TABLE OF CONTENTS

1. INTRODUCTION

Intelligent Transportation Systems (ITS) have the ability to significantly improve the efficiency of existing transportation systems through better monitoring, more reliable travel speeds, and more effective communication with users. Because the Puget Sound region, home to more than three million people, faces significant geographical limits on the physical expansion of its transportation system, various agencies in the region have been successfully implementing various ITS projects over the last 25 years. While this has improved transportation within jurisdictions, one missing link has been significant cross-jurisdictional coordination to improve transportation between different cities and counties.

The PSRC Regional Traffic Operations Committee (RTOC) is a coalition of city, county and state agencies that was formed to provide leadership for regional traffic operations initiatives. The RTOC is serving as the stakeholder group for the development of a Regional ITS Implementation Plan to identify ITS improvements for key multijurisdictional arterial corridors.

Together with a parallel project, the Regional Concept of Transportation Operations, the purpose of the RITSIP is to provide the capital improvements to support better coordination amongst the region's transportation agencies and is intended to help create a more seamless transportation network and a more livable, economically vibrant Puget Sound.

This report summarizes and presents outcomes from the following RITSIP development efforts:

- Document Review: Review of federal, state, regional and local ITS plans and programs.
- Visioning: Development of regional ITS vision, mission, goals and objectives.
- Agency Survey: Survey of RTOC agencies' ITS, operational practices, and challenges.
- Funding Review: Review of federal, state and regional funding programs potentially applicable to ITS projects.
- Key Corridor Selection Criteria: Identification of criteria against which arterials in the region will be assessed to determine the corridors for inclusion in the ITS Plan
- Key Corridor Identification: Assessment of the criteria against over 130 potential arterial corridors to identify 25 to be developed into ITS Plan projects.
- Key Corridor ITS Inventory: Collection of existing ITS, signals and communications inventory along the 25 corridors for mapping and analysis of gaps and needs.

Detailed technical memorandums were developed for the document review, visioning, survey, and funding review.

2. INTELLIGENT TRANSPORTATION SYSTEMS AND TRAFFIC MANAGEMENT IN PUGET SOUND

2.1 Traffic Agency ITS Programs

As described in the Puget Sound Regional ITS Architecture[1], the Washington State Department of Transportation (WSDOT) is the owner and operator of the region's interstates, U.S. highways, and state routes outside of cities, which include most of the major commuter corridors in Puget Sound. WSDOT has been a leader in the deployment of ITS across the state, with many deployments piloted in the Seattle area and later expanded statewide. The Northwest Region is responsible for King and Snohomish counties. The Olympic Region is responsible for Pierce and Kitsap counties.

The WSDOT freeway traffic management system continues to grow across the state, and particularly in the urban Puget Sound region. The management system includes the various Surveillance Control and Driver Information (SC&DI) devices used to monitor freeway conditions and inform travelers en-route, including Vehicle Detectors, Closed Circuit Television (CCTV) Cameras, Ramp Meters, Dynamic Message Signs (DMS), and Highway Advisory Radio (HAR). The field devices provide the data for WSDOT's traveler information website and 511 phone system. The system is controlled from WSDOT's regional Traffic Management Centers (TMC), one in Shoreline (for the WSDOT Northwest Region) and the other in Tacoma (for the WSDOT Olympic Region). WSDOT is currently embarking on a redesign of the Northwest Region TSMC.

WSDOT operates electronic tolling facilities on the Tacoma Narrows Bridge and State Route 167, which is a High Occupancy Tolling (HOT) facility.

King and Snohomish Counties have both adopted ITS plans to improve traffic flow within their borders. King County has opened a Transportation Operations Center and deployed two ITS corridor projects that included Closed Circuit Television (CCTV), detection, and centralized signal control (including control sharing with other agencies). The county has a number of corridor and regional projects in the works to continue to improve mobility.

Snohomish County released an ITS Concept of Operations in 2007 that lists four major goals for ITS in the County: improve the overall performance of the transportation system, improve the performance of the arterial traffic management system, improve and expand data communications and network performance, and increase operations and maintenance productivity and efficiency. Projects advancing these goals include transit signal priority and

The most populous cities in the region have made significant progress in implementing Intelligent Transportation Systems. However, this is an ongoing process and a number of agencies have developed ITS implementation plans in order to continue improving the operations of the existing transportation network.

- In addition to extensive signal and monitoring systems, the Seattle Department of Transportation (SDOT) offers a Traveler's Information Map on its website showing traffic conditions and live camera views for main arterials in and around the city. SDOT is roughly halfway through the lifespan of its ITS Strategic Plan, which recommends a series of actions focusing on the optimized operations and maintenance of the signal system. Actions include connecting every signal to the centralized system, maximizing efficiency through signal and phasing improvements, implementing transit signal priority, and providing measured performance reports.

[1] *Puget Sound Regional ITS Architecture*, prepared by IBI Group for the Puget Sound Regional Council; August 21, 2006

- Guided by its ITS Plan, the City of Bellevue opened a new traffic management center, which controls and monitors the City's 177 traffic signals. The plan focuses on Travel and Traffic Management, Emergency Management, Public Transportation (including transit signal priority), Information Management, and Maintenance and Construction Management.

- The City of Issaquah's ITS Implementation Plan focuses primarily on improved traffic signaling, remote access and control of ITS devices, and congestion and incident information availability. The City has completed implementation of the projects identified in the plan.

- The City of Redmond has implemented projects on multiple corridors under its ITS Program, including upgraded signal systems and timing plans, a CCTV network, a transit signal priority mechanism, and improved traveler information. The City's ITS Program prioritizes short-term, medium-term, and long-term projects for improving operations along a number of key arterials.

- The City of Renton has completed construction of a TMC, deployed a new centralized signal control system, and installed a video link to view WSDOT freeway cameras. Renton was also a partner in the Trans-Valley ITS corridor project led by King County. Renton's ITS Strategic Plan identifies a number of projects to streamline operations and improve real-time monitoring of roadway conditions. These include expanding vehicle detection systems at 49 key intersections, automating traffic counts at 4 locations, deploying a citywide CCTV camera network, providing a traffic flow map, and improving center-to-center communications with other agencies.

2.2 ITS and Regional Planning

As cities and counties continue to implement their respective ITS plans, much of the work left to be done will involve creating a regional transportation system in which signal timing, traffic and incident monitoring, emergency management, and other efforts are more seamlessly coordinated between agencies. The Puget Sound Integrated Corridor Management (ICM) Concept of Operations, submitted to USDOT in 2007, is intended to improve the operations of important cross-jurisdictional corridors in the region. Various strategies include improved incident and travel demand management, traveler information, and inter-agency coordination and information sharing.

