

Addressing SAFETEA-LU Requirements for Operational and Management Strategies in the Puget Sound Region

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Abstract

SAFETEA-LU requires that Metropolitan Transportation Plans (MTPs) “include operational and management strategies to improve the performance of the existing transportation facilities to relieve vehicular congestion and maximize safety and mobility for people and goods.” In addition, SAFETEA-LU requires that “there must be a process that provides for effective management and operation to address congestion management.” These two provisions of SAFETEA-LU establish a clear directive to incorporate operational and management strategies into the long-range planning for a region and to coordinate the consideration of the operational and management strategies between the MTP and the Congestion Management Process (CMP). The Puget Sound Regional Council has undertaken a process to ensure that all of the requirements for incorporating operational and management strategies are addressed in the region. This has included an update of the CMP to fully integrate consideration of operational and management strategies and an update of the Metropolitan Transportation Plan to reflect a more direct linkage of the MTP with the CMP. This paper provides the results of research on the best practices nationally conducted by the project team and how the concepts reflected in these best practices were implemented in the Central Puget Sound region to meet the SAFETEA-LU requirements. The paper describes how the CMP was modified to provide multimodal performance measures for passenger and freight movement that were more sensitive to operational and management strategies and how the data collection and monitoring programs were revised to reflect the new performance measures.

Purpose of Paper

The Safe, Accountable, Flexible, Efficient Transportation Act: a Legacy for Users (SAFETEA-LU), which was passed by congress and signed by the president in August of 2005, established new requirements for the preparation of Metropolitan Transportation Plans (MTPs). The purpose of this paper is to describe the new requirements for incorporating operational and management strategies in the MTP, the key issues that should be addressed in meeting these requirements in the Central Puget Sound region and the process for addressing the new requirements in an update to *Destination 2030*. The paper identifies actions that the Puget Sound Regional Council (PSRC), the Metropolitan Planning Organization (MPO) for the Central Puget Sound region, can take to address the new requirements of SAFETEA-LU.

Operational and management strategies can include a broad range of strategies spanning all modes of transportation: car, truck, ferry, van, bus, rail, air, paratransit, bicycle, and walking. They may be designed to improve passenger movement, goods movement or both. For passenger movement they may be designed to address commute travel during the peak periods, travel for personal or work-related business, shopping travel, trips for school or just purely recreational travel. Operational and management strategies may be designed to control the flow of vehicles on a facility such as intersection traffic signal control and timing of freeway ramp metering. They may also be designed to improve the flow of transit vehicles or other high-occupancy vehicles such bus-only or HOV lanes, ramp meter bypass for buses or HOVs, transit signal priority or bus rapid transit improvements. Strategies to be considered may also include electronic surveillance and information systems designed to improve freight movement including weigh-in-motion or automated credentialing. For passenger travel the strategies consider may also include methods to influence the demand for travel to avoid congested periods. These may include employee trip reduction programs, vanpooling or flexible work schedules.

SAFETEA-LU Requirements

One of the new requirements of SAFETEA-LU is that MTPs “include operational and management strategies to improve the performance of the existing transportation facilities to relieve vehicular congestion and maximize safety and mobility for people and goods.”¹ In addition, SAFETEA-LU requires that “there must be a process that provides for effective management and operation to address congestion management². These two provisions of SAFETEA-LU establish a clear directive to incorporate operational and management strategies into the long-range planning for a region and to coordinate the consideration of the operational and management strategies between the MTP and the Congestion Management Process (CMP).

According to the interim guidance for SAFETEA-LU, MPOs and States must consult “as appropriate” with “State and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation” in developing long-range transportation plans.³

The metropolitan transportation planning regulations for implementing SAFETEA-LU include the following requirements related to operational and management strategies⁴:

23CFR450.306 Scope of the metropolitan transportation planning process

- (a) The metropolitan transportation planning process shall ...provide for consideration and implementation of projects, strategies, and services that will address the following factors:

¹ 23 U.S.C 134 (i)(2) (D) and 49 U.S.C.5303 (i)(2) (D) also Federal Register Vol . 71, No. 111, June 9, 2006, page 33513

² 23 U.S.C 134 (k) (3) and 49 U.S.C.5303 (k) (3) also Federal Register Vol . 71, No. 111, June 9, 2006, page 33513

³ Interim Guidance for Implementing Key SAFETEA-LU Provisions on Planning, Environment, and Air Quality for Joint FHWA/FTA Authorities, September 2, 2005.

