79 compares key employers across selected industrial hubs to show how differences in sector focus and scale contribute to economic activity. The hubs collectively span large-scale aerospace and advanced manufacturing, e-commerce logistics and warehousing, specialized industrial production, and energy-related industries.

- E-commerce firms such as Amazon appear as major employers in multiple hubs, underscoring their consistent role as drivers of industrial employment and truck activity across the state.
- The Kent Valley Industrial Hub functions as a global aerospace and advanced manufacturing center. Key employers such as Boeing, Blue Origin, Exotic Metals Forming, Carlisle Interconnect Technologies, and Amazon together account for several thousand jobs; as of 2022, the hub included about 12,000 companies, including 644 manufacturing firms and 235 aerospace companies, forming a dense cluster that supports high-value supply chains and regional freight demand.³²
- In the Smokey Point–Cascade Industrial Center, Amazon and Smokey Point Distributing anchor e-commerce logistics and specialized trucking activity. Although detailed employment figures are not available for Western Forest Products, its recent acquisition of a distribution and processing center signals continued private investment in forest-products-oriented industrial activity.
- The Spokane Valley Industrial Hub combines e-commerce logistics with advanced wood products and equipment manufacturing, including Amazon, Mercer Mass Timber, and Wagstaff, supporting both regional distribution and export-oriented production.
- The Tri-Cities Industrial Hub is anchored by commercial nuclear power generation at Energy Northwest (about 1,100 employees), along with firms such as Carbitex, IsoRay Medical, and Lampson International, reflecting a

³² Keny Valley Washington, “Kent Valley Economic Development,” 2022, [kent-valley-wa-com-flyer-2022.pdf](#).

mix of energy, advanced materials, medical technology, and heavy-lift manufacturing that underpins specialized regional supply chains..³³

These hubs illustrate how freight-reliant employment clusters are distributed across Washington and how different industry mixes create distinct freight and logistics profiles.

Figure F-79: Comparison of Key Employers Across Industrial Hubs

Industrial Hub	Key Employers	Industry Sector	Economic Indicators
Smokey Point – Cascade Industrial Center (FAH-29)	Amazon	E-commerce logistics and warehousing	2,500 employees
	Smokey Point Distributing	Freight transportation and specialized cargo hauling	293 truck drivers
	Western Forest Products	Forest products and lumber production	\$9 million acquisition investment
Spokane Valley Industrial Hub (FAH-17)	Amazon	E-commerce logistics and warehousing	1,000+ employees
	Mercer Mass Timber	Cross-laminated timber manufacturing	80 employees
	Wagstaff	Manufacturer of aluminum casting equipment,	400 employees
Kent Valley Industrial Hub (FAH-8)	Boeing	Aircraft manufacturer	2,522 employees
	Blue Origin	Engineering and manufacturing for space exploration	1,600 employees
	Exotic Metals Forming	Aircraft parts manufacturer	1,047 employees
	Carlisle Interconnect Technologies	Electronic component manufacturing	615 employees
	Amazon	E-commerce logistics and warehousing	3,073 employees
Tri-Cities Industrial Hub (FAH-10)	Energy Northwest	Commercial nuclear power generation	1100 employees
	Carbitex	Carbon fiber fabric manufacturer	> 50 employees
	IsoRay Medical	Radioactive brachytherapy seeds and implant systems	59 employees
	Lampson International	Manufacturers the world's largest land-based, heavy lift, mobile cranes	160 employees

Source: CPCS analysis of Lynnwood Times, 2026, CPCS analysis of Trucking Database, 2026, CPCS analysis of Western Forest Products, 2026, CPCS analysis of Spokane Valley Economic Development, 2026, CPCS analysis of Spokane Journal, 2026, CPCS analysis of Spokane Journal, 2026, CPCS analysis of City of Kent, Washington, 2026, CPCS analysis of NBC Right Now, 2026, CPCS analysis of Leadnear, 2026, CPCS analysis of Visual Visitor, 2026, CPCS analysis of City of Pasco, 2026.

