Vancouver Area Smart Trek (VAST)

Annual Program Report
YR 2020

A regional partnership of:

Contents

INTRODUCTION

The VAST Program focuses on low cost operational and ITS technology approaches that make better use of existing transportation facilities by improving system efficiency and performance. It represents the non-capital component of regional transportation and emphasizes improvements that leverage technology to manage the system without adding new roadway capacity. The operational strategies were prepared through the region's 2011 Transportation System Management and Operations (TSMO) plan which supports regional transportation goals by improving travel time reliability, reducing crashes, improving transit on-time performance, and by reducing travel delay, fuel use, and air pollution. The 2016 TSMO Plan Update tracked advances in technology and operations since 2011, identifies emerging issues, such as connected and autonomous vehicles, and lays out future strategies for the continued implementation of operational strategies over the next five to ten years.

FEDERAL REQUIREMENTS

The ITS element of the VAST program meets federal requirements for planning, development, and implementation of ITS projects. Federal regulation 23 CFR 940 requires that regions develop and maintain a regional ITS architecture to ensure that ITS technology projects are interoperable and that it must include participation from transportation stakeholders so that projects are coordinated and integrated. The TSMO element of the Program directly supports the federal Congestion Management Process (CMP) by providing regional services to agency partners to improve transportation performance by collaborating on operational strategies. Federal regulation 23 CFR 450.320(c) for the CMP requires that agencies collaborate to utilize operational management, demand management, transit, and ITS technology to address travel demand before adding roadway capacity. In addition, a Memorandum of Understanding executed between WSDOT, C-TRAN and RTC ensures that that planning and deployment of ITS projects and operations are consistent and integrated with the ITS vision for the Clark County region.

MODEL for REGIONAL COLLABORATION

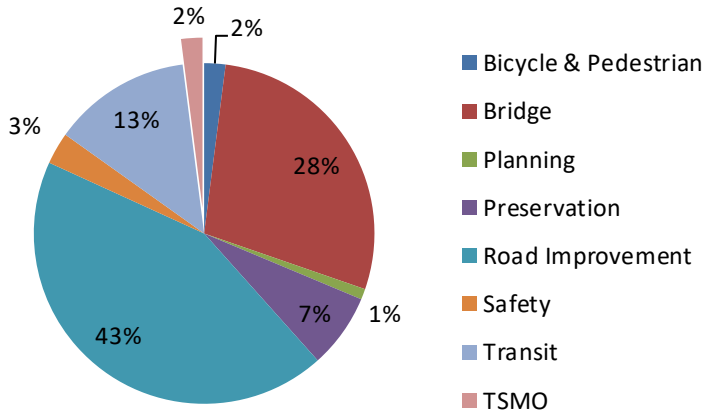
The VAST Program recognizes that the successful implementation of operational strategies requires cooperation between transportation agencies and interoperability between intelligent transportation system (ITS) technologies.

The VAST Steering Committee discusses transportation operations and technology and has been both a successful collaboration and an effective way for the agencies to coordinate on project delivery, joint project funding, monitoring project development, and project integration. RTC also manages the VAST Communications Infrastructure Committee (CIC). The CIC, which addresses sharing, maintenance, and standards for communications infrastructure and equipment, is made up of both transportation and communications technical staff from the VAST agencies. A chart of the program structure is shown on the following page.

VAST Program Structure

The VAST program is funded primarily through federal grants and has resulted in projects that benefit individual transportation agencies and the Clark County region resulting in a valuable pathway for developing and securing funding for ITS/operations projects totaling more than $34 million in federal funding over the last 17 years. A wide range of projects to improve transportation operations, and to build the supporting communications and technology, have been funded since the initiation of the program. They include central signal system upgrades, new signal controllers, signal optimization projects, freeway and arterial detection, cameras, variable message signs, and transit signal priority as well as the fiber and network communications needed for connecting ITS devices and infrastructure. These investments are a small, but effective part of the overall transportation funding program. For example, the 2021-2024 TIP has $422m in programmed projects. In 2020, the TSMO category made up about 2% of the total program.

