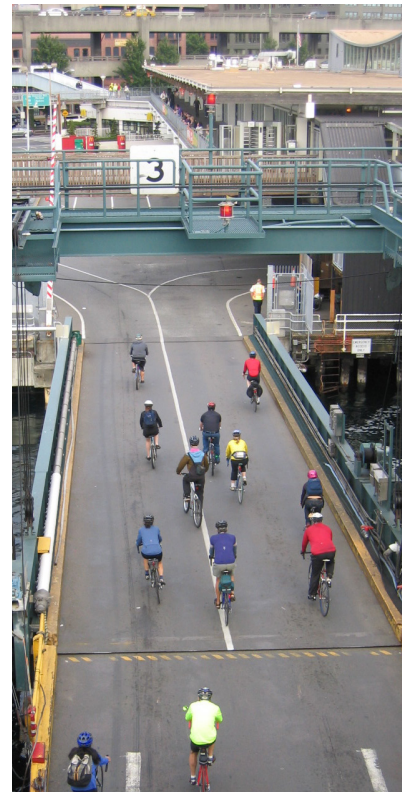


Transportation Systems Management & Operations Program Plan

PHASE 1: DEFINING TSMO AT WSDOT • AUGUST 2022



Acknowledgments

THIS PLAN IS THE RESULT OF THE COMMITMENT AND EFFORT FROM THE FOLLOWING GROUPS AT WSDOT:

Executive Leadership Team

TSMO Council

Active Transportation

Assistant Secretary

Construction

Development

Eastern Region

Maintenance Operations

Management of Mobility

Multimodal Development & Delivery

Multimodal Planning & Data

North Central Region

Northwest Region

Olympic Region

Public Transportation

Regional Transit Coordination

South Central Region

Southwest Region

Tolling

Traffic Operations

Transportation Safety & Systems Analysis

WSDOT IS APPRECIATIVE OF THE ENGAGEMENT BY THE FOLLOWING PARTNERS:

Southwest Washington Regional Transportation Council

Central Washington Council of Governments

THE FUNDING FOR THIS PLAN WAS PROVIDED BY:

Research and Library Services

Traffic Operations

CONSULTANT SUPPORT WAS PROVIDED BY:

DKS Associates

Ganett Fleming

PRR

All photos used in this report are courtesy of Washington State Department of Transportation.

What is TSMO and Why Does WSDOT Need a TSMO Plan?

The purpose of this plan is to engage the Washington State Department of Transportation (WSDOT) in a discussion of what Transportation System Management and Operations (TSMO) means for its projects, plans, and programs.

As defined by the Federal Highway Administration, TSMO stands for Transportation System Management and Operations. WSDOT uses TSMO to manage and operate existing and future transportation infrastructure to preserve and improve safety, mobility, and reliability.

TSMO is a tool used to improve the operations and management of the integrated multimodal transportation system, within WSDOT's Practical Solutions approach. Examples include Intelligent Transportation System technologies, Work Zone Management, Road Weather Management, Incident Response, and Transportation Demand Management (TDM). TSMO solutions address safety, multimodal access, improved operations, and improved reliability with an approach that allows WSDOT to adjust and make improvements. TSMO strategies can also be combined with expansion projects to extend the life of the project.

EXAMPLE TSMO STRATEGIES INCLUDE:

- Transit signal priority
- Coordinated signal systems designed to reduce delay through a corridor
- Information to travelers about weather, construction, or special events
- Variable speed systems
- Leading pedestrian intervals
- Roundabouts

Leadership has identified TSMO among the following actions, in order of priority, to advance WSDOT's Strategic Plan: Preservation, Safety, TSMO, and TDM, followed by focused expansion.

While TSMO is not new to WSDOT, it has not been consistently applied across all regions and divisions.

Future efforts will address how WSDOT engages with external partners on TSMO planning and implementation, explore resources to implement this plan, and document the return on investment provided by TSMO.

The WSDOT TSMO Program Plan is an action plan to elevate TSMO practices throughout the department, across all projects, plans, and programs. The TSMO Program Plan is organized to do the following:

- Lay out the business case and urgency for TSMO at WSDOT
- Provide examples of how TSMO will be integrated with existing WSDOT programs
- Identify near-term actions related to business processes, systems and technology, performance measurement, culture, organization and staffing, and collaboration within the department.
- Describe how WSDOT will maintain the TSMO Program Plan including implementation, funding, and next steps.

This plan was developed with considerable input from the TSMO Council made up of WSDOT staff representing all divisions, regions, modes, and partners from two Metropolitan Planning Organizations. The TSMO Program Plan is aligned with WSDOT's Strategic Plan and is designed as a living document to grow with the agency as priorities, resources, and culture evolve.

WSDOT's Business Case for Formalizing TSMO as a Key Strategy

WHY DO WE NEED TO FORMALIZE TSMO AS A PRIORITY STRATEGY AT WSDOT?

WSDOT is a national leader in implementing TSMO projects. However, there has been no formalized process that recognizes TSMO as priority strategy. As a result, there is no dedicated TSMO funding, and no consistent approach to prioritizing TSMO across the department.

By recognizing TSMO as a priority strategy at WSDOT, resources could be directed to support the initiative including dedicated funding, staff training, project decision processes, and leadership support.

HOW DOES TSMO FIT WITH PRACTICAL SOLUTIONS?

TSMO can be considered as a set of strategies and tools in the Practical Solutions Toolbox that focus on improving safety, reliability, and operations. WSDOT remains committed to applying the Practical Solutions approach to project development and delivery. TSMO provides guidance to take a deeper look into managing the transportation system and strategies to maximize the benefit of new capacity.