In addition, Transportation 2040 is the upcoming update to Destination 2030, PSRC's regional transportation plan, which is intended to guide transportation investments in the region over a 30-year period. The Transportation 2040 Draft Environmental Impact Statement puts forth five alternative strategies for transportation in addition to a baseline alternative, which would complete any projects underway in the region. The alternatives vary in their emphasis on ITS improvements and will be considered for recommendation in the final plan, expected to be adopted in 2010.

2.3 ITS and Signal Operations

A survey was prepared and submitted to the RTOC agencies to gather information on ITS implementations in the region and to gauge interest in inter-agency transportation coordination. Survey respondents included the WSDOT NW and Olympic Regions, King, Pierce, and Snohomish Counties, and a collection of cities. Questions covered the types and extent of technologies used, short term plans for replacement, frequency of system adjustments, and willingness to participate in inter-agency knowledge-sharing.

As seen in Figure 1, the agencies with the largest signal systems include SDOT operating over 1000 signals, WSDOT NW and Olympic Regions, King County, the City of Bellevue, and the City of Everett.

	Traffic Signal System			Central Traffic Control System		
Jurisdiction/Agency	# Signals Owned	# and maintain Signals Operated	# Signals Maintained	Supplier	System Name	Version
City of Auburn	80	81	81	Econolite	ICONS	3.11.2.4
City of Bellevue	156	182	182	Computran / Siemens	MTCS / i2TMS	MTCS-PC / 3.9.6.46
City of Edmonds	21	17	21	-	-	-
City of Everett	170	163	163	Quixote	Multisonics VMS-330	-
City of Federal Way	75	78	75	Econolite	Aries	3.11
City of Issaquah	42	42	42	Siemens	ACTRA	3.3.3
City of Kent	103	107	103	Quixote	VMS	ITMS
City of Kirkland	42	42	42	-	-	-
City of Lynnwood	57	65	57	Naztec	ATMS.now	-
City of Marysville	26	28	26	BItrans	Quicnet	4
City of Redmond	90	90	90	Econolite	Aries	3.10
City of Renton	118	109	118	Siemens - EAGLE	ACTRA	2002
City of Tukwila	52	52	52	Siemens	ACTRA	-
City of Seattle/SDOT	1005	1010	1005	Siemens	ACTRA	3.2
King County	135	190	355	Siemens / Econolite	ACTRA / ICONS	3.3.0 / 3.11.2.4
Pierce County	92	92	173	-	-	-
Snohomish County	72	121	121	McCain	QuicNet/4	2.14.0
WSDOT NW Region	467	482	482	Siemens	i2TMS	3.9.6.14
WSDOT Olympic Region	301	270	270	Quixote	Traconex TMP 390	J8

Figure 1: Information about traffic signal system and central traffic control system

Agencies varied significantly in their use of traffic signal systems, with Siemens, Econolite and Quixote providing the majority of central traffic control systems. Within the family of Siemens products, WSDOT uses i2TMS, while others have ACTRA. The many different systems make center-to-center data sharing and operations difficult due to incompatibility. Indeed, most agencies said that technical barriers prevent signal control sharing with other jurisdictions (Figure 2).

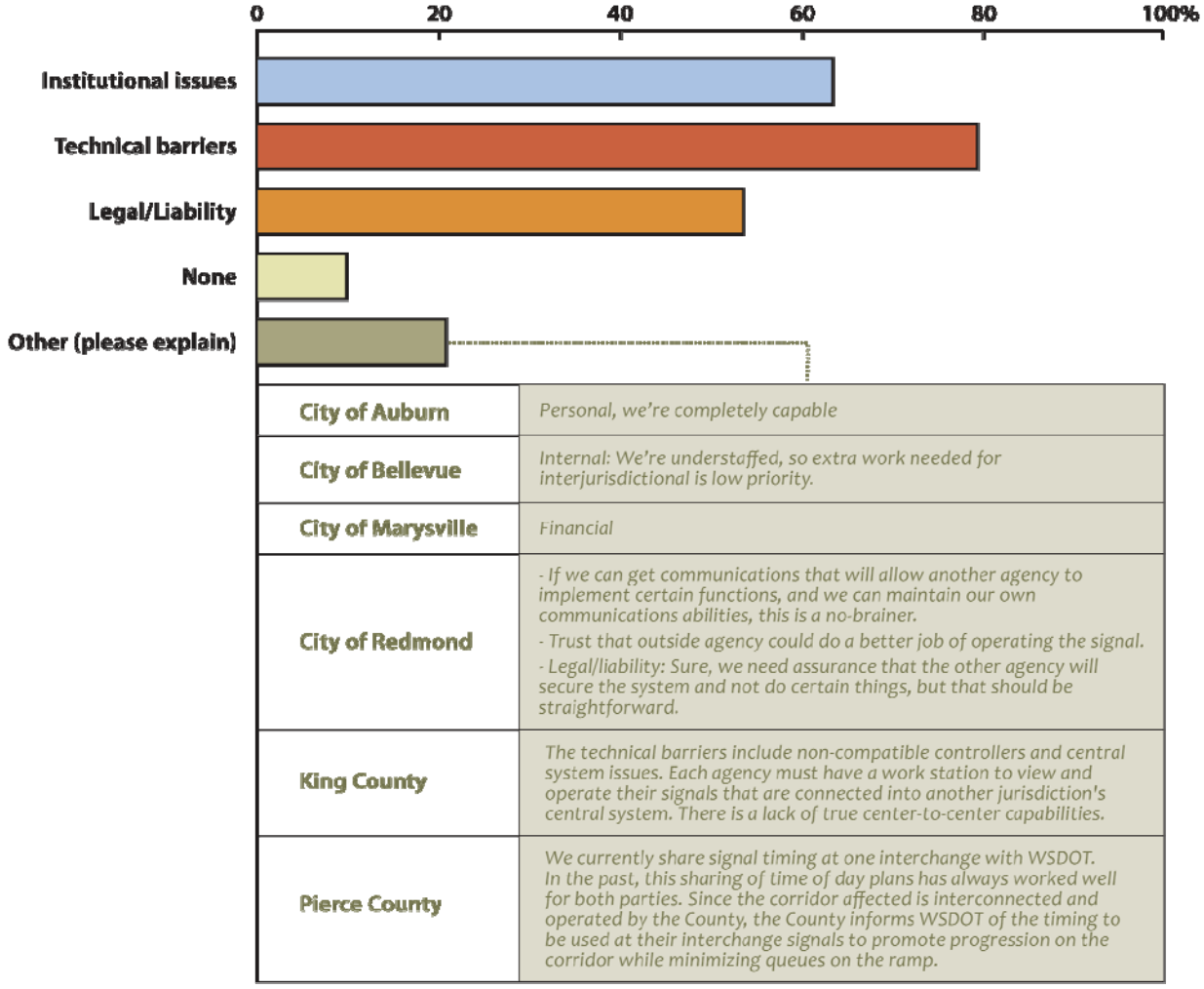
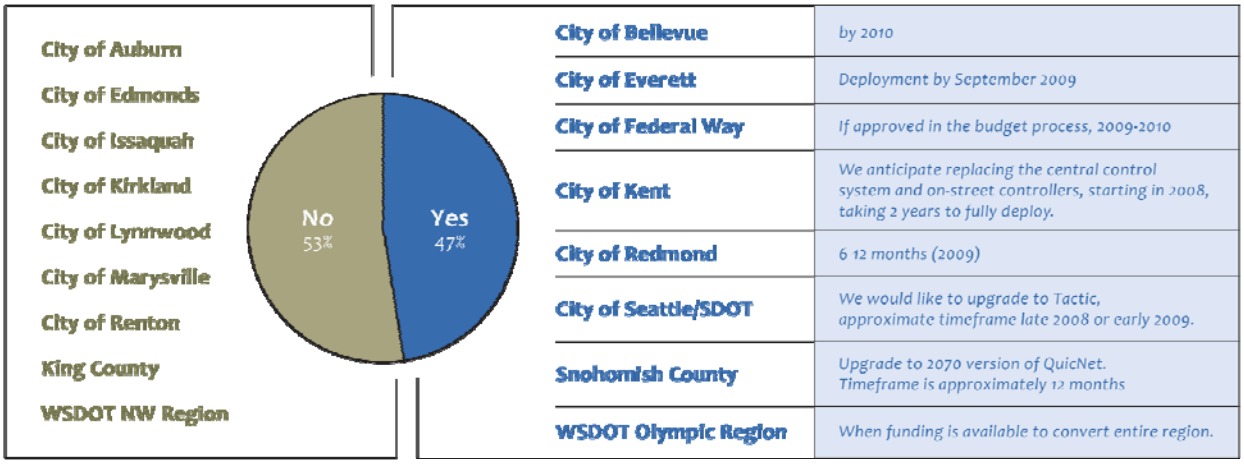


