VANCOUVER AREA SMART TREK (VAST)
REGIONAL INTELLIGENT TRANSPORTATION ARCHITECTURE REPORT

2022 REGIONAL ITS ARCHITECTURE UPDATE

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PREPARED FOR:

Southwest Washington Regional Transportation Council

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

The Vancouver Area Smart Trek (VAST) Intelligent Transportation Systems (ITS) Regional Architecture is the framework for planning, defining, and integrating ITS within the VAST region, which is generally the Vancouver, Washington metropolitan area and Clark County. It enables the VAST partner agencies to support the region's vision, mission, and values within an interoperable context that maximizes the return on ITS investment. ITS involves the application of advanced technologies and proven management techniques to support many goals and objectives, particularly related to managing congestion, improving reliability, providing services to travelers, enhancing safety, reducing greenhouse gas emissions, supporting equitable mobility goals, and assisting transportation system operators with management techniques.

The ITS architecture is a regionally-focused summary of all the ITS strategies, systems, and interconnections operated and/or planned by the VAST region's agency partners. It provides a framework for understanding and simplifying more complex relationships between the transportation agencies that share information and technologies to operate and maintain the transportation system.

The VAST Regional ITS architecture described in this report is maintained in a free-to-use database application developed and maintained by the Federal Highway Administration (FHWA), known as Regional Architecture Development for Intelligent Transportation (RAD-IT)[1]. The RAD-IT application assists planners and system integrators in the development of regional and project architectures using the National ITS Architecture as a starting point. The National ITS Architecture and its requirements are explained in greater detail in the Section 2.

This 2022 update to the architecture covers a five-year period for Fiscal Year 2022 through Fiscal Year 2026. This section describes what was updated since the previous 2011 architecture update, an overview of the region, and elements included in this report.

1.1 WHAT WAS UPDATED

This Regional ITS Architecture update incorporates changes implemented by the local area partner agencies (ITS projects deployed since 2011 and projects planned for future implementation) as well as changes to ITS architecture at the national level. Since the 2011 regional ITS architecture update, FHWA has restructured the National ITS Architecture, which is now called the Architecture Reference for Cooperative and Intelligent Transportation (ARC-IT)[2]. Technology continues to advance at a rapid pace and new features continue to be added to ARC-IT as the industry evolves.

1.2 WHO IS VAST?

For over 20 years, VAST has helped the region harness the benefits of technological innovation and regional approaches to transportation system management and operations (TSMO), a regional

[1] https://www.arc-it.net/html/resources/radit.html

[2] http://arc-it.net

vision for coordinated and integrated operation of the regional transportation system. RTC implements the program in coordination with the: City of Vancouver, WSDOT, Clark County, and C-TRAN. This unique partnership promotes interagency collaboration to improve the management and operations of the multi-modal transportation system. VAST has helped agencies, identify, evaluate, fund, implement, and operate emerging transportation technologies for the benefit of the region's residents.

This role as a facilitator of transportation innovation is more important than ever, as emerging IT, transportation technologies, and evolving mobility service models continue to impact how transportation is delivered in the region and the Nation. With continued population growth and transportation system pressures, coupled with rapidly changing IT technologies and increasingly connected vehicles and devices, it becomes ever more important to identify and plan for emerging technologies and to leverage partnerships (both public and private) to realize the greatest benefit of emerging capabilities.

The VAST Regional ITS Architecture is aligned with the Region's TSMO program, which was initiated to support 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. The Region's updated TSMO Vision is shown below.

> *TSMO strategies promote more efficient and cost-effective use of the existing multimodal transportation system, providing increased accessibility, reliability, safety, and equitable mobility options for people and freight.*

1.3 EMERGING PRIORITIES IN THE REGION

Since the last ITS Architecture update in 2011, several emerging trends and priorities have been identified by VAST partner stakeholders (Table 1), which are reflected in the selection of ITS strategies and near-term actions noted in this Architecture.

TABLE 1. EMERGING TRENDS AND PRIORITIES FOR THE VAST REGION

EMERGING PRIORITIES	DISCUSSION
MULTI-DISCIPLINE COORDINATION	• Increased importance of multi-discipline coordination to deliver TSMO strategies, both within organizations and among agency partners. • Need internal buy-in within an organization (cultural) as well as operational coordination between agencies to deliver regional solutions (e.g., deploying shared signals, jointly-operated TMC)[3].

[3] The VAST regional jointly-operated Traffic Management Center (TMC) will be discussed in more detail in section 3.6.

EMERGING PRIORITIES	DISCUSSION
ASSET MANAGEMENT	• Increased need for asset management/construction activities tracking, which support keeping partner agencies and the public informed about work activities.
PRIVATE SECTOR MOBILITY DATA SERVICE DELIVERY	• Recognizing private sector mobility data providers and capabilities of the services they provide (e.g., systems, data, managed services) while avoiding public sector duplication where feasible.
PARTNERING WITH THE PRIVATE SECTOR MOBILITY PROVIDERS	• Identifying opportunities to partner with private sector service providers to deliver mobility solutions where such opportunities are aligned with the Region's TSMO vision.
CONNECTED, AUTOMATED, SHARED, ELECTRIC (CASE)	• Adapting to and identifying opportunities related to emerging CASE technologies: ○ **Connected:** Impacts to operations, specifically around communications infrastructure (network security, reliability) and roadside technology. ○ **Automated:** Impacts to planning, considering automated vehicles' impact on future travel demand patterns and road and curb space needs. ○ **Shared:** Impacts to policy and planning, considering how best to allocate street and curb space and balance the public and private provision of mobility services. ○ **Electric:** Emerging area, considering internal fleet and public vehicle charging solutions, planning, design, deployment, emerging standards.
BROADBAND AND 5G	• Increased importance of broadband communications and continued expansion of 5G, enabling connected vehicles (CV) and related technologies and opportunities for PPPs to build out fiber for agency use.

1.4 REPORT ELEMENTS

This report provides:

- **Overview of the National ITS Architecture**—primary components, available service packages, and Federal ITS regulations compliance checklist
- **The VAST Regional ITS Architecture**—geographic boundary, timeframe, stakeholders, scope, agreements, accomplishments since the 2011 plan, operational concepts, selected service packages, and system inventory
- **Early Action Plan**—prioritized near-term TSMO activities

- **Maintenance Plan**—procedures and activities to maintain the ITS architecture

2 NATIONAL ITS ARCHITECTURE REVIEW

The U.S. Department of Transportation developed the National ITS Architecture to ensure that intelligent transportation systems deployed around the country can communicate with one another and share information in order to maximize the return of investment in ITS.

2.1 ARC-IT OVERVIEW

The FHWA and FTA published a Final Rule and Policy[4] that all agencies seeking federal funding for ITS projects must develop a regional architecture that is compliant with the National ITS Reference Architecture (ARC-IT) and be able to demonstrate that the funded project was included in said architecture. As of this writing, ARC-IT is now in Version 9.0[5] and has continued to evolve as ITS has expanded and evolved.

ARC-IT provides a common framework for planning, defining, and integrating intelligent transportation systems. Developed as a reference architecture, ARC-IT provides the model on which all current regional ITS architectures are developed. It is a mature product that reflects the contributions of a broad cross-section of the ITS community (transportation practitioners, systems engineers, system developers, technology specialists, etc.).

At its core, an ARC-IT-based architecture defines:

- The **functions** that are required for ITS applications (e.g., gather traffic information or request a route)
- The **physical entities** or subsystems where these functions reside (e.g., the roadside or the vehicle)
- The **information flows** that connect these functions and physical subsystems together into an integrated system

Regional ITS architectures are not intended to specify the particular technologies that will be used in ITS deployments; they are instead used to define the *functions* that technologies must perform. ARC-IT provides the structure for defining general ITS functional requirements during the planning and design process.

2.2 REGIONAL ARCHITECTURE USE

A regional ITS architecture supports three of the major steps of the transportation lifecycle—planning, programming, and implementation—as shown in Figure 1.

[4] Intelligent Transportation System Architecture and Standards: Final Rule. FHWA Docket No. FHWA-99-5899. U.S. Department of Transportation, Federal Highway Administration, Jan. 8, 2001

[5] Link to the ARC-IT website: http://arc-it.net

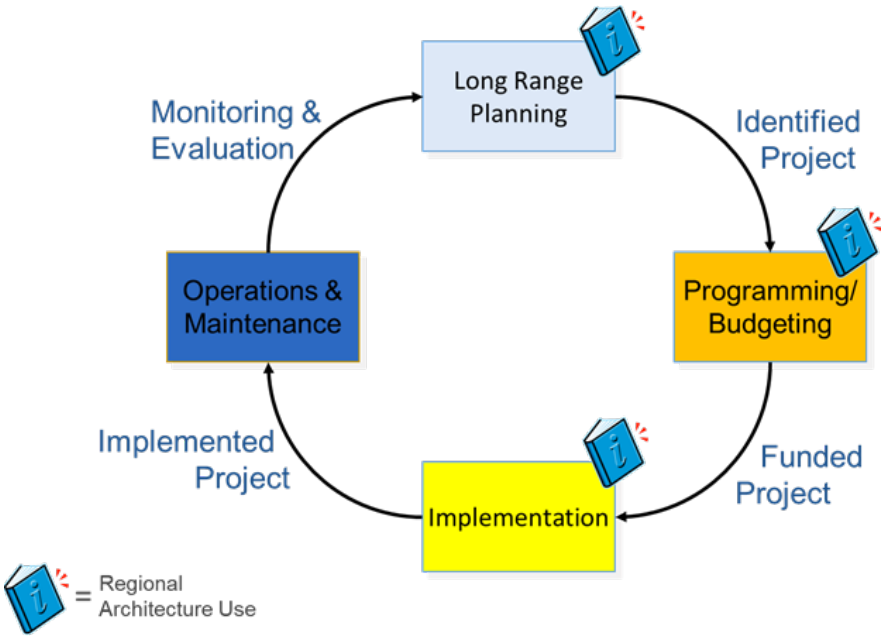

FIGURE 1. REGIONAL ITS ARCHITURE USE THROUGHOUT THE TRANSPORTATION LIFECYCLE[6]

- **Long Range Transportation Planning:** A regional architecture provides a means by which peer agencies can jointly define their vision for ITS development based on regional goals and objectives. Using the regional ITS architecture, a region can plan for technology application and integration to support more effective planning for operations. The Regional Architecture Development for Intelligent Transportation ***(RAD-IT)*** is the software database tool agencies create, update, and maintain their regional ITS architecture.
- **Programming/Budgeting:** The regional ITS architecture provides a high-level description of ITS projects, which can serve as an input the definition and prioritization that occurs during programming/budgeting.
- **Project Development:** A well-maintained regional architecture that is created and maintained using RAD-IT provides context for ITS projects and the initial input for the systems engineering for a project. Once a project has been articulated in RAD-IT, the systems engineer can use the Systems Engineering Tool for Intelligent Transportation ***(SET-IT)***, the companion software database software tool to RAD-IT, to develop project specific output. Project-relevant information from RAD-IT can be used within SET-IT to support not only the development of a project architecture, but also the systems engineering documentation such as Concept of Operations and System Architecture Document.

Note that for the purposes of regional ITS architecture, RAD-IT, not SET-IT, is the tool that is used. Figure 2 shows how both RAD-IT and SET-IT fit into the process described above.

[6] Source: https://www.arc-it.net/html/raguide/raguide-c5.html

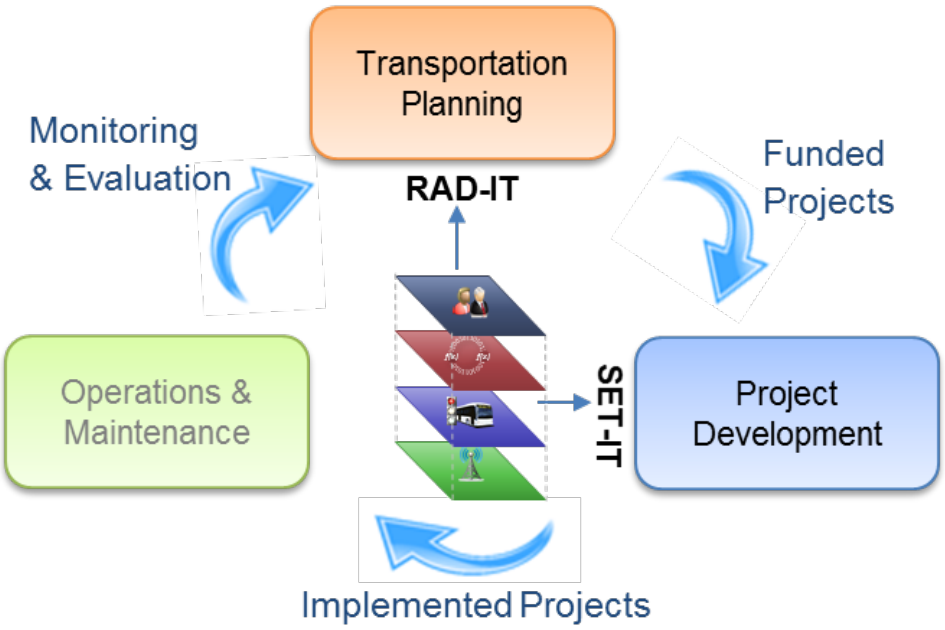

FIGURE 2. RAD-IT AND SET-IT USE IN THE TRANSPORTATION LIFECYCLE[7]

2.3 PRIMARY ARCHITECTURE COMPONENTS

The physical architecture provides a framework for the physical elements of ITS. These elements include management centers, computer systems, roadway equipment, vehicles, mobile devices, people, etc. Adapted from the most recent version of ARC-IT, Figure 3 illustrates the complete set of physical components available in the National ITS Architecture. Elements are organized into one of five subsystem classes:

- **Personal:** Systems or applications that provide information to travelers (e.g., personal information devices, like a traveler's smartphone)
- **Center:** Systems or applications that process and use information to control the transportation network (e.g., Clark County Traffic Management Center)
- **Vehicle:** Systems or applications that provide driver information and safety on vehicle platforms (e.g., C-TRAN fixed route bus)
- **Field:** Systems or applications deployed in the field that collect transportation data and are ideally controlled from a center (e.g., WSDOT Southwest Region traffic signal controller)
- **Support:** Systems or applications that provide data management services to support operations (e.g., PORTAL archived data system)

[7] Source: https://www.arc-it.net/html/archuse/archuse.html

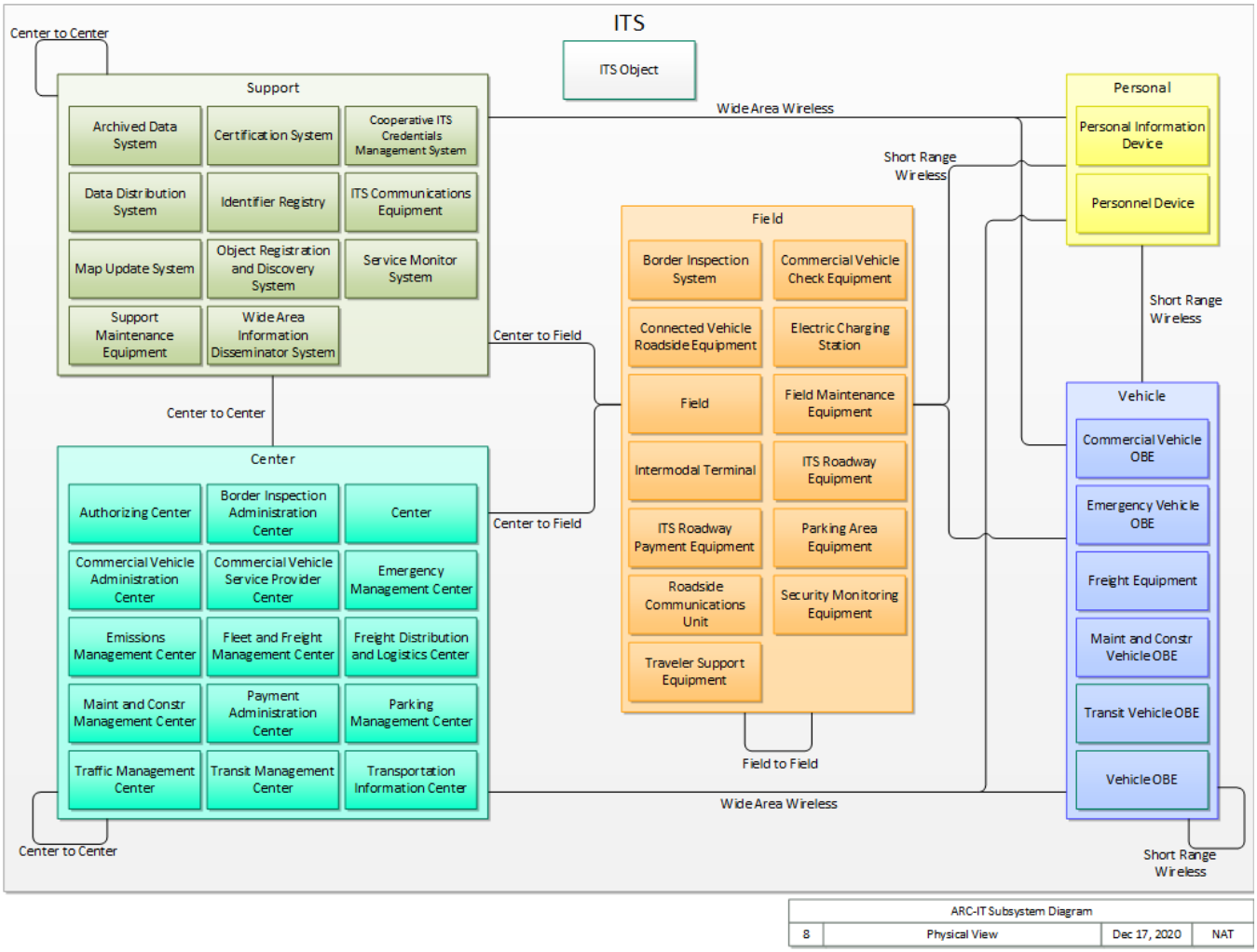

FIGURE 3: PHYSICAL VIEW OF THE NATIONAL ITS REFERENCE ARCHITECTURE (ARC-IT 9.0)