BUSINESS CASE TO FORMALIZE TSMO AS A PRIORITY STRATEGY AT WSDOT

The business case for formalizing TSMO as a priority strategy is fundamentally about using cost-effective solutions that are easily implemented to address safety, reliability, and operations problems on WSDOT's multimodal system. By applying cost-effective solutions on the existing system, WSDOT can focus on maintaining and preserving our existing assets more efficiently. TSMO solutions can include filling in missing active transportation gaps to shift travel behavior to walking, biking and rolling, reducing the demand on the road network. It can also mean, among many other solutions, improving the efficiency of the traffic signals to maximize the movement of traffic through the intersection to avoid needing to increase capacity. TSMO solutions can operate as standalone solutions or can be combined. A host of TSMO solutions are available on the [tsmowa.org](https://www.tsmowa.org) website.

TSMO values aligns with WSDOT's strategic goals: Inclusion, Practical Solutions, and Workforce Development. Specifically, TSMO enhances the practical decision-making approach of identifying and solving problems as quickly and cost-effectively as possible using performance-based, data-driven, community-engaged decision making. WSDOT's workforce is rapidly changing, providing an opportunity to bring in new skills that can support the multidisciplinary needs required to operate and maintain our system.

TSMO STRATEGIES SUPPORT WSDOT'S RESPONSIBILITY OF SYSTEM PRESERVATION AND MAINTENANCE

WSDOT is carefully investing funds for the benefit of system users. However, traditional revenues that have helped to fund the transportation system are changing. Gas tax and farebox revenue are expected to continue to decline as the number of teleworkers throughout the state increases and as technology improves the efficiency of gas-powered vehicles.

Given the expected changes in funding, WSDOT must ensure that any investments made on the state system will produce the highest return on investment. **WSDOT must get the most from existing and new investments.**

TSMO strategies help improve the safety, reliability, and operation of asset maintenance and also are typically more cost-efficient to implement than traditional

capacity projects, freeing up more money to preserve and maintain the existing system. Low-cost strategies deployed by WSDOT have included:

- **Advanced Warning System (AWS) along I-90 alerting drives of an upcoming queue** – The AWS consists of a vehicle detection equipment and variable message signs with flashing beacons. Design and construction costs were under \$1M.
- **Synchronized Pedestrian Signals along US-2 in downtown Leavenworth** – The pedestrian signals coordinate with downstream traffic signal controllers aligning pedestrian crossing times while reducing vehicle delay and idling. Design and construction costs were under \$0.5M.
- **Active Traffic Management (ATM) along I-5 in Southwest Washington** – Overhead lane-by-lane variable message signs and ramp meters reduced incident response time, improved vehicle merging, and resulted in a decrease in rear-end collisions. Design and construction costs were under \$5M.



TSMO SUPPORTS WSDOT'S COMMITMENT OF PRIORITIZING THE SAFE MOVEMENT OF ALL PEOPLE BY ALL MODES

All TSMO strategies prioritize the safe system approach to move people and goods through all modes of travel while maintaining or improving the transportation system's reliability. These strategies can be applied throughout the project lifecycle to ensure the safety of both travelers and WSDOT employees. Some TSMO strategies can also be implemented quickly to address urgent safety needs.

- The Advanced Warning System along I-90 reduced total crashes along eastbound I-90 by 62 percent and along the SR 18 ramp by 75 percent.
- The Active Traffic Management system along I-5 reduced total crashes by 12 percent including a 41 percent reduction during the AM peak (6am to 9am) and a 48 percent reduction in the outside lane where vehicles merge from on and off ramps.
- The Smart Work Zone system that was deployed for the I-5 Wood concrete rehabilitation project included travel delay information, traffic queue warning and zipper merge messaging. The Smart Work Zone system positively contributed to having no collisions resulting in personal injury during the project, cost approximately \$76,000 (total cost was \$7.62 million) and the project finished in 15 days compared to the scheduled 21 days.



TSMO STRATEGIES SUPPORT WSDOT'S NEED TO IMPROVE THE RELIABILITY OF THE MULTIMODAL SYSTEM

Congestion on WSDOT's system impacts safety, the movement of freight and goods, accessibility, and the environment. TSMO strategies can be used to improve the reliability and predictability of the transportation system so that travelers can better plan their use of WSDOT's system. This can be done through:

- Real-time traveler information notifying users of upcoming crash or weather events
- Incident response teams made up of WSDOT staff, state patrol, and other emergency services who work together to ensure the safety of crash victims while getting the roadway cleared quickly to minimize the impact of a crash
- Prioritizing modes like transit, walking, and biking that do not place additional vehicles on the roadway

TSMO strategies support WSDOT and its partner agencies to use an integrated, multi-disciplinary approach to solve transportation issues and enhance the overall multimodal system reliability.



Partnering to Develop the TSMO Program Plan

Developing the TSMO Program Plan required significant collaboration across multiple projects, plans, and agency programs. To do this, WSDOT undertook a 15-month process to involve internal stakeholders and TSMO implementers. This process began with a Strength, Weakness, Opportunity, and Challenge (SWOC) interview for each region and division (results summarized in the Appendix). After these stakeholder interviews, the project team focused engagement with the TSMO Council, or, a group of stakeholders from across the agency and two representatives from Metropolitan Planning Organizations. The TSMO Council was engaged regularly as a whole, and intermittently in small group workshops.

