



U.S. Department of Transportation
Federal Highway Administration

Programming for Operations:

MPO Examples of Prioritizing and
Funding Transportation System
Management & Operations Strategies

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7. Authors Alex Bond (ICF), Michael Grant (ICF), Jocelyn Bauer (SAIC), Sheryl Miller (SAIC), Beverly Bowen (ICF), Lindsey Martin (ICF), Anna Giragosian (SAIC)				8. Performing Organization Report No.	
9. Performing Organization Name and Address Science Applications International Corporation (SAIC) 11251 Roger Bacon Drive, 3 rd Floor Reston, VA 20190 ICF International, Inc. 1725 I St NW #1000 Washington, DC 20006				10. Work Unit No. (TRAIS)	
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16. Abstract This document discusses how MPOs have incorporated TSMO projects into the programming phase of transportation investment decisionmaking in metropolitan areas. Based on a sample of practices from MPOs that have emphasized operations strategies in the planning process, this document highlights findings on: <ul style="list-style-type: none"> • Sources of funding that are being used for TSMO strategies. • Methods for prioritizing strategies for funding. • Staff resources devoted to TSMO-related activities. • Initial lessons learned about effective practices. This report includes case studies of practices related to programming TSMO strategies from nine MPOs around the country.					
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Background and Purpose

For several years, the Federal Highway Administration (FHWA) Planning for Operations program has focused on integrating transportation systems management and operations (TSMO) into the metropolitan and Statewide transportation planning process. Planning for operations is driven by outcome-oriented objectives and performance measures. Rather than focusing on projects and investment plans, the planning for operations approach emphasizes first developing objectives for transportation system performance and then using performance measures and targets as a basis for identifying solutions and developing investment strategies. The result is increased inclusion of TSMO strategies to improve safety, mobility and efficiency at the regional and statewide scale.

While several guidebooks, primers, and case studies have been developed focusing on integrating TSMO strategies into the planning process, metropolitan planning organizations (MPOs) have often faced challenges in advancing TSMO projects, programs, and activities for funding. This document discusses how MPOs have incorporated TSMO projects into the programming phase of transportation investment decisionmaking in metropolitan areas. Based on a sample of practices from MPOs that have emphasized operations strategies in the planning process, this document highlights findings on:

- Sources of funding that are being used for TSMO strategies.
- Methods for prioritizing strategies for funding.
- Staff resources devoted to TSMO-related activities.
- Initial lessons learned about effective practices.

This report includes case studies of practices related to programming TSMO strategies from nine MPOs around the country.

About Metropolitan Programming

Programming refers to the process of selecting projects for funding, identifying funding resources, and scheduling implementation. Programming is a distinct phase of transportation decisionmaking that occurs in conjunction with long-range planning. It focuses on the short-term planning priorities and commits funds for expenditure. Projects are selected by matching available revenue with planned projects that meet the criteria for that funding stream. Programming can be highly analytical, employing revenue models and quantitative project selection criteria; however, it is strongly influenced by decisionmaker perspective and interests.

The project selection and programming process for Federal-aid projects in urban areas is the responsibility of MPOs [23USC §134(j)]. MPOs are required to develop a Transportation Improvement Program (TIP) that identifies projects within their urbanized area. Projects adopted in the MPO TIP must be included in the Statewide Transportation Improvement Program (STIP). All projects receiving Federal funds must be included in both the TIP and STIP.

TIP projects must be consistent with the 20-year (or longer) long-range transportation plan, reflect near-term investment priorities, and indicate progress toward system performance targets. The TIP must contain a minimum of four years' worth of projects and must be updated at least every four years. According to statute, the TIP must:

- Include projects for any mode that will be using Federal funding or Federal subsidy [23USC §134(j)(2)(A)].

- Provide a project description and location for each project [23USC §134(j)(2)(C)]
- Prioritize the projects [23USC §134(j)(1)(A)].
- Indicate the sources of funding that will be used to construct the project [23USC §134(j)(2)(B)(ii)].
- Demonstrate a contribution to achieving performance targets [23USC §134(j)(2)(D)].¹
- Include a consultation process with stakeholders prior to adoption [23USC §134(j)(4)].
- Undergo a period of public availability and comment [23USC §134(j)(1)(B)].
- Be adopted by the MPO governing board and submitted to the governor [23USC §134(j)(1)(D)(ii)].

These legal requirements establish consistency at the national level; however, each MPO will conduct programming to fit its regional context. For example, many MPOs update the TIP more frequently than required. Some MPOs choose to include projects that are funded by local or State funding as well as those that are Federally funded. The TIP schedule for an individual MPO will also vary to meet the State Department of Transportation (DOT) STIP schedule.

In urban areas where the population is greater than 200,000, MPOs must develop an internal Unified Planning Work Program (UPWP). This program identifies expenditures by the MPO over the next 1-2 years [23CFR §450.308].² The UPWP is the work program for funds that will be directly expended by the MPO. This differs from the TIP, which shows projects that will be funded using other agencies' money (transit operators, State DOT, etc.). The UPWP can include staff costs, materials purchase, contracting, studies, and programs offered directly by the MPO. Some TSMO projects or studies may appear in the UPWP because they are implemented with planning funds or require MPO staff time.

TSMO activities are eligible for funding under several Federal programs. These programs are listed in Table 1.

Table 1. Description of Federal Funding Programs that may Support TSMO Activities.

Federal Funding Program	Purpose	Sample of Eligible Activities Related to TSMO
CMAQ	Provides a flexible funding source to State and local governments for transportation projects and programs to help meet the requirements of the Clean Air Act. Funding is available to reduce congestion and improve air quality for areas that do not meet the National Ambient Air Quality Standards for ozone, carbon monoxide, or particulate matter (nonattainment areas) as well as former nonattainment areas that are now in compliance (maintenance areas). ³	<ul style="list-style-type: none"> • Projects that improve traffic flow, including projects to improve signalization, construct high occupancy vehicle (HOV) lanes, improve intersections, add turning lanes, improve TSMO strategies that mitigate congestion and improve air quality, and implement ITS and other CMAQ-eligible projects, including projects to improve incident and emergency response or improve mobility, such as real-time traffic, transit, and multimodal traveler information.⁴
Highway Safety Improvement	To achieve a significant reduction in traffic fatalities and serious injuries on all public	<ul style="list-style-type: none"> • Installation of a priority control system for emergency vehicles at signalized

¹ This requirement was instituted as a part of MAP-21 in 2012. Most MPO TIPs may not yet contain performance achievement information.

² MPOs that are not within a Transportation Management Area (generally under 200,000 people) can adopt a "simplified work program." This document is largely the same as a UPWP.

³ FHWA, MAP-21 Fact Sheets – Congestion Mitigation and Air Quality Improvement Program. Available at: <http://www.fhwa.dot.gov/map21/cmaq.cfm>.

⁴ Ibid.

Federal Funding Program	Purpose	Sample of Eligible Activities Related to TSMO
Program (HSIP)	roads, including non-State-owned public roads and roads on tribal lands. A highway safety improvement project is any strategy, activity or project on a public road that is consistent with the data-driven State Strategic Highway Safety Plan (SHSP) and corrects or improves a hazardous road location or feature or addresses a highway safety problem. ⁵	<p>intersections.</p> <ul style="list-style-type: none"> • Collection, analysis, and improvement of safety data. • Planning integrated, interoperable emergency communications equipment, operational activities, or traffic enforcement activities (including police assistance) relating to work zone safety.⁶
National Highway Performance Program (NHPP)	To support the condition and performance of the National Highway System (NHS), for the construction of new facilities on the NHS, and to ensure that investments of Federal-aid funds in highway construction are directed to support progress toward the achievement of performance targets established in an asset management plan of a State for the NHS. ⁷	<ul style="list-style-type: none"> • Operational improvements of NHS segments, which include capital improvements for installation of traffic surveillance and control equipment, computerized signal systems, motorist information systems, integrated traffic control systems, incident management programs, and transportation demand management facilities, strategies, and programs.⁸ • Capital and operating costs for traffic and traveler information, monitoring, management, and control facilities and programs. • Infrastructure-based ITS capital improvements.⁹
Surface Transportation Program (STP)	Provides flexible funding that may be used by States and localities for projects to preserve and improve the conditions and performance on any Federal-aid highway, bridge and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects, including intercity bus terminals. ¹⁰ MPOs are given full project selection authority over portions of STP funding (called Urban Allocation).	<ul style="list-style-type: none"> • Operational improvements for highways. • Capital and operating costs for traffic monitoring, management and control facilities and programs, including advanced truck stop electrification. • Infrastructure-based ITS capital improvements.¹¹
Metropolitan Planning	Establishes a cooperative, continuous, and comprehensive framework for making transportation investment decisions in metropolitan areas. ¹²	<ul style="list-style-type: none"> • Planning funds may provide for MPO staff support for regional transportation operations coordination, regional operations guideline development, minor studies, and other staff activities to support regional TSMO programs.

⁵ FHWA MAP-21 Fact Sheets – Highway Safety Improvement Program. Available at: <http://www.fhwa.dot.gov/map21/hsip.cfm>.
⁶ USC, Title 23 Section 148. Highway safety improvement program. Available at: <http://www.fhwa.dot.gov/map21/legislation.cfm>.
⁷ FHWA, MAP-21 Fact Sheets – National Highway Performance Program. Available at: <http://www.fhwa.dot.gov/map21/nhpp.cfm>.
⁸ USC, Title 23 Section 101. Definitions and declaration of policy. Available at: <http://www.fhwa.dot.gov/map21/legislation.cfm>.
⁹ FHWA, MAP-21 Fact Sheets – National Highway Performance Program. Available at: <http://www.fhwa.dot.gov/map21/nhpp.cfm>.
¹⁰ FHWA, MAP-21 Fact Sheets –Surface Transportation Program. Available at: <http://www.fhwa.dot.gov/map21/stp.cfm>.
¹¹ Ibid.
¹² FHWA, MAP-21 Fact Sheets – Metropolitan Planning. Available at: <http://www.fhwa.dot.gov/map21/mp.cfm>.

Methodology

The findings in this document are based on case study research on funding for TSMO activities at nine MPOs. Research included a review of programming documents (TIP, UPWP) and 45- to 60-minute semi-structured telephone interviews with case study subjects in the selected agencies. MPOs were identified based upon their level of advancement in planning for operations. MPOs with more developed efforts on planning for operations and performance-based planning were selected for further inquiry. Geographic diversity, population size of the metropolitan area, and air quality attainment status were also considered. The selected agencies are listed below:

Table 2. MPOs Selected for Research.

Agency	Primary City or Cities	Regional Population
Denver Regional Council of Governments (DRCOG)	Denver, Colorado	2.8 million
Genesee Transportation Council (GTC)	Rochester, New York	1.2 million
Maricopa Association of Governments (MAG)	Phoenix, Arizona	3.8 million
MetroPlan Orlando	Orlando, Florida	1.8 million
North Central Texas Council of Governments (NCTCOG)	Dallas-Ft. Worth, Texas	6.4 million
Pikes Peak Area Council of Governments (PPACG)	Colorado Springs, Colorado	684,000
Puget Sound Regional Council (PSRC)	Seattle, Washington	3.7 million
Portland Metro	Portland, Oregon	1.9 million
San Diego Association of Governments (SANDAG)	San Diego, California	3.1 million

Cross-Cutting Findings

The following sections provide a summary of observations regarding TSMO programming practices gathered from our brief case research of nine MPOs.

Foundations for Advancing TSMO in Programming

Emphasizing TSMO in the long-range transportation plan (LRTP) and related planning documents or processes creates a strong foundation for including TSMO projects and programs in the TIP.

The LRTP should guide the selection of projects that are funded in the TIP. As such, regions that place importance on TSMO in the LRTP have a strong basis for devoting funding to these strategies. The process of developing agreement on regional goals and objectives that includes system operations can help to support dedication of funding to TSMO strategies or development of project prioritization processes in programming that enable TSMO strategies to effectively compete for funding.

The Genesee Transportation Council (GTC) has included “promote efficient system management and operations” as one of seven key transportation goals in the region’s LRTP, adopted in 2011. The plan places a priority on TSMO strategies, which are viewed as key opportunities to maximize the effectiveness of the transportation system at the lowest cost, while also improving safety. Consequently, the project prioritization process used for the TIP builds off of the goals and performance measures in the TIP, and scoring of projects includes points for safety, mobility, system continuity and optimization, and other goal areas.