Source: https://local.iteris.com/arc-it/html/viewpoints/physical.html

2.4 ITS SERVICE PACKAGES

Service packages, formerly known as market packages, are ARC-IT's primary means to represent how a region's specific ITS systems and devices are deployed and exchange information with one another to deliver a real-world transportation management service (or function). Service packages are typically presented in a diagram format, using colored boxes to identify the agency systems and core functions used to deliver the service, and arrows to indicate the information exchanged between different systems. Figure 4 is an example of the generic ARC-IT service package diagram for transit signal priority (TSP). Key elements of the diagram are the subsystems (the large colored boxes), the functional objects associated with each subsystem (the small rectangular boxes), and the information flows (the arrows).

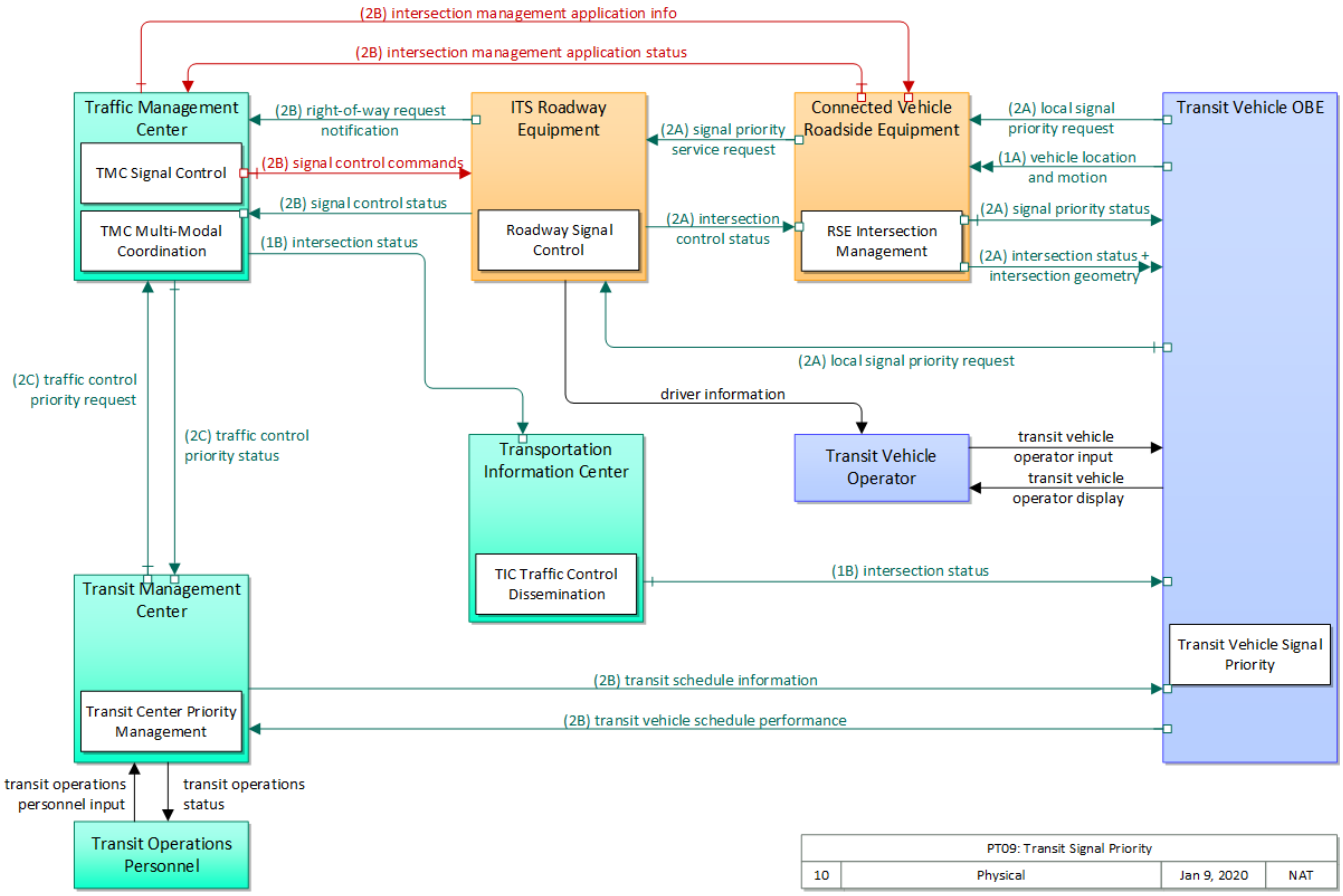

FIGURE 4. PT09: TRANSIT SIGNAL PRIORITY (TSP) SERVICE PACKAGE DIAGRAM (ARC-IT 9.0)

Source: https://www.arc-it.net/html/servicepackages/sp79.html

The current version of ARC-IT defines 150 unique service packages to reflect a wide range of typical ITS services, from basic functions like transit vehicle tracking and traffic signal control to more advanced ones like speed harmonization and intersection safety warning/collision avoidance.

A complete listing of the latest ARC-IT service packages can be found on the National ITS Architecture website[8].

A key step in the regional ITS Architecture development process is selecting which service packages are applicable to the agencies in the region, and the status of each—whether currently operated or planned/future. Once the applicable service packages are identified, each is tailored to reflect the actual (or planned) systems and operations context of the region. This entails naming the individual stakeholders, systems, and ITS elements within the region that will deliver the given service, as well as the key information that is exchanged between actual systems.

2.5 COMPLIANCE WITH FEDERAL ITS REGULATIONS

Effective on April 8, 2001, the Federal Highway Administration (FHWA) issued regulations and the Federal Transit Administration (FTA) issued a policy that requires ITS projects funded through the Highway Trust Fund to conform to the National ITS Architecture and applicable standards. Conformance with these Federal ITS requirements included the development of a Regional ITS Architecture is based upon the National ITS Architecture and serves as a guide to be consistent with National ITS strategies and projects contained in applicable transportation plans. Subsequent completion of systems engineering analysis and ITS projects within a Region must adhere to the developed Regional ITS Architecture.

The Federally required elements of the Regional ITS Architecture for the VAST region area are listed below, with associated references to where they can be found:

- Description of the Region (refer to Section 3.1 *Geographic Boundary* and Section 2 of the 2011 VAST TSMO Plan)
- Identification of Stakeholders (refer to Table 2 in Section 3.3 *Stakeholders* and the RAD-IT Architecture file)
- Operational Concept (refer to Section 3.6 *Operational Concept*)
- Agreements (refer to Section 3.4 *Agreements* and the RAD-IT Architecture file)
- System Functional Requirements (refer to the RAD-IT Architecture file)
- Interface Requirements and Information Exchanges (refer to the RAD-IT Architecture file)
- Identification of ITS Standards (refer to the RAD-IT Architecture file)
- Sequence of Projects Required for Implementation (refer to Section 4 *Early Action Plan*)

[8] Service Packages. U.S. Department of Transportation. https://local.iteris.com/arc-it/html/servicepackages/servicepackages-areaspsort.html

3 VAST REGIONAL ITS ARCHITECTURE

The VAST Regional ITS Architecture describes the existing and planned ITS services and functions, incorporates the relevant subsystems and organizations, and describes the information exchanges (planned or existing) between them. As described in Section 2.2 *ITS Service Packages*, these relationships are illustrated by tailoring specific National ITS Architecture diagrams to VAST needs, called service package diagrams. From these tailored diagrams, a deployment plan structure may be established to provide a basis for long-term transportation planning for the regional agencies. With this structure in place, ITS projects can be more easily mainstreamed into the planning process with greater stakeholder buy-in.

This VAST Regional ITS Architecture provides:

1. The geographic boundary of the VAST region
2. The relevant timeframe for this update
3. An identification of the region's primary transportation operations stakeholders
4. The existing agreements between regional partners used to support interagency cooperation and deliver transportation services
5. Highlights of key ITS implementations and other accomplishments since the previous Regional ITS Architecture update in 2011
6. Operational concepts and applicable service packages for the region
7. A listing of regional ITS inventory elements

A high-level view of the VAST ITS architecture is shown in Figure 3 on the following page. This diagram, developed as part of the regional ITS architecture update, identifies the major ITS elements operated by the VAST stakeholders. It groups the major physical elements into the five classes (Support, Centers, Field, Personal, and Vehicles) and indicates how these elements communicate with one another. Elements shown with solid outline are existing; dashed outline indicates planned.

VAST Regional ITS Architecture Overview

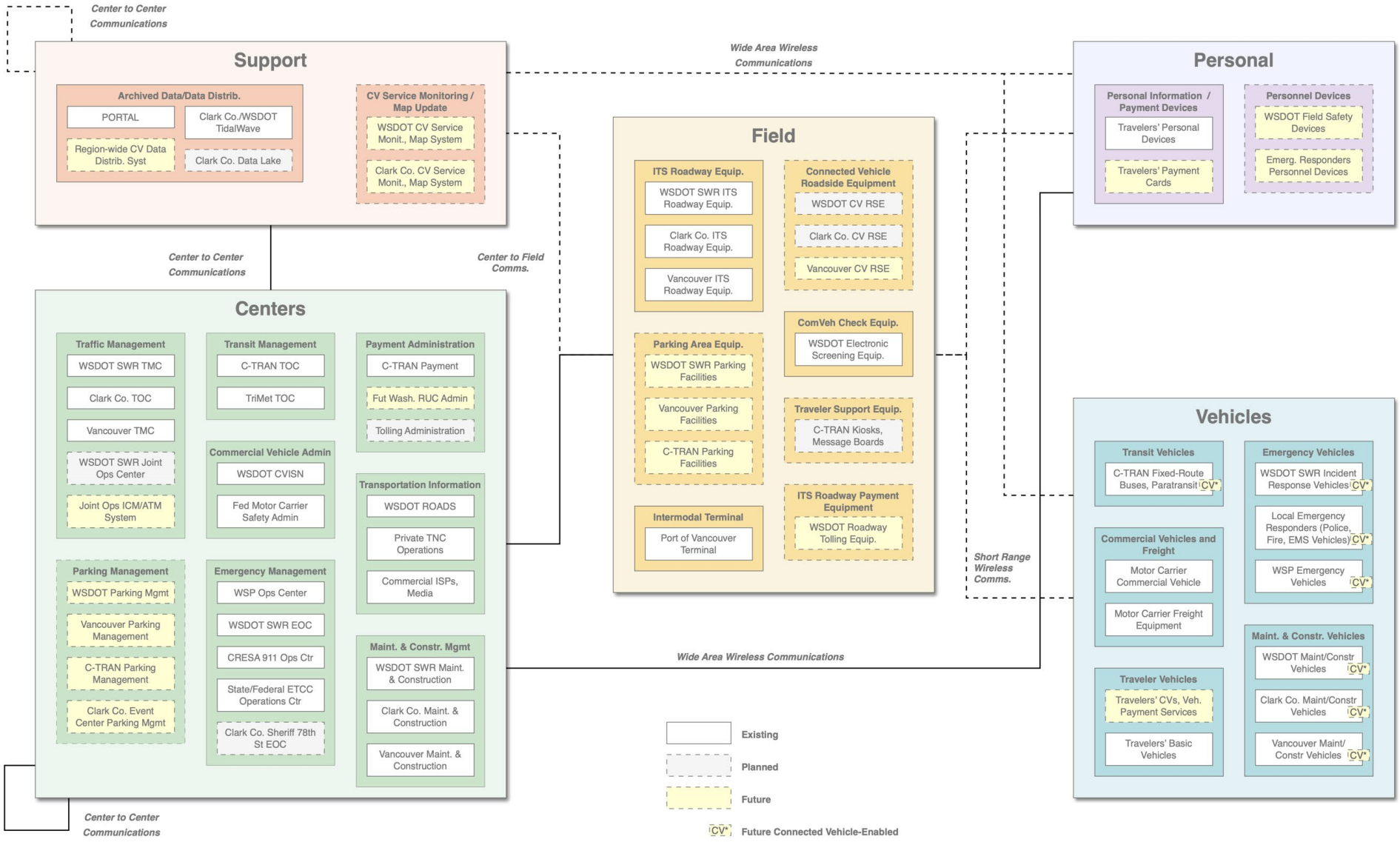

FIGURE 5: HIGH-LEVEL VAST REGIONAL ITS ARCHITECTURE

3.1 GEOGRAPHIC BOUNDARY

The geographic area covered by the VAST Regional ITS Architecture encompasses the urbanized areas and major transportation corridors of Clark County. Participating agencies recognize that other isolated, rural, or urbanizing areas of the County that have operational needs may also be current, or future, candidates for implementation of TSMO strategies. Figure 2 shows the general vicinity of the VAST administered area covered by the regional ITS architecture update.