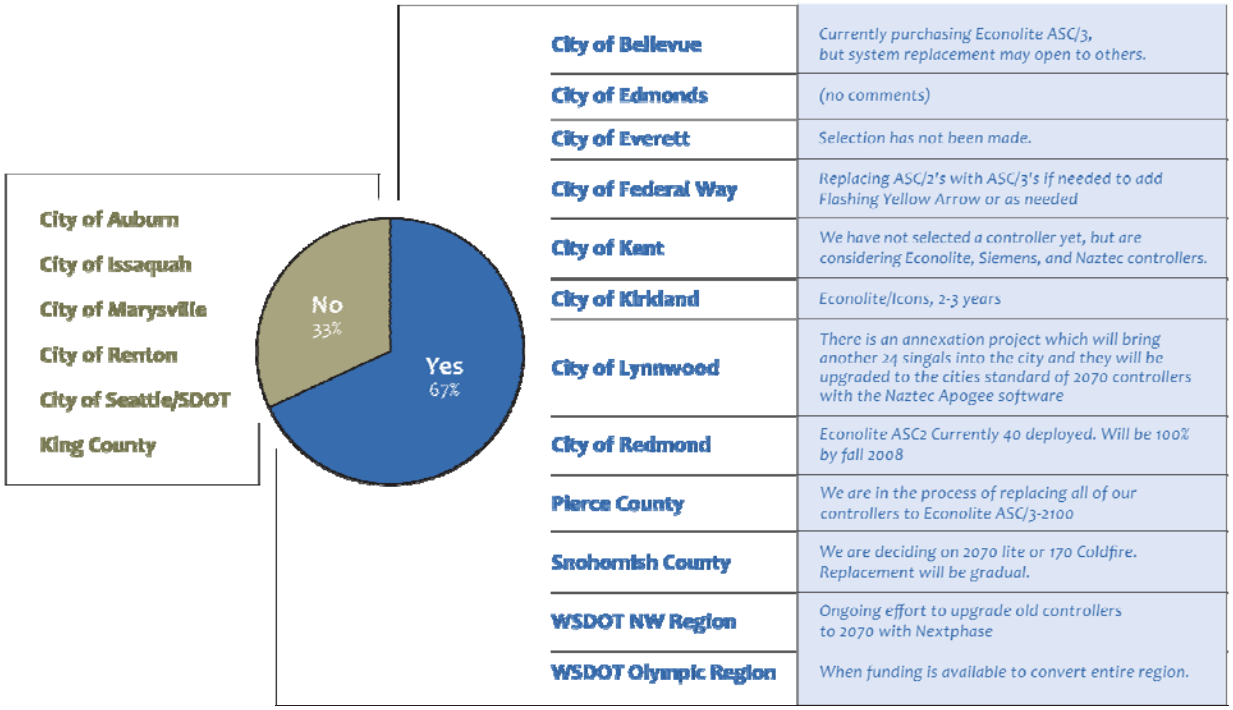
Figure 2: In your experience, what have been the barriers to signal control sharing?

However, nearly 50% of agencies have plans to replace their central control system software in the near future, with two-thirds planning to replace their traffic signal controllers (Figures 3 and 4). This may provide an opportunity for improved integration between systems and/or movement towards a common regional platform.



City of Bellevue	by 2010
City of Everett	Deployment by September 2009
City of Federal Way	If approved in the budget process, 2009-2010
City of Kent	We anticipate replacing the central control system and on-street controllers, starting in 2008, taking 2 years to fully deploy.
City of Redmond	6 12 months (2009)
City of Seattle/SDOT	We would like to upgrade to Tactic, approximate timeframe late 2008 or early 2009.
Snohomish County	Upgrade to 2070 version of QuicNet. Timeframe is approximately 12 months
WSDOT Olympic Region	When funding is available to convert entire region.

Figure 3: Agencies planning to purchase or replace central system software.



City of Bellevue	Currently purchasing Econolite ASC/3, but system replacement may open to others.
City of Edmonds	(no comments)
City of Everett	Selection has not been made.
City of Federal Way	Replacing ASC/2's with ASC/3's if needed to add Flashing Yellow Arrow or as needed
City of Kent	We have not selected a controller yet, but are considering Econolite, Siemens, and Naztec controllers.
City of Kirkland	Econolite/Icons, 2-3 years
City of Lynnwood	There is an annexation project which will bring another 24 singals into the city and they will be upgraded to the cities standard of 2070 controllers with the Naztec Apogee software
City of Redmond	Econolite ASC2 Currently 40 deployed. Will be 100% by fall 2008
Pierce County	We are in the process of replacing all of our controllers to Econolite ASC/3-2100
Snohomish County	We are deciding on 2070 lite or 170 Coldfire. Replacement will be gradual.
WSDOT NW Region	Ongoing effort to upgrade old controllers to 2070 with Nextphase
WSDOT Olympic Region	When funding is available to convert entire region.