⁴ Code of Federal Regulation , Title 23 Volume 1, U.S. Government Printing Office

(7) Promote efficient system management and operation;

(b) Consideration of the planning factors should be reflected, as appropriate, in all aspects of the metropolitan planning process, including activities such as the formulation of goals, objectives, performance measures, and evaluation criteria for use in developing the metropolitan transportation plan; identification of prioritization criteria for projects and strategies reflected in the TIP; and development of short range planning studies, strategic planning and/or policy studies, or transportation needs studies.

23CFR450.320 Congestion management process in transportation management areas

(a) The transportation planning process in a TMA shall address congestion management through a process that provides for safe and effective integrated management and operation of the multimodal transportation system, based on a cooperatively developed and implemented metropolitan-wide strategy, of new and existing transportation facilities eligible for funding under title 23, U.S.C., and title 49, U.S.C., Chapter 53 through the use of travel demand reduction and operational management strategies.

23CFR450.322 Development and content of the metropolitan transportation plan

(f) The metropolitan transportation plan should include at a minimum:

(3) Operational and management strategies to improve the performance of existing transportation facilities to relieve vehicular congestion and maximize the safety and mobility of people and goods;

Overview of the Central Puget Sound Congestion Management Process

The Central Puget Sound region has a four part comprehensive reduction strategy as reflected in the region's transportation plans and Congestion Management Process (CMP):

- a. **Transportation-Efficient Land Use:** Land use is a basic factor in travel, and is the foundation of the region's congestion relief strategy. The region has a comprehensive growth strategy which lays out preferred growth patterns and regional policies to achieve them. The regional growth strategy includes limits on rural sprawl, support for infill into 25 designated urban growth centers, better jobs-housing balance, and other land use patterns that are supportive of an efficient multimodal transportation system including transit-oriented developments.
- b. **Shifting Travel Demand:** The region has an aggressive demand management program to encourage shifting the time or mode of travel. A cornerstone is the state's commute trip reduction law which encourages and supports employers in reducing drive-alone commutes. The region has extensive transit service, the largest vanpool fleet in the

- nation, a large system of HOV lanes, and has supported innovative practices such as car-sharing, parking management, and pay-as-you-drive insurance.
- c. **Improving System Efficiency:** Much of the throughput of major routes is lost at congested times: the region is seeking to reclaim its lost capacity through improved operations. Freeway ramp meters, incident management programs, traffic signal coordination, safety initiatives, traveler information and active management through camera and data monitoring are all employed to increase throughput. The region has a policy supporting the use of congestion pricing to improve system efficiency, and the SR 167 HOT lane pilot project will be completed in 2008 to test these concepts.
 - d. **System Expansion:** With the high levels of growth experienced in the past and expected in the future, the Central Puget Sound region has an aggressive transit and roadway expansion plan. The region's high capacity transit system has been developing over the past 10 years, with commuter rail and express buses already up and operating, and an initial light rail segment under construction. Plans include a large expansion of the light rail system to connect major regional growth centers, and other transit service expansions. On roadways, the region has a large expansion program underway, funded from state gas tax increases. The program includes replacing major at-risk facilities, completing freeway missing links, and widening major travel corridors across the region. An additional, complementary set of roadway expansions are expected as part of the regional roads and transit ballot.

The parts of the regional congestion reduction strategy outlined above are intended to work together to improve multimodal and freight travel conditions, provide choices, and to provide capacity for the additional 1.7 million people and 1 million jobs expected in the region by 2040.