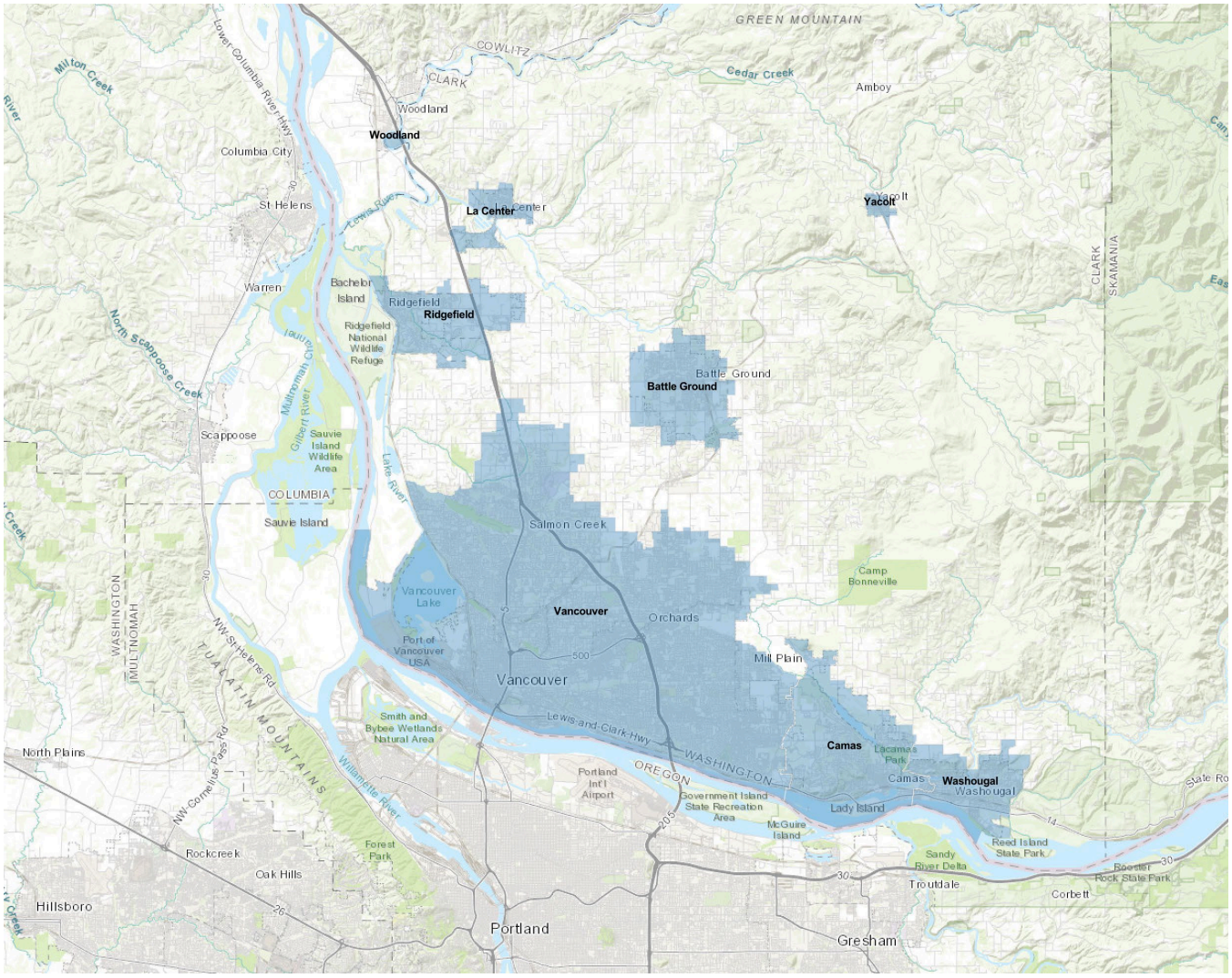

FIGURE 6. CLARK COUNTY URBAN GROWTH AREA BOUNDARY

Source: *Clark County Urban Growth Area Boundary Map*.
Link:https://hub-clarkcountywa.opendata.arcgis.com/datasets/ClarkCountyWa::urban-growth-area-uga-boundaries/about

3.2 TIMEFRAME

This update to the VAST Regional ITS Architecture covers a five-year timeframe, from FY 2022 to FY 2026.

3.3 STAKEHOLDERS

Stakeholders are the backbone of the VAST Regional ITS Architecture. Consensus among them has helped the Region successfully deploy ITS projects in the past and will continue to ensure coordination and integration of future ITS endeavors. Two types of stakeholders are present in VAST: primary and expanded. Primary stakeholders include the transportation management, public transportation, and public safety agencies, who primarily own and operate ITS in the region. Expanded stakeholders include other public agencies, private sector organizations, and travelers/system users. Table 2 lists the VAST ITS stakeholders (primary transportation stakeholders for the region indicated in **bold**).

TABLE 2. VAST REGIONAL ITS ARCHITECTURE STAKEHOLDERS

STAKEHOLDER CATEGORY	STAKEHOLDER
TRANSPORTATION AND TRAFFIC AGENCIES	**C-TRAN**
	City of Camas
	City of Vancouver
	Clark County
	Oregon Department of Transportation (ODOT)
	TriMet
	WSDOT Headquarters (HQ)
	WSDOT Other Regions
	WSDOT Southwest Region (SWR)
EMERGENCY MANAGEMENT	Clark County Sheriff
	Clark Regional Emergency Services Agency (CRESA)
	Local Emergency Responders
	Washington State Emergency Management
	Washington State Patrol (WSP)
PORTS AND FREIGHT	Commercial Vehicle Information Systems and Networks (CVISN) Program
	Federal Motor Carrier Safety Administration
	Motor Carriers
	Port of Vancouver
	Railroads
OTHER	Media
	Portland State University
	Southwest Washington Regional Transportation Council (RTC)
	Third-Party Information Service Providers
	Transportation Network Companies
	Travelers
	Vancouver Area Smart Trek (VAST)

3.4 AGREEMENTS

This section identifies the existing agreements among the different VAST stakeholders, agencies, and organizations, from existing and planned (near-term) projects that are relevant to the regional ITS architecture. These agreements are typically used to define coordination requirements and levels of involvement to deliver regional traffic control services that may span multiple agencies, organizations, cross-jurisdictional boundaries, and/or public-private partnerships. Additionally, the list of agreements may be leveraged to add stakeholders to current projects and programs, or may be used as examples for future projects. Rather than the technologies, the focus is usually on the scope of service as well as specific agency responsibilities of the various components for the service itself. For example, agreements can describe the information that each agency needs to exchange in order to meet the goals and expectations of the others, rather than defining how the delivery of that information will technically occur.

Table 3 below summarizes the ongoing, planned, and potential agreements related to ITS services in the regional ITS architecture. This list is organized by the ITS service area (as applicable), the stakeholders involved, the type of agreement, and a high-level description of the agreement.

TABLE 3. EXISTING, PLANNED, AND POTENTIAL ITS SERVICE AGREEMENTS

AGREEMENT	STAKEHOLDERS	STATUS	DESCRIPTION
VAST STEERING COMMITTEE MOU	• WSDOT SWR • Clark County • City of Vancouver • C-TRAN • RTC	Ongoing	This Memorandum of Understanding (MOU) formed the VAST Steering Committee and defines how the agencies work together on ITS policy, plans, programs, and projects.
COMMUNICATIONS INFRASTRUCTURE COMMITTEE MOU	• WSDOT SWR • Clark County • City of Vancouver • C-TRAN • RTC	Ongoing	This communications-focused MOU formed the Communications Infrastructure Committee and defines how partners work together on ITS infrastructure and devices.
COMMUNICATIONS INTEROPERABILITIY AGREEMENT	• WSDOT SWR • Clark County • City of Vancouver • City of Camas • C-TRAN • RTC	Ongoing	This agreement provides authority to agency staff to enter into fiber and communications sharing agreements (permits) with the CIC for use by VAST member agencies. The agreement is periodically amended to update contract managers, permit formats, etc.

AGREEMENT	STAKEHOLDERS	STATUS	DESCRIPTION
OPSINSIGHT LICENSE USE AGREEMENT	• WSDOT SWR • Clark County • City of Vancouver • C-TRAN • RTC	Ongoing	This agreement is for the OSPInSight cloud web-based database mapping tool that is used and shared among all the VAST agencies. The tool displays communications fiber and equipment as well as their detailed attributes. The agreement further supports fiber sharing among agencies and allows agencies to manage their own assets more effectively. The license is reviewed and renewed annually.
REGIONAL TRAFFIC CONTROL	• WSDOT SWR • Clark County • City of Vancouver • Other local transportation agencies	Planned	Joint sharing and potential control of traffic signals, detectors, cameras, ramp meters, and dynamic message signs has long been occurring between WSDOT, local cities, and counties. The Joint Operations Center and the shared central signal system initiatives currently underway represent a more formalized implementation of joint operations and regional traffic control.
ELECTRONIC TOLL COLLECTION	• WSP • Washington State Travel and Tourism • Department of Licensing		WSDOT is implementing an agreement with the Department of Licensing to allow for license plate lookup to identify toll violators. Others include agreements with the State Treasurer and financial institutions for customer payment processing; agreements with the State Patrol for issuing Notices of Infraction for nonpayment of tolls, patrolling tolled facilities for violators, and providing security; and agreements with the Courts for processing violations. Similar agreements will be made with neighboring states.
JOINT OPERATIONS POLICY STATEMENT (JOPS)	• WSP • WSDOT SWR maintenance & Construction		The WSDOT/WSP Joint Operations Policy Statement (JOPS) formalizes the close working relationship between WSDOT and WA State Patrol.

3.5 ACCOMPLISHMENTS SINCE THE LAST ARCHITECTURE UPDATE

The VAST region has advanced its ITS practice significantly since the previous Regional ITS architecture update in 2011. Table 4 on the following pages shows active and completed ITS project proposed in the last architecture as well as those that were initiated since then. Projects are organized by functional area. Project status is indicated as one of four categories:

Complete	Project successfully completed

Underway	Project initiated but not yet completed
Planned	Project identified but not yet begun
Ongoing	Active project or initiative that is indefinite in nature (e.g., ongoing maintenance activities, controller replacements)

TABLE 4. ITS PROJECT ACCOMPLISHMENTS (2011-2021)

Project/Initiative Name	Description	Lead Agencies	Project Status	Notes
Commercial Vehicle Operations (CVO)				
Truck Traffic Signal Priority	• Expand truck signal priority to other priority truck travel/safety locations (e.g., Padden/94th) • Improve signal integration with RR grade crossings for safety	• WSDOT SWR • Clark Co.	**Underway**	• Mill Plain/Franklin TTSP Pilot Project completed, to implement more broadly
Freight Data Collection	• Improve detection station capability around the region to classify vehicles by length; incorporate into Portal • Expand number and coverage of count stations with freight data collection capabilities • Incorporate fright data and query capabilities into PORTAL	• WSDOT SWR	**Complete**	• Portal has incorporated vehicle lengths data
Data Management (DM)				
Regional data archival via PORTAL	• Determine type and range of potential data from existing and planned ITS infrastructure • Identify data archiving projects and work to implement ITS network feeds to store data in the PORTAL data archive	• WSDOT SWR • Clark Co. • City of Vancouver • C-TRAN	**Ongoing**	
Data Visualization Tools	• Work with PORTAL to develop data visualization and analysis tools	• Clark Co. • C-TRAN	**Ongoing**	
Implement SPaT data feeds	• Work with traffic signal vendor to develop an open data feed for sharing SPAT data to automobile OEM's and CAV system suppliers	• Clark Co.	**Underway**	
Performance Measures in PORTAL	• Work with PORTAL to implement automated performance measurement tools and data analytics, based on regional system management goals and emerging USDOT guidance	• WSDOT SWR • Clark Co. • City of Vancouver • C-TRAN	**Underway**	• C-TRAN ridership/on-time performance, and on/off data being added. C-TRAN and PSU are working on details/final agreement • Clark County STEVE 2 study underway to implement performance measures data lake
Clark County Data Lake	• Deploy Data Lake to capture, store, and analyze key operational data and performance measures	• Clark Co.	**Underway**	• STEVE Phase 2 underway to Data Lake environment and integrate first data stream (high-resolution controller data) • STEVE Phase 3 (planned) to integrate additional data sources, provide operational dashboards

Project/Initiative Name	Description	Lead Agencies	Project Status	Notes
Public Safety (PS)				
Initial Deployment Corridor Incident Event Management	• Implement Corridor Incident and Event Management Plan • Develop policies and procedures for bridge lifts, traffic incidents, and other related operations on I-5, affecting current agency roles, operating procedures*		**Underway**	
Consolidated EVP/TSP Central Management Systems	• Jointly operate a single central management system for managing EVP/TSP (Emergency Vehicle Pre-emption and Transit Signal Priority) across the region, reducing multiple redundant systems, sharing costs, and enabling new functionality	• WSDOT SWR • Clark Co. • City of Vancouver • C-TRAN	**Underway**	
Public Transportation (PT)				
Bus Locating System	• Install AVL equipment on buses and software at the transit control center.	• C-TRAN	**Complete**	
Automatic Passenger Counter	• Deploy automated passenger counters on all buses in the C-TRAN fleet.	• C-TRAN	**Complete**	
Implement GTFS-realtime Transit Data	• Enhance C-TRAN's existing GTFS data by implementing a GTFS-realtime feed to share realtime transit info with the public through Google Transit and other third party apps	• C-TRAN	**Complete**	
Real-Time Transit Arrival Information	• Upgrade CAD/AVL system and enhance reporting capabilities • Extend bus arrival information to riders through expanded web and phone applications • Implement GTFS-realtime feed	• C-TRAN	**Underway**	
VAST Regional Transit Priority Plan	• Develop a regional Transit Signal Priority (TSP) Plan	• WSDOT SWR • Clark Co. • City of Vancouver • C-TRAN	**Complete**	

Project/Initiative Name	Description	Lead Agencies	Project Status	Notes

Priority Detector Upgrade	• Install controller software and install/upgrade Opticom emitters along select bus priority routes:
	  ○ Mill Plain, Fourth Plain
	  ○ Highway 99, NE 78th Street, 164th Avenue and Andresen
	  ○ NE 134th Street, St., 112th Avenue, St. Johns, SR-503, Padden Expressway
		• C-TRAN	Underway	• Fourth Plain BRT complete in 2017
				• Mill Plain BRT project construction began in Fall 2021
				• Hwy 99 BRT in planning (C-TRAN lead)

Transit Signal Priority (TSP)	• Implement TSP on Hwy 99 • Extend TSP on Mill Plain and 164th • Implemented TSP on Fourth Plain in conjunction with BRT project	• WSDOT SWR • Clark Co. • City of Vancouver • C-TRAN	Underway	
Support (SU)				
Communications Infrastructure Repair and Replacement	• Repair or replace obsolete communications infrastructure across the region, including switches, fiber optic cables, and wireless networks. • When possible, upgrades should address the anticipated needs of CAVs, Smart Cities, TSMO network resiliency, interagency partnership needs, and increases in data speed and bandwidth to accommodate future growth	• WSDOT SWR • Clark Co. • City of Vancouver	Underway	
Traffic Management (TM)				

CCTV Camera Deployment for Freeways	• Provide complete coverage of the freeways in the region:
	  ○ I-5: I-205 to bridge
	  ○ I-205: SR-500 to bridge
	  ○ SR-500 at Andresen A
	  ○ SR-14 and SR-500: I-5 to I-205
	  ○ I-205: SR-500 to I-5
	  ○ SR-14: I-205 to Camas
		• WSDOT SWR	Complete	

Project/Initiative Name	Description	Lead Agencies	Project Status	Notes
CCTV Camera Deployment for Local Arterials	• Provide coverage of highly congested local arterials and key intersections: ○ Mill Plain, Fourth Plain, 164th and Burton Road ○ NE 134th Street, Andresen, SR-503, 164th, Padden Expressway, Burton Road, 192nd Avenue NE, Highway 99 and Downtown Vancouver ○ 112th Avenue NE, NE 78th Street, SR-503, SR-502, Padden Way and Andresen ○ 192nd, Mill Plain, Fourth Plain ○ Padden Parkway	• WSDOT SWR • Clark Co. • City of Vancouver	**Ongoing**	• Camera expansion ongoing through the urban area
Freeway and Arterial Detector Station Deployment	• Install detector stations every 0.5 miles along the freeways to collect volume, speed and occupancy data: ○ I-5 and I-205 from their interchange to Columbia River, Mill Plain, 164th Ave. and Burton Road A ○ SR-500 and SR-14 from I-5 to I-205, 192nd, Andresen and Fourth Plain ○ SR-503, SR-502, Andresen, SR-14 east of I-205, 78th Street, Main Street and other misc. location	• WSDOT SWR	**Complete**	
Increased Vehicle Detection Capabilities	• Continue to increase vehicle detection capabilities throughout the region by deploying additional Bluetooth, Radar, and license Plate detection	• WSDOT SWR • Clark Co. • City of Vancouver	**Ongoing**	
Third-party data sources	• RTC, in partnership with partner agencies, to analyze local and regional transportation data needs and identify best sources for needed transportation data. This study will result in future deployment of data collection technology and purchase/acquisition of transportation data	• RTC • WSDOT SWR • Clark Co. • City of Vancouver	**Planned**	• WSDOT monitoring ODOT's CV Ecosystem program and various other initiatives looking into the value of 3rd-party data
Jointly-Operated Video Sharing System (VDG Sense)	• Implement a jointly operated video surveillance capable of operating traffic cameras and sharing video between transportation agencies	• WSDOT SWR • Clark Co. • City of Vancouver	**Underway**	• An ongoing effort to integrate County CCTV and WSDOT cameras