Maritime industrial hub employment and economic indicators (economic vitality)

Several smaller ports are classified as Industrial Hubs rather than Gateway & Intermodal Hubs because they operate at lower overall scale, focus on niche cargoes, and primarily serve regional rather than global markets. Ports such as Olympia, Port Angeles, and Wilma/Clarkston specialize in breakbulk, bulk, and project cargo rather than large-scale containerized trade.

Figure F-80 summarizes employment and economic indicators for these ports:

- The Port of Olympia Industrial Hub supports the largest overall economic footprint among the industrial hub ports, with about 5,030 jobs, nearly \$448 million in business revenue, and \$308 million in personal income in

³³ Leadnear, Energy Northwest, Accessed April 2, 2026, <https://www.leadnear.com/company/us/energy-northwest>.

2020. This activity is tied to a diversified freight profile that includes logs, livestock, locomotives, and construction equipment, as well as its broader role in serving regional construction and agricultural markets.³⁴

- At the Port of Port Angeles Industrial Hub, employment is more narrowly concentrated in log-yard operations, and economic output is reflected primarily in county-level forest-products revenues, indicating a focused role in timber and related industries.
- The Port of Wilma/Clarkston – Snake River Industrial Hub supports 513 jobs, about \$136 million in output, and \$36 million in labor income in 2022, corresponding to its emphasis on agricultural chemicals, wood products, grain, and other bulk commodities that move through the lower Snake River corridor.

These indicators show that, while smaller in cargo volume, industrial hub ports play targeted but significant roles in supporting local employment and commodity supply chains.

Figure F-80: Port Industrial Hub Employment and Other Economic Indicators

Industrial Hub	Freight Specialization	Jobs Supported	Economic Output/ Revenue	Personal/ Labor Income	Other Indicators	Year
Port of Olympia Industrial Hub (FAH-23)	Logs, cattle, locomotives, and construction equipment	5,030 (2,609 direct; 1,354 induced; 1,067 indirect)	Business revenue \$447.9M	\$308.3M Personal Income	\$124.4M local purchases; \$28.6M state/local taxes; \$47.7M federal taxes	2020
Port of Port of Angeles Industrial Hub (FAH-24)	Forest products and log exports	181 in Log Yard Operations	\$144M forest products industry revenue (countywide)	N/A	N/A	2020
Port of Wilma/Clarkston – Snake River Industrial Hub (FAH-20)	Agricultural chemicals, wood products, grain and other commodities	513	\$136M output (sales)	\$36M Labor Income	\$74M gross regional product	2022

Source: CPCS analysis of Port of Olympia, 2026, CPCS analysis of Port of Port Angeles, 2026, CPCS analysis of Port of Whitman County, 2026

Rail terminal dwell time (mobility)

Rail terminal performance is an important mobility measure for industrial hubs that depend on rail for inbound materials and outbound products. Average terminal dwell time (excluding cars on run-through trains) measures how long railcars spend in a terminal being processed, providing an indicator of yard-level efficiency and congestion.

Figure F-81 compares annual average terminal dwell times in 2020 and 2025 for the rail terminal at Pasco (FAH-10) with several major California terminals (Barstow, Roseville, and West Colton). These terminals were selected due to their role in West Coast freight networks and competition for port-related cargo.

Key findings include:

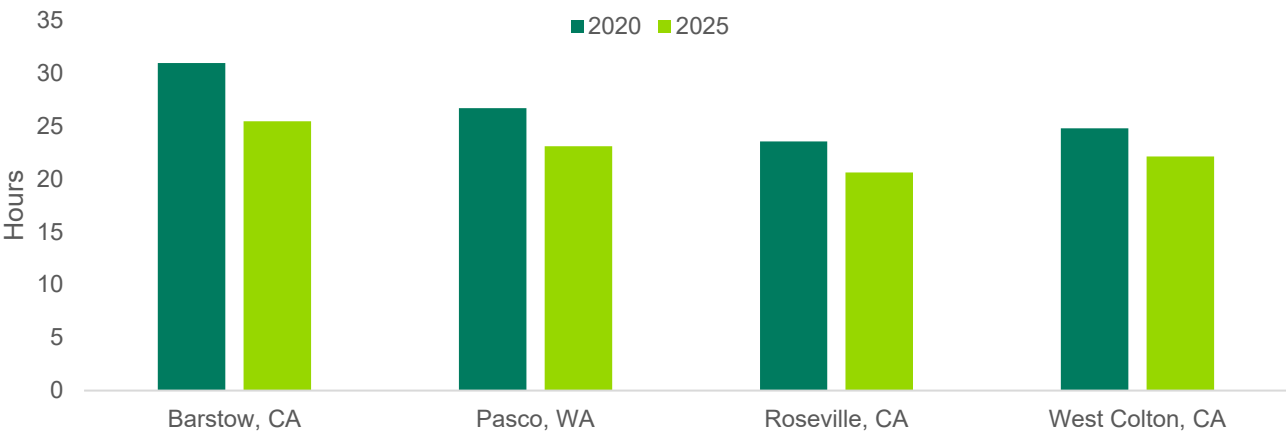
- In 2020, Pasco's average dwell time of about 25.9 hours placed it in the mid-range among the terminals shown; shorter than Barstow (30.9 hours) but longer than Roseville (23.6 hours) and West Colton (24.8 hours).

³⁴ Port of Olympia, *The Economic Benefits of the Port of Olympia*, December 6, 2021, <https://portolympia.com/wp-content/uploads/2022/08/Port-of-Olympia-EIS-2021-12-17-21-Final.pdf>

- By 2025, Pasco's average dwell time decreased to approximately 23.1 hours, an improvement of more than 3.5 hours, indicating more efficient yard operations and reduced congestion at this key inland rail hub.

For regional logistics and industrial hubs that rely on Pasco and similar terminals, these improvements support more reliable rail connections and reduce the risk that yard delays will constrain broader supply chains.

Figure F-81: Annual Average Terminal Dwell Time, Excluding Cars on Run-Through Trains, 2020 vs 2025



Source: CPCS analysis of Surface Transportation Board, 2026.

Agricultural Production and Distribution Hubs

Agricultural hubs function as critical aggregation and transfer points within export-oriented supply chains.

Economic vitality

Grain hubs at Endicott, Four Lakes, McCoy, and Ritzville are critical nodes in eastern Washington's wheat supply chain, aggregating production, providing storage, and enabling rail-based export movements. Figure F-82 summarizes their operational scale, recent and planned investments, employment characteristics, and key sources of economic strength and vulnerability.

Across hubs, the specific scale metrics differ—railcars loaded, bushels handled, storage capacity, and cooperative membership—but all indicate operations at a meaningful regional scale, with the ability to assemble large grain volumes and load unit trains. Recent and planned capital investments, such as shuttle facilities and new storage at Endicott, McCoy, and Ritzville, enhance storage and rail loading efficiency, supporting lower logistics costs and more competitive access to export markets.

Although these hubs are highly mechanized and support relatively few direct on-site jobs, they generate broader economic activity through trucking, rail operations, equipment services, and agricultural support industries. Their economic performance is tightly linked to commodity cycles: strong wheat prices and high yields boost revenues and downstream activity, while low prices, rising input costs, and a strong U.S. dollar can constrain margins and export competitiveness. Shared vulnerabilities include exposure to global price and demand volatility, currency movements, and ongoing workforce recruitment challenges in rural labor markets.

Figure F-82: Economic Strengths and Vulnerabilities of Major Grain Hubs

Hub	Scale of Operations	Investments	Employment Characteristics	Economic Resilience Signals	Economic Vulnerabilities
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Appendix F | Washington's Freight System Performance