Percentage of Dollars Programmed by Project Type ($422m total)



ONGOING PROGRAM ACTIVITIES

The VAST Program will continue the coordination and management of ITS and operations related activities which includes providing support to partner agencies on:

- Transportation operations and planning
- ITS projects, communications, and integration
- Manage the TSMO/ITS committees
- Funding applications for operations and ITS projects
- Performance measurement of operational projects
- Ensure that projects are interoperable

In addition, RTC will continue to manage the VAST Steering Committee and Communications Infrastructure Committee and in the next year will include:

- Continue expansion of communications infrastructure
- Maintain and update shared asset management database
- Identify additional funding opportunities
- Develop agreements, on fiber, infrastructure, and equipment

The VAST program will continue to utilize technical assistance and support the PSU data archive in carrying out the activities described above.

The first TSMO Plan, in 2011, set the policy and performance guidelines for the consideration of regional operational strategies in Clark County. The 2016 update laid out strategies for the continued implementation of operational strategies over the next five to ten years. The Regional Communications Plan describes the communications and network needs which are critical components of the regional transportation system and is fundamental to connecting management centers with field equipment that facilitate regional mobility. The ITS Regional Architecture provides a framework for integrating existing and planned ITS systems for transportation agencies in the region.

Program Activity	Status	Next Update
TSMO Plan	Current	2021
Regional Communications Plan	Current	2021
ITS Regional Architecture	Update initiated	2021
Fiber Sharing Permits	Current	ongoing

VAST PROGRAM AGREEMENTS

The VAST agencies adopted of a memorandum of understanding 2001 that outlines how agencies collaborate on ITS project coordination and integration, review, and guidance, and endorsement; and ensuring that the communications network for VAST is integrated. A Communications was executed in 2004 that addresses the use, sharing, maintenance, and standards for communications infrastructure and equipment. Oher agreements are also summarized below.

Agreement	Entities	Status
Memorandum of Understanding (MOU) Defines how the agencies work together on ITS policy, plans, programs, and projects. *Formed the VAST Steering Committee*	Clark County WSDOT C-TRAN Vancouver RTC	Ongoing
MOU for Communications Similar to first MOU, but focused on communications infrastructure. Defined how partners work together on ITS infrastructure and devices. *Formed the Communication Infrastructure Committee*.	same	Ongoing
Communications Interoperability Agreement Gives authority for at staff level for entering into fiber and communication sharing agreements, or permits, to the CIC for use by VAST agencies	same	Periodic amendments to update contract managers, permit format, etc.
MOU with C-TRAN, WSDOT, and RTC Ensures that that planning and deployment of ITS projects and operations are consistent and integrated with the ITS vision for the Clark County region	same	Periodic review
OSPInSight License Use Agreement A cloud web-based database mapping tool. Used and shared among all the VAST agencies. Tool displays communications fiber and equipment as well as their detailed attributes. Supports fiber sharing among agencies and allows agencies to manage their own assets more effectively	same	Annual licensing review

RECENT VAST ACCOMPLISHMENTS

I-5 Corridor Operations

September 2020 saw opening of two significant improvements to freeway operations in the I-5 corridor. Both projects demanded collaboration between TSMO partners working together to improve travel reliability and mobility in the I-5 corridor.

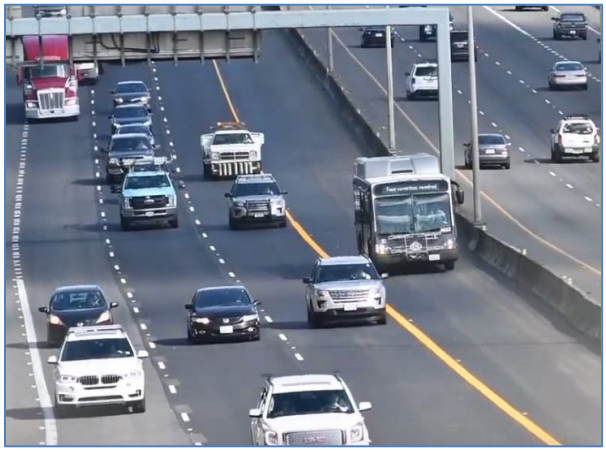
I-5 Active Traffic Management

The I-5 ATM project has ramp meters and variable speed signs on I-5 south from 78th Street to the Interstate Bridge. It is the first ATM project in the Vancouver region and is a comprehensive set of system operations strategies to manage congestion and improve efficiency in the corridor. This smart technology includes new traffic cameras, message signs, advisory speed signs, lane closure information to monitor and manage traffic flow in real time for better reliability and improved safety. The project complements the I-5 ATM project in North Portland for a shared strategy for managing the bi-state corridor.