Figure 4: Agencies planning to purchase or replace their traffic signal controllers.

As seen in Figure 5, nearly all agencies surveyed will have traffic management centers (TMCs) by 2010, but only WSDOT has freeway operations staff in the TMC 24 hours a day. Agencies may have a traffic engineer on call during off hours in case of an incident.

No Existing TMC		Existing Traffic Managment Center							
			Hours of Coverage			# of Stations	Square Footage		
Planned	Not Planned	Jurisdiction/Agency	Peak	Business	24/7		< 500 sq ft	500-1000 sq ft	> 500 sq ft
		City of Auburn		✓		2	✓		
		City of Bellevue		✓		2		✓	
✓ 2010		City of Edmonds							
✓ 2010		City of Everett							
✓ 2009/10*		City of Federal Way							
		City of Issaquah		✓		2	✓		
		City of Kent		✓		1	✓		
		City of Kirkland *(no response)*							
✓ 2010**		City of Lynnwood		✓		3	✓		
✓ 2009/10		City of Marysville							
		City of Redmond	✓			1	✓		
		City of Renton		✓		3		✓	
		City of Tukwila *(no response)*							
		City of Seattle/SDOT	✓			2		✓	
		King County	✓			3		✓	
	✕	Pierce County							
		Snohomish County	✓			2	✓		
		WSDOT NW Region			✓	7		✓	
		WSDOT Olympic Region			✓	3			✓

* *if approved*
** *Larger facility in 2009*

Figure 5: Agencies currently operating a Traffic Management Center.

In addition, as seen in Figures 6 and 7, a large majority of agencies surveyed have vehicle detection and Closed Circuit Television cameras for traffic monitoring and data collection. The information collected through these systems can provide the means for better signal timing and incident management coordination across jurisdictional borders if agencies are willing.

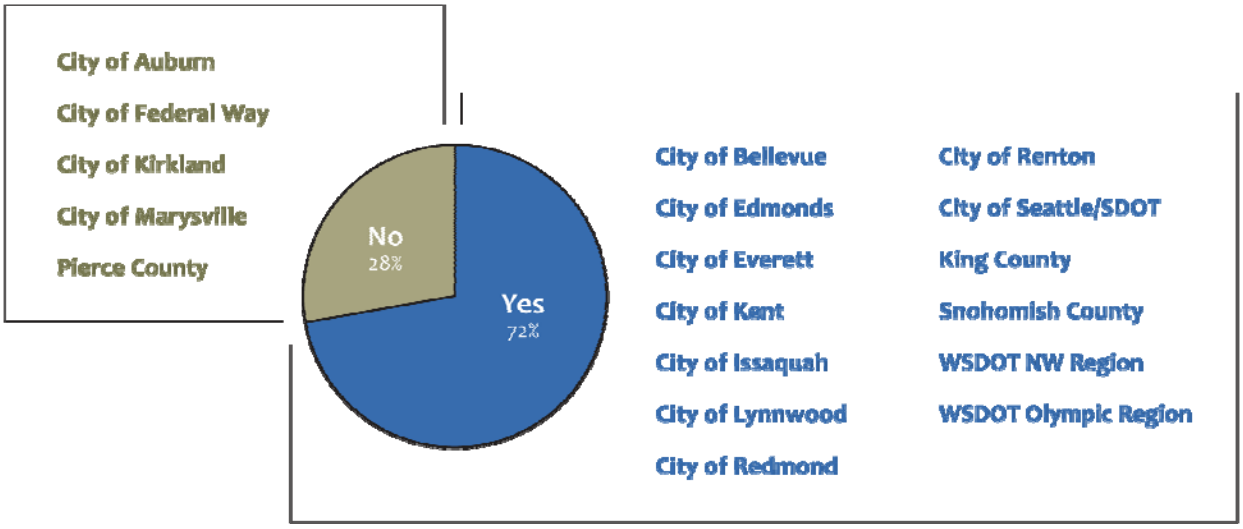


Figure 6: Agencies whose systems include vehicle detectors that send real-time traffic data (i.e. volume, occupancy/density, queues) to a central system and/or master controller.

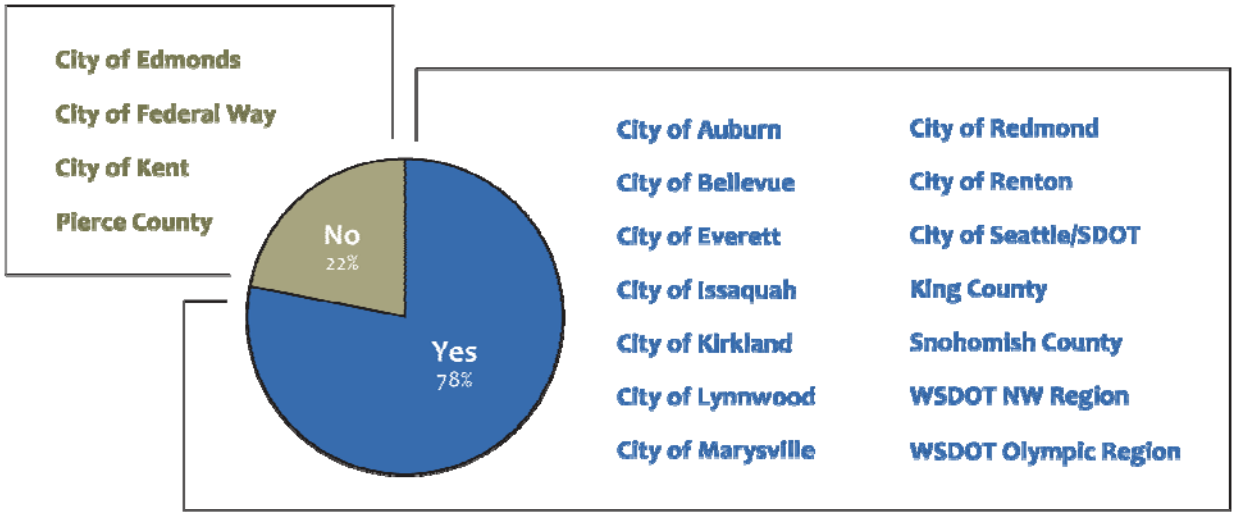


Figure 7: Agencies using CCTV cameras to monitor traffic conditions on arterials.