Over the course of six meetings, the TSMO Council discussed and advised the development of the Program Plan and early implementation:

- **April 2020:** Kick-off TSMO Council; review TSMO Program Plan development schedule
- **June 2020:** Mission, vision and goals
- **September 2020:** TSMO Program Plan framework; early action plan
- **January 2021:** Early action progress update; Implementation next steps
- **May 2021:** TSMO messaging platform; discuss future Council structure
- **June 2021:** Draft TSMO Program Plan; present future Council structure

BY THE NUMBERS:

- 20** **STAKEHOLDER INTERVIEWS WITH REGIONS AND DIVISIONS TO COMPLETE SWOC ANALYSIS**
- 6** **TSMO COUNCIL MEETINGS**
- 4** **SMALL GROUP WORKSHOPS TO ALIGN ON TSMO PROGRAM PLAN GOALS AND EARLY ACTIONS**

- 4** **SMALL GROUP WORKSHOPS TO REVIEW TSMO PROGRAM PLAN ACTIONS FOR IMPLEMENTATION**
- 5** **INTERVIEWS TO TEST THE TSMO MESSAGING PLATFORM**
- 1** **FOCUS GROUP WITH EXTERNAL PARTNERS TO TEST THE TSMO MESSAGING PLATFORM**

The TSMO Council vetted critical pieces of the Program Plan early, providing invaluable input that influenced the direction of the Plan's strategies and action list. From the TSMO Council, several champions emerged to lead specific actions in the Plan, including integrating TSMO into work zone management, updating the Design Manual, and incorporating TSMO into the Highway System Plan update.

WSDOT TSMO Strategic Direction

The TSMO Council developed the following Vision, Mission, Value, and Goal statements to reflect the unique multimodal definition WSDOT applies to TSMO. The three goals identified—Culture Shift, Partnerships, and System Focus—serve as a launchpad for many of the actions outlined later in the plan. This plan is focused on the achievement of these goals for an internal WSDOT audience. Future efforts will broaden WSDOT’s TSMO approach to engage external partners.

VISION

People and goods in Washington get where they need to go safely and efficiently.

MISSION

The TSMO Program Plan optimizes how WSDOT and its partners use resources to realize our multimodal transportation system’s greatest potential.

VALUES⁴

SAFETY

Keep people safe and help achieve target zero.⁵

SUSTAINABILITY

Improve energy efficiency, reduce pollution, and enhance resiliency.⁶

EQUITY

Create equitable access to reliable and affordable transportation options.

PERFORMANCE

Balance the priorities of safety, efficiency, and reliability to increase multimodal mobility.




- 4 The TSMO Program Plan also aligns with six Transportation Policy Goals in the Washington State Transportation Plan: Economic Vitality, Preservation, Safety, Mobility, Environment, Stewardship (<https://washtransplan.com/>).
- 5 Target Zero: Strategic Highway Safety Plan (<https://wsdot.wa.gov/planning/SHSP.htm>)
- 6 The Sustainability value aligns with WSDOT’s Sustainable Transportation Plan (<https://wsdot.wa.gov/construction-planning/environment/sustainable/transportation>).

GOALS

- 1 CULTURE SHIFT** 
- Foster a culture at WSDOT that prioritizes maximizing resources to improve performance.

- 2 PARTNERSHIPS** 
- Achieve shared system ownership among transportation providers and the communities they serve.

- 3 SYSTEM FOCUS** 
- Comprehensively plan, fund, operate and maintain the multimodal system as a whole.

ANTICIPATED OUTCOMES:

- Internal decision makers understand the value of TSMO.
- TSMO is an everyday part of planning, programming, and delivery.
- WSDOT's workforce supports TSMO at every level.

- External decision makers understand the value of TSMO.
- WSDOT holds shared TSMO goals and agreements with partners.
- WSDOT and its partners share ideas, information, and resources across jurisdictional and agency boundaries.

- WSDOT and its partners use TSMO to help make decisions about how to invest in and operate the system.
- WSDOT has a global view of assets to find the right improvements.
- WSDOT leverages its networks to design and implement connected solutions.



How Does WSDOT Define TSMO?

WSDOT's approach to TSMO focuses on cost-effective solutions that prioritize the accessibility and efficiency of the multimodal transportation system. TSMO requires adjustments to business processes, organizational structure, culture, measuring performance, developing the workforce, and partnering inside and outside WSDOT.

PLANNING AND POLICY DEVELOPMENT

Includes the efforts WSDOT is taking to further integrate TSMO into WSDOT's guiding policies and documents. Examples include the Long-Range Transportation Plan, Highway System Plan, various modal plans and other policy guidance for project development from the very early stages of planning through preservation and maintenance.



INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

Refers to the integration of advanced communications technology into the transportation infrastructure and within vehicles that enhances mobility and safety across all modes. ITS solutions are cost effective and can be quickly implemented when compared to capacity improvements. ITS can also be used to collect data to provide insight on the safety and performance of the transportation network. Examples include changeable message signs notifying drivers of weather or congestion, road weather cameras so travelers can check their trip route before heading out; crash detection and prevention for all modes; flood warning systems; smart work zone practices; and multimodal applications such as traveler information at bus stops or micromobility.



TRANSPORTATION OPERATIONS

Focuses on moving people and goods safely and efficiently. For freeways, WSDOT has been a pioneer in HOV lanes and ramp meters. The seven traffic management centers throughout the state serve as the nerve center for traffic management activities connecting to thousands of sensing devices to manage congestion and enabling quick response to incidents. From a freight perspective, truck parking information systems help improve safety by sharing real-time space availability to allow truck drivers to rest when needed. Examples include a variety of multimodal strategies that encourage shifting modes such as Bus on Shoulder Operations, Leading Pedestrian Intervals, Bus Rapid Transit and Transit Signal Priority.