Project/Initiative Name	Description	Lead Agencies	Project Status	Notes
Shared Regional ATMS with VAST Partners and Smaller Cities	• Jointly operate a single ATMS system for the operation and maintenance of the traffic signal network of the region, reducing multiple ATMS systems, sharing costs and enabling new functionality across the region	• WSDOT SWR • Clark Co. • City of Vancouver • C-TRAN	Underway	• Update: project is underway, continuing bid process
Controller Upgrade Project	• Upgrade/replace traffic signal controllers as needed to interconnect them with the local signal system: ○ Main Street, Mill Plain, Fourth Plain, 164th, and City of Camas major intersections A ○ Andresen Road ○ Downtown Vancouver, 192nd, 112th and SR-500 ○ Highway 99, 78th, 99th, 134th, Hazel Dell, Fourth Plain, Padden Way and 162nd	• WSDOT SWR • Clark Co. • City of Vancouver	Ongoing	
Integration of Traffic Signals	• Integrate Vancouver, Clark County, and WSDOT traffic signals • Integrate Camas traffic signals with WSDOT signal system. A remote workstation for the WSDOT signal system will be provided to Camas.	• WSDOT SWR • Clark Co. • City of Vancouver	Underway	• Underway; this is a distinct effort from the region-wide control project
Clark County Traffic Signal System	• Replacement or upgrade of existing traffic signal system • New system should work with all types of controllers installed on County roadways.	• Clark Co.	Underway	

Project/Initiative Name	Description	Lead Agencies	Project Status	Notes
Adaptive Signal Timing Project	• Deploy adaptive signal timing on select signalized corridors in the region with the highest levels of congestion and the most fluctuation in volumes: ○ Mill Plain from SE 104th to Hearthwood, Mill Plain and Fourth Plain west of I-5, 164th, Andresen, Fourth Plain east of I-5A ○ 192nd Avenue NE and Burton Rd	• Clark Co.	**Underway**	• Clark County has a project in STIP to add Adaptive Traffic software to existing traffic signal electronics and add traffic cameras/video systems to collect and process turn counts along NE 134th Corridor (start date 2021). • Clark County has an Orchards Sifton Adaptive Signals (OSAS) project in STIP which will add adaptive/ITS devices to additional county intersections. Develop before and after study of collisions and corridor level of service (start Data 2024). • Clark County has a Salmon Creek/Hazel Dell Adaptive Signal Operations project in STIP which will install adaptive signal operations, develop incident bypass adaptive traffic signal plans, Installing DSRC radios, Gridsmart camera systems, Bluetooth travel time sensors and modifying freeway off-ramp detection systems in the Salmon Creek/Hazel Dell area. (Start Date 2022)
Ramp Metering	• Deploy ramp meters on designated ramps in the region: ○ I-5 SB from I-205 to Mill Plain and NB from Mill Plain to SR-500. I-205 SB at SR-500 and Mill Plain ○ Remaining ramps on I-5 and I-205 between bridges and their interchange. SR-15 WB between I-5 and I-205 ○ SR-500 – I-5 to 112th Ave and remaining ramps on SR-14 between I-5 and Camas	• WSDOT SWR	**Underway**	• WSDOT has in STIP a I-205 SB 134th St to Mill Plain Blvd Ramp Meter project (Start Date 2021) • WSDOT has in STIP a I-5/NB Fourth Plain On Ramp - Ramp Meter project (Start Date 2021) • WSDOT has plans to add ramp meters on all Clark County freeway on-ramps that are identified in the UFCO study conducted by RTC
Program Management and System Evaluation	• Management and system evaluation of the VAST program. This work will be performed by local agency staff and project consultants.	• WSDOT SWR • Clark Co. • City of Vancouver • C-TRAN	**Ongoing**	Agencies are required to submit before and after analysis of RTC funded projects
Freeway Operation System	• This project would deploy a Freeway Operation System for managing the various ITS technologies deployed throughout WSDOT's freeway system in SW Washington.	• WSDOT SWR	**Ongoing**	• Still adding modules, but system is in place

Project/Initiative Name	Description	Lead Agencies	Project Status	Notes
Initial Regional TMC Construction	• This project would build a traffic management center in WSDOT's new facility. It will include multiple workstations and video monitors for managing the area's traffic.	• WSDOT SWR	**Underway**	• Joint TMC in planning (WSDOT lead).
Joint Operations Center	• NEW project to bring in more partners	• WSDOT SWR • Clark Co. • Vancouver • C-TRAN	**Planned**	• Incident management allowing local device control. Also brings in C-TRAN to give visibility to the wider transportation system to allow; CAD from Clark County, regional video feeds
Corridor Incident/Event Management Plan	• Develop Corridor Incident and Event Management Plan for Regional area	• WSDOT SWR • Clark Co. • Vancouver • C-TRAN	**Underway**	• For events at CC Fairgrounds, it is currently active coordination between WSDOT and Clark County—Lane Management focused Playbook is currently underway
Bi-state Incident Management	• Develop policies and procedures for clearing incidents with impacts across state lines	• WSDOT SWR	**Underway**	
Freeway Active Traffic Management	• Conduct feasibility work to apply Active Traffic Management in the urbanized freeways of Clark County, leveraging technology and lessons learned from projects elsewhere in Washington and Oregon	• WSDOT SWR	**Underway**	
Bus on Shoulder (BOS) Operations	• Develop a set of regional policies that would guide how and when to consider BOS in other freeway corridors and regional bus operating protocols • Develop operating plans, agreements, and technology for Bus on Shoulder on SR14/I-205 corridor	• WSDOT SWR • C-TRAN	**Complete**	• SR 14 BOS implemented • I-5 SB BOS implemented • • Glenn Jackson Bridge BOS implemented
Traveler Information (TI)				
Portland-Vancouver Metropolitan Area ATIS Business Plan	• Develop joint ATIS plan for the region in conjunction with plan being initiated by ODOT.	• Vancouver	**Complete**	
Vehicle Safety (VS)				
Queue warning		• WSDOT SWR	**Ongoing**	• Adding queue warning capabilities to existing message boards, but may be adding new boards for collision locations • First location implemented was I-5 NB at 18th Street

3.6 OPERATIONAL CONCEPT

This section presents the VAST operational concept, which describes how the VAST partner agencies and external partners/systems work together to implement operations services, and the specific roles and responsibilities of each stakeholder in delivering those services.

The main objectives of the operational concept are to:

- Provide an overview of the primary functional areas that comprise partner agencies' operations
- Identify stakeholder roles and responsibilities in the implementation of the agencies' ITS systems and strategies
- Illustrate how ITS systems, agency personnel, and other resources interact as a basis for developing the updated ITS architecture

3.6.1 OPERATIONAL CONCEPT SERVICE AREAS

The operational concept is organized into 12 Service Areas that support the VAST Region's ITS vision. Each service area covers a particular aspect of the management and operation of the transportation system in which VAST partner agencies have an operational role. The service areas (further defined in Section 3.6.2-13) are:

- Commercial Vehicle Operations
- Data Management
- Maintenance and Construction
- Parking Management
- Public Safety
- Public Transportation
- Support
- Sustainable Travel
- Traffic Management
- Traveler Information
- Vehicle Safety
- Weather

Each operational concept includes:

- A general description of the applicable service area
- A listing of the relevant individual ITS services identified by the VAST agency partners within the service area
- A list of key participating agencies and their current and future roles and responsibilities in supporting the operational concept

3.6.2 COMMERCIAL VEHICLE OPERATIONS

The Commercial Vehicle Operations (CVO) area addresses the management of the efficiency, safety, and operation of commercial vehicle fleets and the movement of freight. It includes activities that expedite the authorization process for freight to move across national and other jurisdictional boundaries, activities that expedite inter-modal transfers of freight and the operation of freight vehicles that exchange information on the motor carrier, the vehicle, the driver, and, in some cases, the cargo to enhance freight operations and management.

Table 5 identifies the CVO-related service packages selected by the VAST stakeholders. Additionally, it indicates whether the service reflects an existing, planned, or future capability, and the roles of each of the primary agencies in providing the service.

TABLE 5. COMMERICAL VEHICLE OPERATIONS RELATED SERVICE PACKAGES

ID	Service Package Name	Status	Transportation System Operating Agencies	WSDOT	Clark County	City of Vancouver	C-TRAN	Emergency/Law Enforcement Agencies	CRESA, WSP	Other Agencies	Port of Vancouver	Fed Motor Carrier Safety Admin
CVO02	Freight Administration	Existing		P							S	
CVO03	Electronic Clearance	Existing		P								S
CVO04	CV Administrative Processes	Existing		P								S
CVO05	Commercial Vehicle Parking	*Future*		P								
CVO06	Freight Signal Priority	Planned		P	P	P					S	
CVO07	Roadside CVO Safety	*Future*		P								
CVO08	Smart Roadside and Virtual WIM	*Future*		P								
CVO09	Freight-Specific Dynamic Travel Planning	*Future*		P							S	
CVO10	Road Weather Information for Freight Carriers	*Future*		P								
CVO11	Freight Drayage Optimization	*Future*									P	
CVO12	HAZMAT Management	*Future*		P					S			
CVO13	Roadside HAZMAT Security Detection and Mitigation	*Future*		P					S			
CVO14	CV Driver Security Authentication	*Future*		P					S			
CVO15	Fleet and Freight Security	*Future*		P					S			

LEGEND

P	Primary operations role
S	Supporting operations role

Table 6 summarizes the roles and responsibilities of VAST regional agencies in supporting Commercial Vehicle Operations.

TABLE 6. COMMERCIAL VEHICLE OPERATIONS ROLES AND RESPONSIBILITIES

AGENCY	CURRENT ROLES & RESPONSIBILTIES	ADDITIONAL FUTURE ROLES & RESPONSIBILTIES
WSDOT	• Manages statewide Commercial Vehicle Information Systems Network (CVISN) programs • Implements and leads roadside commercial vehicle inspection equipment (e.g., automatic vehicle identification, weigh stations) • Provide enforcement of permits for overheight/overweight or HAZMAT commercial vehicles • Performs freeway and arterial traffic management on regional freight corridors • Operates traffic count stations (including vehicle classifications) • Implements and operates truck signal priority on state highway corridors	• Implement and operate truck signal priority on state highway corridors • Implement automated roadside checks, screenings, violations, CVO enrollment, and credentialing • Provide freight-specific travel planning and traveler information (e.g., truck parking) • Provide route restriction information to private fleet systems
WSP	• Provides enforcement for commercial vehicle operations	
FEDERAL MOTOR CARRIER SAFETY ADMINISTRATION	• Receives and exchanges information with WSDOT CVISN	
CLARK COUNTY	• Operate traffic signals and provide traffic management in select regional freight corridors	• Implement and operate truck signal priority on county corridors
CITIES (VANCOUVER)	• Operate traffic signals and provide traffic management in select regional freight corridors	• Implement and operate truck signal priority on city corridors
PORTS	• Operates port facilities and coordinates with commercial shippers and on-port industries on freight movement into and out of the ports	• Provide terminal queues/wait times and parking information to drayage operators
RTC	• Supports regional traffic data collection program	• Use freight data for planning and performance measurement
ODOT	• Manages commercial vehicle programs and related ITS infrastructure in Oregon • Provides freight data to PORTAL regional data archive	• Coordinate with WSDOT and other agencies on bi-state freight operations initiatives • Share traffic data sets for bi-state freight management analysis through PORTAL

3.6.3 DATA MANAGEMENT

The Data Management (DM) area addresses the management of data that can be used by some, or all, transportation agencies and other organizations to support transportation planning, performance monitoring, safety analysis, and research. Data are collected from detectors and sensors, connected vehicles, and operational data feeds from centers.

Table 7 identifies the DM-related service packages selected by the VAST stakeholders. Additionally, it indicates whether the service reflects an existing, planned, or future capability, and the roles of each of the primary agencies in providing the service.

TABLE 7. DATA MANAGEMENT SERVICE PACKAGES

ID	Service Package Name	Status	Transportation System Agencies	WSDOT	Clark County	Vancouver	C-TRAN	Other Agencies	Port of Vancouver	PORTAL
DM01	ITS Data Warehouse	Existing		S	P	S	S		S	P
DM02	Performance Monitoring	Existing		S	S		S			P

LEGEND

P	Primary operations role
S	Supporting operations role

Table 8 summarizes the roles and responsibilities of VAST regional agencies in supporting Data Management.

TABLE 8. VAST PARTNER AGENCY DATA ROLES AND RESPONSIBILITIES

AGENCY	CURRENT ROLES & RESPONSIBILTIES	ADDITIONAL FUTURE ROLES & RESPONSIBILTIES
WSDOT	• Provide traffic data to PORTAL • Provide vehicle length data to PORTAL	• Integrate and manage 3rd party data
WSP	• Provides CAD incident data to the WSDOT CARS system, which is archived in the Statewide Data Archive system	
CLARK COUNTY	• Provide traffic data to PORTAL	• Operate Data Lake performance data system for operational data analysis and performance measurement

AGENCY	CURRENT ROLES & RESPONSIBILTIES	ADDITIONAL FUTURE ROLES & RESPONSIBILTIES
CITIES (VANCOUVER)	• Provide traffic data to PORTAL	
C-TRAN	• Provide transit data to PORTAL	
PORTS		• Provide freight data to PORTAL
PORTAL REGIONAL DATA ARCHIVE (PSU)	• Receives and archives traffic, transit, incident, and event information in the PORTAL regional data archive	• Process and analyze traffic and transit information for planning and operations analysis purposes
REGIONAL TRANSPORTATION COUNCIL (RTC)	• Manages regional traffic data collection program	• Use traffic and operations data for planning and performance measurement
ODOT	• Provides historical 3rd-party data for the Clark County and Portland Metropolitan area.	

3.6.4 MAINTENANCE AND CONSTRUCTION

The Maintenance and Construction (MC) area addresses the monitoring, maintaining, improving, and managing, of the roadway physical condition and its associated infrastructure equipment, as well as the available resources necessary to conduct these activities. This area also includes work zone management and safety, and the dissemination of maintenance and construction activities to other centers.

Table 9 identifies the MC-related service packages selected by the VAST stakeholders. Additionally, it indicates whether the service reflects an existing, planned, or future capability, and the roles of each of the primary agencies in providing the service.

TABLE 9. MAINTENANCE AND CONSTRUCTION SERVICE PACKAGES

ID	Service Package Name	Status	Transportation System Operating Agencies	WSDOT	Clark County	Vancouver	C-TRAN	Emergency/Law Enforcement Agencies	CRESA, WSP	Other Agencies	N/A
MC01	Maintenance and Construction Vehicle and Equipment Tracking	Existing		P	P	P					
MC02	Maintenance and Construction Vehicle Maintenance	Existing		P	P	P					
MC03	Roadway Automated Treatment	*Future*		P	P	P					
MC04	Winter Maintenance	Existing		P	P	P					
MC05	Roadway Maintenance and Construction	Existing		P	P	P					
MC06	Work Zone Management	Existing		P	P	P					
MC07	Work Zone Safety Monitoring	*Future*		P	P	P					
MC08	Maintenance and Construction Activity Coordination	Existing		P	P	P	S		S		
MC09	Infrastructure Monitoring	*Future*		P	P	P					
MC10	Asset Tracking	Planned		P	P	P					

LEGEND

P	Primary operations role
S	Supporting operations role

Table 10 summarizes the roles and responsibilities of VAST regional agencies in supporting Maintenance and Construction Management.

TABLE 10. VAST PARTNER AGENCY MAINTENANCE AND CONSTRUCTION ROLES AND RESPONSIBILITIES

AGENCY	CURRENT ROLES & RESPONSIBILTIES	ADDITIONAL FUTURE ROLES & RESPONSIBILTIES
WSDOT	• Implements work zone management strategies on State roadways • Performs winter road maintenance on State roadways • Maintain and operate maintenance and construction vehicles • Receives construction information from WSDOT and local transportation agencies • Shares regional construction information to the public via website and 511/ website/application	• Share construction/maintenance schedules and information to provide better traffic management around work zones. • Provide real-time safety monitoring for work zone field personnel • Perform real-time monitoring of infrastructure to assess conditions (pavement, bridges, etc.)
CLARK COUNTY	• Implements work zone management strategies on County roadways • Performs winter road maintenance on County roadways • Maintain and operate maintenance and construction vehicles • Shares construction/maintenance schedules and information with WSDOT SWR	• Implement roadway automated treatment strategies • Provide real-time safety monitoring for work zone field personnel • Perform real-time monitoring of infrastructure to assess conditions (pavement, bridges, etc.)
CITIES (VANCOUVER)	• Implements work zone management strategies on local roadways • Performs winter road maintenance on local roadways • Maintain and operate maintenance and construction vehicles • Shares construction/maintenance schedules and information with WSDOT SWR	• Implement roadway automated treatment strategies • Provide real-time safety monitoring for work zone field personnel • Perform real-time monitoring of infrastructure to assess conditions (pavement, bridges, etc.)
C-TRAN	• Receives construction schedules and information from WSDOT and local agencies to re-route transit vehicles around work zones and road closures	

3.6.5 PARKING MANAGEMENT

The Parking Management (PM) area addresses the management of parking operations, including both space management and the electronic payment for parking. This service area supports both communication and coordination between equipped parking facilities, and regional coordination between parking facilities with traffic and transit management systems. It includes monitoring and managing parking spaces in lots, garages, other parking areas and facilities, as well as loading/unloading zones.