The Maricopa Association of Governments (MAG) Congestion Management Process (CMP) includes congestion mitigation strategies that incorporate a range of TSMO strategies. These projects are advanced to programming following a detailed prioritization process.

MPOs use Regional Concept for Transportation Operations (RCTO) or operations plans as a basis for prioritizing and selecting TSMO activities for funding.

In addition to the LRTP and CMP, some regions have developed specific operations-focused plans, which also can provide a solid foundation for identifying TSMO priorities for funding. Examples of documents that can guide a TSMO program include a regional operations strategy, a Regional Concept for Transportation Operations (RCTO), or an intelligent transportation systems (ITS) strategic plan.

The Denver Regional Council of Governments (DRCOG) developed an RCTO as a management tool to promote long-range plan goals related to safe and reliable operations. Activities identified by the RCTO include managing traffic conditions, improving incident response, and increasing non-single occupant vehicle travel. The DRCOG Transportation Operations Working Group uses the operations investment priorities specified in the RCTO and the Denver Regional ITS Strategic Plan in making their decisions about funding priorities.

MAG’s approach to funding TSMO is also supported by a regional ITS strategic plan, which identifies targeted areas for future investment, and an RCTO that provides a plan for utilizing investments in operations.

Funding Sources Used for TSMO Activities

MPOs use several Federal funding programs to support TSMO.

While the Congestion Mitigation and Air Quality Improvement (CMAQ) Program is a primary source of funding for TSMO in several regions, STP is also frequently used. Other Federal funding sources used in the case study regions include HSIP and NHPP.

In some air quality nonattainment or maintenance regions, CMAQ is a primary source of funding for TSMO projects and programs. In these areas, CMAQ Program funds are being used for strategies that meet both air quality and congestion relief objectives, such as traffic signal coordination and transportation demand management (TDM) programs. For instance, PPACG typically allocates 70 to 80 percent of its CMAQ funds to TSMO projects, including signal synchronization.

However, even in regions without CMAQ, other Federal funding programs are being used to support TSMO activities. The Orlando metro area is in attainment and does not receive CMAQ funds. MetroPlan Orlando sets aside money for TSMO strategies through the STP Urban Allocation, including direct funding for the Road Rangers Program, which provides incident management services on major roadways in the region. While the GTC in Rochester, New York has used CMAQ funding in the past for non-motorized transportation projects and traffic signal optimization projects, the GTC will no longer receive CMAQ funds after FY2014. The MPO has transitioned to using the NHPP and STP (both Urban and Flex) as the primary sources for funding TSMO strategies, including implementation of its Highway Emergency Local Patrol (HELP) Program and staffing for the Regional Traffic Operations Center (RTOC).

The Puget Sound Regional Council (PSRC) in the Seattle region uses a variety of funding sources for operations projects, including STP, CMAQ, and HSIP. HSIP funds are used for TSMO projects that meet both safety and operations goals, and are often used for signal improvements. Project sponsors for ITS projects have found it somewhat difficult to compete for CMAQ funding against transit projects, but have found more success applying for STP funds given different project scoring criteria that are used by PSRC for those funding programs. Large-scale operations projects, such as HOV or high occupancy toll (HOT) lanes, often are funded through a combination of STP, CMAQ, Transportation Investment Generating Economic Recovery (TIGER), and/or State funds.

Local and State funds can be an important source of funding for TSMO projects.

Some local jurisdictions within the case study regions chose to raise transportation funds through local taxes and have additional funding to devote to TSMO strategies. In some cases, local taxes are instituted with a commitment to spend a certain share on TSMO projects.

The San Diego Association of Governments (SANDAG) benefits from a major local funding source. TransNet is a half-cent countywide sales tax for local transportation projects which uses 70 percent of revenues for congestion reduction, including operations projects. TransNet has funded the traveler information network, the construction of HOV or managed lanes, and traffic signal optimization, along with other operational solutions. SANDAG also relies upon a local sales tax to fund transportation projects. The Highway User Revenue Fund and other local sources such as bonds and the general fund support TSMO projects.

North Central Texas Council of Governments (NCTCOG) projects are supported by the Regional Toll Revenue (RTR) Program created through an inter-local agreement with NCTCOG, Texas DOT, and the North Texas Tollway Authority (NTTA). Money is collected from private-sector partners through concessionaire contracts, debt repayment, toll collection, and interest on the RTR pool.

MPOs use planning funds to support TSMO efforts.

MPO activities to support TSMO include data collection, regional coordination efforts, and creation of subcommittees on TSMO. Examples of TSMO efforts that were observed in MPOs' UPWP include:

- Data collection.
- Development of regional operations platforms.
- Intergovernmental coordination and organization of ITS working groups/committees.
- Programs that educate the public (traveler information, commuter information) that are hosted at the MPO.
- Programs for use by the public, such as incident response or vanpool matching. These may be staffed by MPO staff.

While all MPOs profiled spend staff time on TSMO, not every agency has staff dedicated to the area. Specialized staff may allow the MPO to provide more sophisticated services to its members. MetroPlan Orlando is a strong example of an MPO applying planning funds to TSMO staffing needs. The MPO has three full-time staff members who support the Systems Management and Operations Department: a program director, a professional engineer for design and contracting, and technical staff with a focus on data and analysis related to performance measurement, safety and security.

Types of Activities Funded

A range of TSMO activities are included in the TIPs of MPOs

Table 3 shows the TSMO activities that were encountered during the case study research. Additional activities not shown below may be occurring, but were not uncovered during the case study process. ITS hardware, signal timing, TDM, and intersection improvements were common TSMO activities.

Table 3. TSMO Activities Included in TIP Documents

MPO	Example TSMO Strategies or Programs in TIP	MPO	Example TSMO Strategies or Programs in TIP
DRCOG	<ul style="list-style-type: none"> • ITS • TDM • Traffic Signal System Improvements 	NCTCOG	<ul style="list-style-type: none"> • ITS • Intersection Improvements • Signal Upgrades and Timing • TDM
GTC	<ul style="list-style-type: none"> • Highway Emergency Local Patrol • RTOC staffing • ITS • Roundabouts • Traveler Information • Traffic Signal Improvements • Weather Sensors 	PPACG	<ul style="list-style-type: none"> • Signal Synchronization • Roundabouts • Regional TDM Program • Intersection Improvements • Incident Detection • Signal Installation/Replacement • Variable Message Signs (VMS)
MAG	<ul style="list-style-type: none"> • Freeway Management System • Freeway Service Patrol • Transportation Management Centers • Cameras • Dynamic Message Signs (DMS) 	PSRC	<ul style="list-style-type: none"> • ITS • Active Traffic Management • Congestion Pricing • Upgraded Traffic Signalization • Incident Management • TDM
MetroPlan Orlando	<ul style="list-style-type: none"> • Road Rangers • Signal Retiming • Intersection Improvements • TDM • Incident Management 	Metro	<ul style="list-style-type: none"> • ITS Communications Infrastructure Improvements • Regional ITS Communications Master Plan • Regional Data Archive Maintenance

MPO	Example TSMO Strategies or Programs in TIP	MPO	Example TSMO Strategies or Programs in TIP
			<ul style="list-style-type: none"> • Signal System Upgrade • Travel Time Signage • Regional ITS Architecture Update
		SANDAG	<ul style="list-style-type: none"> • ITS • TDM • Traffic Signal Improvements • Managed Lanes

Ongoing staffing and maintenance of TSMO programs and equipment is not often included in the TIP. Most MPOs do not own or operate infrastructure. As such, MPOs traditionally have included only on the capital cost of highway projects or ITS in the TIP, because another agency (such as the State DOT) assumed ongoing maintenance and operation of the infrastructure once it was built. Often MPO TIPs show only the capital cost of the TSMO project. Some agencies noted that obtaining funding for upfront costs of TSMO projects is much easier than insuring the long-term commitment by providing ongoing staffing. In an effort to address the issue of ongoing operations following an initial TSMO project, MAG has made it a requirement to demonstrate that long-term staffing is available before a project is programmed.

Procedures for Programming TSMO Activities

MPOs may set aside funding, allows open competition, or a combination of both.

The TSMO programming approaches for the MPOs studies for this report fell into three main categories: 1) Set aside dedicated funding for TSMO projects, 2) allow TSMO projects to compete with other types of projects for funding, or 3) combine a set-aside with the ability for TSMO projects to compete for other funding.

In a set-aside system, a portion of funding is segregated and spent only on TSMO projects. TSMO projects compete against each other for the pool of set-aside funds. A set-aside system guarantees that some TSMO projects will be funded each year. Separate project selection criteria are sometimes used for certain programs (CMAQ, STP, local, etc.). As an example, MetroPlan Orlando reserves a fixed \$4 million per year to TSMO projects, entirely from STP funds. Some MPOs viewed dedicated funding for TSMO as helpful to advance TSMO priorities and implementation.

Other MPOs have an open competition system where all projects, including TSMO activities, compete for funding. This is the approach used by PSRC. In these cases, using evaluation criteria that address mobility, reliability, safety, and/or cost-effectiveness helps TSMO initiatives compete effectively for funding. The merits of each project are evaluated using selection criteria (discussed below), and the highest scoring projects are generally selected for funding. The potential for TSMO projects to be selected in an open competition system is highly dependent on the selection criteria used for evaluation. Table 4 shows the TSMO programs and projects with funding set-asides encountered during case study research, along with dollar amounts or percentages associated with each.

Table 4. TSMO Funding Set-Aside Programs and Projects Included in TIP Documents.

MPO	TSMO Programs/Projects with Funding Set-Aside	Set-Aside Amount
DRCOG	ITS TDM Traffic Signal System Improvements (TSSIP)	\$4.1M (2012-2017) \$7M (2012-2017) \$14.8M (2012-2017)
GTC	Highway Emergency Local Patrol Regional Traffic Operations Center	\$2.61M (2014-2017) \$5.67M (2014-2017)
MAG	ITS projects	\$105M (2011-2015)
MetroPlan Orlando	Non-capacity projects Road Ranger Program	\$4M/year \$500k/year
NCTCOG	Regional ITS Funding Pool	\$4M (2013-2016)
PPACG	TSMO Maintenance and Operations	35% of annual sales tax revenue
PSRC	No separate funding pool for operations	N/A
Portland Metro	Maintenance and Operations	\$1.67M/year
SANDAG	Congestion reduction, including operations	70% of sales tax revenue

Under an approach that combines the set-aside and open competition models, some funds are segregated for use on TSMO projects. However, TSMO projects are also eligible to compete for the general pool of funds. This method is utilized by GTC and Portland Metro.

For instance, GTC sets funding aside for two priority operations programs: the HELP program and staffing for the RTOC. The remainder of funding is prioritized using a performance-based approach that assigns points to projects based on contribution to different performance areas tied back to the LRTP.

Since 2009, the Portland region has set aside dedicated funding from Metro's Regional Flexible Fund program to support implementation of TSMO. There has been little opposition to the program through four sub-allocation cycles, and Metro hopes to further promote this program by documenting project benefits and demonstrating program successes. A variety of other funding sources is accessed in a competitive process.

Efforts to Support Project Selection for TSMO Activities

MPOs are using a variety of project selection processes. Table 5 summarizes the project selection process of all case studies in this project.

Table 5. Project Selection Process Summary.