TRANSPORTATION DEMAND MANAGEMENT

Includes all the activities and initiatives supported by WSDOT to provide a balanced transportation system that works for all users. Examples include education, incentives and disincentives to reduce the need for vehicle trips, and to shift to higher occupancy modes like transit and ridesharing.



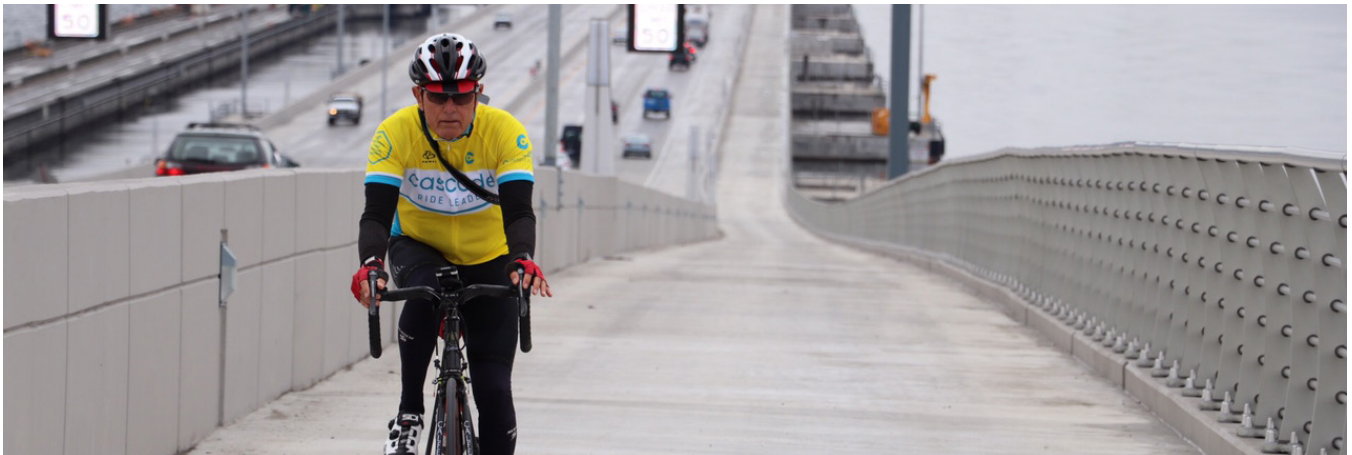
COOPERATIVE AUTOMATED TRANSPORTATION & TECHNOLOGY

Supports the use of automated, connected, electrified, and shared mobility to promote safety and access. The advancement of wireless technology, data aggregation, and real-time analysis enables WSDOT to integrate automated, connected, electrified, and shared mobility options. Examples include micromobility, the use of connected vehicle technology, and freight automation support.



WHAT DOES IT MEAN TO BE MULTIMODAL AND USE TSMO?

Around the United States, TSMO is typically used to manage motor vehicle traffic. However, TSMO strategies are more effective when applied across all modes. WSDOT has integrated multimodal strategies into its TSMO Program to maximize the throughput of its integrated transportation system and serve its wide range of customers. Applying TSMO strategies supports the safe and efficient movement of pedestrians, bicyclists, transit, freight haulers, ferries, aviation, and motor vehicles across the entire transportation system.





ACTIVE TRANSPORTATION AND TSMO

Walking and biking for recreation or commuting are important modes served by WSDOT. TSMO strategies can create opportunities for people walking and biking to feel comfortable on the roadway. A wider variety of safe and convenient modes has the potential to improve the appeal of active transportation to all people. Examples include:

- Technology to support improved mobility and safety, such as outfitting crossings with refuge areas and high visibility signs with flashing beacons
- Completing pedestrian and bicycle networks by installing sidewalks and bike lanes
- Technology to increase detection of vulnerable road users (VRU) at intersections and bike lanes.
- Installing way-finding signs, maps, and landscape cues to direct pedestrians and bicyclists to the safest and most direct route
- Micromobility, such as bike sharing or scooter sharing programs coupled with location-based technology, to allow users to complete the last mile of their trip



PUBLIC TRANSPORTATION AND TSMO

Public transportation provides people with mobility and access to employment, community resources, medical care, and recreational opportunities. WSDOT can use TSMO strategies to help enhance public transportation services and increase ridership. Examples include:

- Bus rapid transit enabled with transit signal priority allows buses to stay on schedule along a corridor. This increased reliability can have a positive impact on ridership because passengers have confidence in getting to their destination on time
- Bus shoulder lanes make transit travel more reliable. In a WSDOT case study of I-5 bus-on-shoulder operations between Lynnwood Transit Center to Mountlake Terrace Freeway Station, allowing buses to use the shoulder during morning peak periods saved approximately 4 minutes per trip along the 2+ mile stretch of roadway
- Improved technology in paratransit (i.e., small transit vehicles) enables better on-demand trip experiences for people reliant on these services



AVIATION AND TSMO

Aviation offers opportunities for seamless travel from one mode to another as passengers travel to and from one of Washington's eleven primary commercial service airports servicing over 24 million passengers. In the 2017 WSDOT Aviation System Plan, one of the objectives is to support and improve multimodal connections, including multiple transportation options for users. WSDOT airports provide a key link in freight transport, as well as emergency response for wildfires. TSMO provides opportunities to measure and continuously improve performance in all of these service areas. Examples include:

- Continued input from aviation to corridor analyses
- Advancing the evaluation of emerging drone technology for freight delivery and emergency response
- Advocating for adequate staging, technology, and roadways for freight access to airports



