Active Vessel Traffic Management (AVTM) Program

Harnessing technology and fostering collaboration to build more efficient and sustainable supply chains at the Port of Vancouver

The Vancouver Fraser Port Authority-led Active Vessel Traffic Management (AVTM) Program digitalizes and optimizes the maritime supply chain at the Port of Vancouver—Canada's largest and most diversified port. This collaborative program enhances the safety, fluidity, and visibility of vessel movements through the port, helping to increase terminal call efficiency and mitigate the social and environmental impacts of commercial marine traffic. It plays a crucial role in connecting Canada to diverse markets around the world and driving economic prosperity. In 2024 alone, program initiatives helped facilitate the movements of a record 158 million metric tonnes (MMT) of cargo through the Port of Vancouver—a 5% year-over-year increase.

The AVTM Program focuses on implementing a centralized scheduling system for commercial marine traffic and leveraging advanced forecasting and collaboration tools to improve anchorage capacity and utilization at the Port of Vancouver. These enhancements support more efficient port calls and contribute to the well-being of coastal communities and the environment.

Program objectives

The AVTM program is designed to address complex supply chain challenges at the Port of Vancouver. Its objectives include:

Optimizing vessel traffic by enhancing the safety and efficiency of vessel movements through busy, narrow port waterways, including the Second Narrows trade corridor

Increasing supply chain coordination through greater visibility over vessel movements to and from port terminals, and collaboration among ship, terminal, and railway operators

Increasing cargo throughput and port capacity through more efficient use of tidal windows, marine assets, and port infrastructure

Mitigating community and environmental impacts of commercial marine traffic by minimizing anchorage utilization and related light pollution, ambient noise affecting coastal communities, and underwater noise affecting at risk whales

Program workstreams

To handle growing cargo volumes at the Port of Vancouver safely and efficiently, the port authority partnered with DHI SeaPort OPX to develop a centralized scheduling system. Using advanced tide and current forecasts, the system identifies the best times for ships to navigate the port's busiest waterways where navigation restrictions apply. This helps optimize tidal windows and maximize cargo throughput in high-traffic areas of Vancouver Harbour for the benefit of all supply chain partners and gateway users.

By centralizing traffic management in one online dashboard and increasing visibility over waterway demand, the system is laying strong foundations for a Single Maritime Window. It has transformed how ship operators request and plan their movements within the port, streamlining operations across seven Burrard Inlet terminals—including the newly expanded Westridge Marine Terminal (Trans Mountain).

Rolled out in October 2023, the centralized scheduling system currently manages over 5,000 annual vessel movements, including cargo, cruise, and tanker traffic, supporting approximately $350 billion in trade through the port each year. It is set to coordinate vessel traffic calling all 29 terminals at the Port of Vancouver by late 2025.

Program efforts to improve the fluidity and visibility of vessel traffic calling at the Port of Vancouver are enhancing anchorage capacity in and around the port. This has helped maintain—and even reduce—anchorage utilization rates despite growing trade volumes, while strengthening supply chain resilience during a time of unprecedented global and local disruptions. It also enables the port authority to share more timely and transparent information with industry about anchorage availability, highlight the strategic importance of anchorages for trade, and address social and environmental concerns related to ships at anchor. As part of our commitment to optimizing anchorage use in support of growing trade, port efficiency, and sustainability, the port authority is currently:

Developing and testing an anchorage demand forecasting tool to provide four weeks of visibility into incoming vessel traffic, enabling proactive anchorage allocation and reducing vessels' dwell times at anchor. Greater vessel fluidity to and from terminals means more efficient port calls and fewer ship-source disruptions on local communities and ecosystems.

Formalizing a near real-time arrival process in collaboration with industry to streamline port calls—helping to prevent bottlenecks, reduce fuel consumption, and lower vessel emissions.

As part of our work to balance trade objectives with enhanced measures to mitigate social and environmental concerns related to commercial ships at anchor, the port authority has so far:

Implemented Canada's first anchorage code of conduct outlining the practices vessels anchoring in or around the Port of Vancouver must follow to minimize their impact on coastal communities and the environment, including noise and light pollution. Ship operators must review and agree with the code of conduct to be assigned to an anchorage.