Key Issues and Challenges

In major metropolitan areas across the U.S. over the past ten year, there has been an increased emphasis given to the use of operational and management strategies to improve the efficiency and effectiveness of existing facilities and to increase the safety of traveling on those facilities. With funding constraints at the federal, state and local level, operational and management strategies have been pursued as ways to improve mobility without the high cost of major capacity-adding construction projects. The Intelligent Transportation Systems (ITS) initiative supported through funding programs at the federal and, in many cases, state and local level, has provided greater information, communication and control infrastructure to support operational and management strategies. The move toward operational and management strategies has raised numerous issues that must be considered as PSRC decides how to increase its consideration of these strategies in its long range planning process. Some of these key issues are identified below.

Identifying the Locations Where Congestion Exists

Identifying the locations where congestion exists is the first important step toward improving mobility through operational and management strategies. The Congestion Management Process, which is a federally mandated process for ensuring that transportation investments in a metropolitan area are cost-effectively addressing the most serious congestion problems, is

currently being updated by PSRC for the Central Puget Sound region. A key element of the CMP is the definition of a system of data collection, data monitoring and travel forecasting to identify the existing locations of congestion in the region and to forecast the locations where congestion is likely to exist in the future. The CMP will need to identify not only the location of existing or future congestion, but also the severity of the congestion, the cause of the congestion and the most appropriate methods for reducing the congestion.

Coordinated Intermodal Regional Operations and Management

In most regions, the major elements of the transportation system are managed; they are just not managed as an integrated system. This is particularly true of intermodal transportation. The way that different modes are linked and managed together can have a significant impact on the level of service experienced by the user of the system whether they are travelers or freight shippers or receivers. Significant time is lost in intermodal transfers and coordination of the intermodal transfer facilities and the schedules of the different modes can reduce the amount of time lost. Often the greatest barrier to intermodal coordination is the lack of a forum for discussing and deciding on intermodal management strategies.

Performance Measurement and Monitoring

For operations and management to be effective, there needs to be clearly stated goals and objectives that define what “good performance” means for a facility or the system as a whole. From the goals and objectives, performance measure must be specified and agreed to as the means for determining whether the strategies used are improving the performance of the system and meeting the stated goals and objectives. A system of monitoring and reporting is required to allow adjustment and refinement for how strategies are applied.

Data Collection and Data Sharing

Data collection is an important element of operations and management of transportation facilities. Data on vehicle, passenger and freight movements are needed to determine when operational and management strategies are needed and how they are to be applied. Data are also needed to set the parameters of an operational or management strategy so that the strategy is most efficiently addressing the problem at any particular time of day or day of week. Finally, data are needed to monitor the effectiveness of the strategies applied. In a multi-modal and inter-jurisdictional operating environment, the sharing of data by the different agencies and jurisdictions involved will be essential.

Pricing and Its Role in Finance and Demand Management

One of the most significant changes that is occurring in the management and operation of transportation facilities in metropolitan areas is the introduction of pricing as a management tool. Pricing of facilities and services has long been a way to finance new facilities or the operating cost of a service such as transit, but pricing is becoming more popular as a method for managing how people choose to travel. More consideration is now being given to the use of pricing to encourage travelers to shift from single occupancy travel to higher occupancy travel (transit or ridesharing) and to encourage travelers to shift from congested facilities or time periods to less congested facilities or time periods. Pricing of travel has been common in most metropolitan areas in the form of transit fares, parking charges and in some cases, bridge or

roadway tolls. More consideration is now being given to varying pricing by time of day to reflect congestion levels and consideration is also being given to pricing access to HOV lanes by single occupant vehicles.

Regional Infrastructure and Communications Architecture

The aggressive pursuit of Intelligent Transportation Systems (ITS) strategies over the past 15 years revealed the importance of establishing regional architectures for transportation infrastructure and communications systems. The planning, implementation and operation of facilities on a mode-by-mode and agency-by-agency basis resulted in significant barriers to operating ITS strategies across jurisdictional boundaries and between operating agencies. In many metropolitan areas, attempts to plan strategies revealed that the communications systems used by different agencies would not allow direct communication. Radio systems used different frequencies, for example, and so communications between the state DOT, city transportation departments and emergency response agencies (such as highway patrol, police fire and emergency medical agencies) often prevented the coordinated response of the region's traffic control elements in response to an accident or an emergency.