All agencies surveyed noted a willingness to discuss shared operations of key corridors as well as sharing traffic data for regional use. However, the response was mixed when asked whether they would be willing to hand control or timing selection over to other agencies, as seen in Figure 8.

Coordinated Operation Scenarios for a Multi-jurisdictional Corridor

Connection Via Center-to-Center (C2C) Communications Using a Centralized Signal System.

Scenario #1: *A single partner agency performs day-to-day signal timing adjustments and operation of the corridor, such as with the Trans-Valley corridor project successfully implemented by King County, WSDOT, Tukwila and Renton. Day-to-day operations are performed by King County, but the other agencies still have control of their signals.*

Scenario #2: *All agencies to continue to operate their signals during business hours, but turn control over to another agency with 24-hour operations at other times.*

Jurisdiction/ Agency	*Is your jurisdiction open to discussing other shared operations of key corridors?*	*Allow another agency to handle operations, including timing plans, after hours?*	*Allow another agency to select timing plans during day-to-day operations?*
City of Auburn	Yes	Yes	No
City of Bellevue	Yes	Yes	Yes
City of Edmonds	Yes	No	Yes
City of Everett	Yes	Yes	Yes
City of Federal Way	Yes	Yes	No
City of Issaquah	Yes	Yes	Yes
City of Kent	Yes	Yes	Yes
City of Kirkland	Yes	No	No
City of Lynnwood	Yes	Yes	Yes
City of Marysville	Yes	Yes	--
City of Redmond	Yes	Yes	Yes
City of Renton	Yes	Yes	Yes
City of Tukwila *(no response)*	--	--	--
City of Seattle/SDOT	Yes	No	Yes
King County	Yes	Yes	Yes
Pierce County	Yes	No	Yes
Snohomish County	Yes	No	No
WSDOT NW Region	Yes	Yes	Yes
WSDOT Olympic Region	Yes	Yes	Yes

In any scenario where signal control sharing is under consideration, signal timing plans and coordination pattern changes would be pre-approved by each agency and a communications chain (voice, e-mail, page, etc.) would be established for contacting each agency during an event that would trigger a change from normal operations.

Figure 8: Willingness to share operations with other agencies.

In short, the survey results verified several needs that the RCTO and RITSIP projects are intended to help address, namely:

- Both technical and institutional issues contribute to regional coordination difficulties
- Lack of some types of ITS on arterials
- Lack of arterial traveler information
- Lack of 24-hour arterial traffic operations

At the same time, the survey highlighted some of the strengths of the region:

- Demonstrated willingness of agencies to work together
- Significant investment in signal systems, traffic cameras, and traffic management centers

3. FUNDING OUTLOOK

Nationwide, funding for transportation projects has always been a concern for local and state agencies, and ITS elements are no exception. The following is an overview of funding programs and opportunities that could provide support for the types of projects that the RTOC wants to pursue.

As ITS projects are fundamentally different than capital improvement roadway projects, they can often be less competitive when evaluated against traditional project selection criteria. When included as part of a large roadway construction project, ITS elements may be removed from the project due to budget considerations if their value is not emphasized. Finally, ITS projects that clear the initial funding hurdles often encounter further difficulties when competing for operations and maintenance funding following deployment. Like many technologies, ITS projects often have a "wow" factor that can help convince decision makers of the need for the initial capital investment. However, the need to support the more mundane daily operations and maintenance can be difficult to convey.

Funding difficulties can become more acute when seeking funds for projects that cross jurisdictional boundaries. Neighboring cities and unincorporated areas often have differing priorities upon which to devote their limited funds, and are not allowed to allocate funds outside of the jurisdiction. The results can be a piecemeal of different technologies, architectures, and implementation timelines. While the traveling public going from Point A to Point B sees a seamless roadway, the reality is that transportation improvement projects frequently only extend to a given jurisdictional boundary, resulting in chokepoints and a lack of coordination across city and/or county lines.

Despite these issues, the benefits and advantages of ITS are becoming more widely known and ITS projects can receive substantial backing and sponsorship by local elected officials and stakeholders who realize their relative ease of implementation and cost-effectiveness in improving mobility, especially when options for adding more roadway capacity are limited. This realization holds true both within single jurisdictions and, increasingly, multi-jurisdictional corridors.

3.1 Federal

Enacted in 2005 and set to expire in September 2009, SAFETEA-LU is the primary transportation bill impacting federal funding of various Intelligent Transportation Systems projects in the region. The Federal Government funds projects through various grant programs, such as the Congestion Mitigation and Air Quality program (CMAQ), which has been one of the primary funding sources for regional ITS programs under SAFETEA-LU. The Surface Transportation Authorization Act of 2009 is expected to replace SAFETEA-LU in 2010 and will dictate federal funding of ITS projects for the next four to six years. An early draft is currently available but does not yet establish funding levels for the various programs.

Many federal grant programs require a detailed quantitative analysis of various project characteristics. Agencies can thus prepare for the adoption of this bill by prioritizing projects and programs according to various sets of criteria, such as environmental and economic benefits, congestion improvements, corridor length, and emergency management advantages.

3.2 State

During major construction for transportation projects, WSDOT develops construction mitigation plans in order to lessen the negative impacts of these projects on the transportation system, such as reductions in capacity and travel time. These plans often call for improvements on alternate routes and can include state-funded ITS projects. As the key corridors comprising the RITSIP are identified, consideration should be given to corridors that could serve as alternate routes to mega-project corridors and identifying the ITS improvements that could help these alternate routes perform most efficiently. By having the identified RITSIP project list to draw upon, the RTOC can be in a better position to request mitigation funds.

In addition, the State Transportation Improvement Board (TIB) uses three cents of the statewide gas tax to fund various projects at the county and local level. Projects require a ten to twenty percent funding match and a city or county agency sponsor. Programs under the TIB include the Urban Corridor Program (UCP), which provides funding to major multi-jurisdictional projects on a major urban corridor, the Urban Arterial Program (UAP) for smaller arterial projects, and various small city programs for cities with populations below 5,000. Compiling a list of projects that fit into these various funding programs would assist in deciding which funding avenues to pursue.

3.3 Regional

As the region’s Metropolitan Planning Organization (MPO), PSRC is responsible for managing the regional transportation improvement program (TIP), which is a list of current transportation projects within the four county Puget Sound region receiving funds that are awarded and managed through PSRC. Much of this funding comes from various federal grants and programs. PSRC is currently considering re-evaluating the criteria against which proposed projects are assessed for award of these funds, which may present an opportunity for ITS and traffic operations projects.