FERRIES AND TSMO

The Washington State Ferry (WSF) system is a successful example of how WSDOT already integrates TSMO into existing practices. This is because WSF relies on a cohesive, effective, efficient operations strategy that supports the transportation needs of communities in the Puget Sound. Ferry ridership is expected to grow more than 30 percent by 2040, climbing to nearly 32 million passengers a year.¹ Several recommendations in the Long Range Plan support many of the goals and objectives of the TSMO Plan, including:

- Investing in technology to assess real-time conditions of the fleet for quick operational adjustments, to maintain service
- Providing an integrated system for scheduling and deployment of resources to improve system reliability and resilience
- Harnessing TSMO technologies to maximize the efficiency and safety of terminal operations including loading and unloading and landside operations

1 Washington State Ferries Long Range Plan, 2019



RAIL SYSTEM AND TSMO

Washington's rail system is a central part of a multimodal transportation strategy that provides choices, supports broad-based economic growth and offers an environmentally efficient transportation option. The rail network includes freight services and passenger services. Under a moderate growth forecast in the 2020 Statewide Rail Plan, rail freight tonnage is expected to grow from 122 million in 2016 to 216 million tons in 2040; long distance passenger service is expected to grow by 29 percent between 2018-2040; intercity rail service ridership is expected to grow from 800,000 in 2018 to 1.7 million in 2040; and commuter rail ridership is projected to reach 8 to 11 million by 2040. With this growth, the level of service for several segments of the rail network will degrade to a point where shifts to highway transport may occur, in turn causing degradation to highway operations. TSMO offers a holistic approach to maintaining operations for all transportation modes within the system.

A few examples include:

- Enhancements for infrastructure modifications for larger passenger trains, adding passenger cars, and making modifications to platforms to accommodate additional ridership and reduce delays
- Applying technology to improve safety and delay information at crossings
- Ongoing coordination with Ports to prepare for increased freight needs



TRUCK FREIGHT AND TSMO

Maintaining Washington's competitive position as a global gateway to the nation with intermodal freight corridors serving trade and commerce is critical. Truck freight movement is crucial to Washington's economy as it supports farm-to-market, manufacturing, and resource industry sectors in both rural and urban economies. Truck freight tonnage moved on the roadway network in Washington is projected to increase from 281.2 million in 2015 to 379.4 million in 2035, which is a total increase of 35 percent over a 20-year period. There are many TSMO strategies geared towards truck freight movement. Examples include:

- Electronic credentialing to allow trucks with proper clearance to bypass scales
- Truck parking information systems to support better adherence to driver hours of operation rules
- Virtual Weigh-in-Motion stations installed on known bypass routes to enforce laws that help to minimize damage to pavements and bridges
- Permitting systems to regulate when and where oversize and overweight loads move across the state
- Design roundabouts near factories to accommodate oversize loads
- Infrastructure designed to accommodate oversize trucks near manufacturing facilities

HOW DOES TSMO RELATE TO PRACTICAL SOLUTIONS?

Practical Solutions is an approach adopted by WSDOT to help it meet its strategic vision, and TSMO provides many strategies that support that approach. The intent of Practical Solutions is to identify cost-effective solutions to problems and needs before making large capital investments. The Practical Solutions approach guides and influences how WSDOT administers, manages, plans, programs, designs, constructs, operates and maintains its services and programs. Through Practical Solutions, WSDOT considers TSMO strategies to achieve performance goals while minimizing capital investment, including:

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

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

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

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

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

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

DID YOU KNOW?

THE INTENT OF PRACTICAL SOLUTIONS IS TO FIND COST-EFFECTIVE SOLUTIONS BEFORE MAKING LARGE CAPITAL INVESTMENTS.

WSDOT DESIGN MANUAL

Elevated as a top priority within WSDOT through Executive Order, Practical Solutions enables more flexible and sustainable transportation investment decisions by:

1. INCREASING THE FOCUS ON ADDRESSING IDENTIFIED PERFORMANCE NEEDS THROUGHOUT ALL PHASES OF DEVELOPMENT
2. ENGAGING LOCAL PARTNERS AND STAKEHOLDERS AT THE EARLIEST STAGES OF SCOPE DEFINITION TO ACCOUNT FOR THEIR INPUT AT THE RIGHT STAGE OF THE DEVELOPMENT PROCESS

FIVE WSDOT STRATEGIES TO ADVANCE PRACTICAL SOLUTIONS

1. MAKING PRACTICAL DECISIONS
2. MANAGING ASSETS
3. ALIGNING BUDGET AND POLICY
4. INTEGRATING SYSTEMS AND MODES
5. ALIGNING INVESTMENTS



Examples of Practical Solutions includes one or a combination of strategies, many of which include TSMO:

- Transportation demand management
- Off-system solutions
- Incremental strategic capital solutions
- Creating or reconfiguring an existing signalized or stop-controlled intersection into a roundabout
- Adjusting project staging to increase efficiency
- Modification of interchange designs
- Opting for cost-effective enhancements (e.g., striping, signing, rumble strips) instead of realignment
- Redesigning projects to reduce right-of-way costs
- Changing repair methods following value engineering studies
- Use of alternative shoulder designs and making clear zone improvements
- Adjusting design or alignments to reduce environmental mitigation costs

ALIGNING TSMO AND PERFORMANCE MEASUREMENT TO IMPROVE OUTCOMES

WSDOT has been a leader in performance measurement as demonstrated through its 20 years of publishing the *Gray Notebook* on a quarterly basis. The culture of measuring outcomes at WSDOT is advanced compared to many other state DOTs. Improving the timeliness of data collection and analysis (e.g., monthly, weekly, daily) and integrating emerging data sources (e.g., commercially available probe data) can provide better intelligence on how to improve management of the state's transportation system. The *Gray Notebook* covers agency-wide topics including:

- Bridge and Pavement Conditions
- Construction
- Commute Options
- Congestion
- Safety
- Aviation
- Active Transportation
- Ferries, Freight
- Passenger Rail
- Project Status
- Environmental Stewardship
- Workforce Development



Many measures included in the Gray Notebook support TSMO's approach to measuring performance. WSDOT identified the need to be able to more easily access their performance measurement systems to inform day-to-day operational decisions. Examples of measures reported within the last couple of years include:

CONGESTION

- Before and After Case Studies
- Congestion Dashboard
- Congestion Measurement Principles
- Corridor Capacity Analysis
- Executive Summary of Measures and Results
- Freeway HOV and HOT Lane System Routes
- Person Throughput: HOV vs. General Purpose Lanes
- Highway Speed Thresholds for Congestion
- Percent of State Highway System Congested
- Results Washington: Congestion Measures
- Severe Congestion by Duration and Frequency
- Cost of Travel Delay
- Travel Times and Reliability
- Vehicle Miles Traveled – Annual and Per Capita on All Public Roads and State

SAFETY

- Crash data
- Safety innovation, strategy, and system
- Statewide traffic fatalities and serious injuries
- WSDOT's safety goals based on Target Zero

TRAFFIC INCIDENT RESPONSE

- Average Clearance Time and Number of Responses by Type of Incident
- Average Clearance Time for All Incidents
- Blocking and Non-Blocking Average Clearance
- Cost of Incident-Induced Delay
- Customer Feedback
- Economic Benefits of Incident Response Program
- Extraordinary (6+ Hours) Incidents
- Number and Percentage of Responses by Category and Incident Duration

INTELLIGENT TRANSPORTATION SYSTEMS

- Commercial Vehicle Information Systems and Networks (CVISN) Use and Benefits
- Number of Calls to Travel Information
- Traveler Information Website Usage and Page Views

HOW DOES WSDOT IMPLEMENT TSMO?

TSMO is implemented throughout the state using a variety of methods:

STANDALONE PROJECTS: Projects that typically only include one TSMO strategy (e.g., dynamic message signs, traffic detection, traffic incident management operations, adaptive signal timing).

SUPPLEMENTARY TO OTHER SOLUTIONS: TSMO is included in many projects to meet operational and safety needs, and minimize future costs.

USED TO DEFER CAPITAL PROJECTS: TSMO solutions can make current situations more manageable until funds are available for a more significant infrastructure-intensive improvement. Examples include:

- Advanced technology on rural expressways to warn of crossing traffic in anticipation of a grade separation
- Supplemental Incident Response Teams on segments that experience a high rate of crashes
- Transit technologies such as bus on shoulder or transit signal priority on congested routes
- Bike detection technology combined with automated warning beacons at an at grade crossing prior to constructing a grade separated bike-only overpass



IN-HOUSE STAFF: WSDOT staff use TSMO strategies to address transportation needs at any stage of project and program delivery:

- Planning, scoping, design, and project delivery
- Traffic Management Center operations
- Incident Response Teams
- Software development and support of the advanced traffic management system

REQUEST FOR PROPOSALS: There are times when traditional project delivery or in-house staff may not be the most appropriate method for implementing TSMO. Examples where an RFP method may be best suited are:

- Subscriptions for data that aide in operating the transportation system (e.g., probe speed data)
- Weather forecasting services
- Specialized software licenses for permitting systems, traffic signal systems, and AVL/GPS for vehicle tracking

PARTNERSHIPS WITH OTHER TRANSPORTATION

AGENCIES: There are cases where TSMO can only be developed through strong partnerships. For example, to fully realize the benefits of transit signal priority along a corridor with multiple jurisdictions, WSDOT needs to work closely with the transit agency and the local agencies who manage different segments of the traffic signal system.



EXISTING FUNDING OPPORTUNITIES

There is no funding stream dedicated to advancing TSMO strategies across WSDOT. To pay for TSMO strategies, funds typically need to be reallocated within existing programs or compete against other initiatives. Examples used to fund TSMO activities include State Planning and Research (SPR), Congestion Mitigation and Air Quality (CMAQ), and Regional Mobility Grants (RMG).

As TSMO strategies gain recognition as a desirable approach to manage mobility, additional funding opportunities are likely to become available.

AS MENTIONED IN THE BUSINESS CASE FOR TSMO ABOVE, WIDESPREAD TSMO IMPLEMENTATION WILL BE MOST SUCCESSFUL WHEN:



**TSMO IS INCLUDED AT THE
TIME OF PROJECT SCOPING**









**MID-SIZE PROJECTS BETWEEN
\$1M AND \$10M HAVE THEIR
OWN FUNDING POT**







Activities Completed or In Progress

As evidence that TSMO is already integrated into some regions and divisions at WSDOT, champions emerged early in the TSMO Program Plan development process to start implementation activities even before this TSMO Program Plan was complete. These activities are referred to as Tier 0. Some activities are expected to be complete by June 30, 2021, and others will be ongoing.