MPO	Project Selection Process
DRCOG	Three program pools serve as the core mechanism for Federal funding for operations in the region: ITS, TDM, and Traffic Signal System Improvements. There is a separate project selection process for each of three pools. Stakeholder groups apply a consensus-based scoring process with different selection criteria for each funding pool. Decisions are based on regional operations priorities in regional operations-focused planning documents.
GTC	There are set-aside funds for the HELP (highway emergency local patrol) program and RTOC staffing. Other operations projects compete with all other projects for TIP funds. All projects are ranked using a set of common criteria and mode-specific criteria. TSMO is a category with its own mode-specific criteria.
MAG	Selection of ITS/operations projects is based on priorities set forth in the Regional ITS Strategic Plan using a competitive process with the following criteria: 1) relevance to regional ITS plan; 2) compliance with Regional ITS Architecture; 3) congestion mitigation potential; and 4) emissions reduction potential. ITS/operations projects do not compete with other transportation projects for funding. All proposed ITS projects are reviewed by the ITS Committee. It provides project recommendations that are then reviewed by other committees.
MetroPlan Orlando	Once a year, an operations stakeholder committee meets to select TSMO projects to be funded by the TSMO set-aside, prioritize them, and set a schedule for implementation. The committee ranks projects based on expected system impact, cost efficiency, coordination with the ITS System Architecture, Strategic Plan and geographic equity among MetroPlan’s member local governments.
NCTCOG	NCTCOG uses separate project selection criteria for the following types of TSMO projects: a) intersection improvements, b) ITS, and c) traffic signal improvements. NCTCOG staff then evaluate the merits of each project using criteria and weights identified in the call for projects. While most projects go through a competitive proposal and technical evaluation process, some projects are selected because they qualify for targeted, strategic State or local programs.
PPACG	Projects are prioritized based on their ability to fulfill the goals of the RTP and to meet criteria specified for each specific funding program. TSMO strategies compete for funding in the Maintenance & Operations and CMAQ funding program categories.
PSRC	Operations projects compete against all others in the TIP selection process. Operations project sponsors may apply for Federal transportation funds from PSRC’s programming process through either a regional competition or through one of four countywide competitions
Portland Metro	Operations projects receive funding through the TSMO Program funding set-aside and the open competitive process. The MPO works through its operations stakeholder group to evaluate and select projects for the TSMO Program funds; one-third of these funds go to region-wide projects and two-thirds goes to corridor-level projects. The region-wide projects are selected by consensus whereas the

MPO	Project Selection Process
	corridor-level projects are selected using specific evaluation criteria and analysis.
SANDAG	The MPO applies a 100-point scoring process. The scoring criteria are grouped into three broader categories: serves travel needs (40 percent weight), network integration (20 percent weight), and addresses sustainability (40 percent weight).

Operational performance measures enable TSMO strategies to compete effectively for funding. The use of operational performance measures creates a system where TSMO projects may score highly enough to compete with other types of projects. Some MPOs use separate criteria for evaluating TSMO projects even when competing with other types of projects. In developing the TIP, GTC begins with the goals and performance measures from the LRTP. Project evaluations are based on the responsiveness of proposals to the performance measures and are conducted by a combined GTC and New York State DOT Region 4 team. MPOs provide additional points for (mainstream) projects that include ITS/operations elements. The DRCOG evaluation criteria for the ITS Systems Program pool provides additional points for projects on the 2035 *Metro Vision Regional Transportation Plan* Emphasis Corridors for Operational Improvements map. The performance return of each proposed TSMO project was generally not analyzed. Instead, the performance of the entire investment package was analyzed (all projects, including TSMO).

Collaboration between member agencies including use of TSMO committees can be a key element of TSMO project selection. MPOs create formal, collaboratively developed operations objectives and priorities in the RCTO, LRTP, and ITS Strategic Plan. These carry over into the programming phase in the form of project selection criteria and project prioritization in the TIP.

MPOs including Portland Metro and DRCOG host regional TSMO committees that provide input to the evaluation and selection of TSMO projects. The committees are usually composed of professional staff members from local governments in the area. Some MPO committees are delegated project selection authority over TSMO projects. This is usually found in conjunction with a set-aside funding system (described above). Committees are charged with evaluating projects for funding from the TSMO pool and prioritizing projects for inclusion in the TIP.

MPOs may use measures of cost-effectiveness to evaluate TSMO projects. Pikes Peak Area Council of Governments (PPACG) does not have a formal policy to support operational improvements. However, the project prioritization process focuses strongly on cost-effectiveness, which allows TSMO projects to do well in the project selection process. A significant percentage of programmed projects are solely operations or have operations components. MetroPlan Orlando includes cost-effectiveness as an evaluation criterion in the LRTP with the annual cost of congestion as the performance measure.

Denver Regional Council of Governments (Denver, CO)

Agency Overview

The Denver Regional Council of Governments (DRCOG) serves as the metropolitan planning organization for Adams, Arapahoe, Boulder, Clear Creek, Douglas, Gilpin and Jefferson counties; the City and County of Broomfield and the City and County of Denver; and southwest Weld County. The organization serves approximately 2.7 million people and expects to serve 1.5 million more by 2035. DRCOG's policy **framework, defined in *Metro Vision 2035*, focuses on the following performance-based goals for 2035**¹³:

FAQs about DRCOG	
Population	2.8 million
TSMO Dedicated Funding	Set-asides for ITS, TSSIP, TDM
TSMO included in UPWP	Yes

- Increase urban density by 10 percent.
- Locate 50 percent of new housing and 75 percent of new employment in urban centers.
- Protect a total of 880 sq. mi. of State and local parks and open space.
- Cut per capita greenhouse gas emissions by 60 percent.
- Lower single-occupant vehicle trips to work from 74 percent to 65 percent.
- Reduce daily vehicle miles traveled (VMT) per capita by 10 percent.

The *2035 Metro Vision Regional Transportation Plan* (MVRTP) expands upon this core strategy by identifying regionally important transportation projects that meet the needs of local governments; the Regional Transportation District, the major transit provider in the region; Colorado Department of Transportation (CDOT); and the public. The 2012-2017 TIP is the six-year program for implementing the regional plan.

Three documents define the vision, goals, and strategic direction for operations in the Denver region and are used to support the selection of operations investments. The *Regional Transportation Operations Strategy*¹⁴ (adopted October 2010) defines regional operations goals as well as operators' roles and responsibilities within the regional transportation system. The *Regional Concept of Transportation Operations* (RCTO) (adopted August 2012) expands upon this strategy by describing a unified direction for regional transportation managers through shared objectives and performance measures. The RCTO¹⁵ was developed as a management tool to promote goals related to providing safe and reliable operations to regional travelers. This includes monitoring and managing traffic conditions, improving incident management, and increasing non-single occupant vehicle travel by providing mode, departure, and route choice. The *DRCOG Regional Transportation Demand Management Short Range Plan (2012-2016)* defines the region's TDM policies, activities, strategies, and stakeholder roles and describes how TDM supports the vision, goals, and strategies in DRCOG's regional plans.¹⁶

¹³ Denver Regional Council of Governments, *Metro Vision 2035 Plan*, January 2011. Available at: <http://www.drcog.org/index.cfm?page=MetroVision>

¹⁴ Denver Regional Council of Governments, *Regional Transportation Operations Strategy*, October 2010. Available at: <http://www.drcog.org/index.cfm?page=IntelligentTransportationSystems>.

¹⁵ Denver Regional Council of Governments, *Regional Concept of Transportation Operations*, August 2011. Available at: <http://www.drcog.org/index.cfm?page=IntelligentTransportationSystems>.

¹⁶ Denver Regional Council of Governments, *DRCOG Regional TDM Short Range Plan (2012-2016)*, June 2012. Available at: <http://www.drcog.org/index.cfm?page=TravelDemandManagement%28TDM%29>.

Funding for Operations Projects

The 2012-2017 TIP includes several funding pools for programs, including three program pools that serve as the core mechanism for Federal funding for operations in the region, described in the table below. In addition to the three pools described below, the 2012-2017 TIP provides funds for the “RideArrangers Program” for the Denver Transportation Management Area. RideArrangers is a regional commute options program that provides centralized services to help commuters, employers, and others find transportation options to reduce traffic congestion and improve air quality in the region.

Table 6. DRCOG Regional Operations Program Pools.¹⁷

Funding Pool	Description	2012-2017 Funding Amount (including match)
Regional ITS Pool	Funds ITS projects that implement the adopted <i>Regional Intelligent Transportation Systems Strategic Plan</i> .	\$4,124,000
Regional TDM Program Pool	Funds projects that promote alternative transportation mode use, with the intent to reduce mobile source emissions.	\$6,985,000
Regional Traffic Signal System Improvement Program (TSSIP)	Funds 1) capital improvements to signal systems in the region, defined in the <i>Update to Traffic Signal System Improvement Program</i> (adopted by DRCOG in August 2010); 2) traffic signal timing and coordination work; and 3) traffic signal system engineering and design.	\$14,800,000

There is a project selection process for each for these three funding operations programs within the TIP. Most ITS, TDM, and TSSIP projects are only eligible for the pool project selection processes and not the general TIP project selection process. However, two types of projects are exceptions¹⁸:

- Traffic signal system/coordination projects over \$1,000,000 in Federal funds that have been approved for submittal by the Transportation Advisory Committee (TAC) and the Metro Vision Issues Committee (MVIC), and
- TDM projects over \$200,000 in Federal funds, with letters of support from affected local governments.

Intelligent Transportation Systems Program Pool

The ITS program pool projects are selected through a consensus-based process led by DRCOG’s Regional Transportation Operations Working Group, an ongoing, collaborative forum for operations in the Denver region. Projects submitted for ITS funding are scored using a unique set of criteria. The working group relies on the operations investment priorities based on those specified in the RCTO and the *Denver Regional ITS Strategic Plan* in making their decisions.

¹⁷ Denver Regional Council of Governments, *Metro Vision 2035 Plan*, January 2011. Available at: <http://www.drcog.org/index.cfm?page=MetroVision>

¹⁸ Denver Regional Council of Governments, *TIP Preparation Policy*, May 2013. Available at: [http://www.drcog.org/index.cfm?page=TransportationImprovementProgram\(TIP\)](http://www.drcog.org/index.cfm?page=TransportationImprovementProgram(TIP)).

The specific priorities used to select Fiscal Year (FY) 2012 and FY 2013 projects were:

1. Projects that prepare and implement inter-jurisdictional coordinated operations.
2. Projects that expand traffic monitoring and traveler information systems.
3. Projects that implement upgraded software or infrastructure to specifically support incident management.
4. Projects that implement and enhance transit signal priority.

As part of the application process, sponsors were requested to estimate person-hours of travel (PHT) savings to subsequently prioritize projects (by benefit-cost ratio) in the same priority category.

The ITS program pool is funded with CMAQ funds. An example of an ITS pool project funded with FY 2012-2013 funds is the *Denver Federal Blvd Traveler Information System* "to monitor in real-time, the traffic and travel conditions on Federal Blvd between Alameda and Interstate 70" (\$370,000).¹⁹

Regional Transportation Demand Management Program Pool

DRCOG also manages a regional TDM program, which provides funding for strategies aimed at reducing single-occupant vehicle travel, varying travel time of day, shortening or eliminating trips, and providing multimodal travel opportunities such as ridesharing, vanpooling, transit, bicycling, and walking. The *DRCOG Regional TDM Short Range Plan (2012-2016)* defines TDM regional stakeholders, roles, policies, and strategies within the context of the larger DRCOG vision.

Projects for the TDM pool are also selected using a collaborative group of stakeholders. Once projects are submitted, a TDM Project Review Panel comprised of TDM experts and DRCOG staff members evaluates the projects according to the scoring criteria given in the table below. Following the scoring process, the TDM Project Review Panel makes recommendations for projects to be funded.

A total of \$2.15 million in Federal funds is available from the TDM pool for FY 2014-2015. The minimum project funding request is \$80,000, and the recommended target maximum is \$300,000 total over a 2 year period.²⁰

TDM projects funded through the pool must adhere to the Federal CMAQ Final Program Guidelines. Evaluation scoring criteria for the TDM pool are as follows.²¹

¹⁹ Denver Regional Council of Governments, *Fiscal Year 2012-2013 ITS Pool Application Submissions*, November 2011. Available at: <http://www.drcog.org/index.cfm?page=IntelligentTransportationSystems>.

²⁰ Denver Regional Council of Governments, *Regional Travel Demand Management Pool Call for Projects*, 2013. Available at: <http://www.drcog.org/index.cfm?page=TDMFundingOpportunities>.

²¹ Denver Regional Council of Governments, *Table 1 TDM Evaluation Criteria for the FY 2014-15 TDM Pool*, April 2013. Available at: <http://www.drcog.org/index.cfm?page=TDMFundingOpportunities>.

Table 7. TDM Evaluation Criteria for the FY 2014-15 TDM Pool.