I-5 ATM

I-5 Bus on Shoulder

WSDOT and C-TRAN collaborated to construct BOS on I-5 from 99th Street to Interstate Bridge. The project utilizes an improved inside shoulder on I-5 that can be used anytime mainline traffic speeds drop below 35 mph. BOS offers a low-cost way to improve transit mobility and efficiency without affecting mainline freeway operations. I-5 south, the region's most congested corridor also carries the highest number of C-TRAN commuter routes. The project benefits riders directly with improved travel time and reliability and also helps bus operations by improving on-time performance and transit service efficiency. The I-5 BOS project is C-TRAN's second, which has used the freeway shoulder on a segment of SR 14 since 2017 and was the first BOS facility in the bi-state region.



I-5 BOS

Recently Programmed Agency Projects

The TSMO Plan connects the planning process with project implementation. RTC's role in operations planning is intended to identify the best operational projects in coordination with the partner agencies, while the agencies are responsible for project delivery. RTC works closely with the VAST

agency partners to identify projects and develop federal funding applications that leverage local funds for the partner agencies.

Selected operational projects programmed for 2020 contained in the 2020-2023 TIP are listed in the following table. These projects consist of $3.7 million in federal funds leveraging more than $2.6m in local funds.

Project	Agency	Summary	CMAQ	Local
Regional Signal System Expansion	Clark County	This programmed project will add the City of Vancouver, linking Clark County, WSDOT, and the small cities into a shared central signal system.	$700k	$340k
I-205 SB Ramp Meters	WSDOT	Implement ramp meters along the I-205 corridor Padden Parkway to Mill Plain Boulevard. The southbound ramp meters are also part of the Vancouver East Highway Operations Study recommendations for I-205.	$2.5k	$1.5m
Adaptive Signal Expansion	Clark County/WSDOT	Consists of signal controller improvements in the Salmon Creek and Hazel Dell areas as the next step in the operation and expansion of adaptive signals in Clark County.	$500k	$800k

Upcoming 2021-2024 TIP Projects (RTC Board Resolution 10-20-23)

I-5 NB Fourth Plain Ramp Meter: *($74.5k CMAQ)* Builds upon existing southbound I-5 ramp meters for design of a NB ramp meter onto northbound I-5 to include overhead mast arms, ramp signals, electrical services, signs, cameras, detection, conduits, minor paving, striping, fiber optic communication, and other peripheral items to operate the ramp meter.

I-205 SB Ramp Meter: (*$695.1k CMAQ)* Completes the I-205 SB ramp meter project, by adding a ramp meter at 134th to programmed meters on I-205 from Padden Parkway to Mill Plain Boulevard. This project is also part of the Vancouver East Highway Operations Study recommendations for I-205.

WSDOT Ramp Meter

Orchards Sifton Adaptive Signals: *($1.0m CMAQ)* This project adds adaptive signal capability to 8 intersections in the Orchards Sifton vicinity including new ITS cameras and expanded fiber communications.

SUCCESSFUL PARTNERSHIPS

VAST agency collaboration and federal funding through RTC has also led to successful agency partnerships. The following examples demonstrate some of the more noteworthy efforts.

Regional Transportation Data Archive: RTC and the VAST agencies have an ongoing partnership with Portland State University in the regional transportation data archive known as Portal (https://portal.its.pdx.edu/home/). The Portal archive contains, in a single location, historical and real-time transportation data from agencies in the Vancouver-Portland region. This information warehouse is used by researchers, planners, traffic engineers, and the public to look at multimodal transportation performance throughout the region.