In addition, various counties and cities have their own sources of funding, including vehicle registration fees, property taxes, and highway tolls, which can be used for ITS projects of various scales.

Road user charging (tolls) programs have become a major transportation topic in the Puget Sound region as gas tax dollars and other transportation tax revenues have dwindled. As the gas tax becomes an unreliable source of funding, road user pricing becomes an attractive source of needed

transportation funds. While tolls are most commonly assessed for freeway and bridge construction projects, the use of pricing as a tool for congestion management is becoming more prevalent.

Operations and maintenance funding remains an issue. Most funding sources provide only for initial capital improvements. The Federal CMAQ (Congestion Mitigation and Air Quality) funds are one of the only grant sources that allow allocations for operations.

Determining a dedicated, diverse pool of funding sources for a program can help ensure continued fiscal stability.

4. VISION, MISSION, GOALS AND OBJECTIVES

Clearly, much has been accomplished by individual transportation agencies in the region. However, a vision for the next phase of regional coordination was needed as the RTOC moved forward. The objective of the visioning exercise was to develop a vision, mission, goals and objectives for the RTOC committee, and by extension, the RCTO and RITSIP projects. A workshop was held to brainstorm and refine the vision, mission, goals and objectives. All of the RTOC agencies were invited, and over 20 agency representatives attended.

The group developed an overall vision statement, group mission statement, and five specific goals with supporting objectives. The objectives would be tracked by appropriate performance measures. Most fall within the three to five year time frame of the RCTO.

The RTOC vision and its accompanying statement of mission, goals and objectives, serve several purposes for the nascent organization. For both the participating agencies as well external entities, the Vision articulates the group's reason for being. This statement of purpose assists in strategic planning and provides targets against which the group's activities and progress can be measured.

- The Vision encompasses the ultimate aim of the RTOC's activities, and the outcome of its cumulative efforts. The Vision is the long-term outcome that the RTOC strives to promote through its activities.

- The Mission Statement encapsulates the agencies reason for being – a "big picture" statement of its aims. The Mission Statement succinctly captures the common interests and uniting themes that compel the varied agencies and municipalities to participate in the organization. It is a statement of what the RTOC seeks to accomplish, and provides an answer to the question of WHY the RTOC group exists.

- The Goals are an answer to the question of WHAT the RTOC will do in support of its mission.

- The Objectives state more specifically HOW the RTOC will accomplish its stated goals. An important characteristic of the Objectives is that progress against the objectives can be measured, therefore Performance Measures were identified for each objective.

4.1 Vision

The RTOC's **vision** for the Puget Sound roadway transportation network is as follows:

"An efficient, safe, reliable, environmentally-sensitive and seamless surface transportation system, brought about through inter-agency coordination and partnerships in the Puget Sound Region."

The RTOC is part of the wider transportation community, and thus the vision statement is intended to be broad and reflective of its contribution to regional and statewide transportation priorities (efficiency and safety), while still emphasizing the cooperative nature of the RTOC group.

4.2 Mission

The RTOC's **mission** is as follows:

"The RTOC seeks to collaboratively apply advanced technologies and transportation management techniques to operate, maintain and integrate a regionally-coordinated freeway and arterial network."

4.3 Goals and Objectives

The attainment of the mission shall be supported by the following goals, objectives and performance measures. The following goals were identified:

1. Promote Cooperation and Collaboration in Regional Transportation System Management and Operations
2. Establish Roles and Responsibilities to Facilitate Interagency Cooperation
3. Improve Efficiency and Reliability of the Transportation System.
4. Improve Safety of the Transportation System
5. Promote Funding and Increase Awareness of Transportation Operations Benefits

Goal 1: Promote Cooperation and Collaboration in Regional Transportation System Management and Operations. Build consensus, share information, coordinate funding and human resources, and link systems among state, local, transit, and emergency services agencies in the Region.

Objectives	*Performance Measures*
Provide a forum to discuss regional transportation operations needs and opportunities	• Continuing monthly RTOC meetings with strong participation from state, county and local traffic agencies. • Diverse meeting agendas include other modes, stakeholders, and regional projects.
Share knowledge and experiences among local and regional agencies.	• Implementation of "knowledge pooling" program for RTOC agencies.
Coordinate traffic management with transit, emergency management, and	• Partnership with other stakeholder groups when pursuing projects,

freight operations.	programs, and initiatives. • Regular, ongoing information exchanges between stakeholder groups and RTOC.
Build professional capacity for regional signal operations staff through training and knowledge sharing.	• Specific training gaps identified. • Development and implementation of training program for operations staff in the region.

Goal 2: Establish Roles and Responsibilities to Facilitate Interagency Cooperation. Agree on roles and responsibilities for local and regional agencies with an emphasis on coordinated operations.

Objectives	*Performance Measures*
Identify regional operations needs and concept of operations for regional signal coordination.	• Regional buy-off and implementation of relationships, procedures and resource arrangements identified in RCTO.
Obtain commitment of resources and participation for regional transportation operations initiatives	• Multi-agency initiatives implemented and backed by formal agreements.

Goal 3: Improve Efficiency and Reliability of the Transportation System. Optimize freeway and arterial system performance and reliability through operational improvements, interagency cooperation and supported maintenance.

Objectives	*Performance Measures*
Maximize throughput on regional arterials by improving signal timing, coordination, and management across jurisdictional boundaries.	• Reduced arterial travel times. • Improved people throughput • Reduced vehicle emissions through reduction of arterial travel times.
Improve reliability of traffic flow on regional arterials through improved incident/event management.	• Ability to remotely revise signal timing during incidents on arterials that carry freeway detour/overflow traffic. • Improved travel time reliability during incidents resulting from implementation of new incident timing plans.
Promote implementation of ITS measures (equipment and/or	• Collection and analysis of signal timing changes and travel time variations during

operational) that will provide arterial operational improvements to mitigate the impact of mega-project construction on the freeways in the region.	construction. • RTOC representation on mega-project construction mitigation team.
Improve dissemination of arterial traveler information	• Increased availability of user-friendly traveler information that meets the needs of both the public and transportation operators (traffic, freight, transit, etc.) • Measurable mode shifts and route changes resulting from availability of traveler information

Goal 4: Improve Safety of the Transportation System. Increase the safety of the regional transportation system by reducing the frequency, severity, and duration of incidents and hazardous conditions.

Objectives	*Performance Measures*
Implement system management techniques and technologies which reduce accident rate and severity of accidents.	• Reduced crash rate by classification (fatality, injury, non-injury collision).
Implement system management techniques and technologies to improve incident detection and response.	• Reduced incident notification, response times and clearance times.

