**Southwest Washington
Regional Transportation Council**

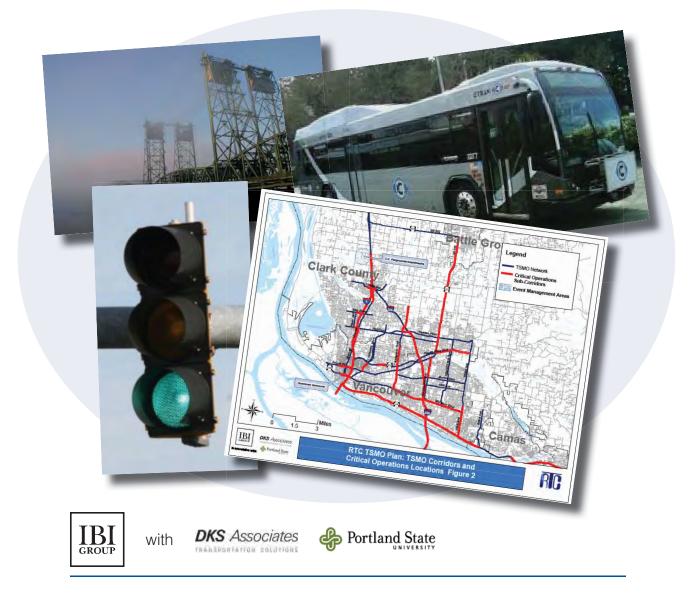**Executive Summary**

Regional Transportation Systems Management and Operations Plan
for Southwest Washington

June 2011

IBI GROUP with **DKS Associates** TRANSPORTATION SOLUTIONS **Portland State** UNIVERSITY

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Regional Transportation
Systems Management and Operations Plan
Executive Summary

Study Highlights:

- Establishes a multimodal, regional vision for how TSMO can cost-effectively address transportation needs of Southwest Washington.

- Provides a "toolkit" of specific TSMO strategies, at the regional level and corridor levels

- Identified Performance Measures for monitoring the effectiveness of TSMO through the use of ITS data and the PORTAL regional data archive.

- Describes agency roles and responsibilities (Concept of Operations) to support TSMO implementation.

- Provides specific recommendations for integrating TSMO into the regional planning and project development process.

- Presents a Corridor Operations Improvement Plan that identifies specific TSMO strategies applicable to operationally-significant arterials and freeways in the region.

- Presents a ten-year ITS implementation plan to provide the technology infrastructure that enables TSMO strategies.

Introduction

The Transportation System Management and Operations (TSMO) Plan for RTC builds upon a proven reputation of success and national leadership in interagency transportation operations coordination in Southwest Washington. The most visible example of this is VAST (Vancouver Area Smart Trek), a coalition of multimodal state, regional and local agencies which have been working actively together for over 10 years implementing Intelligent Transportation Systems (ITS) and operations solutions to address the region's transportation needs.

This TSMO Plan provides a strategic framework to guide transportation system management objectives, while it informs future ITS technology investments and capital improvements necessary to support those objectives over the next 10 years. The TSMO Plan is intended to support, and where applicable, is to be incorporated into the regional Congestion Management Process (CMP). The CMP identifies regional transportation needs that can be addressed through application of TSMO strategies, while the Regional Transportation Data Resources developed under this project provide a means for tracking CMP and TSMO performance metrics for recurring and non-recurring sources of congestion.

The Plan has a planning horizon of approximately ten years. While this is shorter than the planning horizon of many regional planning and capital investment efforts, it reflects both the nature of TSMO strategies as viable near-term solutions to transportation needs, as well as the dynamic evolution of ITS technologies and operations practices.

Intelligent Transportation Systems – Enabling Tools of TSMO

The Plan identifies future ITS infrastructure investment plans based upon the TSMO strategies identified by regional agencies, in the context of other elements of a successful regional operations program such as institutional coordination, plans, policies, funding, and performance measures.