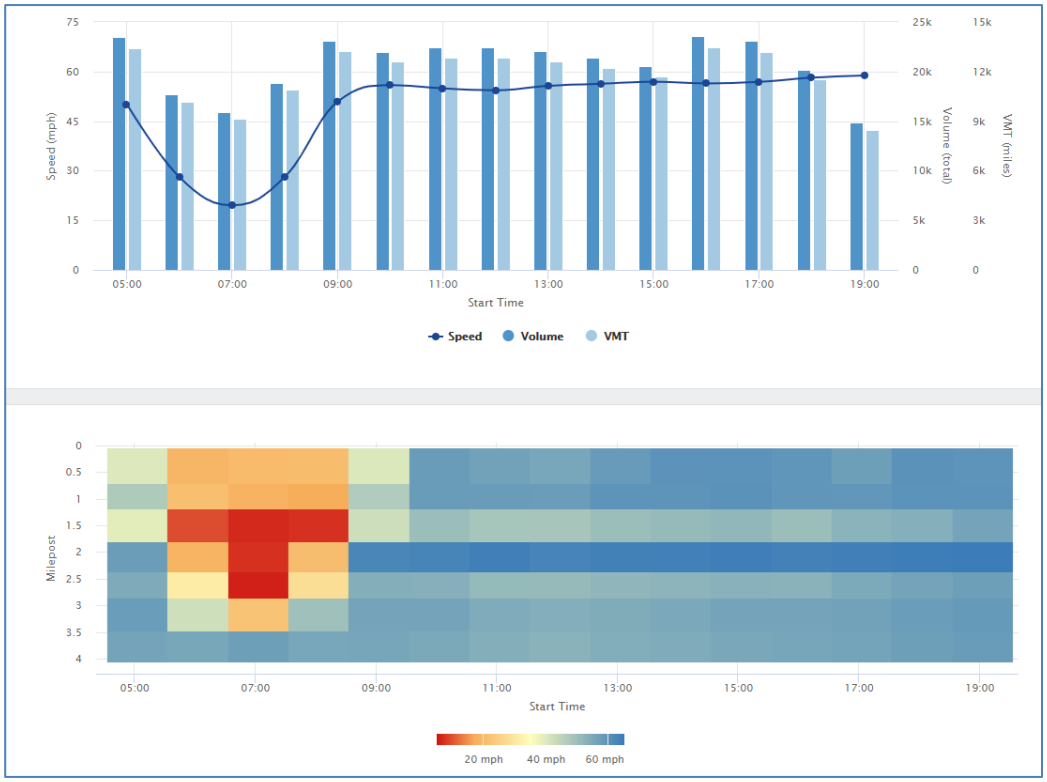
2020 efforts have focused improving the quality and usability of the existing data. One improvement is automatic notification of broken or missing data feeds so they can be quickly discovered and resolved. Second, is the development of a script so that new WSDOT data stations are automatically added to the Portal web site.

A transit data feed has been in place over the over the last 3 years consisting of transit ridership, on and off stop data, and on-time performance from C-TRAN. This data is currently being archived, but not yet published. A series of workshops are being planned in early 2021 with C-TRAN and TriMet staff with goal of designing two new transit data visualizations and publishing one of them in Portal

The primary feature enhancement for 2020 was to freeway travel time. The travel time function is integrated between Washington and Oregon allowing a user to do a single travel time calculation for a corridor covering both states.

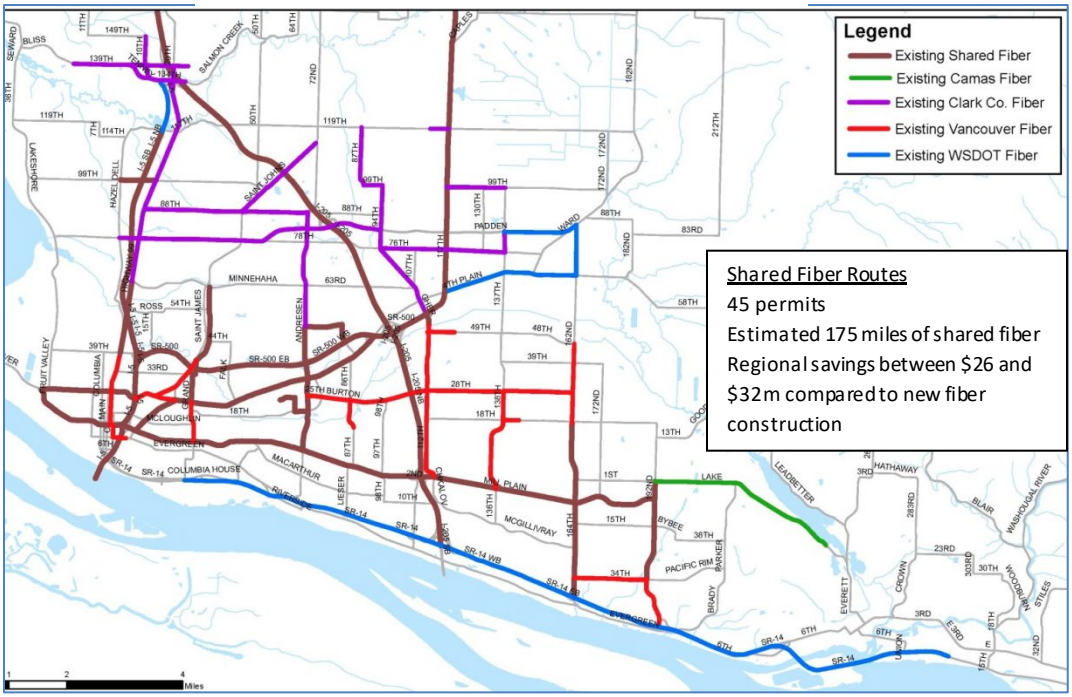
Developed a prototype Congestion Management Process (CMP) report that covered only freeways and used WSDOT data stored in PORTAL. Also began investigation on the use of other data sources, such as probe vehicle data and other 'big' data sources to calculate the metrics in prototype CMP report and to develop consistency between freeway and arterial data reporting.