Special Considerations to Address Freight Movement Needs

Movement of freight within or through the Central Puget Sound region will require consideration of somewhat different issues than movement of people. The size and weight of vehicles often restricts the use of freight movement vehicles on particular roadways or under particular weather conditions. Information about size limitations, roadway construction or weather conditions that might restrict use of facilities by trucks is particularly important to freight movement. Any operational strategy that reduces the restrictions for trucks is also beneficial. Because most freight movement requires scheduling for either a transfer from one vehicle to another or for delivery, reliability of travel time is at least as important as the travel time itself. Strategies that help reduce the variability in travel time on particular routes from day to day are valuable for freight movement. While most of the focus in operational and management strategies is on freight movement by truck, freight movement by rail, marine vehicle and air can be affected by congestion. Strategies for monitoring and management of flow by each of these modes can improve freight movement in a dense urban area.

Enforcement as a Management Tool

Many of the elements of a regional transportation management strategy involve restrictions on the use of the transportation system: speed limits, vehicle occupancy requirements, etc. An important consideration in the development of a comprehensive program for operations and management is the requirements for enforcing those limitations and restrictions. Enforcement requires adequate funding to be applied effectively, but also often requires special requirements in the system infrastructure as well. As an example, enforcement of HOV lane restrictions is most effective when there is adequate roadway to pull over vehicles suspected of being below the occupancy requirement.

Equity Issues in Operational and Management Strategies

Equity is an important consideration in the development and application of operational and management strategies. By definition, these types of strategies involve manipulation of the

system to achieve optimal results. The way in which the system is operated or managed can often affect market segments differently. HOV systems, for example, promote the use of carpools, vanpools and transit by giving a travel-time advantage to the people in the higher occupancy vehicles. This often means a lower average speed for SOV drivers, but can produce greater system efficiency and lower total person hours of travel when properly designed. Strategies that meter the traffic flow, such as ramp metering or even traffic signal coordination, can provide an advantage to one trip pattern over another. Development of strategies with concern for the equity of the system is usually necessary to gain broad support for the strategy.

Regional Concept of Transportation Operations

The idea of a Regional Concept of Transportation Operations was developed in 2001 by a joint working group of FHWA and FTA to bridge a gap between transportation planning and operations. “A Regional Concept for Transportation Operations can serve three important purposes. First, it presents an operations vision and direction for the future of transportation systems management and operations based on a holistic view of the region. Second, it can garner commitment from agencies and jurisdictions for a common regional approach to transportation management and operations. Third, it provides an opportunity to strengthen the linkage between regional planners and managers responsible for transportation operations by providing a coherent operations strategy for consideration in the planning process.”⁵

How are the SAFETEA-LU Requirements being Addressed in Other Regions of the Country

The Federal Highway Administration recently released a document titled *Getting More by Working Together: Opportunities for Linking Planning and Operations*⁶, which provides a good overview of exemplary practice across the country. The document describes of how regions in the United States have address the following issues:

- a. Incorporating Consideration of Operations in the Transportation Planning Process
- b. Data Sharing
- c. Performance Measures
- d. Congestion Management Systems
- e. Funding and Resource Sharing
- f. Institutional Arrangements
- g. Regional ITS Architecture
- h. Regional Management and Operations Projects
- i. Regional Concept of Operations

Some of the exemplary projects described in the report are identified in the sections below.

⁵ *Regional Concept of Transportation Operations - A Tool for Strengthening and Guiding Regional Transportation Operations Collaboration and Coordination*, prepared by the Federal Highway Administration, Office of Transportation Management, page 2.

⁶ Federal Highway Administration, *Getting More by Working Together: Opportunities for Linking Planning and Operations*, Washington, D.C. November 2004.

Incorporating Consideration of Operations in the Transportation Planning Process

In the Chicago metropolitan area the most recent MTP establishes a regional policy that all major capital projects are to include management and operations components to enhance efficiency.

Data Sharing

WSDOT has worked with the University of Washington to use archived traffic data to explore benefits of operational improvements such as ramp metering and incident response programs. From the data, the University has been able to develop analytical tools that are now used to evaluate operational investment options.