Compared to many ITS strategic planning efforts in the past, this reflects a more comprehensive view of ITS as the "enabling tools" that allow agencies to collaborate in active management of the transportation system. This active management, in turn, reflects operational objectives that speak to transportation needs and priorities acknowledged by transportation professionals and decision-makers at the regional level.

Participating Agencies

The development of the TSMO Plan concerned a diverse array of stakeholders who play a functional role in transportation operations, planning and emergency response in Clark County.

A Steering Committee comprised of the relevant public agencies was established to guide the TSMO planning process. The TSMO Steering Committee Agencies include the following:

TSMO STEERING COMMITTEE PARTICIPANTS

- Clark County
- SW Washington Regional Transportation Council (RTC)
- Washington State Dept. of Transportation
- City of Vancouver
- Oregon Metro
- C-TRAN
- City of Camas
- Port of Vancouver

TSMO Program Goals

- Provide viable transportation solutions that advance regional transportation goals, economic vitality, and environmental sustainability.

- Promote operational policies that are responsive to the need and concerns of citizens, industry, and the core missions of participating agencies.

- Maximize the value of existing and future transportation investments to meet transportation needs in a fiscally responsible manner.

- Promote multimodal and interagency cooperation to develop, fund, implement, operate, and maintain TSMO programs.

- Deploy integrated and interoperable Intelligent Transportation Systems (ITS) and communications assets that are shared among agencies to maximize functionality, flexibility, and return on investment for transportation and other public uses.

- Use operations data to continually measure and improve the quality of the transportation system and operational strategies in the region.

- Establish operational strategies that support safety businesses and are sensitive to adjacent land-uses.

TSMO Process Goals

- Coordinate technology, infrastructure, resources and maintenance investments to implement TSMO strategies.

- Incorporate TSMO into the regional transportation planning, project development, and urban development process.

- Manage the bi-state highway and public transportation system through operational and investment coordination among agencies in southwest Washington and the Portland, Oregon metropolitan area.

- Seek opportunities to engage private enterprise, institutions and other community partners to envision, research, and implement TSMO strategies and user services for the benefit of the region.

The TSMO Vision

The Regional Transportation Council held a TSMO Visioning Workshop in February 2010. The TSMO Plan has been developed around the vision statement and utilizes transportation system operational strategies that are directed toward improving system efficiency and better performance without adding new roadway capacity. It focuses on lower cost operational and multimodal strategies that are regionally coordinated and better utilize existing transportation facilities. The vision statement:

TSMO Vision Statement:

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

Integrating Regional Planning and Transportation Operations

To increase the level of regional coordination between TSMO and other forms of transportation investment like capacity expansion, transportation demand management, or access management, greater consideration of TSMO needs and opportunities is required in the regional transportation planning process, project development, and measurement of the effectiveness of transportation investment.

The regional transportation planning process sets policy priorities and guides future transportation investment. TSMO is one potential path of transportation investment that can meet the identified needs and priorities. Therefore it is important to connect transportation planning and transportation operations programs in a deliberate and sustained manner.

Executive Summary Figure 1: The Regional Planning and TSMO "Lifecycle"

Regional TSMO Strategies Toolkit

The TSMO toolkit includes a comprehensive list of operational strategies that stakeholders may use to optimize the operational performance of the regional multimodal transportation system. The strategies on the following table are categorized in five key focus areas. The strategies focus on daily real-time operations and management that utilizes technology and require agency collaboration.

There are mutually-supportive strategies are associated with TSMO strategies that improve the performance of the regional transportation system. Region wide access management standards and policies could support system operations at a broader level by optimizing the physical operating characteristics of a given roadway. Access management strategies such as medians, channelization and driveway consolidation, can be used in concert with enhanced traffic signal operations to improve traffic flow that gets disrupted by vehicles entering and exiting businesses along an arterial roadway. Irrespective of the particular situation, a balanced set of strategies tailored to local conditions can improve access to adjacent businesses by improving safety, reliability and travel-time in a given corridor.