Portal Data: I-5 Southbound, 78th to Interstate Bridge, 5 am to 7 pm



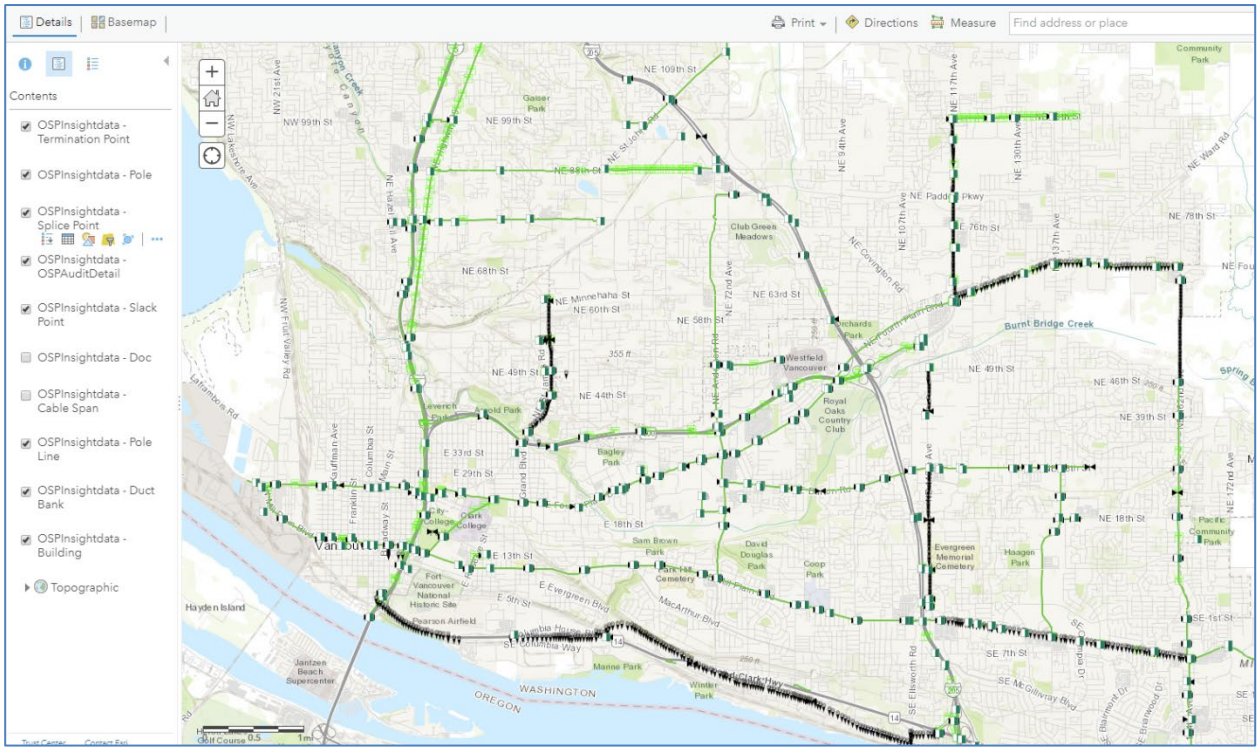
Shared Communications Fiber: VAST agencies have had a Communications and Interoperability Agreement in place since July 2006 that authorizes agencies to enter into fiber asset sharing permits. The agreement has led to better use of existing fiber and communication equipment by sharing available capacity among agencies.