Goal 5: **Promote Funding and Increase Awareness of Transportation Operations Benefits.** Develop a regional commitment to ITS deployments by advancing awareness of the benefits of planning, funding, and implementing transportation operations initiatives among decision makers, transportation professionals, and members of the general public.

Objectives	*Performance Measures*
Promote RTOC and its activities to the public and elected officials.	• Development and dissemination of RTOC informational materials. • Development and dissemination of "Signal Coordination 101" information for public. • Scheduled periodic updates of RTOC activities given to Transportation Planning Board and presentations given at industry conferences and annual meetings.
Identify and seek innovative funding options as well as traditional funding	• Percent increase in transportation funds allocated to signal operations

sources dedicated to system operations.	and/or ITS. • Increase in number and scale of multi-agency funding applications to achieve common operational objectives.
Ensure that all transportation management and ITS improvement projects are adequately funded for operations and maintenance.	• Identify recurring operations and maintenance budget estimates in the project development and prioritization process. • Operations and maintenance funding received with funding for capital projects.

The projects implemented through the ITS Plan will in particular support Goals 3 and 4, as the projects will seek to improve the efficiency, reliability and safety of the regional transportation network through improvements in arterial management and operations.

5. KEY CORRIDOR SELECTION CRITERIA AND ATTRIBUTES

The Puget Sound region's 6,612 miles of arterials carry 52% of regional traffic[2]. The Regional ITS Implementation Plan is built around the concept of key arterial corridors that are operated by multiple jurisdictions. In order to keep the ITS Plan projects to a scale that could be implemented within a reasonable time frame, the RTOC decided to identify 25 key arterials out of hundreds in the region. An initial list of principal arterials, WSDOT-designated Highways of Statewide Significance and PSRC's Metropolitan Transportation System routes was compiled. Input was also sought through stakeholder meetings and interviews with freight, transit and emergency management stakeholders. The initial list included over 130 corridors, as shown in the maps in Appendix A. Each corridor was assigned an identification number based upon the primary county where it was located (i.e., K# for King County, P# for Pierce, S# for Snohomish and KT# for Kitsap).

In order to reduce the list to a set of projects whose implementation would provide the greatest benefit and could be completed within a reasonable time frame, 25 corridors were selected for inclusion in the ITS Plan, key corridor selection criteria were identified in cooperation with the RTOC. These criteria were comprised of characteristics and attributes that were considered to be the "hallmarks" of key regional corridors that could show the greatest benefit from ITS improvements.

The following criteria categories were identified:

- Roadway Characteristics: Criteria relating to physical or operational characteristics specific to the corridor.
- Regional Significance: Criteria relating to the corridor's relative role in regional mobility.
- Stakeholder Significance: Criteria relating to the corridor's relative importance in stakeholder operations.

[2] Source: *Transportation 2040: Draft Environmental Impact Statement*; Puget Sound Regional Council; May 29, 2009.

- STP/CMAQ Project Evaluation: Criteria used for the most recent regional project evaluation in 2009.

From within these categories, the following criteria were identified:

Table 1: Key Corridor Criteria

ID#	Category	Criteria	Benefits
RC-1	Roadway Characteristics	Vehicle Miles Traveled (VMT): VMT data for the corridors was collected from PSRC's regional model.	• Quantitative • Measure of roadway use • Easily understood and commonly used measure
RC-2	Roadway Characteristics	V/C (Volume over Capacity): The value of V/C was considered based upon 2010 PM peak travel volumes from the PSRC regional model.	• Indicates congestion • Quantitative • Easily understood and commonly used measure
RS-1	Regional Significance	Arterial Classification: Whether the arterial is classified by jurisdictions as a principal arterial.	• Available for the entire region • Easy to assess – classification already done by agencies
RS-3	Regional Significance	Metropolitan Transportation System (MTS) designation, which includes two sub-categories: • Regionally Significant State Highways, tiers 1 and 2 • Highways of Statewide Significance (HSS)	• Available for the entire region • Easy to assess – classification already performed by WSDOT and PSRC • Adopted by WSDOT and PSRC
RS-5	Regional Significance	Multi-jurisdictional: Corridors under the jurisdiction and/or operation of multiple agencies.	• Criteria is the basis of the RITSIP project • Demonstrates cooperative nature of corridor projects • Multijurisdictional corridors may also bring more resources for improvements
RS-6	Regional Significance	Alternate Route: Corridor may be used as a highway/freeway alternate route during construction or an unplanned incident. Particularly key would be corridors that may be used as an alternate route for a freeway mega project.	• Project could be eligible for construction mitigation programs • Public relations benefit of potentially improving traffic flow during high profile construction projects
RS-7	Regional Significance	Redundancy: If corridor were disabled, there would be few or no alternate options available.	• Useful measure for emergency management • Criteria used by PSRC
RS-8	Regional Significance	Environmental Justice: Corridor provides connectivity to underserved parts of the region.[3]	• Criteria used by PSRC

[3] See technical appendices for *Destination 2030*.
http://www.psrc.org/projects/mtp/index2007.htm

ID#	Category	Criteria	Benefits
SS-1	Stakeholder Significance	Tonnage Classification: Arterials designated as T-1 or T-2 freight routes.	• Available for the entire region • Easy to assess – classification already performed by WSDOT/agencies • Recognizes the importance of freight mobility in regional planning
SS-2	Stakeholder Significance	Transit-Identified Route: Identified by transit agencies as existing/planned route for BRT service and/or transit signal priority.	• Opportunity for multi-modal coordination • Routes may have infrastructure/other improvements already in place.
SS-3	Stakeholder Significance	Existing or Planned ITS Corridor: Route identified by jurisdiction as an ITS corridor. • Existing: Communications infrastructure and/or upgraded signal systems in place. • Planned: Identified "ITS Corridor" in existing ITS plan OR primary jurisdiction has an ITS plan in place.	• Recognizes previously-completed planning efforts • May offer benefit of some ITS already in place
SS-4	Stakeholder Significance	Other Significance: Corridor identified by traffic, transit freight or emergency management agency as congested and/or key to operations.	• Incorporates input from range of agencies • Such corridors may serve to "fill in the gaps" between corridors identified through other means
STP-1	STP/CMAQ Project Evaluation	Corridor traverses two or more Designated Urban Centers[4].	• Criteria used in regional project competition
STP-2	STP/CMAQ Project Evaluation	Corridor considered a critical route between one or more Designated Urban Centers and one or more Manufacturing/Industrial Centers.[5]	• Criteria used in regional project competition
STP-3	STP/CMAQ Project Evaluation	Corridor provides key connections to other ITS project corridors, or fills "gaps" in other projects.	• Criteria used in regional project competition

Throughout the corridor criteria analysis process, it was emphasized that the analysis is not a "prioritization". The analysis provided a relative means of selecting the 25 corridors that would be developed into Regional ITS Plan projects as funding and resources become available, and is not a sequential list for deployment.