TABLE 1: TIER 0 ACTION ITEMS (COMPLETED OR ONGOING)

ACTION	DESCRIPTION	CHAMPION	TSMO PLAN GOAL
DESIGN MANUAL REVIEW	Ongoing: Inserted TSMO into the Design Manual where it already refers to system management and operations, including the Work Zone Safety, Mobility, ITS, Practical Design, and HOV Facilities Chapters. The Design Guidance Document was also reviewed for potential TSMO integration points.	Kevin Miller <i>HQ Design</i>	CULTURE SHIFT 
TSMO WORK ZONE SUBCOMMITTEE	Completed: Subcommittee formed to coordinate consistent application, develop resources, and set expectations across the agency for smart work zone activities. Completed: Facilitated a Capability Maturity Model workshop and developed a workplan.	Tony Leingang <i>HQ Traffic Operations</i>	PARTNERSHIPS 
EASTERN REGION CAPABILITY MATURITY MODEL WORKSHOP	Completed: Facilitated a Capability Maturity Model workshop to understand the current state of TSMO in WSDOT's Eastern Region. Workshop included regional WSDOT staff and their local partners.	Becky Spangle, Glenn Wagemann <i>Eastern Region</i>	CULTURE SHIFT 
SOUTHWEST REGION CAPABILITY MATURITY MODEL WORKSHOP	Completed: Facilitated a Capability Maturity Model workshop to understand the current state of TSMO in WSDOT's Southwest Region. Workshop included regional WSDOT staff and their local partners.	Scott Langer, Monica Harwood Duncan <i>Southwest Region</i>	CULTURE SHIFT 
SOUTH CENTRAL REGION CAPABILITY MATURITY MODEL WORKSHOP	Completed: Facilitated a Capability Maturity Model workshop to understand the current state of TSMO in WSDOT's South Central Region. Workshop included regional WSDOT staff and their local partners.	LisaRene Schilperoort, Todd Daley <i>South Central Region</i>	CULTURE SHIFT 
LAND USE AND TSMO CAPABILITY MATURITY FRAMEWORK TOOL DEVELOPMENT	Completed: Initiated research to develop a Capability Maturity Framework to define what a mature land use and transportation coordinating organization looks like. Action includes a test workshop to assess WSDOT's level of maturity.	Celeste Gillman <i>HQ Multimodal Planning and Data</i>	PARTNERSHIPS 

ACTION	DESCRIPTION	CHAMPION	TSMO PLAN GOAL
HIGHWAY SYSTEMS PLAN NARRATIVE INTEGRATION	Completed: TSMO specific language was integrated into the HSP program narratives to describe how TSMO strategies can enhance WSDOT's ability to achieve safety, capacity, and operational objectives.	Pamela Vasudeva <i>HQ Traffic Operations</i>	SYSTEM FOCUS 
EASTERN REGION RETURN ON INVESTMENT SUMMARIES	Completed: Development of three return on investment benefit summaries for recent TSMO projects implemented in WSDOT's Eastern Region.	Becky Spangle, Glenn Wagemann <i>Eastern Region</i>	CULTURE SHIFT 
TSMO TRAINING VIDEO	Completed: Developed a training video for transportation designers within WSDOT.	Monica Harwood Duncan <i>HQ Traffic Operations</i>	CULTURE SHIFT 
DRAFT EXECUTIVE ORDER DEVELOPMENT	Ongoing: A proposed Executive Order was drafted to elevate TSMO throughout WSDOT.	Pamela Vasudeva <i>HQ Traffic Operations</i>	CULTURE SHIFT 

In addition to the Tier 0 actions, the TSMO Council identified actions to advance the TSMO Program Plan over the next few years. The actions are categorized into three tiers depending on priority and start time:

- **Tier 1:** Start in the next 3-6 months
- **Tier 2:** Start activities in 12-18 months
- **Tier 3:** Start activities beyond 18 months

Champions identified through the TSMO Steering Committee defined the Tier 1 Action Items to maintain momentum as the TSMO Program moves towards implementation.

In the Appendix each Tier 1 and Tier 2 action is laid out with a more detailed workplan for advancing TSMO at WSDOT. Topics included in the workplan are as follows:

- What issues or questions are we trying to solve?
- Priority
- Status
- Duration
- Lead and Support Offices
- Support Bureaus
- Resources Needed
- Dependencies
- Associated Goals
- Description
- Critical Steps
- Benefits, Impacts, Outcomes
- How do we know if we are done?

TABLE 2: TIER 1 ACTION ITEMS (START IN NEXT 3-6 MONTHS)





ACTION	CHAMPION / LEAD OFFICE	TSMO PLAN GOAL
INTEGRATE TSMO INTO STATEWIDE PLANNING PROCESSES (BP01)	Karena Houser / Multimodal Planning	CULTURE SHIFT 
INTEGRATE TSMO INTO REGIONAL PLANNING PROCESSES (BP02)	LisaRene Schilperoort / Regions	PARTNERSHIPS 
DEVELOP PLAN TO IMPROVE TRAVELER INFORMATION (ST01)	TBD	SYSTEM FOCUS 
IMPROVE GLOBAL TRANSPORTATION SPECIFICATION FEED DATA AND STANDARDS (ST02)	Stan Suchan / Public Transportation	SYSTEM FOCUS 
DEVELOP TSMO PERFORMANCE MANAGEMENT PLAN (PM01)	Sreenath Gangula / Safety & Systems Analysis	SYSTEM FOCUS 
REVIEW & UPDATE POSITION DESCRIPTIONS TO ADVANCE TSMO (OS01)	Jeff Pelton / Human Resources	CULTURE SHIFT 
INTEGRATE TSMO STRATEGIES AND TOOLS INTO APPLICABLE LOCAL GRANT PROGRAMS (CO01)	Ed Spilker / Local Programs	PARTNERSHIPS 

TABLE 3: TIER 2 ACTION ITEMS (START IN NEXT 12-18 MONTHS)