VAST Agency Fiber by Ownership and Shared Routes



Asset Management: The VAST agencies are using a shared GIS mapping cloud database (OSPInSight) that displays communications fiber and equipment as well as their detailed attributes. This asset management tool facilitates and supports fiber sharing among partner agencies and also allows them to manage their own assets more effectively. While the software has been a valuable tool for tracking and sharing fiber assets, it has been difficult to access it from outside the County network, where the database is located. The VAST partners migrated to a full web-based cloud interface that seamlessly allows any approved user to easily view information such as fiber and communication network, fiber ownership, capacity, and availability.

OSP InSight Map of VAST Agency Fiber and Devices



EMERGING PROJECTS and TRENDS

The TSMO plan identifies current and emerging operations issues and trends that are impacting the direction of transportation systems management and operations in the region. The following is a partial list of trends identified in the Plan and how the region and VAST agencies have responded with associated projects, programmed initiatives, and planned activities. These issues will need to be revisited periodically because of the evolving nature of transportation technology and will be reviewed by the VAST members in the next year to both acknowledge recent and future strategy implementations in the region and to consider potential changes to technology and communications.

Emerging Issues and Trends	Related TSMO Project or Initiative
Supporting Emerging Operational Strategies	• SR-14 Bus on Shoulder (BOS) from 164th to I-205 has been in place since October 2017 • The SR-14 expansion project will include peak shoulder running westbound from 164th to I-205 • WSDOT, ODOT and C-TRAN successfully implemented southbound and northbound BOS on the Glenn Jackson Bridge from SR-14 to Airport Way during the Interstate Bridge Trunnion repair project in September 2020. • BOS on GJB SB from SR-14 to Airport Way is continuing as a pilot project through October2021, when it will be evaluated to determine if it should be made permanent. • The Vancouver East Highway Operations Study (VEHOPS) recommended a series of low-cost operational improvements for the I-205 corridor. • The Shared Central Signal System Study was initiated cooperatively between RTC and WSDOT. It will define user needs, the concept of operations and system requirements for WSDOT's Regional Signal System Expansion Project. • The Urban Freeway Corridor Operations Study was completed in 2020, managed by RTC in partnership with WSDOT. The study analyzed strategies including active traffic management, lane restriping and extensions, ramp meters, ramp modifications, and integrated corridor management. The Study and outcomes are described in the "2020 Highlights" section.
Opportunities for Collaborative Initiatives and Shared Infrastructure	• Build upon collaboration to share video, set common standards for fiber and communications infrastructure, development of a common construction notification system, and an integrated central signal system for the region. • Agencies have continued to expand fiber sharing permits with 47 permits signed since 2006 with 184 miles of shared fiber assets.

Smart Communities	• Refers to the application of information technology to increase the connectivity and intelligence of urban infrastructure. This concept, referred to as "Smart Communities", envisions integrated urban infrastructure to provide real-time monitoring information, user feedback, and performance measurement. The result is a safer, more efficient, and more user-responsible urban infrastructure. • The Smart Communities Assessment Project, a multiagency collaboration effort, was completed in October 2020. It compared smart community transportation and technology initiatives in the Vancouver region with its peers and is described under "2020 Highlights".

2016 TSMO PLAN

The TSMO Plan, last updated in 2016, was first developed and adopted by the RTC Board in May 2011. The TSMO Plan guides the implementation of operational strategies and supporting Intelligent Transportation Systems (ITS) technologies for Clark County in Southwest Washington and presents a strategic framework for accomplishing transportation system management objectives. It also supports future ITS technology investments and capital improvements necessary to accomplish those objectives. It is a five to ten-year look that better reflects both the nature of TSMO strategies as viable near-term solutions to operational deficiencies, as well as the rapid evolution of ITS technologies and operations practices

The TSMO Plan was developed around a regional vision for coordinated and integrated operation of the regional transportation system, as articulated in the TSMO Vision Statement below. TSMO programs and investments in Clark County use innovative and proactive operational strategies to maximize the transportation system efficiency. It focuses on lower cost operational and multimodal strategies that are regionally coordinated in an effort to better utilize existing transportation facilities.