EMERGING TSMO STRATEGIES

Executive Summary Table 1: Emerging TSMO Strategies

Traveler Information	Regional Management & Operations	Roadway Management & Operations	Transit Management & Operations	Freight Management & Operations
Bi-state traveler information interoperability	Regional multi-agency transportation management center (TMC)	Active Traffic Management (ATM)	Automated vehicle location (AVL) and computer aided dispatch (CAD)	Real-time and predictive freight information
Roadside traveler information dissemination	Bi-state incident management	Freeway/arterial integrated corridor management (ICM)	Automated passenger counting (APC)	Roadside truck electronic screening/ clearance programs
Regional traveler information	Regional incident and emergency management	Ramp Metering	Transit signal priority (TSP)	Truck traffic signal priority (TSP)
Predictive traveler information	Event management	Enhanced traffic signal operations	Transit speed and reliability	Freight data collection
Real-time transit arrival information	Work zone management	Traffic surveillance	Regional transit fare integration	
Transit trip planning website	Regional performance measures and supportive data collection	Road weather information systems		
Parking availability informations				

The regional TSMO toolkit includes five categories of multi-modal strategies to improve operational efficiency of the existing transportation network.

TSMO Performance Measures

Role of Performance Measures in TSMO

Performance measurement of the transportation system provides transportation professionals and decision makers with an ongoing understanding of the effectiveness of TSMO strategies and investments so they can identify what strategies most benefit the overall operation of the transportation network and allocate resources accordingly. A defined set of performance measures also supports the sharing of real-time and archived data to support active management and operations of the transportation system, traveler information dissemination and transportation planning efforts.

Role of the PORTAL Regional Data Archive

PORTAL, developed in 2004 and operated/maintained by Portland State University (PSU), is the official transportation data archive for the Portland-Vancouver metropolitan area and plays a key role in performance measurement. It supports:
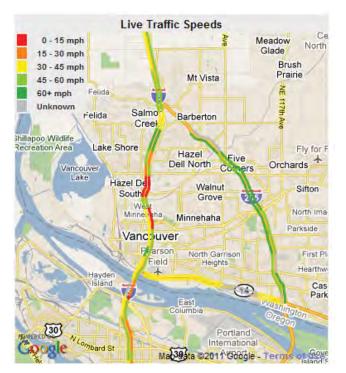
- Building a performance-based long-range transportation plan;

- Better management of the transportation system; and

- Decision-making beyond traditional level-of-service analysis.

Today PORTAL includes freeway data, transit data, freight data, incident data, traffic counts, parking data and weather information.

The Southwest Washington Regional Transportation Council is one of the PORTAL partners and they represent the interests of transportation agencies in the southwest Washington urban area. To date, WSDOT detector data are archived in PORTAL. Stakeholders

are currently working with PSU to expand PORTAL to achieve the following goals:

- Validate WSDOT detector data

- Develop methodology for archiving arterial data from Clark County and Vancouver

- Develop methodology for archiving C-TRAN data

- Support data download so agency personnel have access to data stored in PORTAL

- Develop tools to automate performance measurement reports

Today, users of PORTAL include researchers, local transportation planners and engineers, and the local news media. PORTAL is set up to allow for the capture of raw data, which is of interest to researchers; more notably, it has the ability to generate reports based on user parameters, which is of particular interest to the agencies that operate the transportation network.

The PORTAL Regional Data Archive is a powerful tool to collect and analyze operations data for planning analysis, project evaluation, and performance measurement.

Regional Concept of Operations

As the region moves forward to implement more sophisticated TSMO strategies, the Regional Concept for Transportation Operations (RCTO) provides specific guidance to the inter-agency coordination that will be required to support those strategies.

The Regional Concept for Transportation Operations serves as a blueprint for key intra-agency and agency-to-agency relationships in delivering TSMO strategies in the region. In some cases, these relationships may merit the development (or update) of formalized interagency agreements among the parties.

Agency Roles and Responsibilities in Support of TSMO Implementation

Many agencies in Clark County and on the Oregon side of the metropolitan area perform critical roles in supporting TSMO strategies. This is indicative of the underlying operational linkages among agencies and the multiple jurisdictions that comprise the region's complex, multimodal transportation network.