Implemented an arrival and departure window for ships anchoring near coastal communities asking ship operators to prioritize arriving at or departing from Salish Sea anchorages during daytime to limit disruptions to coastal communities at night.

Updated its anchorage assignment procedures, allocating port anchorages first and using external anchorages as overflow. This helps reduce unnecessary vessel transits and mitigates anchorage utilization near coastal communities and critical habitat of at-risk southern resident killer whales.

Program impacts

The AVTM Program delivers transformative operational, environmental, and social outcomes for the Vancouver gateway, its users and customers, and surrounding communities and ecosystems.

Operational efficiency

- **Supports fluidity:** Manages 5,000+ annual vessel movements across Burrard Inlet, including 20 daily transits under Lions Gate Bridge during peak periods.
- **Increases throughput:** Streamlines thousands of vessel movements through Second Narrows, the port's busiest intersection. In 2024 alone, the centralized scheduling system facilitated a 122% year-over-year increase in deep-sea vessel traffic through this key trade area.
- **Facilitates significant growth in vessel traffic through the port:** Enabled a 400% increase in tanker movements to Westridge Terminal in 2024, ensuring safe and efficient operations post-Trans Mountain pipeline expansion.
- **Enhances the coordination of marine and rail traffic:** Improves rail bridge efficiency to minimize delays in the Second Narrows trade corridor. Over 60% of ship operators now provide 48+ hours' notice before transiting under the rail bridge, reducing rail delays by ~15% and enhancing freight fluidity.
- **Supports terminal productivity:** Real-time data made available through the centralized scheduling system's online dashboard streamlines labour planning and terminal calls, supporting efficient turnaround and boosting supply chain reliability.

Economic and social value

- **Drives economic growth for British Columbia and Canada:** Supports the efficient movement of approximately $350 billion in goods through the Port of Vancouver annually, facilitating trade with 170 countries.
- **Mitigates the impact of marine traffic on local communities:** Reduces nighttime anchorage arrivals in the Salish Sea by ~50% and anchorage-related complaints by 12% year-over-year.
- **Fosters meaningful engagement:** 700+ industry stakeholders, community members, and First Nations have participated in program consultations—helping shape key program initiatives.

Port sustainability

- **Optimizes anchorage utilization:** Helps maintain stable or lower anchorage utilization despite growing trade volumes, mitigating impacts on coastal ecosystems. Despite a slight increase in ship assignments to anchorage in 2024, average dwell time per assignment decreased by 19.5%.
- **Contributes to emissions and underwater noise reduction:** Optimized vessel movements and anchorage protocols help reduce ships' dwell times in port and at anchor and associated fuel consumption, air pollution, and ambient and underwater noise.
- **Supports climate resilience:** Weather-integrated vessel scheduling enhances adaptability to extreme weather conditions and events and supports the port authority's climate action goals.

Program innovations and scalability

The AVTM Program sets a global benchmark for port digitalization, through:

Technological innovation: The DHI NCOS platform, recognized for its global impact, integrates real-time data and predictive analytics for unparalleled efficiency.

Process engineering: centralized scheduling of vessel movements and anchorage forecasting redefine traffic management, enhancing safety and fluidity.

Scalability: The program's phased expansion and adaptable framework make it replicable for ports facing congestion, coordination challenges, and community concerns.

Global Relevance: The program's focus on balancing trade growth with sustainability offers a model for ports navigating rising demand and environmental pressures

Engagement and collaboration

Industry and public engagement are fundamental parts of the AVTM Program. Ongoing collaboration with Transport Canada, Canadian Coast Guard, Pacific Pilotage Authority, Canadian National Railway, and Trans Mountain ensures alignment with national trade and safety priorities.

In 2022, the port authority conducted three phases of engagement with industry, governments, First Nations and the public to gather insights to inform program initiatives to increase port efficiency and help better manage the effects of ship traffic on local communities and the environment. More than 700 individuals participated in these engagements through information sessions, open houses and surveys. The feedback received helped shape the development of the anchorage code of conduct and arrival and departure window for ships anchoring outside of the port and nearby coastal communities.