TSMO Vision for Clark County

Transportation System Management and Operation (TSMO) strategies promote more efficient and cost-effective use of the existing transportation system, providing increased accessibility, reliability, and safety for people and freight

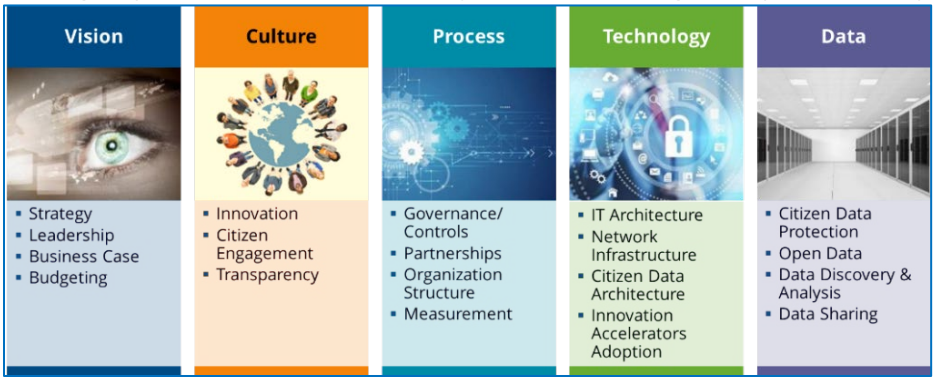
TSMO provides options to address transportation needs where conventional transportation investments may be cost prohibitive, infeasible, or undesirable. In this way, TSMO is highly complementary to other regional transportation strategy and should be considered an integral part of the region's toolkit to address existing and future needs.

2020 Highlights

Smart Communities Assessment

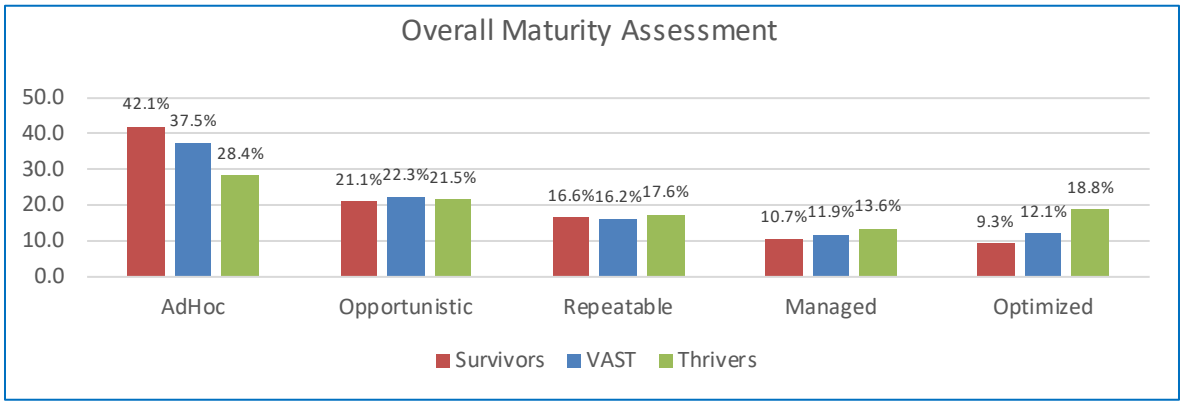
The Smart Communities Assessment project was a multi-agency (RTC, City of Vancouver, Clark County, C-TRAN, and WSDOT) initiative to gather information and conduct a self-assessment regarding the region's capabilities and readiness to adopt strategies and smart technologies for infrastructure in operating the region's transportation networks.

The study was organized into three distinct phases of assessment: 1) leadership engagement interviews; 2) workshops for agency leaders and staff; and, 3) a benchmarking survey. The survey measured agency conditions against key *Maturity Metrics* for digital transformation, which included an assessment of an agency's: Vision, Culture, Process, Technology, and Data.



The multi-dimensional benchmarking survey was fielded with sponsor agency policy and technical staff, the Regional Technical Advisory Committee members, and was transmitted to the RTC Board of Directors. The findings of the survey were analyzed compared to national peers, establishing a benchmark of regional awareness, readiness, and implementation of smart communities' strategies.