Table 11 identifies the PM-related service packages selected by the VAST stakeholders. Additionally, it indicates whether the service reflects an existing, planned, or future capability, and the roles of each of the primary agencies in providing the service.

TABLE 11. PARKING MANAGEMENT RELATED SERVICE PACKAGES

ID	Service Package Name	Status	Transportation Agencies	WSDOT	Clark County	Vancouver	C-TRAN	Emergency/Law Enforcement	CRESA, WSP	Other Agencies	N/A
PM01	Parking Space Management	*Future*		P		P					
PM02	Smart Park and Ride System	*Future*		S			P				
PM03	Parking Electronic Payment	*Future*		P		P					
PM04	Regional Parking Management	*Future*		P		P	P				

LEGEND

P	Primary operations role
S	Supporting operations role

Table 12 summarizes the roles and responsibilities of VAST regional agencies in supporting Parking Management.

TABLE 12. VAST PARTNER AGENCY PARKING MANAGEMENT ROLES AND RESPONSIBILITIES

AGENCY	CURRENT ROLES & RESPONSIBILTIES	ADDITIONAL FUTURE ROLES & RESPONSIBILTIES
WSDOT	• Operate park-and-ride lots	• Monitor real-time parking space availability in parking facilities • Share parking availability data with regional partners
CLARK COUNTY		• Monitor real-time parking space availability in parking facilities

		• Share parking availability data with regional partners
CITIES (VANCOUVER)		• Monitor real-time parking space availability in parking facilities • Share parking availability data with regional partners
C-TRAN	• Operate park-and-ride lots	• Monitor real-time parking space availability in parking facilities • Share parking availability data with regional partners

3.6.6 PUBLIC SAFETY

The Public Safety (PS) area addresses the management by public safety agencies of emergencies or incidents in the transportation network including those relating to HAZMAT materials that are transported through the transportation network. It covers public safety (police, fire, and emergency medical services) agencies using emergency management services to improve their response to emergency situations. The area also addresses how emergency operations centers interact with transportation and public safety agencies to support response to disasters and for evacuations impacting the transportation network.

Table 13 identifies the PS-related service packages selected by the VAST stakeholders. Additionally, it indicates whether the service reflects an existing, planned, or future capability, and the roles of each of the primary agencies in providing the service.

TABLE 13. PUBLIC SAFETY RELATED SERVICE PACKAGES

			Transportation System Operating Agencies					Emergency/Law Enforcement Agencies				
ID	**Service Package Name**	**Status**	**WSDOT**	**Clark County**	**Vancouver**	**C-TRAN**		**CRESA**	**WSP**	**WSDOT SWR IRT**	**ETCC/Emergency Ops**	
PS01	Emergency Call-Taking and Dispatch	Existing	S	S	S			P	P	P		
PS02	Emergency Response	Existing	S	S	S			P	P	P		
PS03	Emergency Vehicle Preemption	Existing	P	P	P			S				
PS04	Mayday Notification	*Future*	S	S				P				
PS05	Vehicle Emergency Response	*Future*						P				
PS06	Incident Scene Pre-Arrival Staging Guidance for Emergency Responders	Existing	S	S	S			P	S	S		
PS08	Roadway Service Patrols	Existing	P							P		
PS10	Wide-Area Alert	Existing	S	S	S	S		S	S	S	P	
PS13	Evacuation and Reentry Management	Existing	S	S	S	S		S	S	S	P	

LEGEND

P	Primary operations role
S	Supporting operations role

Table 14 below summarizes the roles and responsibilities of VAST regional agencies in supporting Public Safety, including incident and emergency management.

TABLE 14. VAST PARTNER AGENCY PUBLIC SAFETY ROLES AND RESPONSIBILITIES

AGENCY	CURRENT ROLES & RESPONSIBILTIES	ADDITIONAL FUTURE ROLES & RESPONSIBILTIES
WSDOT	• Coordinates with other agencies in the Virtual Traffic Management Center environment through the SWR TMC • Coordinates with other WSDOT regions and the state Emergency Operations Center for large-scale incident response • Develops and implements bi-state incident management strategies • Participant in regional traffic incident and event management for larger scale incidents • Performs network surveillance for detection and verification of incidents • Provides incident and emergency information to travelers via traffic information devices (e.g., VMS)	• Via the jointly-operated regional TMC, provide enhanced information, data, and control sharing functions
CLARK COUNTY	• Leads incident management and response on County roadways and arterials • Participant in regional traffic incident and event management for larger scale incidents	• Via the jointly-operated regional TMC, provide enhanced information, data, and control sharing functions
CITIES (VANCOUVER)	• Leads incident management and response on City roadways and arterials • Participant in regional traffic incident and event management for larger scale incidents	• Via the jointly-operated regional TMC, provide enhanced information, data, and control sharing functions
C-TRAN	• Coordinates with traffic agencies on incident-related service disruptions	• Via the jointly-operated regional TMC, provide enhanced information, data, and control sharing functions
WSP	• Emergency responder for transportation incidents and emergencies • Coordinates with WSDOT Southwest Region TMC on tactical incident response • Participates in training exercises with traffic management agencies to support incident and event management	• Increased coordination with traffic management agencies for management of traffic incidents and events
CRESA	• Provides 911 Public Safety Answering Points (PSAP) and regional emergency response dispatch for Clark County	• Via the jointly-operated regional TMC, share 911 incident and event data through Computer Aided Dispatch (CAD) integration with traffic management systems

AGENCY	CURRENT ROLES & RESPONSIBILTIES	ADDITIONAL FUTURE ROLES & RESPONSIBILTIES
	• Coordinates with transportation agencies and first responders for incident and emergency response • Participate in training exercises with traffic management agencies to support incident and event management	
LOCAL FIRST RESONDERS (POLICE, FIRE, EMS)	• Respond to traffic incidents and other regional emergencies and events • Participants in traffic detour/diversion schemes during transportation system disruptions	

3.6.7 PUBLIC TRANSPORTATION

The Public Transportation (PT) area addresses the management, operations, maintenance, and security of public transportation to enable them to provide transit services that operate in a timely and efficient manner, delivering operational information, including multimodal information to the operators and users. This area covers both fixed route and demand response systems, as well as those passenger rail systems operated by transit agencies.

Table 15 identifies the PT-related service packages selected by the VAST stakeholders. Additionally, it indicates whether the service reflects an existing, planned, or future capability, and the roles of each of the primary agencies in providing the service.

TABLE 15. PUBLIC TRANSPORTATION RELATED SERVICE PACKAGES

ID	Service Package Name	Status	Transportation System Operating Agencies	C-TRAN	WSDOT	Clark County	Cities (Vancouver)	Emergency/Law Enforcement Agencies	CRESA, etc.	Other Regional Agencies	TriMet
PT01	Transit Vehicle Tracking	Existing		P							
PT02	Transit Fixed-Route Operations	Existing		P							
PT03	Dynamic Transit Operations	*Future*		P							
PT04	Transit Fare Collection Management	Existing		P							S
PT05	Transit Security	*Future*		P					S		
PT06	Transit Fleet Management	Existing		P							
PT07	Transit Passenger Counting	Existing		P							
PT08	Transit Traveler Information	Existing		P							S
PT09	Transit Signal Priority	Existing		S	P	P	P				
PT11	Transit Pedestrian Indication	*Future*		P							
PT13	Vehicle Turning Right in Front of a Transit Vehicle	*Future*		P							
PT14	Multi-modal Coordination	Planned		P	S	S	S				S

LEGEND

P	Primary operations role
S	Supporting operations role

Table 16 summarizes the roles and responsibilities of VAST regional agencies in supporting Public Transportation.

TABLE 16. VAST PARTNER AGENCY PUBLIC TRANSPORTATION ROLES AND RESPONSIBILITIES

AGENCY	CURRENT ROLES & RESPONSIBILTIES	ADDITIONAL FUTURE ROLES & RESPONSIBILTIES
C-TRAN	• Operates public transportation services in Clark County • Operates Advanced Transit Management Systems including CAD/AVL • Coordinates with local traffic signal operators to operate Transit Signal Priority (TSP) • Supports fare coordination and interoperability with TriMet • Manages C-TRAN transit traveler information • Manages onboard ITS equipment on transit vehicles	• Coordinate with other transit agencies and mobility providers to provide comprehensive trip planning and service coordination throughout the metro area • Operate and maintain CV-based pedestrian and driver safety technology systems
CITIES (VANCOUVER)	• Coordinates with C-TRAN operations during incident and event management and response • Supports TSP system through regional traffic signal operations infrastructure	• Share traffic data and video through the jointly-operated Regional TMC concept to support transit operations
CLARK COUNTY	• Coordinates with C-TRAN operations during incident and event management and response • Supports TSP system through regional traffic signal operations infrastructure	• Share traffic data and video through the jointly-operated Regional TMC concept to support transit operations
WSDOT	• Coordinates with C-TRAN operations during incident and event management and response • Supports TSP system through regional traffic signal operations infrastructure	• Share traffic data and video through the jointly-operated Regional TMC concept to support transit operations

3.6.8 SUPPORT

The Support (SU) area addresses monitoring, maintaining, and managing of the connected vehicle system which includes, centers, field equipment, vehicles, and traveler devices. In addition, it covers the security and privacy of the communications in the connected vehicle environment as well as fundamental services, such as location and data distribution, that support the full range of ITS services.

Table 17 identifies the SU-related service packages selected by the VAST stakeholders. Additionally, it indicates whether the service reflects an existing, planned, or future capability, and the roles of each of the primary agencies in providing the service.

TABLE 17. SUPPORT RELATED SERVICE PACKAGES

ID	Service Package Name	Status	Transportation Agencies	WSDOT	Clark County	Cities (Vancouver)	C-TRAN	Emergency/Law Enforcement Agencies	CRESA, etc.	Other Regional Agencies	N/A
SU01	Connected Vehicle System Monitoring and Management	*Future*		P	P						
SU03	Data Distribution	*Future*		P	P						
SU04	Map Management	*Future*		P	P						

LEGEND

P	Primary operations role
S	Supporting operations role

Table 18 summarizes the roles and responsibilities of VAST regional agencies in supporting Support functions.

TABLE 18. VAST PARTNER AGENCY SUPPORT ROLES AND RESPONSIBILITIES

AGENCY	CURRENT ROLES & RESPONSIBILTIES	ADDITIONAL FUTURE ROLES & RESPONSIBILTIES
WSDOT	• Manages the distribution of data from WSDOT systems to authorized users	• Coordinate with regional and state agencies for the management and operation of Connected Vehicle data distribution, monitoring, and mapping system
CLARK COUNTY	• Manages the distribution of data from County systems to authorized users	• Coordinate with regional and state agencies for the management and operation of

AGENCY	CURRENT ROLES & RESPONSIBILTIES	ADDITIONAL FUTURE ROLES & RESPONSIBILTIES
		Connected Vehicle data distribution, monitoring, and mapping system
CITIES (VANCOUVER)	• Manages the distribution of data from the City systems to authorized users	
C-TRAN	• Manages the distribution of data from C-TRAN systems to authorized users	

3.6.9 SUSTAINABLE TRAVEL

The Sustainable Travel (ST) area addresses the operation of the transportation system to minimize the environmental impact. It promotes a transportation system that balances accessibility, mobility, protection of human safety and environment. It covers all aspects of the transportation system from optimizing traffic signals and ramp meters to managing HOV/HOT lanes, monitoring vehicle emissions, and managing vehicle electric charging stations.

Table 19 below identifies the ST-related service packages selected by the VAST stakeholders. Additionally, it indicates whether the service reflects an existing, planned, or future capability, and the roles of each of the primary agencies in providing the service.

TABLE 19. SUSTAINABLE TRAVEL RELATED SERVICE PACKAGES

ID	Service Package Name	Status	Transportation Agencies	WSDOT	Clark County	City of Vancouver	C-TRAN	Emergency/Law Enforcement Agencies	CRESA, etc.	Other Regional Agencies	N/A
ST04	Roadside Lighting	Existing				P					
ST05	Electric Charging Stations Management	*Future*		P	P	P	P				

LEGEND

P	Primary operations role
S	Supporting operations role

Table 20 summarizes the roles and responsibilities of VAST regional agencies in supporting the Sustainable Travel area.

TABLE 20. VAST PARTNER AGENCY SUSTAINABLE TRAVEL ROLES AND RESPONSIBILITIES

AGENCY	CURRENT ROLES & RESPONSIBILTIES	ADDITIONAL FUTURE ROLES & RESPONSIBILTIES
WSDOT		• Maintain and operate EV charging infrastructure on State facilities
CLARK COUNTY		• Maintain and operate EV charging infrastructure on County facilities
C-TRAN		• Maintain and operate EV charging infrastructure on agency facilities
CITIES (VANCOUVER)	• Maintains and operates smart streetlight infrastructure (e.g., roadside lighting brightness linked to ped push button activation)	• Maintain and operate EV charging infrastructure on agency facilities

3.6.10 TRAFFIC MANAGEMENT

The Traffic Management (TM) area addresses the management of the movement of all types of vehicles, travelers, and pedestrians, throughout the transportation network. It deals with information collection, dissemination, and processing for the surface transportation system. It covers both automated monitoring and control activities as well as decision-making processes (both automated and manual) that address real-time incidents and other disturbances on the transportation network, as well as managing travel demand as needed to maintain overall mobility.

Table 21 identifies the relevant TM-related service packages selected by the VAST stakeholders. Additionally, it indicates whether the service reflects an existing, planned, or future capability, and the roles of each of the primary agencies in providing the service.

TABLE 21. TRAFFIC MANAGEMENT RELATED SERVICE PACKAGES

ID	Service Package Name	Status	Transportation System Operating Agencies	WSDOT	Clark County	Vancouver	C-TRAN	Emergency/Law Enforcement Agencies	CRESA, WSP	Other Regional Agencies	ODOT
TM01	Infrastructure-Based Traffic Surveillance	Existing		P	P	P					
TM02	Vehicle-Based Traffic Surveillance	*Future*		P	P						
TM03	Traffic Signal Control	Existing		P	P	P					
TM04	Connected Vehicle Traffic Signal System	*Future*		P	P						
TM05	Traffic Metering	Existing		P							
TM06	Traffic Information Dissemination	Existing		P							
TM07	Regional Traffic Management	Existing		P	P	P					S
TM08	Traffic Incident Management System	Existing		P	P	P			S		S
TM09	Integrated Decision Support and Demand Mgmt	Planned		P	S	S	S		S		S
TM10	Electronic Toll Collection	*Future*		P							S
TM11	Road Use Charging	*Future*		P							
TM12	Dynamic Roadway Warning	Planned		P	P	P					
TM13	Standard Railroad Grade Crossing	Existing		P	P	P					
TM15	Railroad Coordination	*Future*		P	P	P					
TM16	Reversible Lane Management	*Future*		P	P						
TM17	Speed Warning and Enforcement	Existing		P		P					
TM19	Roadway Closure Management	*Future*		P							
TM20	Variable Speed Limits	Existing		P							
TM21	Speed Harmonization	*Future*		P							
TM22	Dynamic Lane Management and Shoulder Use	Planned		P		P					S
TM25	Wrong Way Vehicle Detection and Warning	*Future*		P							

LEGEND

P	Primary operations role
S	Supporting operations role

Table 22 summarizes the roles and responsibilities of VAST regional agencies in supporting Traffic Management.