Evaluation Factor	Point Allocation
Reviewed by Project Review Panel	
Level of Innovation and Uniqueness	15 points awarded to totally new (market/connections/project type) and extremely unique project; 1 point to project that does not reach new market or is continuation of existing service/project/campaign
Project Readiness	5 points awarded if project sponsor is ready to go; 1 point if sponsor is just getting started/extensive additional coordination is required
Timing/synergy of Projects	5 points awarded if project brings immediate benefits/links to major roadway/rapid transit project; 1 point if benefits are several years out/no links to roadway/rapid transit project
Motor Vehicle Trip Reduction Potential	15 points awarded if high trip reduction is expected (> 150,000 trips/year); 1 point if low trip reduction is expected (< 20,000 trips/year)
VMT Reduction Potential	15 points awarded if high VMT reduction is expected (> 1.5 million miles/year); 1 point if low reduction is expected (< 100,000 miles/year)
Cost-Effectiveness (Cost/VMT reduction) Potential	5 points awarded to projects with high results expected/lower cost; 1 point awarded to projects with low results expected/higher cost
Other Factors/Intangibles	7 points to project sponsors with established quality of project performance, pertinent project partnerships, cooperation with Regional TDM Program, etc.
Scored by DRCOG Staff	
User Base	Points awarded if population or/and employment are to be reached directly through this project in the specific project area
Environmental Justice (EJ) Area	5 points to project entirely in EJ area; 3 points to project partially in EJ area, or that serves defined population away from project; 1 point to project that does not serve any EJ area
Congestion Level Within Project Area	10 points to project in high congestion area; 1 point to project in low congestion area
Serves DRCOG Designated Urban Center (UC)	5 points awarded if project strongly serves/focuses on established UCs; 1 point if no UCs are involved
Type of Local Match	3 points awarded to all cash; 1 point to any "in kind"

Traffic Signal System Improvement Program (TSSIP) Pool

The purpose of TSSIP is to work with CDOT and local governments to coordinate traffic signals in the region to reduce congestion and improve air quality. Through the TSSIP, DRCOG identifies corridors to retime, develops and fine-tunes timing plans, and documents improvements and benefits. In turn, the operating agencies are responsible for maintaining and operating their signals, maintaining the timing, and reviewing and approving plans. "The implementation program consists of four categories of activities:

- Capital improvements and special projects
- Contingency and miscellaneous equipment purchases
- Signal timing and coordination

- System engineering and design²²

The TSSIP investment program is updated every 3 to 4 years through a collaborative planning process involving representatives from the region's operating agencies. Projects are prioritized based on general consensus from TSSIP stakeholder group and DRCOG on the following factors:

- "The criticality of the need (higher priority assigned to corridors/projects addressing key signals not on system, insufficient communications, and/or obsolete systems)
- Cost effectiveness (lower priority assigned to improvements with a high cost per signal)
- The importance of the corridor (priority based on roadway classifications)
- Strategic communications links
- Local priorities and synergies among projects²³

After each project is implemented, DRCOG evaluates and documents the benefits of the project. These summaries can be found in the Annual Benefits Summary²⁴ and are also contributed to CDOT's *CMAQ Reporter* in order to comply with CMAQ regulations and promote the benefits of the region's investment in signal improvements. Benefits are clearly delimited in terms of

- Travel Time Reduction (Hours/Day).
- Fuel Consumption Reduction (Gallons/Day).
- Pollution Emissions Reduction (Pounds/Day).
- Greenhouse Gas Reduction (Pounds/Day).
- User Savings (Dollars/Day).

Operations Staffing

Support from DRCOG staff for planning for operations is typically funded through the UPWP. Staff support from DRCOG for signal timing and other engineering activities associated with the TSSIP is funded through the CMAQ program. The UPWP provides staff support to several areas of planning for operations, including:

- DRCOG CMP. The objective of this activity is to conduct the region's ongoing multimodal and multi-approach CMP, including updating the DRCOG Congestion Mitigation Program data, evaluating key bottlenecks in partnership with CDOT, and incorporating congestion information into project selection and evaluation for the TIP and Regional Transportation Plan.²⁵
- Regional Transportation Operations. The staff support activities under this area include providing a regional operations perspective to the planning process, holding regular operations stakeholder meetings to support the implementation of the RCTO, and ensuring that projects comply with the Regional ITS Architecture. The activities for 2013 include conducting the project selection processes

²² Denver Regional Council of Governments, *Traffic Signal System Improvement Program*, August 2010. Available at: <http://www.drcog.org/index.cfm?page=trafficsignalprogram>.

²³ Denver Regional Council of Governments, *Traffic Signal System Improvement Program*, August 2010. Available at: <http://www.drcog.org/index.cfm?page=trafficsignalprogram>.

²⁴ Denver Regional Council of Governments, *Traffic Operations Program Projects Completed in Calendar Year 2013*. Available at: <http://www.drcog.org/index.cfm?page=trafficsignalprogram>.

²⁵ Denver Regional Council of Governments, *FY 2014 and 2015 Unified Planning Work Program for the Denver Region*, July 2013. Available at: <http://www.drcog.org/documents/FINAL%20FY14-15%20UPWP-Adopted%2007-17-13.pdf>.

for the Regional ITS Pool for FY2014 and FY2015 and revising the Regional ITS Deployment Program to direct deployment through the Regional ITS Program Pool.²⁶

- Regional TDM Planning. The objective of this activity is to “facilitate and monitor the provision of travel demand management services and projects consistent with the 2035 MVRTP.”²⁷ This includes assisting with completion and monitoring of projects funded through the TIP Regional TDM Pool (including activities of the Regional TDM Program), conducting the project selection process for the Regional TDM Pool for FY2016 and FY2017, and preparing a summary report on progress, status, and outcomes of the TDM Program and Pool.

DRCOG has been successful in implementing operations projects throughout the Denver region. The separation of funding for operations into specific funding pools has helped to ensure the use of Federal funds dedicated to operations, which provides flexibility for project selection separate of other funding demands. Additionally, DRCOG relies on documented strategies for regional operations and a highly collaborative, consensus-based operations project selection process. DRCOG has created an atmosphere in which operators are working together on a consensus basis rather than a competitive basis. This is especially true with the development of an RCTO, which focuses disparate efforts of individual jurisdictions around the region. Already, DRCOG has witnessed individual regions delaying project deployment in favor of neighboring jurisdictions in an effort to work together.

Although there is a strong cooperative spirit in the Denver region, joint operations project submissions are rarely received by DRCOG. The localities have expressed that it is challenging to collaborate with other jurisdictions as part of the application development process. This is especially true for ITS Pool projects, which require systems engineering analysis activities prior to completing the application. Instead of collaborating with other localities, sponsors seek partnership with DRCOG staff to assist with collaborative project development.

For More Information

Contact	Greg MacKinnon gmackinnon@drcog.org
TIP Link	http://www.drcog.org/documents/DRAFT%202012-2017%20TIP.pdf
UPWP Link	http://www.drcog.org/agendas/DRAFT%20FY12-13%20UPWP%20%20Amended%20May%202012.pdf

²⁶ Denver Regional Council of Governments, *FY 2012 and 2013 Unified Planning Work Program for the Denver Region*, May 2012. Available at: <http://www.drcog.org/documents/FINAL%20FY12-13%20UPWP%20-%20Amended%20May%202012.pdf>

²⁷ Denver Regional Council of Governments, *FY 2014 and 2015 Unified Planning Work Program for the Denver Region*, July 2013. Available at: <http://www.drcog.org/documents/FINAL%20FY14-15%20UPWP-Adopted%2007-17-13.pdf>.

Genesee Transportation Council (Rochester, NY)

Background

The Genesee Transportation Council (GTC) is the MPO for the Genesee-Finger Lakes Region, spanning nine counties in New York State centered around Rochester.²⁸ The Rochester Transportation Management Area (TMA) includes all of Monroe County (which contains the City of Rochester) and parts of Livingston, Ontario and Wayne counties.

Efficient system management and operations is recognized as a key transportation goal for the region. GTC's

L RTP, adopted in 2011, lays out a vision for transportation in the region through 2035. It includes "promote efficient system management and operations" as one of seven goals, which guide the planning activities and programs conducted by GTC. Consequently, the plan places a priority on TSMO strategies, which are seen as the best opportunity to maximize the effectiveness of the current transportation system at the lowest cost, while also improving safety. The plan is performance-based and identifies key performance measures in relation to key goals. These include travel time index on major roadways, transit on-time performance, median incident clearance time on major roadways, and number of fatalities.

The region has also developed an *Intelligent Transportation Systems Strategic Plan for Greater Rochester*, which lays out key ITS strategies. Monroe County (which provides traffic engineering services for the City of Rochester) maintains and continues to expand ITS capabilities and is recognized as a national leader among mid-sized metropolitan areas. The New York State DOT (NYSDOT) and Monroe County DOT manage and operate the highway and bridge network from the RTOC, with the New York State Police co-located at the facility. The New York State Thruway Authority (NYSTA) also maintains ITS instrumentation across the region. Together NYSDOT, Monroe County, and NYSTA coordinate monitoring of traffic conditions, as well as incident response.²⁹

Project Prioritization and Selection Process

In developing the TIP, GTC builds off the goals and performance measures articulated in the L RTP. The TIP is developed cooperatively with project evaluations based on the responsiveness of proposals to the performance measures conducted by a team led by GTC and the NYSDOT Region 4. GTC is responsible for programming projects in the Rochester TMA, and projects outside of this area are programmed by NSYDOT Region 4 in coordination with GTC.³⁰ The TIP spans a four-year period and is typically updated every two years.

FAQs about GTC	
Population	1.22 million ¹
TSMO Dedicated Funding	Hybrid; Funds set aside for certain projects while others compete for funding
Dedicated Operations Staff	1 FTE
Programmed Operations Funding	6 percent of the 2014-2017 TIP
M&O included in UPWP	Yes

²⁸ Though the MPO region is comprised of nine counties, seven are covered in the TIP.

²⁹ Genesee Transportation Council, *Long Range Transportation Plan for the Genesee-Finger Lakes Region*, June 2011. Available at: [http://www.gtcmppo.org/docs/LRTP/2035/LRTP%202035%20\(with%20Appendices\).pdf](http://www.gtcmppo.org/docs/LRTP/2035/LRTP%202035%20(with%20Appendices).pdf)

³⁰ Genesee Transportation Council, *Transportation Improvement Program 2014-2017*, June 2013. Available at: <http://www.gtcmppo.org/Docs/TIP.htm>

Recognizing their high levels of cost-effectiveness, GTC dedicates funding directly to two priority TSMO projects:

- Implementation of the Highway Emergency Local Patrol (HELP) Program, which provides emergency roadside service to disabled vehicles. This is an important initiative in minimizing non-recurring incident-based delay and in increasing safety on major highways by reducing the potential for secondary incidents. NYSDOT Region 4 found that the HELP Program had one of the highest benefit/cost ratios of any initiative assessed.
- Funding for on-going staffing of the RTOC, including continued 24-hour operations and training of NYSDOT and Monroe County personnel at this facility.

These projects receive funding “off the top” and do not compete for funding with all other projects. In the 2014-2017 TIP, these projects received approximately \$2.61 million and \$5.67 million in funding, respectively, over the four-year period, out of a total TIP of \$401 million.

For the remainder of funding, GTC collaborates with NYSDOT Region 4 to solicit project proposals for the TIP from counties, municipalities and other eligible entities, including NYSDOT, NYSTA, and the Rochester Genesee Regional Transportation Authority (RGRTA). GTC and NYSDOT Region 4 staff have established a very structured, performance-based process to evaluate project submissions, using specific criteria to score how well a proposed project supports the region’s goals and objectives. Funding is not divided up by mode or major category initially. Rather, all projects are ranked using a set of common criteria and mode-specific criteria in order to select the most beneficial projects for funding.

A project can score up to 130 points: up to 100 points on the common criteria and up to 30 points on the mode-specific criteria. Common criteria used for evaluating projects tie directly to the goals and performance measures in the LRTP and include:

- Safety (improve safety of the existing transportation system).
- Mobility (improve the efficiency and reliability of the existing transportation system; promote travel alternatives).
- Community and Economic Development (enhance the region’s attractiveness to new and existing businesses; align with land use, economic, housing, or other policies; support, enhance, or improve regional food system stability).
- System Continuity and Optimization (support corridor-level/multi-modal solutions, especially across regional boundaries; advance the recommendation(s) of a UPWP study or other transportation plan consistent with LRTP 2035; improve the resiliency of the system).
- Environment (encourage efficient use of non-renewable energy sources and/or promote renewable alternatives; reduce emissions of greenhouse gases and/or criteria pollutants).
- Fiscal Responsibility (minimize lifetime maintenance and user costs; provide non-Federal match beyond the required amount; employ innovative funding/financing/partnerships).

Mode-specific project evaluation criteria are unique to the following types of projects: highway and bridge, public transportation, bicycle and pedestrian, system management and operations, and goods movement. The mode-specific criteria for system management and operations projects are shown in Figure 1 below.