These metrics are used internationally in a *maturity model*, which was ultimately used to gauge and benchmark each agency and the region against its national peers. The study found that RTC's regional partners benchmark *in the middle of the pack* when compared to national peers. Key study findings and recommendations suggest the region's smart community investments, staff capacity and agency culture, and buy-in can be improved.



Additional smart technology deployment should be a focus of VAST program partners in the years ahead and used by regional agencies to further capacity building, adoption and implementation of strategies.

Urban Freeway Corridor Study

The Urban Freeway Corridor Operations (UFCO) Study was completed in 2020. It identified near term operational and system management improvements focused on low cost capital improvements and technology-based traffic management tools to optimize the flow of traffic and maximize available capacity.

TYPE OF STRATEGY	SPOT	SYSTEM
Ramp Closure Ramp closures remove an access point to the freeway and can be implemented permanently or on an as-needed basis. Ramp closures can reduce friction on the mainline by removing an access point to the freeway.	X	
Auxiliary Lane An additional lane space for travel between entrance and exit ramps. Allows traffic to adjust their speed before making a maneuver to enter or exit the freeway. These improvements help to reduce friction at merge and diverge locations on the freeway and decrease the possibility for conflicts that contribute to freeway congestion.	X	
Acceleration/Deceleration Lanes Encourage smooth increases in traffic flow by allowing traffic to adjust to the proper speed before merging into or out of mainline traffic. Extending these lanes separates slower traffic from the mainline and improves safety.	X	
Restriping Utilizes the existing pavement and reconfigures existing striping to accommodate changes in traffic distribution that may have occurred since the freeway was originally designed.	X	
Static Signs Providing advance or increasing visibility of existing signs can improve driver awareness and provide ample time for a driver to make a decision.	X	X
Temporary Shoulder Use Involves utilizing the roadway shoulder (inside or outside) as a travel lane during congested periods to alleviate recurrent (bottleneck) congestion for all or a subset of users, such as transit buses. Temporary shoulder use can also be used to manage traffic and congestion immediately after an incident.	X	X
Variable Speed Utilizing regularly spaced, over-lane speed and lane control signs to dynamically and automatically reduce speed limits in areas of congestion, construction work zones, accidents, or special events in order to maintain traffic flow and reduce the risk of collisions due to speed differentials at the end of the queue and throughout the congested area.	X	X
Queue Warning Utilizing either side-mount or over-lane signs to warn motorists of downstream queues, thus effectively utilizing available roadway capacity and reducing the likelihood of collisions related to queuing.	X	
Traveler Information Providing estimated travel time information and other roadway and system conditions reports in order to allow travelers to make better pre-trip and in-route decisions.	X	X
Ramp Metering Ramp metering manages the amount of traffic entering the freeway.	X	X
Managed Lane Managed lane involves dynamically indicating the proper use of individual traffic lanes as warranted. Managed lanes can provide advance warning of closures in order to give drivers time to safely merge into adjoining lanes.	X	X
Incident Management Identifying incidents more quickly, improving response times, and managing incident scenes more effectively.	X	X

The study reviewed freeway routes in Clark County consisting of: I-5 from the Columbia River to 179th; I-205 from the Columbia River to I-5; SR-14 from I-5 to 192nd; and SR-500 from I-5 to Fourth Plain, including north from SR-500 on SR-503 up to Padden Parkway.

Recommended projects include a mix of strategies that fell into two major categories: 1) Spot strategies, such as an auxiliary lane or restriping, are intended to address bottlenecks; and 2) System strategies, such as variable speeds and electronic signage, have a broader application and address overall corridor operations. Other strategies, like ramp metering, are applied at spot locations, but their benefits are seen mainly when applied along a full corridor.

The Study report consists of a tiered set of strategy recommendations with detailed information sheets for each strategy showing its relative benefits to operations, safety and cost. The tiered set of strategy recommendations are not assigned rankings. They are intended to be flexible and provide guidance to WSDOT in prioritizing investment in selecting beneficial strategies from the tiers that align with specific system needs and existing and future priorities. Tier one strategies are generally lower cost, ready to implement, or address existing needs, and in some cases, are already programmed. Tier three strategies, may have higher costs or address needs just starting to emerge or that are anticipated in the near future. It is available for download at: https://www.rtc.wa.gov/reports/misc/rtcUFCOStudy.pdf