Agencies are classified according to their function as follows:

- Agencies with a Lead Operations Role have a day-to-day, "hands on" role in implementing the TSMO strategy. Quite often, these agencies, or a subset of them, lead the planning, funding and implementation of ITS technologies that enable strategy implementation. Each TSMO strategy has at least one Lead Agency in the region.

- Agencies with a Supporting Operations Role are also critical to the success of a TSMO strategy, though their participation may be limited according to jurisdictional factors or the degree of responsibilities or participation as compared to Lead Agencies.

- Each TSMO strategy is also a potential Data Source of ITS or operational data to the PORTAL archive to support performance measurement, analysis and planning. Portland State University maintains a lead role in collecting and archiving operations data for each strategy.

For example, many agencies may take advantage of Roadway Weather Information Systems (RWIS) data to support operations and emergency response, but only WSDOT (the Lead Agency), builds, operates and maintains the regional RWIS system. By contrast, a TSMO strategy like Regional Incident and Emergency Management requires substantial commitment of technology, resources, and personnel by several traffic, law enforcement, and emergency management agencies. Accordingly, a larger number of agencies are shown with a lead operational role. In both examples, data from the ITS systems supporting these TSMO strategies, such event logs and pavement weather conditions, is exported to the PORTAL regional data archive at PSU.

TSMO in the Regional Planning Process

A fundamental objective of this Plan is to support continued integration of Transportation System Management and Operations activities with the regional transportation planning and project development process. This supports the growing recognition that improved operations is vital to meeting the transportation needs of the region in the coming years. Furthermore, it is imperative to coordinate, prioritize and evaluate TSMO strategies and ITS investments alongside other proposed transportation improvements.

TSMO, and the ITS technologies that enable many TSMO strategies, can have direct and cost-effective benefits in addressing particular transportation needs of the region. Specifically, in the case of non-recurring congestion or corridors that are constrained by physical or other factors, TSMO offers alternatives or complements to conventional transportation investments and therefore should be incorporated

consistently within the transportation planning process and the allocation of funding resources.

By linking ITS deployments with planning outcomes and goals, it is anticipated that funding for TSMO can more often be derived from the conventional planning process. It is anticipated that this will become more likely now, given that technology investments can be compared to traditional projects on a more equal basis.

Opportunities to Link TSMO and Regional Planning

- Incorporate TSMO goals and strategies into the long-range Metropolitan Transportation Plan (MTP).

- Require evaluation of TSMO components or alternatives in project development and ranking.

- Use PORTAL operations data to support the Congestion Management Process (CMP), and use TSMO strategies to address regional 'hotspots' identified in the CMP.

- Provide ongoing coordination of planning and operations agencies, building upon the success of the Vancouver Area Smart Trek (VAST) program.

- Measure the effectiveness of TSMO projects and strategies and regional transportation efficiency using PORTAL data derived from field ITS systems and data collection.

- Promote awareness of the benefits of TSMO through education and outreach.

Regional TSMO Network in Clark County

The Plan identifies a regional network of TSMO corridors comprised of limited-access roadways, principal and major arterials in urbanized Clark County where TSMO strategies are likely to be an effective strategy given these corridors' operational characteristics and needs. For example, varying levels of congestion on these corridors, either by time of day or due to non-recurring events such as traffic accidents, weather, or special events, suggests that an active approach to managed operations is necessary to minimize impacts to the traveler and commercial freight.

Regional TSMO Corridor Screening Process

RTC's Congestion Management Process (CMP) was used as the basis for identifying the Regional TSMO Network, supplemented by a thorough screening process and extensive participation of Steering Committee members. The resulting Regional TSMO Network is a footprint of transportation facilities for future TSMO implementation.

The regional CMP network was reviewed by the project Steering Committee, which made edits based on known operational conditions in the corridors. Committee members were provided with a set of selection criteria, which was developed to capture transportation characteristics that suggest a need for active management of the transportation system network.

Subsets of the Regional TSMO Network with the highest degree of perceived operational needs and opportunity have been identified as Critical Operations Sub-Corridors. While all corridors within the Regional TSMO Network are operationally significant, there were specific "critical" segments within each of the corridors that would stand to benefit the most from TSMO implementation.