<i>System Management and Operations</i>						
1. Reduce travel times on major roadways	0	2	4	6	8	10
2. Reduce incident clearance times	0	2	4	6	8	10
3. Increase the productivity of regional transportation agencies/ providers (e.g., cost savings, time savings, etc.)	0	1	2	3	4	5
4. Support or advance existing and/or proposed ITS elements	0	1	2	3	4	5

Figure 1. GTC’s Mode-Specific Project Evaluation Criteria for TSMO Projects.

Based on the overall ranking, typically TSMO projects are competitive with public transit and highway projects, and score much more favorably than highway expansion projects.

The outcome of the project scoring is a preliminary ranking of the projects. The ranking is reviewed by the TIP Development Committee (TDC), which is comprised of representatives from four counties (the counties in the region within the TMA), the City of Rochester, the RGRTA, and NYSDOT. The TDC may adjust the rankings to address geographic balance around the region, the capacity of sponsors to deliver their projects in a timely and cost-effective manner, or other considerations not factored into the evaluation criteria. Given funding restrictions, funding sources are then matched to projects in order to fund those most valuable to the region.

The draft TIP is then released for a 30-day public comment period. It contains two lists: one of projects recommended for funding and the other of proposed projects for which there is not funding anticipated to be available in the period covered by the TIP. Public comments are considered by the TDC and the GTC Planning Committee as they produce the (if necessary) revised draft TIP for GTC Board action. The Board considers the Planning Committee recommendation and adopts the final TIP. The Board is GTC’s 27-member governing body, comprised of elected officials and representative of local, regional, State, and Federal agencies.³¹

In the latest TIP, TSMO projects made up about 6 percent of total funding. Over the years, operations projects programmed in the TIP have included purchasing and operating ITS improvements, roundabouts, RTOC staffing levels, traveler information, traffic signal modernization or optimization, and weather sensors. Examples of projects in the current TIP include ITS improvements along Interstate 490 (\$191,000) and replacement of an old traffic control system in the City of Geneva with a modern system to improve traffic signal optimization at 16 signalized intersections (\$128,000). The share of total funding dedicated to TSMO in the TIP is less than the 10 percent level suggested in the LRTP 2035. However, the funding allocated was based on a limited number of TSMO project applications submitted during this TIP round.

³¹ Genesee Transportation Council, *Transportation Improvement Program 2014-2017*, June 2013. Available at: <http://www.gtcmppo.org/Docs/TIP.htm>

Funding Sources for TSMO Projects

FHWA programs are the primary source of funding for operations projects in the region, including the NHPP, STP (both Urban and Flex), and, to a lesser degree, CMAQ. Though GTC identifies funding sources for each project after the project selection phase (in order to best match funding to projects given any restrictions), typically the NHPP funds NYSDOT staff operations and the STP funds Monroe County staff operations at the RTOC. Though GTC has used the CMAQ program as a primary source of funding for non-motorized transportation projects, it did fund a traffic signal optimization project in the 2014-2017 TIP. The region's air quality nonattainment status is marginal, and the GTC will no longer receive CMAQ funds after FY2014.

As indicated in the LRTP, 10 percent of funds in the TIP are set aside for select operations projects, including the highway emergency patrol, regional traffic operations center staffing, and a police substation. Other operation projects (ITS, etc.) compete with other projects for remaining funds. The total amount programmed in the 2014-2017 TIP is \$401,325,901, and about 6 percent of the total funds are programmed operations projects in the TIP.

Other TSMO-related Activities

TSMO is also addressed in the UPWP. GTC developed the 2013-2014 UPWP in alignment with the LRTP and Moving Ahead for Progress in the 21st Century (MAP-21) planning objectives, which both support the efficient management and operations of transportation systems. GTC's 2013-2014 UPWP outlines key roles for staff in TSMO planning activities that will "maximize the safety, efficiency, and security of the transportation system by working with member agencies to identify appropriate management and operations strategies and initiatives, including ITS deployments, which result in fuller utilization of existing capacity."³² The TSMO staff supports the Transportation Management Committee (TMC), which focuses on managing and operating transportation infrastructure and services. The TMC is comprised of representatives from any interested agency; agencies that have participated in the committee include NYSDOT, NYSTA, the New York State Police, Monroe County DOT, the Monroe County Sheriff's Office, the City of Rochester, the RGRTA, the Monroe County Supervisors Association, and GTC.³³ Other TSMO tasks outlined in the UPWP include identifying and advancing TSMO projects that align with Federal expectations and local conditions, implementing the ITS plan, and collecting and disseminating data and information on TSMO activities.

Collaboration Activities

There is a high level of coordination between GTC and NYSDOT Region 4, which is located entirely within the MPO region. The two agencies collaborate on a joint call for projects and use the same Project Evaluation Form to review and rank submitted projects. They consult with each other on the final project program selection as well. This ensures the region receives the maximum benefit from transportation investments, which can be particularly critical for some operations projects, for which regional cooperation yields optimal deployment (i.e., traveler information, traffic control management, traffic signal synchronization, etc.).

³² Genesee Transportation Council, Unified Planning Work Program, 2013-2014, April 2013. Available at: <http://www.gtcmppo.org/Docs/UPWP.htm>.

³³ Genesee Transportation Council, *Transportation System Management and Operations*. Available at: <http://www.gtcmppo.org/Resources/Topics/TSMO.htm#TMC>

Lessons Learned

- There is broad recognition of the value of key operations activities, namely HELP and RTOC, which enables GTC to set aside dedicated funding for these ongoing activities.
- GTC's project evaluation criteria allow for smaller operations projects to be competitive for funding. This may be attributed to the inclusion of criteria related to broader transportation goals and objectives (i.e. safety, mobility, fiscal responsibility, etc.) and mode-specific criteria.

For More Information

Contact	Richard Perrin rperrin@gtcmpo.org Joseph Bovenzi jbovenzi@gtcmpo.org
TIP Link	http://www.gtcmpo.org/Docs/TIP.htm
UPWP Link	http://www.gtcmpo.org/Docs/UPWP.htm

Maricopa Association of Governments (Phoenix, Arizona)

Background

The Maricopa Association of Governments (MAG) is the MPO for the Phoenix metropolitan area. MAG is comprised of 27 incorporated cities and towns within Maricopa County and urbanized areas in two adjacent counties, as well as three Native American communities. In the past four decades, Maricopa County has experienced considerable population growth – Phoenix was the 20th largest city in the United States in the 1970s and is now the 6th largest.³⁴ The population for Maricopa County is expected to steadily increase through 2050.³⁵

FAQs about MAG

MPO Population	3.8 million
TSMO Dedicated Funding	Yes
Dedicated Operations Staff	2 FTE
TSMO included in UPWP	Yes

With no major freeway system expansion slated for the near future, MAG is committed to improving the region's existing transportation system through safer and more efficient system operations. This is reflected in the goals of the current draft *2035 Regional Transportation Plan*, which lists system preservation and safety as one of its key goals. MAG groups all operations related projects under the project category ITS.

MAG was one of the country's early leaders in planning for operations. Since 1996 the MPO has integrated ITS projects into its regional transportation planning process. This concerted approach to system management and operations is further supported by a Regional ITS Strategic Plan that identifies targeted areas for future investments, an RCTO that provides a plan for more fully utilizing investments in operations projects, and the CMP, which works to incorporate congestion mitigation strategies into the planning and programming process.

Project Prioritization and Selection Process

The region's ITS infrastructure projects are divided into two categories, freeway and arterial, with separate funding streams for each: MAG is responsible for programming of regional funds for all freeway and arterial ITS projects, and all these projects are included in the TIP. Selection of projects is based on priorities set forth in the Regional ITS Strategic Plan using a competitive process with the following criteria: 1) relevance to regional ITS plan; 2) compliance with Regional ITS Architecture; 3) congestion mitigation potential; and 4) emissions reduction potential. ITS projects do not compete with other transportation projects for funding. Since 1998, MAG has had a dedicated funding stream for ITS projects. Although most of the ITS projects are funded with CMAQ funds received by the region, several other regional transportation funding sources are applied as well. The Arizona DOT (ADOT) is responsible for the actual construction of freeway ITS projects.

MAG's ITS project selection process includes extensive involvement from various policy and technical committees, as well as the public. First, MAG solicits project applications, which are reviewed by the ITS Committee and the Transportation Review Committee (TRC). The ITS Committee, comprised entirely of ITS professionals representing member agencies, is responsible for regional ITS planning and is supported by MPO technical staff. All proposed ITS projects are reviewed by the ITS Committee and

³⁴ United States Census Bureau, *Top 20 Cities*, July 2012. Available at: <http://www.census.gov/dataviz/visualizations/007/>

³⁵ Arizona Department of Administration, "2012-2015 State and County Population Projections," *Population Projections*. Available at: <http://www.workforce.az.gov/population-projections.aspx>.

recommended for funding and inclusion in the TIP. This recommendation is reviewed by the TRC, which is comprised of high-level transportation staff from member agencies and is the primary committee responsible for assembling and recommending the TIP. During the project review phase, the ITS Committee reviews and ranks applications for operations projects. This committee includes representatives from 15 member agencies, as well as ADOT, Arizona Department of Public Safety, Regional Public Transit Authority, METRO Rail, Arizona State University, and FHWA. The Air Quality Committee evaluates all proposed ITS projects for emission reduction potential and provides this as input to the project review process.

The recommendation of proposed projects generated by the TRC is further reviewed and recommended by the Management Committee, comprised of city and town managers of member agencies. The Regional Council, comprised primarily of mayors of member agencies, provides the final approval of projects to be funded and included in the draft TIP. The overall programming process from the initial call for projects to Regional Council approval takes about six months.

The draft TIP is then compiled and released for public review. During the public review period, MAG hosts an open house and public meeting. Public comments are incorporated into the Final TIP, and MAG holds another open house and public meeting for additional review. Program managers, the TRC and TPC approve the final TIP, which is then sent to a designee appointed by the Governor for final approval.

Funding Sources for TSMO Projects

MAG's 2011-2015 TIP programs \$7.4 billion worth of projects.³⁶ Out of this, about \$105 million is slated for ITS projects (both freeway and arterial), and almost half was programmed by the MPO for arterial ITS projects. Funding for ITS comes from a number of sources:

- Federal (FHWA and Federal Transit Administration): CMAQ and STP.
- State: Highway User Revenue Fund (from gasoline and fuel taxes, vehicle license tax, registration fees, etc.)
- Local: Highway User Revenue Fund (local apportionment), and other local sources (bonds, general funds, etc.)

The types of ITS projects planned and funded by the MPO include: the Freeway Management System operated by the ADOT, Freeway Service Patrol operated by the Department of Public Safety (DPS), transportation management centers (TMCs) at 12 local agencies, cameras and dynamic messaging signs.³⁷ Lifecycle costs are paid by the local agencies (i.e. staff time, maintenance, etc.), and MAG does not track these expenditures.

Lessons Learned

- While the region has deployed a range of operations projects, local agencies continue to struggle to secure adequate funding for staffing. This is a challenge, because sophisticated ITS systems alone cannot help manage congestion issues. All these systems are highly dependent on skilled staff to operate them on a day-to-day basis. Hiring skilled operations staff and providing them with training, tools and other resources to perform their jobs is critical to getting the maximum benefit out of regional investments that are being made in the transportation system.

³⁶ Maricopa Association of Governments, *FY2011-2015 Transportation Improvement Program*, July 2010. Available at: http://www.azmag.gov/Documents/1_TIP_2010-07-28_FINAL-Transportation-Improvement-Program-FY2011-FY2015_v2.pdf

³⁷ Ibid.

- Diversifying funding sources for operations projects is a sound programming strategy. Having multiple streams of funding to rely on helps to ensure that the operations program is more resilient to funding cuts.

For More Information

Contact	Sarath Joshua sjoshua@azmag.gov
Transportation Programming Guidebook (FY 2013)	http://www.azmag.gov/Documents/TIP_2012-08-03_ModalApps_August-2013-Transportation-Programming-Guidebook.pdf
TIP Link	http://www.azmag.gov/Documents/1_TIP_2010-07-28_FINAL-Transportation-Improvement-Program-FY2011-FY2015_v2.pdf
Regional Transportation Plan	http://www.azmag.gov/Documents/RTP_2013-08-28_Draft-2035-Regional-Transportation-Plan-(RTP).pdf
MAG's ITS Committee	http://www.azmag.gov/Committees/Committee.asp?CMSID=1050

MetroPlan Orlando (Orlando, Florida)

Agency Overview

MetroPlan Orlando is the MPO for a three-county region in central Florida. Areas of active work on operations include highway system enhancements, tolls, parking management, ITS infrastructure, traffic signal optimization, intersection improvements, and traveler information systems. The MPO has 14 staff members, including a professional engineer (PE) and two other staff who work exclusively on TSMO.