In the Portland, Oregon region a fiber optic cable connecting Metro (the region's MPO) the Oregon DOT, the City of Portland and Tri-Met (the region's transit operator) has enabled Metro to receive traffic data and transit operations and ridership data and provide the data to all of the participating agencies to detect congestion points and to fine-tune traffic signal and transit operations.

Performance Measures

The report describes WSDOT's efforts to formulate performance measures and to report them in the quarterly report titled *Measures, Markers and Mileposts*. In this effort, WSDOT moves beyond traditional measures of traffic congestion to define additional measures focused on travel reliability.

The California Department of Transportation (Caltrans) incorporated performance measures in the agency's strategic plan. The measures used are focused on outcomes and address system-level characteristics rather than specific projects.

Congestion Management Processes

The MPOs in Wilmington, Delaware; Salt Lake City, Utah and Miami, Florida area all cited as having exemplary processes for incorporating the Congestion Management Process into the development of the Metropolitan Transportation Plans and the Transportation Improvement Programs. The report cites the use of the CMP in these areas to identify locations of existing and future congestion, consideration of operational and management strategies as well as capacity-adding solutions, and evaluation of alternatives in the process of developing the transportation plans for the regions.

Funding and Resource Sharing

The Capital District Transportation Commission for the Albany area of New York developed a new method for allocation of funding. It divided the distribution of funding among 17 different categories with proportions for each category developed as part of a regional consensus process. In this system, operational and management strategies are eligible for clearly defined pools of funds.

Institutional Arrangements

The Central Florida Regional Transportation Operations Consortium was formed to facilitate the planning and implementation of operational and management strategies for the Orlando metropolitan area. The group includes the Florida DOT district office, turnpike and expressway authorities, several cities and counties, the regional transit agency and the local state highway patrol troop. The group formalized its relationship and the roles and responsibilities of its members in a Memorandum of Understanding (MOU). The MOU establishes the organizational structure and the decision-making process. It also establishes how the activities of the consortium will be funded.

PSRC is also cited for its Regional Freight Mobility Roundtable, which was established in 1994 to provide a forum for public and private sector interests to discuss freight mobility needs in the Central Puget Sound region. The group has been instrumental in making sure that freight movement is considered in the development of the RTP and the RTIP. It has helped to develop performance measures that are sensitive to freight movement for use in analysis of transportation investment options.

Regional ITS Architecture

The North Central Texas Council of Governments (NCTCOG) is the MPO for the Greater Dallas-Fort Worth area of Texas. NCTCOG was a leader in the region's development of a Regional ITS Architecture and has made it part of the Regional Transportation Plan. It also plans to use the architecture as a tool for prioritizing projects for inclusion in the RTIP.

Regional Management and Operations Projects

Operation Green Light in the Kansas City metropolitan area is a joint effort between state and local agencies. The purpose of the operation is to synchronize and coordinate signals for 1500 intersections in the area. The Mid-America Regional Council (MARC) is the area's MPO and is the umbrella organization under which Operation Green Light functions.

Regional Concept of Transportation Operations

The Maricopa Association of Governments (MGA) is the MPO for the Phoenix metropolitan area of Arizona. MAG initiated the development of a Regional Concept of Transportation Operations (RCTO) as a blueprint for how to get from the current methods of operations to the system defined in the Regional ITS Architecture. The RCTO became the mechanism for the stakeholders in the region to reach a common vision and vision for the region's transportation system operations. The stakeholders then developed 3-year and 5-year operational goals that were consistent with the vision and mission.

Addressing the SAFETEA-LU Requirements for Operational and Management Strategies in the Puget Sound Region

MTP Policies

Destination 2030, PSRC's recently updated MTP, acknowledges the value and role of operational and management strategies. It calls for "application of the latest available technologies and programs designed to optimize use of transportation systems that represents a

financially prudent course in light of the high cost of adding capacity through infrastructure investment.” It also calls for the implementation of an ITS system architecture and infrastructure that allow using existing and new transportation infrastructure as efficiently as possible. *Destination 2030* also provides support for vehicle trip reduction services and incentives including the strengthening the state’s Commute Trip Reduction law and program.