TABLE 22. VAST PARTNER AGENCY TRAFFICE MANAGEMENT ROLES AND RESPONSIBILITIES

AGENCY	CURRENT ROLES & RESPONSIBILTIES	ADDITIONAL FUTURE ROLES & RESPONSIBILTIES
WSDOT	• Operates and maintains state freeways and highways in Clark County and the Southwest Region, including associated ITS field devices • Coordinates incident management and response on freeways and state highways • Operates freeway ramp meters • Manages and operates Active Traffic Management (ATM) systems and roadside infrastructure (e.g., variable speeds, speed warnings)	• Manage and operate Integrated Corridor Management (ICM) and freeway diversion strategies in concert with local agencies • Via the jointly-operated regional TMC, coordinate arterial traffic management strategies with adjacent jurisdictions • Manage and operate systems and technologies supporting new ATM strategies (e.g., speed harmonization, dynamic lane management/shoulder use, automated roadway closures, and wrong way detection) • Manage and operate Connected Vehicle roadside infrastructure • Support statewide Road Use Charge (RUC) operations and related roadway infrastructure • Manage and operate electronic tolling systems and roadway tolling infrastructure
CLARK COUNTY	• Manages traffic operations on County streets and arterials, including traffic signal systems, detection, and other ITS devices	• Via the jointly-operated regional TMC, coordinate arterial traffic management strategies with WSDOT and adjacent jurisdictions • Participate in ICM and freeway diversion operations in conjunction with WSDOT • Manage and operate Connected Vehicle roadside infrastructure
CITIES (VANCOUVER)	• Manages traffic operations on City streets and arterials, including traffic signal systems, detection, and other ITS devices	• Via the jointly-operated regional TMC, coordinate arterial traffic management strategies with WSDOT and adjacent jurisdictions • Participate in ICM and freeway diversion operations in conjunction with WSDOT • Manage and operate systems and technologies supporting ATM strategies (e.g., speed warning, dynamic lane management)
C-TRAN		• Participate in ICM and freeway diversion operations in conjunction with WSDOT

3.6.11 TRAVELER INFORMATION

The Traveler Information (TI) area addresses the provision of both static and dynamic information about the transportation network to travelers both prior to and during their trips. It includes information about multi-modal options and transfers and the status of other transportation modes for use by the travelers. Providing static and dynamic signage information directly to drivers through in-vehicle devices is also covered by this area.

Table 23 identifies the relevant TI-related service packages selected by the VAST stakeholders. Additionally, it indicates whether the service reflects an existing, planned, or future capability, and the roles of each of the primary agencies in providing the service.

TABLE 23. TRAVELER INFORMATION RELATED SERVICE PACKAGES

ID	Service Package Name	Status	Transportation Agencies	WSDOT	Clark County	Vancouver	C-TRAN	Emergency/Law Enforcement Agencies	CRESA, WSP
TI01	Broadcast Traveler Information	Existing		P	P	P	P		S
TI02	Personalized Traveler Information	Existing		P	P	P	P		S
TI06	Dynamic Ridesharing and Shared Use Transportation	*Future*				S	P		
TI07	In-Vehicle Signage	*Future*		P	P				

LEGEND

P	Primary operations role
S	Supporting operations role

Table 24 summarizes the roles and responsibilities of VAST regional agencies in supporting Traveler Information.

TABLE 24. VAST PARTNER AGENCY TRAVELER INFORMATION ROLES AND RESPONSIBILITIES

AGENCY	CURRENT ROLES & RESPONSIBILTIES	ADDITIONAL FUTURE ROLES & RESPONSIBILTIES
WSDOT	• Operates Statewide Traveler Information Systems (511 telephone traveler information, website, and mobile/subscription applications) • Operates field traveler information ITS devices (e.g., variable message signs, highway advisory radio)	• Provide the data feed and support solutions for distributing en route in-vehicle signing information directly to vehicles

AGENCY	CURRENT ROLES & RESPONSIBILTIES	ADDITIONAL FUTURE ROLES & RESPONSIBILTIES
	• Maintain WSDOT Traveler Information API • Provide predicative travel time data services • Coordinates with local media on traffic and emergency management issues • Coordinates with other WSDOT regions and the state Emergency Operations Center for large-scale incident response	
CLARK COUNTY	• Limited operation of field traveler information ITS devices • Coordinates with local media on traffic and emergency management issues	• Provide the data feed and support solutions for distributing en route in-vehicle signing information directly to vehicles
CITIES (VANCOUVER)	• Limited operation of field traveler information ITS devices • Coordinates with local media on traffic and emergency management issues	• Develop policies for coordinating shared use mobility services and integrate services into a multimodal transportation network
C-TRAN	• Operates agency website with dynamic information and special announcements • Provides real-time schedule and arrival information to 3rd-party ISPs and trip planning services (e.g., Transit App) • Operates customer information hotline • Coordinates with media on transit service disruptions and event information	• Operate field ATIS devices (arrival time screens, interactive kiosks) at select locations • Provide integrated traveler information with the TriMet system to enable end-to-end trip planning and real-time information across systems • Develop policies for coordinating shared use mobility services and integrate services into a multimodal transportation network
INFORMATION SERVICE PROVIDERS (ISP)	• ISPs receive real-time transit data feeds from C-TRAN (e.g., Transit App) and disseminates status information and trip planning services to subscribers • ISPs access WSDOT Traveler Information API	• Incorporate enhanced traffic agency traveler information data feeds into navigation and trip planning applications
MEDIA	• Coordinates with traffic and transit agencies for traffic reporting and special events	• Incorporate automated traffic data and information feeds from traffic and transit agencies

3.6.12 VEHICLE SAFETY

The Vehicle Safety (VS) area addresses the vehicle's safety for automated, connected, and non-equipped vehicles. Its focus is on the enhancement of safety, security, and efficiency in vehicle operations, by warnings and assistance to users or direct input to the operation of the vehicle.

Table 25 identifies the relevant VS-related service packages selected by the VAST stakeholders. Additionally, it indicates whether the service reflects an existing, planned, or future capability, and the roles of each of the primary agencies in providing the service.

TABLE 25. VEHICLE SAFETY RELATED SERVICE PACKAGES

ID	Service Package Name	Status	Transportation System Operating Agencies	WSDOT	Clark County	Vancouver	C-TRAN	Emergency/Law Enforcement Agencies	CRESA, WSP
VS02	V2V Basic Safety	*Future*		S	S	S	S		
VS03	Situational Awareness	*Future*		P	P				
VS04	V2V Special Vehicle Alert	*Future*		P	P		S		
VS05	Curve Speed Warning	*Future*		P	P				
VS06	Stop Sign Gap Assist	*Future*		P	P				
VS07	Road Weather Motorist Alert and Warning	*Future*		P	P				
VS08	Queue Warning	*Future*		P					
VS09	Reduced Speed Zone Warning / Lane Closure	*Future*		P	P	P			
VS10	Restricted Lane Warnings	*Future*		P	P				
VS11	Oversize Vehicle Warning	*Future*		P	P	P			
VS12	Pedestrian and Cyclist Safety	*Future*		P	P	P			
VS13	Intersection Safety Warning and Collision Avoidance	*Future*		P	P	P			
VS15	Infrastructure Enhanced Cooperative Adaptive Cruise Control	*Future*		P	P				
VS17	Traffic Code Dissemination	*Future*		P	P	S			

LEGEND

P	Primary operations role
S	Supporting operations role

Table 26 summarizes the roles and responsibilities of VAST regional agencies in supporting vehicle safety-related services.

TABLE 26. VAST PARTNER AGENCY SAFETY RELATED ROLES AND RESPONSIBILITIES

AGENCY	CURRENT ROLES & RESPONSIBILTIES	ADDITIONAL FUTURE ROLES & RESPONSIBILTIES
WSDOT		• Manage and operate Connected Vehicle (CV) systems and technologies supporting new CV-enabled vehicle and vulnerable road user (VRU) safety strategies • Collect and share traffic safety information obtained from vehicle-to-infrastructure communications
CLARK COUNTY		• Manage and operate Connected Vehicle (CV) systems and technologies supporting new CV-enabled vehicle and VRU safety strategies • Collect and share traffic safety information obtained from vehicle-to-infrastructure communications
CITIES (VANCOUVER)		
C-TRAN		

3.6.13 WEATHER

The Weather (WX) area addresses activities that monitor and notify users and transportation network managers of weather and environmental conditions that have an impact on the road transportation network and its users.

Table 27 identifies the relevant WX-related service packages selected by the VAST stakeholders. Additionally, it indicates whether the service reflects an existing, planned, or future capability, and the roles of each of the primary agencies in providing the service.

TABLE 27. WEATHER RELATED SERVICE PACKAGES

ID	Service Package Name	Status	Transportation Agencies	WSDOT	Clark County	Vancouver	C-TRAN	Emergency/Law Enforcement Agencies	CRESA, WSP
WX01	Weather Data Collection	Existing		P	P				
WX02	Weather Information Processing and Distribution	Existing		P	P	S	S		S
WX03	Spot Weather Impact Warning	*Future*		P	P				

LEGEND

P	Primary operations role
S	Supporting operations role

Table 28 summarizes the roles and responsibilities of VAST regional agencies in supporting weather-related services.

TABLE 28. VAST PARTNER AGENCY WEATHER RELATED ROLES AND RESPONSIBILITIES

AGENCY	CURRENT ROLES & RESPONSIBILTIES	ADDITIONAL FUTURE ROLES & RESPONSIBILTIES
WSDOT	• Operates Roadway Weather Information Systems (RWIS) • Operates CCTV cameras to monitor weather impacts and road conditions • Distribute roadway weather information to agency partners • Provide roadway weather traveler information to the public	• Manage and operate Connected Vehicle (CV) systems and technologies supporting mobile weather sensor data

AGENCY	CURRENT ROLES & RESPONSIBILTIES	ADDITIONAL FUTURE ROLES & RESPONSIBILTIES
	• Interface with and obtain data from external weather information service providers	
CLARK COUNTY	• Receive roadway weather information and incorporate into traffic and maintenance operations	• Manage and operate Connected Vehicle (CV) systems and technologies supporting mobile weather sensor data
CITIES (VANCOUVER)	• Receive roadway weather information and incorporate into traffic and maintenance operations	

3.7 ITS INVENTORY

The VAST Regional ITS Architecture includes a comprehensive inventory of the existing and planned ITS elements in the region. In RAD-IT, each inventory element includes the element name, the associated stakeholder, and the associated subsystem(s) and/or terminator(s). A transportation element can be a center, vehicle, traveler, field equipment, or support system.

Table 29 lists all the surface transportation inventory elements identified in the VAST Regional ITS Architecture along with a description of the element, associated stakeholder, and its deployment status (whether existing, planned, or future).

TABLE 29. VAST ITS INVENTORY

STAKEHOLDER	ELEMENT	DESCRIPTION	STATUS
C-TRAN	C-TRAN Fixed Route Transit Vehicle	C-TRAN fixed route buses equipped with AVL, APC, ASA and other CAD/AVL software	Existing
C-TRAN	C-TRAN Maintenance Center	Maintenance facilities for repair and maintenance of C-TRAN vehicles.	Existing
C-TRAN	C-TRAN Paratransit Vehicle	C-TRAN paratransit vehicles equipped with AVL, APC, ASA and other CAD/AVL software	Existing
C-TRAN	C-TRAN Managed Parking Facilities	C-TRAN-owned parking facilities that may be outfitted in the future with monitoring and management equipment	Future
C-TRAN	C-TRAN Parking Management	Potential future parking management system for coordinating and monitoring agency parking facilities	Future
C-TRAN	C-TRAN Payment Administration	Fare payment administration and processing center. Coordinates with TriMet on	Existing
C-TRAN	C-TRAN Security Monitoring Equipment	Monitoring and surveillance equipment installed at C-TRAN bus stations and facilities	Existing

STAKEHOLDER	ELEMENT	DESCRIPTION	STATUS
C-TRAN	C-TRAN Transit Operations Center	C-TRAN's Transit Operations Center includes computer aided dispatching (CAD) to manage their fixed route fleet.	Existing
C-TRAN	C-TRAN Transportation Information Systems	Includes the C-TRAN trip planning website, interface with Transit App, and regional trip planning coordination with TriMet.	Existing
C-TRAN	C-TRAN Traveler Support Equipment	Kiosks, arrival time, message boards, and other traveler information displays located at transit stops and centers	Planned
CITY OF VANCOUVER	City of Vancouver Field Maintenance Equipment	Mobile apps, laptops, and central monitoring tools for diagnosis and repair of field equipment	Existing
CITY OF VANCOUVER	City of Vancouver Field Equipment	Includes signals, cameras, sensors, and other ITS devices installed at the roadside.	Existing
CITY OF VANCOUVER	City of Vancouver CV RSE	Future connected vehicle roadside equipment (RSE), including radios, edge computing, and integration with central systems	Future
CITY OF VANCOUVER	City of Vancouver Maintenance and Construction	Maintenance and construction department for the City of Vancouver	Existing
CITY OF VANCOUVER	City of Vancouver Maintenance Vehicle	City maintenance vehicles equipped with AVL.	Existing
CITY OF VANCOUVER	City of Vancouver Managed Parking Facilities	City-owned parking facilities that may be outfitted in the future with monitoring and management equipment	Future
CITY OF VANCOUVER	City of Vancouver Parking Management	Potential future parking management system for coordinating and monitoring agency parking facilities	Future
CITY OF VANCOUVER	City of Vancouver Personnel Safety Device	Potential future CV-based safety devices for City of Vancouver maintenance and construction personnel	Future
CITY OF VANCOUVER	Vancouver TMC	City's traffic management center (TMC) to manage traffic signals and arterial operations within the City of Vancouver	Existing
CLARK COUNTY	Clark County CV RSE	Includes existing DSRC-based connected vehicle roadside equipment (RSE), and future CV2X expansion	Existing
CLARK COUNTY	Clark County CV Test Vehicles	Used to demonstrate and test CV applications	Existing
CLARK COUNTY	Clark County Field Maintenance Equipment	Mobile apps, laptops, and central monitoring tools for diagnosis and repair of field equipment	Existing

STAKEHOLDER	ELEMENT	DESCRIPTION	STATUS
CLARK COUNTY	Clark County Field Equipment	Includes signals, cameras, sensors, and other ITS devices installed at the roadside.	Existing
CLARK COUNTY	Clark County Maintenance and Construction	Center responsible for maintenance and construction activities and dispatching maintenance and construction vehicles.	Existing
CLARK COUNTY	Clark County Maintenance/Construction Vehicle	County vehicles all equipped with AVL. Future upgrades to include CV.	Existing
CLARK COUNTY	Clark County Parking Management	Potential future parking management system for coordinating and monitoring agency parking facilities	Future
CLARK COUNTY	Clark County Personnel Safety Device	Potential future CV-based safety devices for Clark County maintenance and construction personnel	Future
CLARK COUNTY	Clark County TOC	County's traffic operations center (TOC), which currently operates unstaffed, providing remote access. Future enhancements include center-to-center communications and control	Existing
CLARK REGIONAL EMERGENCY SERVICES AGENCY (CRESA)	CRESA Operations Center	The Clark Regional Emergency Services Agency (CRESA) is the 911 Public safety access point (PSAP) for Clark County that coordinates emergency response. Coordinates with the Statewide Emergency Operations Center in the event of large-scale emergencies.	Existing
CLARK COUNTY SHERIFF	Future 78th St EOC	Planned Emergency Operations Center (EOC) to provide Sheriff access to Clark County's ATMS and cameras	Planned
FEDERAL MOTOR CARRIER SAFETY ADMINISTRATION	Federal Motor Carrier Safety Administration	Administrators of the SAFER commercial vehicle safety check database, which provides information to CVISN.	Existing
LOCAL EMERGENCY RESPONDERS	Local Emergency Responder Vehicles	City and Regional Emergency Management agencies, including local police and fire, CRESA, E-911, CAPCOM.	Existing
LOCAL EMERGENCY RESPONDERS	Local Emergency Responder Personnel Safety Device	Potential future CV-based safety devices for emergency responder personnel	Future
MEDIA	Local Media	Local television and radio stations who receive and broadcast traveler information, including camera images and incident reports.	Existing
MOTOR CARRIERS	Motor Carrier Commercial Vehicle	Commercial Vehicle onboard systems.	Existing