MetroPlan Orlando has included a TSMO component in the Year 2030 LRTP, which was adopted in August 2009. TSMO projects are designed to get the greatest efficiency out of the existing transportation network. Other strategies include ITS techniques such as computerized traffic signals and advanced traveler information systems, as well as intersection improvements.

FAQs about MetroPlan

MPO Population	1.84 million
TSMO Dedicated Funding	Yes
Dedicated Operations Staff	3 FTE
Programmed Operations Funding	\$4 million per year
TSMO included in UPWP	Yes

Project Selection

MetroPlan's 2030 LRTP includes multiple goals that support investment in TSMO. Goals are evaluated using performance measures like those shown in Figure 2.

Evaluation Criteria	Performance Measure
Cost effectiveness	Annual cost of congestion in billions of dollars (user costs only)
Efficiency	Seminole (miles of roadways below standard)
	Orange (miles of roadways below standard)
	Osceola (miles of roadways below standard)
Transit passenger miles	Total transit passenger miles per capita
Percent single occupancy vehicle	Percent of person trips by single occupancy vehicle
System daily VMT	Average VMT per dwelling

Figure 2. Operations Performance Measures from MetroPlan METROPLAN 2030 LRTP.

During development of the TIP, MetroPlan sets aside \$4 million per year for non-capacity improvements, as directed by the LRTP. This creates a pool of funding that is committed to TSMO projects. TSMO projects are not identified in the LRTP; instead, projects are identified during the programming phase. Projects to be funded using the set-aside are identified by a TSMO subcommittee composed of technical specialists from MetroPlan's member local governments, including traffic engineers, urban planners, and public works department heads. Once per year, the subcommittee meets to select projects, prioritize them, and set a schedule for implementation. The subcommittee ranks projects based on expected system impact, cost efficiency, coordination with the ITS System Architecture, Strategic Plan and geographic equity among MetroPlan's member local governments.

Funding Programs

The \$4 million TSMO set-aside is funded through the Surface Transportation Program Urban Allocation. This program delegates full project selection authority to large MPOs. MetroPlan Orlando is only concerned with the capital cost of operations projects. In general, life cycle costs are not a component of the TIP. Local governments operate and maintain the infrastructure. The TIP also includes funding for the Road Rangers program, which is a fleet of vehicles that help repair and clear disabled vehicles from the roadway, thus easing traffic delays.

The TIP shows operations projects that are not under the direct control of the MPO. MetroPlan's member local governments play an important role in system management and operations. Since local governments operate all roadways and traffic operations centers, they collect most of the data used in TSMO planning. Local governments share information and data with the MPO and each other. Local governments have come together under the MetroPlan umbrella to form a TSMO subcommittee.

Programming Documents

The process of compiling each TIP begins with the development of the Prioritized Project List (PPL) the previous year. This document contains a list of unfunded highway, transit, and bicycle and pedestrian projects that have been prioritized for funding based on selection criteria described in the LRTP. The PPL is used by Florida DOT (FDOT) to develop its Five Year Work Program. In turn, the projects in the Five Year Work Program within the MetroPlan region become the TIP. The first four years of the FDOT Five Year Work Program become the Statewide TIP.

The PPL contains a list of TSMO projects, including projects related to incident management, transportation demand management, and other TSMO activities. In addition, FDOT has targeted about \$30 million per year in State funds that are to be used for Project Development and Environment (PD&E) studies and design phases for new highway projects on the state road system in the MetroPlan Orlando area. These projects include traditional road widening projects, intersection improvements, and multimodal projects that utilize bicycle and pedestrian and transit facilities to improve traffic flow on constrained roadways without adding lanes.

Staffing

METROPLAN has three full-time staff members who support the Systems Management and Operations Department. The Department includes a Director, a staff member that handles transportation demand management and land-use and a second staff position is in transition, but will focus on performance measurement, safety, security and data analysis. The second staff is a PE, which allows MetroPlan to become Local Agency Program (LAP)³⁸ certified to design and contract improvements in-house. LAP certification allows public agencies to perform design and construction activities normally reserved for the DOT. MetroPlan Orlando places a strong emphasis on improving bicycle and pedestrian safety through signal retiming, intersection redesign, and safety improvements.

Interlocal coordination is an important feature of the TSMO environment in Orlando; coordination efforts allow for TSMO staff at local governments to pool their expertise and resources. Local governments maintain all traffic signals and operate traffic management centers. Each jurisdiction has its own TMC, but a reciprocity agreement allows cameras outside one jurisdiction to be viewed by all others. Sometimes group requisitions are made. Another example of effective interlocal coordination is in signal retiming. MetroPlan includes funding for signal retiming work in the TIP, then FDOT manages the

³⁸ Information on Florida's LAP program can be obtained at: <http://www.dot.state.fl.us/projectmanagementoffice/lap/>

retiming project, and local governments maintain the pattern throughout the year. MetroPlan works with its member local governments to perform a before-and-after study for each retiming to check on progress and measure roadway performance.

Interactive TIP

MetroPlan uses a server-side software tool called Interactive TIP to make the projects in the TIP more accessible to the public. Users can search the TIP for projects based on project type, location, jurisdiction, dollar value, and keyword. Projects that fit the search criteria are returned as a report to the user. A map of the project is shown, along with project information, lead agency, phase, and funding source. This is a powerful tool for public information and public involvement. A screen capture of MetroPlan's Interactive TIP is shown in Figure 3.

METROPLAN Transportation Improvement Program - FY 2012/13 - 2016/17

John Land Apopka Expy. ITS Components (Phase 2)		99068				Non-SIS	
		Project Description: Install Closed Circuit TV Cameras & Data Collection Sensors (OOCEA). 2030 LRTP reference - Technical Report #5 - page 61.					
Work Summary: ITS FREEWAY MANAGEMENT		From:					
		To:					
Lead Agency: OOCEA		Length: N/A					
Phase	Fund Source	2012/13	2013/14	2014/15	2015/16	2016/17	Total
CST (6)	CF	2,541,000	3,729,000	0	0	0	6,270,000
Total		2,541,000	3,729,000	0	0	0	6,270,000

Figure 3. MetroPlan's Interactive TIP.

Lessons Learned

- The MPO can be a unifying point for local governments to work together on TSMO issues.
- Once a pool of funds has been segregated, a committee of TSMO professionals can select the actual projects to be funded.
- Using technology, the TIP can function as a public involvement tool.

For More Information

Contact	Eric Hill ehill@metroplanorlando.com
TIP Link	http://www.metroplanorlando.com/plans/transportation-improvement-program/
UPWP Link	http://www.metroplanorlando.com/plans/unified-planning-work-program/

North Central Texas Council of Governments (Dallas-Ft. Worth, Texas)

Agency Overview

The North Central Texas Council of Governments (NCTCOG) is the MPO for the Dallas-Fort Worth region, which spans twelve counties in north central Texas. The region has a complex network of limited access freeways, including a number of toll roads and managed lanes, which require a strong emphasis on management and operations. NCTCOG plays an important coordinating role between FHWA, Texas DOT (TxDOT), toll authorities, and hundreds of local governments.

NCTCOG defines operations as devices and personnel that allow planners and engineers to optimize the efficiency of a corridor. Examples of operations projects that meet this definition include ITS infrastructure, signal upgrades and timing, and TDM. In general, NCTCOG includes capital and operational projects in the TIP. Administration, implementation, and outreach activities related to TDM, air quality, and streamlined project delivery projects have become more common in recent years. Lifecycle costs are considered in the project cost estimates.

FAQs about NCTCOG

MPO Population	6.4 million
CMAQ Funding	Nonattainment
TSMO Dedicated Funding	Yes
Dedicated Operations Staff	3 FTE
Programmed Operations Funding	\$4 million per year
TSMO included in UPWP	Yes

Funding Programs

NCTCOG has several funding streams at its disposal to fund TSMO projects, including Federal, local, and public-private sources. Federal funding consists of two main programs: STP and CMAQ. CMAQ is more restrictive than STP, because it can only be used for projects that directly improve air quality. NCTCOG generally assigns CMAQ funds to projects that qualify for the program first, leaving the STP funds for other activities. Matching funds for Federal programs are obtained through local partners, State match or Transportation Development Credits (also known as Toll Credits).³⁹ Federal funds can be used for TSMO purposes and often fare well in project selection, because of cost efficiency and return on investment. Federal, State and local funds are often dedicated to TSMO projects.

NCTCOG has a significant local source of funding from the Regional Toll Revenue (RTR) Program. This program was created when the North Texas Tollway Authority (NTTA) bought the right to finance, develop, construct, operate, and maintain the Sam Rayburn Tollway. Since that time, funding has been added to the RTR program from private-sector partners through concessionaire contracts, loan repayments, revenue sharing on certain toll collection projects, and interest on the RTR pool. Annual funding for RTR projects varies based on proposals for eligible projects. The fund has grown to over \$3.6 billion. TSMO projects are eligible for RTR funding, and most toll roads have operational infrastructure included in initial construction.

³⁹ Transportation Development Credits require the active participation of the State DOT, and can only be used in states with active toll roads. For more information, see FTA Circular 9010.1.D: http://www.fta.dot.gov/legislation_law/12349_11492.html

Project Selection

There are two pathways to project selection for TSMO projects and other types of projects. Some projects are selected because they qualify for targeted, strategic State and local programs. These projects undergo less technical review, because they were already identified as a priority in the metropolitan transportation planning process. Most projects, however, must go through a competitive proposal and technical evaluation process associated with different programs and Federal funding categories.

Since 1992, NCTCOG has selected projects using a performance-based selection process. The selection process involves developing regional selection criteria to evaluate projects both on their individual merits and for their impact on the regional transportation system. A call for projects is issued to stakeholders in the region. Thus, local governments and other public entities are able to propose projects for funding using a formal application process.

There are separate project selection criteria for the following types of TSMO projects: a) Intersection Improvements; b) ITS; and c) Traffic Signal Improvements. Those proposing projects fill out an application. NCTCOG staff then evaluate the merits of the project using criteria and weights identified in the call for projects. Figure 4 shows a portion of the project selection criteria for ITS projects. The first step in evaluating a project is to determine eligibility (shown in yellow). The second step evaluates whether the project meets the strategic mission of the agency (shown in orange). The third step includes 26 criteria (blue; all rows are not shown) designed to measure the technical merits of the project. A set of recommended projects is then prioritized using the results of this technical evaluation, while also considering geographic equality.