Destination 2030 has numerous adopted policies that support and encourage operational and management strategies to meet the mobility needs of the region. Policies encouraging consideration of operational and management strategies are included in three categories:

- Optimize & Manage the Use of Transportation Facilities & Services
- Manage Travel Demand Addressing Traffic Congestion & Environmental Objectives
- Expand Transportation Capacity Offering Greater Mobility Options

Thirty-one specific policies were included in the 2007 MTP update.

Inventory of Existing Operational and Management Strategies

One of the initial steps to address the SAFETEA-LU requirement for a separate operational and management element in the MTP was the development of an inventory of the already extensive use of operational and management strategies in the region. Freeway management strategies include HOV lanes, ramp metering, reversible express lanes, traffic management centers, traveler information, and commercial vehicle services. In addition, tolling will soon begin in the region on the Tacoma Narrows Bridge. Arterial street management strategies include traffic management centers, signal timing and coordination and a variety of access-control strategies such as limitation of on-street parking during commute hours. Transit management strategies include schedule coordination at transit centers, express services, transit signal priority and Bus Rapid Transit. A wide variety of demand management strategies are in use supported by a state-wide Commute Trip Reduction Act that requires employers with 100 or more employees to develop trip reduction programs to meet specific trip reduction goals. The CTR Act is supported by a WSDOT Corridor TDM Program that funds TDM activities in congested corridors. City and county trip reduction programs are also in place in much of the region, and Transportation Management Associations have been formed to coordinate the activities of employers in employment centers. Specific demand management strategies in use include vanpooling, a regional ride-matching service, park-and-ride lots and Flex-Pass: a multi-dimensional program that includes transit pass subsidy, vanpool subsidy and guaranteed ride home.

Integration of the Congestion Management Process with the MTP

While steps have been taken to give greater emphasis to operational and management strategies in the policies of the MTP, an agreed-to process for determining when operational and management strategies are an appropriate approach to addressing congestion or other mobility problems in the region has been lacking. This is being addressed by more fully integrating the Congestion Management Process (CMP) with the MTP. Operational and management strategies are a significant focus of the current CMP update that is near completion where they will be given priority in the consideration of strategies to address congestion and mobility

problems and challenges before capacity adding solutions. A collaborative process was established to ensure that the CMP update was developed with multi-modal, intermodal, and interjurisdictional input and coordination. The process has incorporated the issues for movement of people and the movement of goods and covers all modes of travel. The CMP has also incorporated Least Cost Planning procedures that were developed to evaluate the benefit/cost ratio of alternatives during the transportation planning process. Least Cost Planning is required by state legislation in Washington.

Regional Traffic Operations Committee (RTOC)

Potentially the greatest single challenge to effective use of operational and management strategies in the CMP and the MTP may be the institutional structure and decision-making process needed to plan, design, manage and operate regional strategies. PSRC is probably in a unique position to provide this role because of its regional and multimodal coverage and its existing role in planning and programming investments. The challenge comes because PSRC, like most MPOs, has not had a long history of operational experience particularly as it relates to traffic and transit management. This has historically been the responsibility of line operating agencies such as WSDOT, the transit agencies or the cities and counties. PSRC recently formed a Regional Traffic Operations Committee to undertake the complex issues of institutional management of regional operational and management strategies. The committee consists of representatives from the state DOT, the counties and the cities in the Central Puget Sound region. The committee will also meet with representatives of the six transit operators in the region as appropriate.

Regional ITS Architecture, Regional ITS Plan and Regional Concept of Transportation Operations

The new PSRC Regional Traffic Operations Committee (RTOC) is developing a work plan to include a Regional ITS Plan and a Regional Concept of Transportation Operations. Building upon the Regional ITS Architecture, a Regional ITS Plan will describe in detail the region's arterial ITS needs for connectivity and coordination among jurisdictions. This would involve mapping out the existing communication links as well as identifying those missing and how to best to best provide that communication connectivity. The Regional ITS Architecture is also an inventory of ITS application in the region. The ITS plan will go further and inventory equipment and signals. Based on the findings of the inventory and communications needs the ITS plan will identify projects and prioritize them based on need and benefits along with available funding opportunities. The ITS plan will also be beneficial to coordinate with the Washington DOT's developing congestion mitigation plan for the many large scale construction project slated to begin with in a few years throughout the region.