Endicott Grain Hub (FAH-3)	>3,000 rail cars loaded annually	\$2M+ shuttle facility; \$7M terminal expansion enabling unit trains	Highly mechanized operations; limited direct employment growth	Higher wheat prices in 2021 increased wholesale and retail activity in Whitman County	Workforce recruitment challenges; dependence on agricultural labor
Four Lakes Grain Hub (FAH-2)	~22M bushels annually; ~50 unit trains per year; 2.1 million bushels internal storage plus; 2.4M outside storage	N/A	Five full-time staff at the grain elevator; high seasonal trucking and logistics demand	Critical grain elevator and storage infrastructure supporting regional farm access	Exposure to low commodity prices and rising input costs
McCoy Grain Hub (FAH-4)	1.3M bushels storage; Serves ~1,400 cooperative members	Proposed \$12.5M expansion to increase storage and throughput	Indirectly supports farm labor, trucking, equipment services, and rail workers	Planned expansion supports long-term stability	Reliance on grain markets; exposure to global price volatility, export demand, and trade conditions
Ritzville Grain Hub (FAH-1)	110-car shuttle loading facility	New 1.5M bushel storage facility at cooperative terminal	Supports regional agricultural services and grain logistics workforce	Strong wheat yields in 2024 supported regional farm revenues	Low wheat prices, higher production costs, strong U.S. dollar affecting export competitiveness

Source: CPCS analysis of Employment Security Department, 2026, CPCS analysis of Whitman County, 2026, CPCS analysis of Washington State Transportation Commission, 2026, CPCS analysis of Wheat Life, 2026, CPCS analysis of Cheney Free Press, 2026, CPCS analysis of Journal of Business, 2026, CPCS analysis of WSDOT, *Washington State Short Line Rail Inventory and Needs Assessment*, 2026, CPCS analysis of WSDOT, *Pacific Northwest Farmers' Cooperative – McCoy Grain Terminal Expansion*, 2026, CPCS analysis of The Ritzville Adams County Journal, 2026, CPCS analysis of City of Ritzville Washington, 2026, CPCS analysis of Basin Business Journal, 2026, CPCS analysis of Ritzville Warehousing Co., 2026

Energy Commodity Hubs

Energy hubs support fuel production and distribution systems that underpin statewide economic activity.

Economic vitality

Facilities within the Anacortes–March Point (FAH-16) and Cherry Point/Ferndale (FAH-21) energy hubs support regional economic vitality by providing high-wage, technically skilled employment and by reinvesting in surrounding communities. Figure F-83 summarizes direct employment, broader employment effects, and selected community investments for refineries in these hubs.

Major facilities, including Marathon Anacortes, HF Sinclair Puget Sound Refinery, and BP Cherry Point, employ several hundred full-time workers each in operations, maintenance, safety, and management, with additional seasonal and project-based contractor jobs for cleaning, servicing, turnarounds, and capital upgrades. These positions require advanced technical and regulatory expertise, supporting stable, high-wage employment that bolsters household income and local spending in adjacent communities.

Refineries also generate substantial indirect and induced employment through procurement of goods and services from regional vendors and contractors, with Cherry Point alone supporting thousands of regional and statewide jobs when multiplier effects are included. In addition, facilities invest in workforce development and community capacity, funding STEM education, scholarships, and vocational training, as well as environmental restoration, emergency response, and local organizations, which strengthen long-term workforce readiness, public safety, and community resilience in the surrounding areas.

Figure F-83: Employment and Community Impacts of Energy Facilities by Hub

Indicator	Anacortes – March Point Energy Hub (FAH-16)		Cherry Point / Ferndale Energy Hub (FAH-21)
Major Facilities	Marathon Anacortes	HF Sinclair Puget Sound Refinery	BP Cherry Point Refinery
Direct Employment	400 full-time employees; 200 contractors (varies seasonally)	532 full-time employees; 400 contractors	900+ direct refinery employees
Broader Employment Effects	N/A	\$100M in annual salaries supported	1,700+ regional jobs; 31,000+ jobs supported statewide
Community Impact	STEM education and workforce program scholarships and community investments	Largest taxpayer in Skagit County; \$1M in community support over four years	\$370+ million spent with vendors in Washington; \$3+ million in schools and workforce programs

Source: CPCS Analysis of Marathon Refinery Contractor, Anacortes, 2026, CPCS Analysis of Experience Anacortes, About Us, 2026, CPCS Analysis of Washington State Department of Commerce, Washington State Refinery Economic Impact Study, 2026.