STAKEHOLDER	ELEMENT	DESCRIPTION	STATUS
MOTOR CARRIERS	Motor Carrier Freight Equipment	This terminator includes external equipment installed on commercial vehicles, such as eSeals, that provides equipment safety data and status and can alert the appropriate systems of an incident, breach, or tamper event.	Existing
MOTOR CARRIERS	Motor Carrier Licensing	The Department of Licensing is a partner in CVISN, and provide registration information for toll violations processing.	Existing
MOTOR CARRIERS	Motor Carrier Management Center	Private commercial vehicle fleet and freight management.	Existing
NATIONAL WEATHER SERVICE	Weather Services	National weather service providing weather forecast information to supplement maintenance activity planning.	Existing
ODOT	ODOT TripCheck	ODOT's Tripcheck and 511, border crossing information with Oregon, etc. WSDOT exchanges information with ODOT's systems in order to provide a broader reach of information to travelers.	Existing
ODOT	ODOT Tolling Admin Center	ODOT tolling system. Coordination with WSDOT on bi-state travel	Existing
PORT OF VANCOUVER	Port of Vancouver Terminal	Port coordination to provide traveler information and to coordinate during incidents.	Existing
PORTLAND STATE UNIVERSITY	PORTAL Archived Data System	Portland Regional Transportation Archive Listing (PORTAL) is a National ITS Architecture's Archived Data User Service for the Portland metropolitan region. The system was developed by students and faculty in the ITS Laboratory at Portland State University. PSU is work the Oregon Department of Transportation, Metro, the City of Portland, TriMet and other regional partners. Washington State provides real-time traffic flow information to ODOT which in turn is automatically archived in PORTAL.	Existing
RAILROADS	Rail Operator	Rail operators in Washington include Union Pacific (UP), Burlington Northern-Santa Fe (BNSF) and Amtrak	Existing
RAILROADS	Railroad Wayside Equipment	This terminator represents train interface equipment (usually) maintained and operated by the railroad and (usually) physically located at or near a grade crossing. This terminator is the source and destination for HRI information for, or about, approaching trains and their crews (e.g. the time at which the train will arrive and the time it will take to clear a crossing, crossing status or warnings, etc.). In the future, WSDOT may interface with this equipment to provide train crossing information to travelers.	Existing

STAKEHOLDER	ELEMENT	DESCRIPTION	STATUS
REGIONAL/JOINT OPERATIONS	Future Clark County/Regional Data Lake Archive	In-development data lake to capture real-time transportation data and provide operational performance management services. Currently being developed for Clark County but may migrate to a regional/jointly operated system	Future
REGIONAL/JOINT OPERATIONS	Future Regional CV Data Distribution System	Clark County and WSDOT currently operate Trafficware Tidal Wave, a platform for sharing near-real time signal data with CV users. Future system may be a region-wide CV data distribution system.	Future
REGIONAL/JOINT OPERATIONS	Future Joint Operations ICM/ATM System	Future jointly-operated system to provide integrated corridor management (ICM) and active traffic management (ATM) services for key regional corridors	Planned
OTHER STATE RUC ADMINISTRATOR	Future Other State Road Use Charging Admin Center	Potential future Oregon (and other state's) Road Use Charging (RUC) platform for administering statewide RUC program and coordinating with other states' RUC systems	Future
TNC/SHARED USE TRANSPORTATION PROVIDERS	TNC Management and Dispatch System	Potential integration opportunity with Transportation Network Company (TNC) or other shared-use mobility services provider	Future
TNC/SHARED USE TRANSPORTATION PROVIDERS	Shared Use Vehicle	Potential integration opportunity with Transportation Network Company (TNC) or other shared-use mobility services provider	Future
THIRD-PARTY INFORMATION SERVICE PROVIDERS	Private Information Service Providers	Third-party information providers partnered with VAST agencies to provide transportation information to travelers (e.g., Transit App provides C-TRAN bus arrival information and trip planning services)	Existing
THIRD-PARTY INFORMATION SERVICE PROVIDERS	Private Sector Traffic Data Providers	Third-party sources of transportation data utilized by VAST agencies to support operations and planning	Existing
TRANSPORTATION NETWORK COMPANIES	Private TNC Operations	Transportation Network Company operations center that manages the dispatch and coordination of TNC fleets	Existing
TRAVELERS	Traveler's Connected Vehicle	Connected vehicles that receive and transmit information to roadside devices, other vehicles, or other networked systems. Includes integrated payment services that utilize the same communications paths	Future
TRAVELERS	Traveler's Payment Card	Personal payment device used by travelers to pay tolls, fares, or future mobility-as-a-service trips. May be integrated with future Road Use Charging deployments.	Future
TRAVELERS	Traveler's Personal Information Device	Personal electronic devices used to access traveler information, including smart phones and tablets	Existing

STAKEHOLDER	ELEMENT	DESCRIPTION	STATUS
TRIMET	TriMet Transit Operations Center	TriMet's Transit Operations Center includes computer aided dispatching (CAD) to manage their fixed route fleet. Coordinates with C-TRAN	Existing
WASHINGTON STATE PATROL	WSP Operations Center	WSDOT's Joint Operations Policy Statement (JOPS) with the Washington State Patrol endorses co-location of facilities and information sharing. The WSDOT Southwest Region has access to WSP Computer Aided Dispatch (CAD) data. WSP is also the enforcement agency for toll and CVO violations.	Existing
WASHINGTON STATE PATROL	WSP Patrol Vehicles	State patrol vehicles	Existing
WASHINGTON STATE RUC ADMINISTRATOR	Future Washington Road Use Charging Admin Center	Potential future Road Use Charging (RUC) platform for administering statewide RUC program and coordinating with other states' RUC systems	Future
WASHINGTON STATE EMERGENCY MANAGEMENT	Washington Emergency Operations Center	State emergency operations center	Existing
WSDOT HQ	WSDOT Archived Data Warehouse	WSDOT plans to implement a statewide archived data warehouse and SWR WSDOT will coordinate with	Planned
WSDOT HQ	WSDOT Roadway Tolling Equipment	Toll collection support equipment, including plaza and lane-level equipment. E.g., at Tacoma Narrows Bridge and possible future locations	Existing
WSDOT HQ	WSDOT Tolling Administration Center	Planned statewide tolling system. Tacoma Narrows Bridge operates a toll administration subsystem. Planned system would integrate all existing and potential new toll roads, bridges, and HOT lanes.	Planned
WSDOT HQ	WSDOT Traveler Information System	WSDOT real time traveler information system, providing traveler information via web (WSDOT CARS), 511, kiosks and cable TV. Includes ferry information.	Existing
WSDOT HQ	WSDOT/WSP/FHWA Emergency Transportation Coordination Center (ETCC)	The Emergency Transportation Coordination Center (ETCC) is a coordination center for WSDOT, Washington State Patrol and FHWA that will be active in times of a major transportation emergency	Existing
WSDOT HQ (CVISN)	WSDOT CVISN Commercial Vehicle Administration	WSDOT Commercial Vehicle Information Systems and Networks (CVISN) program for electronic credentialing of commercial vehicles	Existing
WSDOT HQ (CVISN)	WSDOT CVISN Electronic Screening Equipment	Weigh-in-motion, roadside AVI, safety checks, and other commercial vehicle inspection equipment and facilities (ex. at Kelso and Ridgefield)	Existing

STAKEHOLDER	ELEMENT	DESCRIPTION	STATUS
WSDOT OTHER REGIONS	Other WSDOT TMC	This terminator is provided to show coordination between WSDOT regional traffic management centers.	Existing
WSDOT SWR / REGIONAL PARTNERS	Future SWR Joint Operations Center	A future jointly-operated operations center to include multiple workstations and video monitors for managing the area's traffic, to support both physical and virtual access by agency partners	Planned
WSDOT SWR	Infrastructure and Facilities Security Monitoring	WSDOT has identified critical infrastructure (bridges, ferries, etc.) in need of security monitoring. WSDOT and WSP also provides security monitoring at facilities such as park and ride lots.	Existing
WSDOT SWR	WSDOT Field Maintenance Equipment	Mobile apps, laptops, and central monitoring tools for diagnosis and repair of field equipment	Existing
WSDOT SWR	WSDOT Field Equipment	Includes signals, cameras, DMS, HAR, environmental sensors, and other WSDOT ITS devices installed at the roadside.	Existing
WSDOT SWR	WSDOT Personnel Safety Device	Includes newly-deployed LED Flares, which activate different lighting patterns and provide a GPS link to display on maps, and future personal safety technologies	Planned
WSDOT SWR	WSDOT SWR CV RSE	Connected vehicle roadside equipment (RSE), including radios, edge computing, and integration with central systems	Planned
WSDOT SWR	WSDOT SWR Incident Response Vehicles	IRT maintenance employees and vehicles that respond to traffic incidents on state roadways. Whether assisting stranded motorist, or responding to a collision, snowstorm or disaster, their mission is to work in partnership with the Washington State Patrol and other responders to quickly clear roads and help drivers. They restore normal traffic flow as safely and quickly as possible.	Existing
WSDOT SWR	WSDOT SWR Maintenance and Construction	WSDOT SWR Maintenance Offices, responsible for maintenance and construction activities and dispatches maintenance and construction vehicles. Utilize ARROWS Maintenance Support Tool to provide decision support for maintenance activity planning. Future asset management system planned to support decision-making for maintenance, upgrade, and operation of physical transportation assets. Asset management integrates and includes the pavement management systems, bridge management systems, and other systems that inventory and manage the highway infrastructure and other transportation-related assets.	Existing
WSDOT SWR	WSDOT SWR Maintenance/Construction Vehicle	WSDOT SWR maintenance and construction vehicles	Existing

STAKEHOLDER	ELEMENT	DESCRIPTION	STATUS
WSDOT SWR	WSDOT Parking Management	Potential future parking management system for coordinating and monitoring agency parking facilities	Future
WSDOT SWR	WSDOT SWR Parking Facilities	WSDOT SWR parking facilities that may be outfitted in the future with monitoring and management equipment	Future
WSDOT SWR	WSDOT SWR Regional Video Distribution System	VDG Sense video distribution system co-implemented with Clark County	Existing
WSDOT SWR	WSDOT SWR ROADS traveler information system	ROADS interfaces with other traveler information systems	Existing
WSDOT SWR	WSDOT SWR Traffic Management Center	Traffic Management Center for the SWR, co-located with WSP	Existing

3.8 EARLY ACTION PLAN

This early action plan identifies the priority near-term actions (within the 2022-2024 timeframe) confirmed by agency stakeholders related to advancing ITS and TSMO in the region. Actions are organized by National ITS Architecture service area (e.g., data management, public transportation, traffic management, etc.). Each action includes an identification of lead and support agencies and the status of the activity—whether it is ongoing, planned, or new.

Finally, each action is assessed using an adapted organizational effectiveness evaluation tool—called the Capability Maturity Framework[9] (CMF)—to indicate how the action aligns with the Framework's six standard business process capability dimensions (summarized in Table 30 below). The purpose of this assessment is (1) to indicate what kind of organizational capabilities may be needed to successfully implement the action and (2) to help identify where there may be gaps.

Each of the six CMF dimensions for a given action is assessed as either fully, somewhat, or minimally engaged/aligned with the action. Dimensions that are not at all engaged/aligned are left blank. For example, an action with a fully engaged/aligned *Collaboration* dimension is meant to indicate that a strong collaboration-supportive organizational capabilities is likely needed to deliver the action successfully. An agency, or agencies, considering pursuing that action should ensure that its organizational processes are set up to support significant collaboration.

"Harvey Ball" style icons are used to indicate the level of alignment, as shown below.

Dimension *fully* engaged/aligned

Dimension *somewhat* engaged/aligned

Dimension *minimally* engaged/aligned

Dimension *not* engaged/aligned

TABLE 30. SIX TSMO-ORIENTED CMF CAPABILITY DIMENSIONS

DIMENSION	DESCRIPTION	KEY ELEMENTS
BUSINESS PROCESSES (BP)	Development, use, and institutionalization of agency-level business process for integrating TSMO at different stages of the project lifecycle	• Scoping • Goal alignment • Formalized processes • Funding

[9] CMF is a widely-adopted approach to review common barriers to implementation and success of TSMO. It is a framework that allows for a common understanding of improvement and institutional issues that agencies face. The CMF allows agencies to develop consensus around needed improvements, identify immediate priorities for improvements, and identify concrete actions to continuously improve capabilities to plan, design, and implement TSMO. Refer to the FHWA website on using CMF for TSMO: https://ops.fhwa.dot.gov/tsmoframeworktool/index.htm.

DIMENSION	DESCRIPTION	KEY ELEMENTS
COLLABORATION (CO)	Fostering internal and external partnerships, including sharing of resources, data, and workforce development	• Stakeholder involvement • Community engagement • Resource sharing
CULTURE (CU)	Building organizational champions for TSMO through leadership, outreach, and solutions for equitable outcomes	• Champions • Management and leadership support • Diversity and equity focus
ORGANIZATION / STAFFING (OS)	Recruitment, retaining, and training of staff to develop a TSMO-capable organization	• Current staff capabilities • Workforce development
PERFORMANCE MEASUREMENT (PM)	Establishing and use of performance measures associated with SMART (specific, measurable, agreed-upon, realistic, and time-bound) operations objectives	• Champions • Management and leadership support • Diversity and equity focus
SYSTEMS AND TECHNOLOGY (ST)	Incorporating technologies and analysis tools that enhance transportation operations and maintenance	• Data and performance metrics • Systems engineering • Processes promoting interoperability and repeatability, traceability

The VAST near-term TSMO action plan is show in Table 31 on the following pages.

3.8.1 VAST SMART COMMUNITY INITIATIVES ALIGNMENT

In 2020, the VAST partners completed a Smart Community Assessment Project to identify applicable smart community concepts to incorporate into a strategic roadmap. (Refer to Appendix A for a summary of the findings report). As part of this effort, the VAST partners participated in a Maturity Benchmark exercise that assessed their smart community capabilities in the areas of vision, culture, processes, technology, and data. Based on this maturity assessment, several recommendations were made for how the region could better support and deliver smart community initiatives. Key recommendations from this initiative have been incorporated into the TSMO early actions list provided below. They include:

- Establish a smart community group, based on the VAST partnership model, to centralize innovation
- Launch a formal regional data program (interagency, intra-agency, and public)

TABLE 31. VAST 2022-2024 PRIORITY ACTIONS FOR ADVANCING TSMO

Area / Category	Action	CMM Dimensions						Lead Agency	Support Agency	Status
		BP	CO	CU	OS	PM	ST			
COMMERCIAL VEHICLE OPERATIONS (CVO)										
Freight Signal Priority: Expansion	Expand truck signal priority to other priority truck travel/safety locations (e.g., Padden/94th)		○			◑	◑	WSDOT, Clark Co., Vancouver		Ongoing
Railroad Grade Crossings: Signal Integration	Improve signal integration with railroad grade crossings. Improve detection and monitoring capabilities at unsignalized railroad crossings.		◑				◑	All traffic agencies		Planned
Commercial Vehicle Inspection: Enforcement Coordination	Develop better strategies to coordinate commercial vehicle weight/inspection operations and enforcement activities.		◑					WSDOT, WSP		Ongoing
DATA MANAGEMENT (DM)										
Clark County Data Lake: Deploy Initial Environment	Implement Data Lake to capture, store, and analyze key operational data and performance measures from Clark County signals and devices	◑	○			●	●	Clark Co.	PSU	New
Clark County Data Lake: Analysis Tools and Additional Data Sources	Enhance Data Lake to add other agency data feeds and analytics capabilities	◑	●			●	●	Clark Co., other partner agencies	PSU	New
PORTAL Enhancements: Performance Measures	Work with PORTAL to implement automated performance measurement tools and data analytics based on regional system management goals and emerging USDOT guidance	◑	◑			●		PSU	Partner agencies	Ongoing
PORTAL Enhancements: Data Visualization Tools	Work with PORTAL to develop data visualization and analysis tools		◑			●		PSU	Partner agencies	Ongoing
PORTAL Enhancements: Regional Data Archival	Determine type and range of potential data from existing and planned ITS infrastructure, identify data archiving projects and work to implement ITS network feeds to store data in the PORTAL data archive		◑			●		PSU	Partner agencies	Ongoing