A strengthened ITS Architecture and Implementation Plan coupled with a planned Regional Concept of Transportation Operations will establish interagency relationships and technology interconnections (system-to-system communications links) for agencies to electronically exchange information and control ITS devices. A Fully implemented, the operational concept envisions the seamless sharing of information (data, video, status, request and control) to enable improved agency operations and provide travelers with the information they need to make trip-

related decisions. This process would include the development of regional performance measures, uniform operation standards and formal agreements between agencies.

Data Collection and Monitoring Program

The state, regional and local agencies in the Central Puget Sound region have made significant strides in the definition of performance for the transportation system and the collection of data to monitor the system's performance. WSDOT's Measures, Markers and Mileposts is an example of how the agencies in the region have embraced performance monitoring as an important element of transportation system planning, management and service delivery. In addition, PSRC's Puget Sound Milestones Regional Monitoring system was developed to monitor progress in policy implementation to determine whether planned actions are occurring and whether they are achieving desired results. The system is designed to investigate the growth and transportation issues and milestones of regional importance through an ongoing series of focused, topical reports, presentations and briefings. The information generated by monitoring efforts will help provide the region's decision makers with the knowledge and tools they need to update and refine the region's plans and to make critical choices about its future.

As the complexity and sophistication of operational and management strategies increases in the region, additional data collection and monitoring will be needed to allow for the optimization of the system operations. Operational and management strategies designed to manage the flow of people and vehicles during periods of congestion will require data in real-time so that strategies can be adjusted to meet the specific needs that exist at a particular point in time. More data will also be required to determine how congestion is affecting goods movement and how well strategies designed to improve goods movement will work. The current CMP update has defined measures of congestion in six different categories:

- Travel Time and Delay
- Travel Time Reliability
- System Access
- Throughput
- Crowding
- Safety

Specific measures in each category have been identified for each passenger mode and for freight movement. A methodology has been defined for how to collect the data necessary to calculate each measure. Although not all of the measures can be calculated with current data availability, the current CMP update has identified a schedule for collecting the remaining data needed to calculate and monitor all of the measure. The availability of these measures will be critical to the evaluation and monitoring of operational and management strategies.

Roadway/Congestion Pricing Plan

Roadway pricing is one way to provide funding for transportation projects and programs, but it can also be a valuable tool for system management. The Central Puget Sound region is lacking a regional plan for the use of roadway pricing for revenue generation and for system management. The Washington Transportation Commission has undertaken an examination of

the potential applications of roadway pricing in the state, and that effort will help to shape policy in the region. The on-going update of the Congestion Management Process and the next MTP update will provide additional opportunities to consider the role of roadway pricing.

Incorporating Land Use into the CMP

Travel patterns in the Central Puget Sound region are influenced by land use patterns as much or more than by transportation systems and services. The agencies in the region have recognized that by encouraging more efficient land use patterns that support use of transit or other alternatives to the automobile, future vehicular travel can be reduced and a higher level of mobility can be achieved with the limited transportation funds available. WSDOT has initiated a major initiative called *Integrated Land Use and Transportation Decision-Making* to incorporate consideration of land use patterns and development options in the transportation planning process. One element of the program is the *Transportation-Efficient Land Use Mapping Index (TELUMI)*⁷, which evaluates the impacts of different land-use variable on transportation efficiency. Considerations is now being given to how the tool can be used in the Congestion Management Process and the regional planning process to identify the locations where land use patterns provide the best opportunities for transportation investment.

Traffic Simulation Modeling

One of the challenges of planning for operational and management strategies is estimating the potential benefits of strategies in advance. Most operational and management strategies cannot be modeled using the traditional regional model. The operational characteristics that produce the benefits are not often captured by the traditional four-step model. Supplemental modeling is usually needed. A variety of tools exist depending on the strategy under consideration. Many of the operational and management strategies that are designed to optimize traffic flow as part of the approach can be modeled using traffic simulation models. These may include macro-simulation models such as SYDRA or FREQ or more detailed micro-simulation models such VISSIM or CORSIM. These models can provide estimates of the benefits of such strategies as HOV lanes, ramp metering, traffic signal control and coordination, and transit signal priority.