ACTION	LEAD OFFICE(S)	TSMO PLAN GOAL(S)
PLAN TO INTEGRATE TSMO INTO GUIDING DOCUMENTS (BP03)	Multimodal Planning / CPDM / Development	CULTURE SHIFT AND SYSTEM FOCUS
INTEGRATE TSMO INTO PROJECT DEVELOPMENT PROCESSES (BP04)	Development / Multimodal Planning / CPDM	CULTURE SHIFT AND SYSTEM FOCUS
DEVELOP CONSISTENT STATEWIDE WORK ZONE MANAGEMENT STRATEGIES (ST03)	Maintenance Operations / Construction / Traffic Operations	SYSTEM FOCUS
DEVELOP PLAN TO IMPROVE MULTIMODAL CONNECTIVITY (ST04)	Regions / Multimodal Planning	SYSTEM FOCUS
ESTABLISH TSMO OVERSIGHT STRUCTURE (OS02)	Executive Management	CULTURE SHIFT
TSMO PERFORMANCE MANAGEMENT SYSTEM DEVELOPMENT (PM02)	Safety & Systems Analysis	SYSTEM FOCUS
IDENTIFY TSMO CHAMPIONS TO GUIDE IMPLEMENTATIONS (OS03)	TSMO Council	CULTURE SHIFT
DEVELOP AN ONGOING TSMO TRAINING PLAN (OS04)	Traffic Operations	CULTURE SHIFT
COMMUNICATE TSMO SUPPORT FOR PRACTICAL SOLUTIONS (CU01)	Practical Solutions Team / Development / Traffic Operations	CULTURE SHIFT, PARTNERSHIPS, AND SYSTEM FOCUS
COMMUNICATE TSMO BENEFITS & RETURN ON INVESTMENT (CU02)	Traffic Operations / Communications	CULTURE SHIFT
ARTICULATE WSDOT'S PRESERVATION & SAFETY ROLE (CU03)	Executive Management	CULTURE SHIFT

TABLE 4: TIER 3 ACTION ITEMS (INITIATE AFTER 18 MONTHS)

PROPOSED ACTION	LEAD OFFICE(S)
INCORPORATE PROCESS FOR TSMO PROCUREMENT, O&M, AND LIFECYCLE COSTS (BP05)	Traffic Operations / CPDM / Public Transportation
UPDATE PROCESSES FOR WEB-BASED TSMO RESOURCES (BP06)	Traffic Operations / Communications
DEVELOP ASSET MANAGEMENT PROCESS FOR TSMO LIFECYCLE COSTS AND FORECASTS (BP07)	CPDM / Traffic Operations / Regions
CREATE LONG-TERM, STATEWIDE TMC ATMS STRATEGY (ST05)	Traffic Operations / Regions
DEVELOP ASSESSMENT FRAMEWORK FOR LEVERAGING EMERGING MULTIMODAL DATA (ST06)	Traffic Operations / Safety & Systems Analysis
ANALYZE GAPS IN INFORMATION TECHNOLOGY SUPPORT FOR TSMO OPERATIONS AND TECHNOLOGY (ST07)	Information Technology
DEVELOP STRATEGIES TO COMPLETE STATEWIDE ITS AND COMMUNICATIONS NETWORK (ST08)	Traffic Operations / Regions
DEVELOP APPROACH TO COMMUNICATIONS NETWORK RESILIENCY (ST09)	Traffic Operations / Regions / Maintenance Operations
DEVELOP MANUAL FOR URBAN AND RURAL TSMO (ST10)	Regions
WORK WITH PARTNERS TO UPDATE ITS PLANS AND ARCHITECTURE (ST11)	Traffic Operations
PUBLISH MULTIMODAL TSMO INTEROPERABILITY STANDARDS (ST12)	Traffic Operations
ESTABLISH CROSS-ORGANIZATIONAL TSMO POSITIONS (OS05)	Executive Management / Traffic Operations / Regions / Divisions
DOCUMENT STATE AND REGIONAL TSMO ROLES AND RESPONSIBILITIES (OS06)	TSMO Council
DEVELOP COMPREHENSIVE TSMO STAFFING APPROACH AND PROCEDURES (OS07)	Human Resources & Safety
STRATEGICALLY ADVOCATE FOR TSMO FIRST THROUGHOUT WSDOT (CU04)	TSMO Council / Communications
PUBLICLY PROMOTE TSMO PERFORMANCE AND BENEFITS (CU05)	Communications / Safety & Systems Analysis / Regions
CREATE FORMALIZED TSMO AGREEMENTS WITH LOCAL JURISDICTIONS (CO02)	Regions / Local Programs / Public Transportation / Traffic Operations
PROACTIVELY ENGAGE PRIVATE TECHNOLOGY SECTOR TO ADVANCE TSMO (CO03)	Innovative Partnerships
ENGAGE LARGE PRIVATE DEVELOPERS EARLY IN PROJECT SCOPING (CO05)	Regions
ENGAGE LOCAL JURISDICTIONS ON INTEGRATED CORRIDOR MANAGEMENT (CO06)	Regions

Next Steps

WSDOT recognizes that having a TSMO focus is critical to the agency's ability to deliver a safe and reliable multimodal transportation system. TSMO's cost-effective, easily implementable solutions to multimodal safety, reliability, and mobility challenges protect scarce resources for system preservation and maintenance.

Phase 1 of the WSDOT TSMO Program Plan was designed to develop an understanding about the importance of TSMO and how WSDOT defines the practice across regions and divisions. This effort was extremely successful as evidenced by the broad list of early action items that were initiated and completed by champions across the department.

WSDOT recognizes that delivering TSMO requires partnerships with local and regional agencies, and state policymakers. The next phase of TSMO will focus on external partner engagement. In addition, Tier 1 actions will get started as projects, plans, and programs are able. WSDOT will continue to explore funding opportunities for TSMO research, projects, and efforts will include a deeper dive into the return on investment and costs of TSMO implementation.