Area / Category	Action	CMM Dimensions						Lead Agency	Support Agency	Status
		BP	CO	CU	OS	PM	ST			
Performance Measurement: SPaT Data	Work with traffic signal vendor to develop an open data feed for sharing Signal Phase and Timing (SPaT) data to automobile OEM's and CAV system suppliers	◑				◑	◑	Clark Co., WSDOT		Ongoing
Performance Measurement: Private Sector Data	Define requirements and procure private sector region-level data to support multi-agency operations and planning. Consider data ownership and use rights.		◑			◑	◑	RTC, all partner agencies		Ongoing
Performance Measurement: New Data Types	Develop framework for regional operations assessment tools aligned with statewide efforts to support consistent identification of operationally sensitive highway segments leveraging "new" types of operations data (e.g., probe speeds, historical weather, freight commodity flows, event O-D, etc.). Data archival to PORTAL.		◑			◑	◑	RTC, all partner agencies	PSU	New
Performance Measurement: Non-Transportation Data	Launch regional data program to catalog multi agency/department Smart Communities data and share with stakeholders, partners, and the community	●	●	◑	◑	◑	◑	RTC, all partner agencies		New
Performance Measurement: TSMO Perf Mgmt Planning	Develop regional TSMO-focused performance management plan to support real-time decision making and guide policy development. Identify and establish policy, accountability, reporting, and data needs for systems operational performance.		◑			●		RTC, WSDOT SWR	Partner agencies	New
Performance Measurement: TSMO Perf Mgmt Systems	Develop TSMO performance management system to track statewide and regional operations activity in real-time. Allow for short and long-term trend analysis to provide intelligence that allows for change in TSMO strategies and tactics.		◑			●	◑	RTC, WSDOT SWR	Partner agencies	New

Area / Category	Action	CMM Dimensions						Lead Agency	Support Agency	Status
		BP	CO	CU	OS	PM	ST			
Regional Modeling: Improve Tools	Develop a process for assessing multi-resolution models (macro, meso and microscopic) that go beyond capacity analysis. Continue collaboration with Metro on the regional model.	◑	●	⊙		●	◑	WSDOT SWR, Portland Metro	RTC	Ongoing
MAINTENANCE AND CONSTRUCTION (MC)										
Construction Activities Tracking	Develop process for tracking construction assets and communicating construction activities to partner agencies and the public		◑			◑	◑	All partner agencies	RTC	New
Work Zone Management	Align work zone management strategies with regional and statewide practices		◑				◑	WSDOT SWR, other partner agencies	RTC	New
Regional ITS Asset Management: Budgeting	Develop and incorporate process for operations, maintenance and asset management of TSMO investments as part of budgeting cycle (including lifecycle replacement concepts).	◑	⊙		⊙	◑		WSDOT SWR, other partner agencies	RTC	New
Regional ITS Asset Management: System Planning	Prepare an asset management plan for the repair and maintenance of existing traffic devices and ITS systems and addresses funding requirements specific to those types of procurements		◑					All partner agencies	RTC	Ongoing
PARKING MANAGEMENT (PM)										
Parking and Curb Use Management Planning: Addressing CASE	Monitor other regions' efforts in this area. Develop regional curb space management and parking plan that considers Connected, Automated, Shared, and Electric (CASE) vehicles' impacts to future travel demand patterns and curb space and parking needs.	⊙	◑			⊙		All partner agencies	RTC	New
PUBLIC SAFETY (PS)										

Area / Category	Action	CMM Dimensions						Lead Agency	Support Agency	Status
		BP	CO	CU	OS	PM	ST			
Corridor Incident and Event Management: Operational Planning	Implement regional Corridor Incident and Event Management Plan. Plan should align with the strategies identified in the completed I-5 Management Plan and the ongoing Shared Signals Integration project.	◑	●					All partner agencies	RTC	Ongoing
Emergency Vehicle Preemption: Centralization	Implement a centralized regional emergency vehicle preemption (EVP) system for managing emergency preemption across the region.	◑	●				●	Fire/Emerg. Response, traffic agencies	RTC	Ongoing
PUBLIC TRANSPORTATION (PT)										
Transit Signal Priority: Expansion	Continue TSP expansion to new transit corridors	◑	●			⊙	●	C-TRAN, traffic agencies	RTC	Ongoing
Transit Signal Priority: Centralization	Convert TSP into centralized regional system, potentially combined with the centralized EVP system	◑	●			⊙	●	C-TRAN, traffic agencies	RTC, Fire/Emer. Response	Ongoing
Shared-Use Economies: Curb Use Policies	Assess and develop policies for the allocation of street and curb space between public and private mobility service providers		◑	⊙				All partner agencies	RTC	New
Shared-Use Economies: Partnering with Private Sector	Develop policies for interacting and partnering with shared-used services and other private sector mobility solution providers	◑	◑	⊙	◑		◑	C-TRAN, traffic agencies	RTC	New
Shared-Use Economies: Data and System Integration	Identify and implement technology and data tools to integrate shared-user services into the multi-modal transportation network	◑	◑			◑	●	C-TRAN, traffic agencies	RTC	New
SUPPORT (SU)										
IT Enhancements: Gap Identification	Perform gap analysis of IT support for TSMO/ITS applications, TMC operations and operational technology.						◑	All partner agencies	RTC	New

Area / Category	Action	CMM Dimensions						Lead Agency	Support Agency	Status
		BP	CO	CU	OS	PM	ST			
IT Enhancements: Private Sector Opportunities	Identify IT services (e.g., cloud systems, data, managed services) that may be shifted to private sector providers	◑	◑	◑	◑		◑	All partner agencies	RTC	New
ITS Network Enhancements: PORTAL Connections	Enhance ITS network to facilitate the sharing of transportation data with PORTAL		◑				●	All partner agencies	PSU, RTC	Ongoing
ITS Network Enhancements: Equipment Replacement	Repair or replace obsolete communications infrastructure across the region, including switches, fiber optic cables, and wireless networks.						●	All partner agencies		Ongoing
ITS Network Enhancements: Buildout Strategies	Develop strategies to complete regional ITS and Communications Network.		◑				◑	All partner agencies	RTC	Ongoing
ITS Network Enhancements: Buildout Partnerships	Identify PPP opportunities to build out fiber networks for agency use		◑	◑			◑	All partner agencies	RTC	New
ITS Network Enhancements: Resiliency	Investigate methods to harden communications network to not be impacted by natural disasters.						◑	All partner agencies		New
ITS Network Enhancements: 5G Opportunities	Identify agency use cases for 5G technology and identify opportunities		◑	◑			◑	All partner agencies	RTC	New
ITS Network Enhancements: CV Opportunities	Identify agency use cases for connected vehicle technology and identify opportunities		◑				◑	All partner agencies	RTC	New
ITS Planning: ITS Plan Update	Update VAST regional ITS Plan (including ITS architecture) and coordinate with statewide efforts		◑				◑	RTC	All partner agencies, WSDOT HQ	Ongoing
ITS Standards: Harmonization	Publish TSMO/ITS standards to encourage regional and statewide interoperability.		◑				◑	WSDOT SWR	RTC, WSDOT HQ, other partner agencies	New

Area / Category	Action	CMM Dimensions						Lead Agency	Support Agency	Status
		BP	CO	CU	OS	PM	ST			
SUSTAINABLE TRAVEL (ST)										
Electric Vehicles: Public Charging Access	Develop policies for improving the public's access to EV charging	◑	◑					All partner agencies	RTC	Ongoing
Electric Vehicles: Fleet Management (Light-/Medium-Duty)	Develop agency EV fleet and charging management plans for light- and medium-duty fleet vehicles, including planning, design, deployment, and consideration of emerging standards	◑			◑		◑	All partner agencies	RTC	New
Electric Vehicles: Fleet Management (Heavy-Duty/Transit Vehicles)	Develop a EV fleet and charging management plan specifically for transit and heavy-duty vehicles. The plan should consider the unique operational, service, and physical characteristics of large vehicles and applicable solutions (e.g., inductive charging, opportunity charging, high-power specialty chargers)	◑			◑		◑	C-TRAN	RTC	New
TRAFFIC MANAGEMENT (TM)										
Regional Operations: Joint Operations Center	Build a joint operations center to include multiple workstations and video monitors for managing the area's traffic, to support both physical and virtual access by agency partners	◑	●	⊙	◑		◑	WSDOT SWR	Other partner agencies, RTC	Ongoing
Regional Operations: Shared Regional ATMS	Jointly operate a single ATMS system for the operation and maintenance of the traffic signal network of the region, including smaller cities.	◑	●	◑	⊙		◑	All partner agencies	RTC	Ongoing
Regional Operations: Traffic Signals Integration	• Integrate Vancouver, Clark County, and WSDOT traffic signals. • Integrate Camas traffic signals with WSDOT signal system. A remote workstation for the WSDOT signal system will be provided to Camas	◑	●	◑	⊙		◑	All partner agencies	RTC	Ongoing

Area / Category	Action	CMM Dimensions						Lead Agency	Support Agency	Status
		BP	CO	CU	OS	PM	ST			
Regional Operations: Jointly-Operated Video Sharing System	Complete implementation of the jointly-operated video surveillance system (VDG Sense) capable of operating traffic cameras and sharing video between transportation agencies		◑				◑	WSDOT SWR, Clark Co.	RTC	Ongoing
Regional Operations: Integrated Corridor Management	Engage regional and local agencies to collaborate on integrated corridor management real-time operations and performance management activities.	◑	●				◑	WSDOT SWR, other partner agencies	RTC	Ongoing
Roadside Technology: Controller Upgrades	Upgrade/replace traffic signal controllers as needed to interconnect them with the local signal system						◑	All partner agencies	RTC	Ongoing
Roadside Technology: Arterial CCTV Cameras	Provide coverage of highly congested local arterials and key intersections.						●	All partner agencies	RTC	Ongoing
Roadside Technology: Vehicle Detection	Continue to increase vehicle detection capabilities throughout the region, including radar and other roadside detection						●	All partner agencies	RTC	Ongoing
Freeway Active Traffic Management: Ramp Metering	Continue ramp metering deployments and prioritize future opportunities as recommended in the 2020 Urban Freeway Corridor Operations (UFCO) study					⊙	●	WSDOT SWR	RTC	Ongoing
Freeway Active Traffic Management: ATM Strategies Assessment	Conduct feasibility work to apply Active Traffic Management in the urbanized freeways as recommended in the 2020 UFCO study	⊙	⊙			◑	◑	WSDOT SWR, ODOT	RTC	Ongoing
Bi-state Incident Management	Develop policies and procedures for clearing incidents with impacts across state lines	◑	●		⊙			WSDOT SWR, ODOT	RTC	Ongoing
TSMO and Innovative Partnerships	Include large land use developers in early project scoping to discuss operations.	⊙	◑					All partner agencies	RTC	New
TRAVELER INFORMATION (TI)										

Area / Category	Action	CMM Dimensions						Lead Agency	Support Agency	Status
		BP	CO	CU	OS	PM	ST			
In-Vehicle Signing	Develop an approach for publishing a location-based real-time traveler information data feed for use by in-vehicle third-party trip planning/routing applications	◑	◑				◑	WSDOT SWR	WSDOT HQ, ODOT	New
VEHICLE SAFETY (VS)										
Connected and Autonomous Vehicle Roadmap	Develop an approach for considering Connected and Autonomous Vehicles (CAV) in the region. Identify policy and technical issues, the role of public agencies, new partnerships, and early adoption opportunities to "future proof" and accelerate CAV implementation	◑	◑	⊙	⊙		⊙	Clark Co., other traffic agencies	RTC	Ongoing
Road Safety: Queue warning signs	Deploy queue warning capabilities to existing freeway message boards and identify new message signs for high-collision locations						●	WSDOT SWR		Ongoing
WEATHER (WX)										
N/A	[None identified]									
TSMO-PROMOTING ACTIVITIES										
TSMO and Procurement	Establish process to quantitatively assess best TSMO related procurement methods on a periodic basis.	◑						RTC	Partner agencies	New
TSMO and Multi-Agency Planning	Lead/support TSMO conversation in local and regional planning and joint operations groups.		◑					RTC, WSDOT		New
TSMO and Multi-Agency Planning and Operations	Formalize TSMO relationships and agreements at regional/local planning and operations levels		◑					RTC, WSDOT		New
TSMO and Innovative Partnerships	Develop methods to proactively engage with the region's high-tech private sector to advance TSMO		◑					RTC, WSDOT		New

Area / Category	Action	CMM Dimensions						Lead Agency	Support Agency	Status
		BP	CO	CU	OS	PM	ST			
TSMO and Grants	Incorporate TSMO requirements into local grant programs		◑					RTC, WSDOT		New
TSMO and Long-Range Planning	Develop and provide model framework for incorporating TSMO into LRTPs		◑					RTC, WSDOT		New
Promoting TSMO	Communicate the return on investment and benefits of TSMO internally and to VAST agency partners (business case studies, etc.)			◑				RTC, WSDOT		New
Promoting TSMO	Encourage "TSMO mentality" through outreach and awareness			◑				RTC, WSDOT		New
Promoting TSMO	Present and promote TSMO at partner and professional events			◑				RTC, WSDOT		New
TSMO Professional Development	Identify TSMO champions within and among VAST partner agencies to guide near-term TSMO implementation			◑	◑			RTC, WSDOT		New
TSMO Professional Development	Support/host/participate in sustainable TSMO training programs (leverage LTAP)			◑	◑			RTC, WSDOT		New
TSMO Professional Development	Develop strategy for succession planning at RTC to capture key institutional knowledge and encourage partner agencies to do the same			⊙	◑			RTC	Partner agencies	New
SMART COMMUNITY ACTIONS										
Fostering a Regional Culture of Innovation	Build a smart community group, based on the VAST partnership, model that can centralize innovation across members and create a model that members can use in their own jurisdictions. Aims of the group are to break down the silos of innovation and elevate the good work being done at department levels. Employ a federated mode to foster coordination while retaining local control.		●	●	⊙			RTC	Partner agencies	New

Area / Category	Action	CMM Dimensions						Lead Agency	Support Agency	Status
		BP	CO	CU	OS	PM	ST			
Formal Processes for Regional Data Sharing	Launch a formal regional data program to promote proactive information sharing among agencies, departments, and with the public. To include both open and protected data, to both catalog/document information assets as well as maintain and share data to stakeholders, partners, and the community.	⊙	●	◑	◑	◑	⊙	RTC	Partner agencies	New

4 ARCHITECTURE MAINTENANCE PLAN

As ITS projects are implemented in the region, the Regional ITS Architecture will need to be updated to reflect new ITS priorities and strategies that emerge through the transportation planning process to account for expansion in ITS scope, and to allow for the evolution and incorporation of new ideas. The VAST Regional ITS Architecture has a ten-year time horizon, as do most regional ITS architectures that support the higher-level statewide architecture.

The purpose of maintaining an ITS architecture is to keep it current and relevant, so that stakeholders will use it as a technical and institutional resource when developing specific ITS project plans. The VAST Region ITS Architecture should be continuously maintained to assure that:

- The architecture is consistent with state plans and priorities;
- New projects properly integrate with existing systems;
- New projects do not duplicate current systems;
- The region is spending resources efficiently; and
- New projects are eligible for Federal funding.

4.1 REGIONAL ITS ARCHITECTURE MAINTENANCE RESPONSIBILITIES AND PROCEDURES

The Regional Transportation Council of Southwest Washington is the primary agency for maintenance and upkeep of the Regional ITS Architecture. RTC has established collaborative relationships with FHWA, FTA, WSDOT, C-TRAN, Cities, ODOT, and other stakeholders in the region for ITS planning and implementation.

Through its VAST standing committee and technical working groups, RTC provides a forum for project-level Architecture coordination and regional discussion of proposed updates to the ITS architecture.

The ongoing monthly VAST project coordination meetings, as well as direct meetings among project participants, will be used to identify potential changes to the Regional ITS Architecture based on changing conditions, needs, and/or project implementations. From this initial assessment, one or more of the following Regional ITS Architecture maintenance activities may occur:

- Convening of a committee of regional stakeholders that may be impacted by a potential change in the ITS Architecture (e.g., addition of new service packages);
- Incorporation of minor changes directly in the regional ITS architecture (e.g., update of interconnect from ‘planned’ to existing’ or change in the formal name of a Stakeholder agency).

- Logging of potential issues for further consideration in the next comprehensive update of the Regional ITS Architecture.

4.2 COMPREHENSIVE UPDATES TO THE REGIONAL ITS ARCHITECTURE

In addition to ongoing maintenance, it is anticipated that the Regional ITS Architecture will undergo a comprehensive update every three to five years. Factors that will influence the timing of comprehensive regional updates include:

- Updates to the National ITS Architecture that significantly impact user services, market packages, or other features;
- Emergence of substantial new regional transportation needs, stakeholders, or entities;
- Updates and changes to the WSDOT Statewide ITS Architecture; and/or
- Other Federal or State-Level guidance pertaining to Regional ITS Architectures.

APPENDIX A – 2020 VAST SMART COMMUNITY FINDINGS AND RECOMMENDATIONS REPORT

IDC ANALYZE THE FUTURE

VAST Smart Community Benchmark Results

October 6, 2020