Traffic simulation models are generally set up and calibrated to a select corridor or subarea where a strategy is to be tested. The data requirements for an application are such that simulation of the region or even large areas of the regional network are not practical. PSRC is cooperating with the Washington Transportation Center (TRAC) to build a regionally accessible micro-simulation capability and working cooperatively with other agencies in the region to form a simulation model library. Over time this might also include the development of an archive of networks that could be used in other applications.

Other specialized tools have also been developed and used for testing of other types of operational and management strategies. WSDOT has led the development of the TDM Effectiveness and Evaluation Model to evaluate a broad range of TDM and land-use strategies designed to reduce vehicle trip making and VMT. PSRC could provide a regional service by

⁷ Moudon, A., D.W. Sohn, and J. Mabry, *Transportation-Efficient land use Mapping Index (TELUMI)*, prepared for the Washington State Transportation Commission and Washington State Department of Transportation, Seattle, WA, June 2005.

maintaining the WSDOT model as a TDM and land-use strategy analysis tool to supplement the regional model that it maintains.

New modeling tools are also becoming available to supplement the regional model for testing of pricing strategies. Because many of the pricing strategies that might be considered as operational and management strategies linkage to the regional model forecasts of future travel flows and simulation of the flow characteristics of the traffic flow may be required. PSRC has been an active participant in the development of tools for the analysis of pricing strategies and should continue that role.

Funding Opportunities and Prioritization and Project Selection Criteria

One barrier to the use of operational and management strategies in the Central Puget Sound region may have been the way in which projects are scored in the programming of state and federal funds within the region. PSRC issues a call for projects that are to be considered for the TIP. The projects are then scored on the basis of criteria agreed to and adopted by the members of PSRC, but the scoring criteria rely on estimates of benefits that have traditionally been estimated with the four-step modeling process. Operational and management strategies that require more specialized modeling to assess the benefits have not done well in scoring because the benefits could not be easily estimated by PSRC or the sponsoring agency. As new analysis methods and regional operations performance measures become available to PSRC and its member agencies, more incorporation of operational and management benefits can be reflected in the scoring criteria.

Without a change in the capabilities to model operational and management strategies benefits, greater funding priority can be given to these strategies in ways other than changing scoring criteria. A pool of funds may be created that is earmarked for operational and management strategies. This could include a broad definition of strategies including freeway management, traffic management, transit management, Intermodal and interagency coordination, ITS, demand management pricing and pricing. The pool could also include projects and program that are not capacity-adding such as safety and security.

Conclusions

In SAFETEA-LU, the U.S. Congress gave its clear support to more proactive use of operational and management strategies in addressing congestion and mobility problems in metropolitan areas. As a result of the act, the nation's MPOs must now include as an element of future MTPs a discussion of how they will "include operational and management strategies to improve the performance of the existing transportation facilities to relieve vehicular congestion and maximize safety and mobility for people and goods." In addition, SAFETEA-LU requires that "there must be a process that provides for effective management and operation to address congestion management." PSRC has embraced the concept operational and management strategies and has made significant strides in meeting the new SAFETEA-LU requirements. Specific recent steps taken by PSRC have included the following:

- Adoption of regional policies as part of the MTP that support the consideration of operational and management strategies

- Identification of the numerous existing uses operational and management strategies and identification of how consideration of operational and management strategies can be strengthened
- Formulation of a more rigorous CMP that is more integrated with the MTP and the regional decision-making process for transportation investment
- Formulation of CMP guidelines that encourage consideration of operational and management strategies
- Formation of a Regional Operations Committee to guide regional consideration and design of operational and management strategies
- Initiation of a Regional Concept of Transportation Operations that will provide a blueprint for regional integration of operational and management strategies
- Development of procedures and tools for integrating land use and transportation planning

With these steps, PSRC has demonstrated a commitment to a fully integrated, regional approach to use of operational and management strategies to improve the efficiency and effectiveness of the region's transportation system in moving people and goods.