	Column Name	Definition
Eligibility Screen	Eligible County	Dallas, Tarrant, Denton, & Collin County are the only counties eligible to participate in this funding initiative.
	Eligible Match = 20%	Is the Eligible State/Local Match of the Total Cost greater than or equal to 20% of the Total Cost?
	Must include Construction Phase	Does the project involve the construction or implementation of a transportation improvement?
	Adopted Clean Fleet Policy	Has the implementing agency adopted RTC Clean Fleet Vehicle Modal Ordinance? *Applies as an eligibility requirement only to Dallas & Tarrant County. In Collin & Denton County, this criteria applies to the Technical Screen.
	Pass Eligibility Screen	Does project meet minimum eligibility requirements?
Strategic Screen	Initial Assessment of RTC Interest	Given existing RTC policies & priorities, would the RTC be interested in funding this type of project?
	Creates Permanent or Long Term Improvement	Does the project create a permanent or long term improvement? The RTC prefers not to invest in temporary or "throw away" improvements.
	No Duplication of Service	The proposed project shall not duplicate other existing ITS project(s).
	Pass Strategic Screen	Does the project meet minimum strategic requirements?
Technical Screen	Project Consistent with Metropolitan Transportation Plan (MTP)	Is the project correctly documented/referenced in the current Metropolitan Transportation Plan?
	Interjurisdictional Project (Crosses Jurisdictional Lines or Funded by More Than One City)	Does the project traverse city limit lines and/or is the project's local match funded by more than one city/agency?
	% Local Match	Percent of Local/State Match committed by project sponsor(s)
	% of Other Leveraging	Percent of Other Funding Sources above and beyond the required 20% match
	Sum of all Leveraging	Sum of all Local Match funding and Other Leveraging committed by submitting agency
	Is Local Match and Other Leveraging >=50%	Is the sum of the Local Match and Other Leveraging greater than or equal to 50% of the Total Cost?
	Intermodal/ Multiple Transportation Modes	Does the project involve the use of multiple modes of transportation (i.e. pedestrian, transit, roadway, intermodal)?
	Final 2015 Volumes	Projected daily vehicular volumes generated by the Regional Travel Model for year 2015
	2015 Volume Threshold	Is the project's 2015 daily volume greater than or equal to the average 2015 daily volume among all ITS projects?
	Congestion Management Process (CMP) Strategy	Does the project utilize one or more of the congestion management strategies identified in the currently approved CMP?
	Environmental Justice Score	Measures positive impacts on protected populations, such as minority and low income populations (1=Communities of Lowest Concern will have a lower population of protected classes and a low to moderate density), (2=Communities of Moderate Concern will have a moderate percent of protected classes and a moderate to high density), and (3=Communities of Highest Concern will have a high percent of protected classes and a moderate to high density).
	Meets Environmental Justice Threshold	Staff processes scores of 2 or higher for projects located in Denton and Collin Counties and scores of 3 for projects located in Tarrant and Dallas Counties in order to meet threshold.
	Safety (# of incidents)	Number of vehicular traffic accidents reported along the roadway between 2003 and 2007
	Meets Safety Threshold	Staff processes that a minimum of one incident be reported to meet threshold
	Safety Severe (# of incidents)	Number of severe vehicular traffic accidents (i.e. incidents with an injury or fatality) reported along the roadway between 2003 and 2007

Figure 4. ITS Project Selection Criteria.

Programming Documents

NCTCOG makes use of “regional funding pools” for certain types of projects or programs. In this method of programming, funding is identified for a specific type of project, but individual projects are not yet known. The source and amount of funds are set aside in advance for expenditure over a span of several years. The timeframe for expenditure often approximates the time horizon of the TIP, but there is not a direct relationship. At any point, an individual project can be identified and funded from the regional funding pool. When a project is identified, the TIP is amended to include full project information, including a project description, funding amounts, and funding timeframe(s). The cost of the project is deducted from the regional funding pool. Identification of a new project requires approval by FHWA and TxDOT through the TIP/STIP revision process.

An example of a regional funding pool is NCTCOG’s “Regional ITS Funding Pool.” This program draws together funding committed to ITS from multiple sources, including Federal, State, local, and private sources. The pool can be used to pay for capital costs of ITS infrastructure, active operation, or life cycle costs associated with maintaining and replacing components. Project needs are identified through analysis of data collected through performance monitoring of the system.

Staffing

Much of NCTCOG’s operations activities are staff-led, and funding is found in the UPWP. This includes projects that are Federally funded, such as data collection and special events coordination, and items that are not Federally funded, like vanpool matching.

NCTCOG’s staff is highly integrated. No staff are completely dedicated to management and operations. Instead, project teams are assembled as needed for TSMO activities. NCTCOG has a planning team that focuses on traditional transportation planning and project implementation. Other teams focus on facilitating interlocal agreements, public private partnerships, and interlocal coordination of operations activities.

NCTCOG plays an important role in coordinating the TSMO efforts of multiple agencies. TxDOT has three Districts within the region, with the two largest Districts (Dallas and Fort Worth) each having their own TMCs. NCTCOG also maintains a TMC. Concessionaires of public-private partnership facilities are responsible for operation of their facility. Sixteen counties and 230 municipalities are responsible for maintenance, incident response, and law enforcement. Cities over 50,000 people have traffic signal operations centers. NCTCOG consolidates all of the information generated by these agencies and uses it in the planning process. Further, NCTCOG facilitates interagency cooperation.

Public-Private Involvement

The NCTCOG region is notable for the strong role of private sector involvement in transportation infrastructure construction and operation. The NCTCOG is a State-chartered toll road operator that plans to operate 1,435 lane-miles of toll roads in the region by 2035, nearly 21 percent of the region’s limited access highways. NCTCOG maintains its own TMC and performs routine maintenance and upgrades to its roadways. Local governments are responsible for law enforcement within their jurisdictional boundaries along NCTCOG’s facilities.

Private dollars are important beyond construction and maintenance of toll roads and managed lanes. Concession and other tolling agreements have generated large amounts of funding for traditional investment in the transportation system. A portion of the RTR funds are invested in TSMO improvements to the existing system.

Lessons Learned

- Private investment can introduce complexity to the roles and responsibilities in management and operation of the system. Further, public-private partnerships can be a significant source of funding for non-tolled facilities.
- Project decisionmaking can be deferred by identifying pools of funding in the TIP. Decisions on which projects to fund can be made later, as needs become more apparent.

For More Information

Contact	Natalie Bettger (Management and Operations) nbettger@nctcog.org Christie J. Gotti (Funding) cgotti@nctcog.org
TIP Link	http://www.nctcog.org/trans/tip/
UPWP Link	http://www.nctcog.org/trans/admin/upwp/

Pikes Peak Area Council of Governments (Colorado Springs, Colorado)

Agency Overview

The Pikes Peak Area Council of Governments (PPACG) is an association of 16 county and municipal governments in a three-county area in central Colorado, which includes the City of Colorado Springs. PPACG serves as the MPO for the region, which has experienced considerable growth in the past few decades – particularly in Colorado Springs⁴⁰ – and with it, increased traffic. As a result, reducing congestion and improving regional mobility are two of the region's top priorities. Though PPACG does not have a formal operations policy, their focus on cost-effectiveness allows TSMO projects to score highly during the project selection process. Of the more than 60 percent of programmed transportation projects that involve improvements to existing roadways,⁴¹ close to one-fifth are solely operations projects. A third of the remaining projects have operations components.

FAQs about Pikes Peak Area COG

MPO Population	684,000
TSMO Dedicated Funding	Yes
Dedicated Operations Staff	0.5 FTE
TSMO included in UPWP	No

TSMO is also a key component in the Regional Transportation Plan, as well as the CMP. PPACG has developed a comprehensive congestion management approach that identifies a suite of TSMO, TDM, non-motorized, land development and roadway capacity strategies that may be implemented to address congestion along a given corridor. PPACG places an emphasis on using an outcomes-driven, performance-based planning process. TSMO and other congestion management strategies are evaluated based on broader transportation objectives. Specific performance measures pertinent to CMP strategies include:

- **Travel Time:** Measures include average travel time, average travel speeds, and travel time index.
- **Delay:** Measures include vehicle hours of recurring delay, vehicle hours of delay associated with recurring congestion, and vehicle hours of delay associated with non-recurring congestion.
- **Volume-to-Capacity Ratio (V/C):** Measures include level of recurring congestion, daily average V/C ratio, and number of vehicles affected.
- **Incident Occurrence/Duration:** Measures include median minutes of incident clearance times, total number of bus breakdowns, and average number of transit rail delays in excess of a certain amount of time.
- **Travel Time Reliability:** Measures include additional buffer time added to ensure that travelers reach their destination on time, percentage of total actual time versus how long a trip should take, and percentage of time when travel time exceeds average travel time by a certain amount.
- **Person Throughput:** Measures include number of persons moved during peak-hour and number of persons on transit services during peak-hour.
- **Customer Satisfaction:** Measures include percentage of population reporting being satisfied or highly satisfied with travel conditions, access to traveler information, and reliability of transit services.
- **Traveler Information Access:** Measures focus on public knowledge of travel alternatives or traveler information.⁴²

⁴⁰ CensusScope, *Colorado Springs, CO Population Growth*, 2000. Available at: http://www.censuscope.org/us/m1720/chart_popl.html

⁴¹ Pikes Peak Area Council of Governments, *Moving Forward Update 2035 Regional Transportation Plan*, January 2012. Available at: http://www.ppacg.org/files/TRANSP/LRTP-Jan2012/LRTP_complete.pdf

Project Prioritization and Selection Process

In Colorado, the State DOT plays a leading role in the selection of projects. PPACG conducts a two-step project prioritization process and then presents a ranked list of projects to Colorado DOT (CDOT) for consideration in final project selection decisions.

In the first step of the process, PPACG solicits projects from potential project sponsors within the MPO region and screens submitted projects using minimum eligibility criteria regarding consistency with the Regional Transportation Plan, accuracy of project cost estimates, and compliance with Federal funding requirements. Those projects that pass the preliminary screening are prioritized by MPO staff in a second step using criteria related to the project's ability to fulfill the goals of the Regional Transportation Plan. The goals address efficient system management and operation and preservation of the existing transportation system, in addition to economic vitality, safety and security of users, accessibility and mobility, environmental protection, and intermodal connectivity. Criteria are also identified for each specific funding program; generally the same criteria are used, but they are weighted differently based on the specific program.

The project prioritization process informs the development of the draft TIP that PPACG presents to the Transportation Advisory Committee and the Community Advisory Committee for review and feedback. At the end of a 30-day public comment period, PPACG votes to approve the TIP. CDOT takes the lead on selecting projects for implementation for each funding category, in consultation with PPACG.

Funding Sources for TSMO Projects

PPACG demonstrates its commitment to operations by using Federal, State and local funding for operations projects. Federal funds used for TSMO projects come from the STP and CMAQ Programs. Typically, about 70 to 80 percent of CMAQ funds are allocated to TSMO activities. For instance, CMAQ is used to fund consultants PPACG hires to conduct signal timing work and for the regional travel demand management program. Additional funding is available from the local sales tax revenue for roadway maintenance and operations. TMC staff is paid from these funds. CDOT also provides funds for maintenance and operations projects.

Local Funding Source for TSMO: Pikes Peak Rural Transportation Authority

In 2004, voters in the City of Colorado Springs, El Paso County, City of Manitou Springs, and the Town of Green Mountain Falls approved a one percent sales tax to fund transportation projects. The annual revenue is divided into three dedicated funding streams; 35 percent is used for maintenance projects and operations

The current TIP (2010-2017) includes a total of \$903 million in transportation investments. PPACG does not specifically track overall TSMO funding. Operations projects are grouped in a Maintenance and Operations category (\$382 million over the TIP period), as well as integrated into a number of other categories in the document (such as CMAQ, Local/Private, Metro). In both the Maintenance and Operations and CMAQ categories, there are line items for unspecified projects; this pooled funding is reserved for projects to be determined later.⁴³ The most common TSMO project in the region is signal synchronization, which is incorporated into many roadway projects. Other types of TSMO projects funded

⁴² Pikes Peak Area Council of Governments, *Moving Forward Update 2035 Regional Transportation Plan*, January 2012. Available at: http://www.ppacg.org/files/TRANSP/LRTP-Jan2012/LRTP_complete.pdf

⁴³ Pikes Peak Area Council of Governments, *2010-2017 Transportation Improvement Program*, September 2010. Available at: <http://ppacg.org/transportation/transportation-improvement-program>

by PPACG are roundabouts, intersection improvements, incident detection improvements, signal installation and replacement, and variable message signs.

Measuring the Benefits of TSMO Strategies

Given PPACG's emphasis on outcomes-driven, performance-based planning, the MPO is interested in quantifying the benefits of TSMO strategies. To consider the impacts of operations strategies on the efficiency of the transportation system, PPACG has used two tools: the Intelligent Transportation Systems Deployment Analysis System (IDAS) and DYNASMART-P. IDAS is compatible with traditional transportation planning models and produces a benefit-cost analysis of ITS investments that allows PPACG to compare ITS projects with more traditional infrastructure investments. DYNASMART-P is used to predict the impact of operational improvements on traffic flows.

Lessons Learned

- Given PPACG's emphasis on the cost-effectiveness of transportation investments, operations projects are very competitive. The MPO Board understands the benefits of operations projects. Even without a formal policy to advance operations, TSMO plays a significant role in the region through stand-alone projects and integration into other transportation improvements.
- PPACG's TIP includes pooled funds in CMAQ and Maintenance and Operations for projects to be added at a later date. This allows flexibility in implementing TSMO projects.
- PPACG has found that the tools and models available for conducting benefit-cost analysis for operations projects require extensive expertise. PPACG staff turnover makes it difficult to continuously quantify project benefits for performance measurement.