In 2023, the port authority established the AVTM User Committee. We engage with port users and stakeholders monthly through this forum to discuss and improve ship scheduling and anchorage management for greater operational efficiency and sustainability. These discussions inform the fine-tuning and expansion of the port's centralized scheduling system and anchorage allocation procedures.

Industry testimonials

Canadian National Railway (CN)

"Coordination of marine and rail traffic at the CN Second Narrows Rail Bridge is critical to the efficiency, reliability, and resilience of cargo movements across Burrard Inlet. CN and the port authority have long understood the importance of collaborating to optimize the flow of freight that ensures safety and fluidity for both vessels and trains in this key supply chain corridor.

The centralized scheduling system provides CN with critical visibility over vessels transiting—or scheduled to transit—under the Second Narrows Rail Bridge. This enables us to better anticipate when the bridge will need to be lifted for marine vessels and adjust train movements accordingly. By increasing visibility over vessel movement in the Burrard Inlet, the system and our ongoing collaboration with the port authority helps reduce the likelihood of congestion, minimizes wait times, and ensures a more predictable and efficient flow of freight in and out of the Port of Vancouver."

– Nicole James, Vice President, Transportation Western Region, CN

Trans Mountain

"Trans Mountain's newly expanded Westridge Marine Terminal in Burrard Inlet came into service in May 2024. As anticipated during consultation with the port authority and the marine shipping community in BC, there has been an immediate increase in marine vessel traffic, reaching over 270 tankers to date.

While Trans Mountain does not own or operate vessels calling at Westridge Marine Terminal, we take an active interest in safe and reliable shipping of oil by tankers calling at our terminal. The port authority's centralized scheduling system has played a key role in supporting smooth and efficient movement of tankers through the Burrard Inlet, including the Second Narrows.

Enhanced coordination of vessel movements in the area promotes transit fluidity, maximizing transit window opportunities for all vessels seeking to transit the Second Narrows. We value the port authority's ongoing efforts to improve the flow of commercial marine traffic at Vancouver port terminals and appreciate the opportunity to participate in and collaborate on the AVTM Program since its inception."

– Bikramjit Kanjilal, Director of Burnaby Westridge Terminals, Trans Mountain

Contributions to United Nations Sustainable Development Goals

The AVTM Program supports a shared vision of a sustainable and inclusive future by aligning with five of the United Nations Sustainable Development Goals:

By helping to facilitate record volumes of Canadian trade in 2024, the AVTM Program enabled the Port of Vancouver to drive economic prosperity—supporting seamless trade with up to 170 countries, sustaining over 130,000 well-paying jobs across Canada, and contributing to inclusive, sustainable economic growth and full, productive employment in alignment (SDG 8).

By leveraging technology and industry collaboration to drive supply chain efficiency, the AVTM Program promotes sustainable economic growth through innovative solutions and resilient infrastructure (SDG 9).

By reducing overall anchorage utilization in Southern British Columbia, implementing an anchorage code of conduct and encouraging vessels to avoid arriving at anchor at night, the AVTM Program helps reduce negative social impacts (including ambient noise and light pollution) and promote safe, resilient, and sustainable local communities (SDG 11).

By limiting unnecessary vessel movements, the AVTM Program reduces environmental impacts from marine shipping, including underwater noise in southern resident killer whale critical habitat, and promotes sustainable use the oceans in support of trade enabling activities (SDG 14).

By fostering strong, cross-sector collaboration that drives sustainable maritime innovation, the AVTM Program strengthens implementation capacity and offers a scalable framework for global ports seeking to align with sustainable development priorities (SDG 17).

Leading the future of sustainable port operations

The Active Vessel Traffic Management Program is a transformative digitalization initiative that redefines sustainable port operations. By optimizing vessel traffic, enhancing supply chain resilience, and considering community and environmental well-being, the program delivers operational excellence and social value. The Vancouver Fraser Port Authority proudly submits the AVTM Program for the IAPH Sustainability Awards, showcasing its leadership in digital innovation and its scalable model for global ports striving for sustainability and efficiency.