By mapping specific TSMO strategies to regionally-significant corridors, the Regional TSMO Network serves as a guide for future operations and transportation investment planning. Inclusion in the network suggests that TSMO is a viable approach to meeting at least some of the transportation needs of these corridors. The Regional TSMO Network will be re-evaluated periodically and modified to reflect changing transportation and land use conditions in the region.

TSMO Strategies Applied to the Corridors

After determining the Regional TSMO Network, specific TSMO strategies identified in the MTP were applied to individual TSMO corridors.

In general, TSMO strategies in the MTP fall into two categories: those that are implemented on a regional basis (e.g., Regional Incident & Emergency Management) and those that are implemented on a localized or corridor-by-corridor basis (e.g., Transit Signal Priority). Those that are implemented regionally are not mapped against specific corridors, because these are more overarching initiatives that are not directly relevant to any specific corridor.

Most regional arterials offer similar opportunities, with the differences among them attributable to the presence (or absence) of transit service, regional freight corridor designation, or proximity to a limited-access corridor (i.e. traffic diversion due to an incident). All arterial corridors in the Regional TSMO Network can benefit from enhanced traffic signal operations and traffic surveillance as core strategies for arterial operations management.

Regional TSMO Implementation Plan

The TSMO vision for Clark County, along with the associated TSMO network and operational strategies provide the framework for the Implementation Plan, which identifies the enabling ITS technology and equipment. The Plan provides a roadmap for implementation of ITS field equipment and technology to support system management and operations over the next ten years.

ITS implementation guidelines have been developed as part of the Plan to describe functional guidelines and specifications for ITS technologies to ensure that these investments support TSMO objectives in an effective, interoperable manner. Examples include the location of surveillance cameras (intersections, high incident locations, etc.) to support incident and emergency management activities, or the spacing and quality of traffic detection to adequately capture traffic flow or travel-time measures.

By comparing these standards to existing ITS deployments in the region, the future ITS needs of the region to support TSMO have been identified at the corridor level. The guidance contained in the Plan is a valuable guideline for future project-level planning and design for ITS implementation.

To fulfill the TSMO vision for the region, the Implementation Plan provides the necessary guidance to agencies on the enabling ITS infrastructure that is required to support each of the TSMO strategies in the corridors defined in the TSMO network.

The future deployment need is based on three factors:

1. The existing, or 'baseline' level of ITS deployment in the region;
2. The ITS technologies needed to support the TSMO strategies identifies for each corridor; and
3. A Regional ITS Deployment Guideline that defines a target level of instrumentation and functionality to partially equipped ITS corridors, and that also supports the desired level of implementation based on the TSMO Plan goals and objectives.

By comparing the 'baseline' ITS deployment in the region today to the ITS implementation standard, it is possible to estimate the level of future ITS deployment needed in the region to fulfill the TSMO vision.

Regional ITS Architecture Update

The TSMO Plan provides the foundation for the update of the Regional ITS Architecture; the Architecture is a framework to ensure interoperability among ITS systems and devices across the region. This includes infrastructure that is deployed, owned and operated by multiple agencies. The ITS Architecture helps to ensure that Clark County derives the maximum value and functionality from its investment in ITS infrastructure. Consistency with the Regional ITS Architecture is required to use federal funding for ITS infrastructure projects, in accordance with 23 CFR Part 940.

To ensure interoperability of ITS systems on the macroscopic scale, the Regional ITS Architecture is consistent with other ITS Architectures that provide the context for urbanized Clark County. These include: The WSDOT Statewide and Southwest Region ITS Architecture; the corresponding ODOT Statewide ITS Architecture; and the ITS Architecture for ODOT Region 1.

As the region's ITS infrastructure is deployed incrementally on a project-by-project basis, the Regional ITS Architecture will be a valuable resource for ensuring that the regional vision for interoperable ITS systems and services is fulfilled.

RTC TSMO Plan: TSMO Corridors and
Critical Operations Locations   Figure 2