All of the 130-plus regional arterials were assessed against the criteria shown in Table 1 and assessed a point score. Appendix B provides the detailed point-based criteria analysis and the relative ranking of each corridor. The 40 arterials with the highest scores were presented to the RTOC. The group then cooperatively discussed the 40 corridors under consideration and selected

[4] See http://www.psrc.org/projects/tip/selection/2006/CallMaterials/Map%20of%20Designated%20Centers.pdf
[5] See http://www.psrc.org/projects/tip/selection/2006/CallMaterials/Map%20of%20Designated%20Centers.pdf

25 for inclusion in the ITS Plan. Based upon relative population, it was decided that the 25 corridors should include 15 corridors primarily located in King County, four in Pierce County, five in Snohomish County and one in Kitsap County.

Table 2 lists the selected 25 corridors:

Table 2: Regional ITS Plan Key Corridors

No.	County	Road Name	Start	End
K1	King	Woodinville Duval Road	SR522	SR203
K10	King	Central Way/NE 85th Street/Redmond Way/SR 202	Market Street	SR 18/I-90
K12	King	68th Avenue NE/NE 170th Street/Simonds Road NE/100th Avenue NE/98th Avenue NE/Market Street/Central Way/Lake Street S/Lake Washington Blvd NE/Bellevue Way NE/SR908	SR522/NE Bothell Way	I-90
K16	King	Logan Way/Park Ave/Sunset Boulevard NE/SR 900/17th Ave NW	SR167	E. Lake Sammamish Pkwy
K17	King	SR99/ Aurora Ave N	Downtown Seattle	County Line
K20	King	4th Ave/4th Ave S/East Marginal Way South/Interurban Avenue South/West Valley Highway/SR181/68th Avenue South/ West Valley Highway	John St	SR18
K22	King	1st Ave N/1st Ave/1st Avenue S/Myers Way S/1st Avenue S/SR509/S 216th / SR516/South Kent Des Moines Road/West Willis Street	SR99/SR509	SR 169
K23	King	S 154th/ Southcenter Blvd/ Grady Way/Main Ave S	SR99	SR900
K25	King	S Jackson Street/Rainier Avenue South	4th Ave South	Logan Ave S
K27	King	SR522	I-405	I-5
K29	King	Greenwood Ave N/Holman Road NW/ 15th Avenue NW/15th Avenue W/Elliot Avenue W	NE 145th St/SR 523	SR99
K5	King	NE 90th/148th Avenue NE/ 150th Ave SE	Highway 202/Redmond Woodinville Road NE	I-90
K58	King	Lind/ SW 16th/ E Valley Highway / E Valley Road / 84th Avenue S / Central Way / Central Avenue / Auburn Way	I405	SR 164
KT1	Kitsap	SR304/SR303	SR3	Bremerton Ferry Terminal
P1	Pierce	16th Ave S/SR161/Enchanted Parkway South/Meridian Ave E	SR99	224th St E
P3	Pierce	Auburn Ave./ A Street NE/ E Valley Highway/ SR162	Main St.	South City of Orting Limits
P6	Pierce	Pacific Avenue/SR7	Stadium Way	SR507
P8	Pierce	SR99 / South Tacoma Way/Pacific Way SW/ Gravelly Lake Road SW	King County Line	SR512
S11	Snohomish	168th St SW/44th Ave W/164St SW/Seattle Hill Road	SR99	SR527
S4	Snohomish	Marine View Drive/SR529/Everett Avenue	I-5	I-5 (loop)
S6	Snohomish	SR99	SR529	Downtown Seattle
S9	Snohomish	SR527	I-5	SR522 (Bothell)

Appendix C provides maps of the corridors in each county. Together, the corridors provide a comprehensive north-south, east-west arterial network connecting urban centers, rural communities and manufacturing centers. Most importantly, the corridors were selected as a cooperative effort among the jurisdictions providing arterial traffic operations in the region.

6. CORRIDOR PROJECT DEVELOPMENT

Identifying the 25 corridors for the ITS Plan was a significant step in moving forward with a multijurisdictional regional approach to deploying ITS on Puget Sound arterials. The next step was to identify specific ITS improvements and associated cost estimates for each corridor project.

6.1 Regional ITS Inventory

The ITS improvements for each corridor should expand on the existing investments to fill gaps from previous projects. In order to identify such gaps, the inventory of signal system, communications and ITS inventory along these 25 key corridors needed to be collected.

The corridors were split into segments by jurisdiction and the following inventory collected from each jurisdiction:

- Dynamic Message Sign locations
- CCTV camera locations
- Other ITS devices
- Fiber routes
- Signal system hardware and software
- Signal timing
- Vehicle detection
- Transit signal priority

The inventory was mapped using GIS-based mapping tools. The maps for each corridor were analyzed to determine gaps in ITS and communications coverage. In discussions with the RTOC, the following improvements were identified for a fully-deployed ITS corridor:

- Fiber Communications: Broadband communications along the full length of each ITS corridor and back to the operating TMC(s) is the backbone for the implementation of the other improvements, including ITS devices, upgrades and operational strategies.
- Controller and Cabinet Upgrades: Upgraded NTCIP-compliant signal controllers and cabinets with rack space for additional ITS equipment.
- System Detection: Installation of system detection at key points to collect arterial performance data.

- UPS (Uninterruptable Power Supply) Battery Backup: Given the critical nature of these corridors in providing connections to communities and alternate routes to freeways, UPS backup power will help to ensure that the corridors can continue to operate during power outages.

- Transit Signal Priority: Transit signal priority was included as an improvement along corridors with heavy transit usage and that had not already been identified for TSP implementations by transit agencies.

- Central System: Centralized signal control is key to supporting enhanced corridor operations. The ITS Plan projects would include upgraded or replaced central systems where needed to provide centralized signal control and operate ITS devices from a TMC.

- CCTV Cameras: Each corridor should allow full CCTV camera surveillance by the operator. The exact locations of the cameras will be determined during the actual corridor design.

- Dynamic Message Signs: Dynamic message signs would be provided at key decision points, such as freeway interchanges, to disseminate incident and travel time information.

- Time of Day, Construction, Incident and Evacuation Timing Plans: In order to ensure smooth coordination of signals along the full length of the multijurisdictional corridors, the projects include development of new signal timing plans in line with regional operations strategies.

In all cases, engineering judgment during the design phase, available funding and the agreements between the partnering agencies will determine the final placement, quantities and types of ITS deployed.

The next report issued for this project will present the ITS Plan projects, cost estimates and detailed map books showing existing and planned ITS inventory.