For More Information

Contact

Craig Casper

ccasper@ppacg.org

PPACG TIP Link

<http://ppacg.org/transportation/transportation-improvement-program/fy-2013-2018-tip>

PPACG Regional Transportation Plan

<http://ppacg.org/transportation/regional-transportation-plan>

DYNASMART-P

<http://www.fhwa.dot.gov/research/deployment/dynasmart.cfm>

Puget Sound Regional Council (Seattle, Washington)

Agency Overview

The Puget Sound Regional Council (PSRC) serves as the MPO for over three million residents of the central Puget Sound, Washington region. The use of TSMO strategies is prevalent in the region, and PSRC actively supports TSMO through its regional planning process. The region is carrying out operations projects in several areas, including active traffic management, congestion pricing, traffic signalization, incident management programs, and travel demand management. Operations projects in the region can be funded through several channels. First, operations projects can compete against other types of projects through the either the countywide or the regional track of the Project Selection Process for PSRC Funds. Alternatively, agencies can use local funding to support operations efforts, as well as other Federal and State funding sources. The process for acquiring funding for operations varies based on the sponsor, its goals and interest in collaboration, and TIP selection track and scoring. The following sections describe PSRC and how TSMO projects become funded in the region.

FAQs about PSRC	
MPO Population	3.7 million
TSMO Dedicated Funding	No
Percent of TIP to Operations Projects	1%
TSMO included in UPWP	Yes

Members of PSRC include King, Pierce, Snohomish and Kitsap counties and several cities and towns, ports, tribes, transit agencies, and the State. PSRC's key policy document, *VISION 2040*, adopted in April 2008, lays out a strategy for regional growth in which population and employment growth will be distributed across regionally designated centers. These centers will serve as hubs for transportation and services to support the growing population.⁴⁴ This centers-focused vision drives the *Transportation 2040* regional transportation plan and the policy underlying the TIP project selection process. Operations projects are integrated into the TIP, including upgraded signalization and development of ITS infrastructure along corridors (e.g., monitoring, fiber optic improvements).

MPO Staff Support for Operations

PSRC provides several staff members to support the operations mission amidst other responsibilities. These staff members' positions are funded from within the annual Budget and Work Program. The PSRC *2014 Budget and Work Program*⁴⁵ includes planning support for "Intelligent Transportation Systems (ITS) Strategies, Architecture and Regional Operations" and the staffing of the RTOC. The work program also calls for staff to promote and implement the *Regional ITS Implementation Plan* and to maintain agency involvement with ITS Washington and ITS America. There are also planning funds allocated to consultant support for the ITS architecture and ITS planning.

Funding of Operations Projects

Transportation 2040, the regional transportation plan based on the *VISION 2040* strategy, guides transportation investment decisions in four major categories: preservation, maintenance and operations; safety and security; efficiency; and strategic capacity. Operations and ITS are budgeted at approximately

⁴⁴ Puget Sound Regional Council, *VISIONS 2040 Executive Summary Brochure*. Available at: <http://www.psrc.org/assets/1775/V2040execsumm.pdf>.

⁴⁵ Puget Sound Regional Council, *Fiscal Years 2014 – 2015 Biennial Budget and Work Program*, April 2013. Available at: <http://www.psrc.org/about/budget/>

\$1.4 billion of the entire \$189 billion budget for 2010-2040.⁴⁶ *Transportation 2040* plans for an “aggressive” TSMO program of advanced technology on arterials and freeways, including better signal coordination, active traffic management, new and expanded traveler information services, and transit-specific technologies to ensure on-time performance and provide customers with more complete, up-to-date travel information.⁴⁷

PSRC has not established a separate funding pool for operations, so operations projects compete against all others in the Project Selection Process for PSRC Funds. Primary Federal sources used to fund operations projects in PSRC’s TIP include HSIP, STP, and CMAQ Improvement Program. There is frequently a State or local match for these funds. Large operations-related projects such as HOV or HOT lanes are often funded through a combination of STP, CMAQ, TIGER, and State funds. Safety funds are often used for signal improvements (i.e., HSIP). Some local jurisdictions have used freight or security funds (e.g., Homeland Security) to support operations related to military bases and ports.

In 2007, PSRC and its member organizations began the joint development of an RCTO and a Regional ITS Implementation Plan (RITSIP). The RCTO was intended to define a coordinated approach for regional signal operations, whereas the RITSIP was intended to identify 25 key arterial multi-jurisdictional corridors and the recommended ITS physical improvements for each corridor, including signal improvements.⁴⁸ ITS corridor projects were included in the plan, but during the call for projects for 2010-2013, the projects were not selected in the regional competition. One project for a single county was successful in the countywide competition.

Local agencies are finding success in obtaining funding for operations projects by using local funding programs. For example, the City of Belleville implemented adaptive signal control using a local funding program and continues to obtain additional funds for operations projects in the City. Local operations or ITS projects appear to be more successful in obtaining funding in the PSRC TIP through the countywide competitions than the regional competition. Project sponsors for ITS projects have also found it difficult to obtain CMAQ funding when competing against transit projects and have found more success applying for STP funds given the different project scoring criteria for those funding programs.

Project Selection Process for the TIP

Operations project sponsors may apply for Federal transportation funds from PSRC’s programming process through either a regional competition or through one of the countywide competitions. Each of the four counties in the PSRC region manages a competition for a limited number of project submittals to PSRC. The total estimated amount of both STP and CMAQ funds available to PSRC is divided between the regional and countywide competitions based on a regionally adopted funding split, which is currently 50/50 (after any set-asides are removed).⁴⁹ The intent of this split process is to recognize local differences among the region’s counties while also strengthening regional growth management.⁵⁰

In the countywide process, the four countywide forums are responsible for coordinating the competitions and recommending projects to the Transportation Policy Board (TPB) to receive the countywide portions

⁴⁶ Puget Sound Regional Council, *Transportation 2040*, May 2010. Available at:

<http://www.psrc.org/transportation/t2040/t2040-pubs/final-draft-transportation-2040/>.

⁴⁷ Puget Sound Regional Council, *Transportation 2040 Executive Summary*. Available at:

<http://www.psrc.org/transportation/t2040/t2040-pubs/final-draft-transportation-2040/>.

⁴⁸ Puget Sound Regional Council, *Transportation 2040*, May 2010. Available at:

<http://www.psrc.org/transportation/t2040/t2040-pubs/final-draft-transportation-2040/>.

⁴⁹ Puget Sound Regional Council, *2013-2016 Transportation Improvement Plan Appendix B Project Selection Process*, February 2012. Available at: <http://www.psrc.org/transportation/tip/current/1316tip>.

⁵⁰ Ibid.

of the FHWA funds.⁵¹ This process is similar to the regional process; however, each forum is responsible for developing and maintaining its own project selection process.⁵²

In the regional project selection track, PSRC issues a call for projects and the PSRC Regional Project Evaluation Committee (RPEC) is responsible for recommending projects to receive the regional Federal transportation funds to the TPB. The number of projects in the regional competition is currently limited to 36 (6 each from Kitsap, Pierce and Snohomish countywide forums; 12 from the King countywide forum; and 2 each from Washington State DOT, Sound Transit, and the Puget Sound Clean Air Agency). PSRC scores the projects according to the criteria in the following table. RPEC reviews the projects and the results of the PSRC scoring and submits a prioritized list of funding recommendations to the TPB for further review and discussion (with no formal allocations). The TPB then forwards their funding recommendations to PSRC's Executive Board for final action.⁵³

The following table provides an overview of the regional scoring system for the award of Federal STP and CMAQ funds. Potential projects (regardless of whether they are operations-related or not) are scored based on the degree to which they support the regional centers perspective outlined in *VISION 2040*.

Table 8. 2012 Regional Project Evaluation Criteria For PSRC's FHWA Funds (STP & CMAQ).⁵⁴

Evaluation Factor	STP Points	CMAQ Points	Criteria
Regional Growth Center Development	20	30	A high rating requires a project to support employment and population in the center.
Project's Benefit to the Regional Growth Center	20	15	A high rating requires a project to remedy a problem and benefit a large number and variety of users.
Circulation Within a Regional Growth Center	20	15	A high rating requires improved access to circulation in the center, benefiting a variety of users, or involves innovative design.
Development and Users Benefit	40	30	A high rating requires a project to describe its benefit or support to the development of the manufacturing or industrial center and job expansion.
Mobility and Accessibility Benefit	30	20	A high rating requires an investment that benefits a variety of users for multimodal travel and results in a reduction in travel time, along with an improvement in safety.
Benefit to Regional Growth and Manufacturing/Industrial Center	40	30	A high rating requires expansion to capacity adjacent to dense areas and serving many user groups.
System Continuity/Long-Term Benefit and Sustainability	30	20	A high rating requires a project to address corridor gaps and travel demand and consider environmental impacts.
Air Quality and Climate Change	20	40	A high rating requires substantial emissions reduction benefits occurring by 2020.
Project Readiness	10	10	A high rating requires a project to demonstrate that prerequisites for obligation have been met at the time of the application.
Other Considerations	0	0	Any additional project elements that are innovative (e.g., design elements, cost savings measures)

⁵¹ Puget Sound Regional Council, *2013-2016 Transportation Improvement Plan Appendix B Project Selection Process*, February 2012. Available at: <http://www.psrc.org/transportation/tip/current/1316tip>.

⁵² Ibid.

⁵³ Ibid.

⁵⁴ Ibid.

At this time, PSRC does not have a formal process to conduct a cost-benefit analysis related to operations projects, although they have used a sketch planning tool (Intelligent Transportation System Deployment Analysis System (IDAS)) for project evaluation in the past.

Selected operations projects are presented in the TIP amidst all other selected projects. They include funding detail along with descriptive information (e.g., project number, jurisdiction, functional class), phase (e.g., design, construction), and a brief narrative describing the location and goals of the project. An example of an operations project in the TIP is an ITS project in King County along Avondale Road. The project will upgrade, interconnect and synchronize signals along Avondale Road and includes a fiber connection throughout the corridor and cameras at major intersections and high accident locations. This project will include installation of volume count systems at key signalized intersections, as well as data collection stations at mid-block locations. The estimated total cost is \$2.2 million and the current phase is funded at \$53,723 by CMAQ and State/local funds.⁵⁵

For More Information

Contact	Stephanie Rossi srossi@psrc.org
TIP Link	http://www.psrc.org/transportation/tip/
UPWP Link	http://www.psrc.org/assets/9326/BudgetFY2014-15.pdf

⁵⁵ Puget Sound Regional Council, *2013-2016 Transportation Improvement Plan Detailed Project Listings Process*, October 2012. Available at: <http://www.psrc.org/transportation/tip/current/1316tip>.

Portland Metro (Portland, OR)

Agency Overview

Metro serves as the MPO for close to two million residents in the Portland region, including Clackamas, Multnomah and Washington counties and 25 cities.⁵⁶ It is a metropolitan area whose leaders strive to meet the needs of a growing population by following an agreed upon regional growth management strategy. The Portland region has a strong history of regional collaboration among transportation operators dating back to the early 1990s. Around 2004, Metro became fully involved in planning for operations, establishing a program area and assuming management of the regional operations collaborative group, TransPort.⁵⁷

FAQs about Portland Metro

MPO Population	1,927,881
TSMO Dedicated Funding	Yes
Dedicated Operations Staff	1.49 FTE
TSMO included in UPWP	Yes

Funding for Operations

Operations projects in the Portland region are funded by a variety of sources, including local dedicated funds and State funds (e.g., STIP). However, a major source of funding is Metro's dedicated TSMO funds. Since 2009, the Portland region has set aside funding from Metro's Regional Flexible Fund program to support implementation of TSMO. Metro is currently in its fourth sub-allocation process for TSMO, and it is still strongly supported by Metro members. Metro promotes this program by documenting project benefits and demonstrating program successes.

Metro's *Metropolitan Transportation Improvement Program* (MTIP) includes a line item for the TSMO Program which "coordinates both the planning and implementation of the regional system management and operations strategies to enhance multi-modal mobility for people and goods." This program is funded by a combination of Federal STP and local dollars in the annual amount of \$1,671,682 for 2014 and 2015, respectively.⁵⁸

To guide operations investments in the region, Metro developed a 10-year *Regional Transportation Systems Management and Operations Plan* in collaboration with two subcommittees of the Transportation Policy Alternatives Committee – TransPort and the Regional Travel Options Subcommittee. TransPort is a regional committee of transportation operating agencies, and the Regional Travel Options Subcommittee is a public-private sector working group. This document identifies strategies that will "make the most of the transportation system" by improving travel time reliability, reducing crashes, improving transit on-time arrivals, reducing travel delay, reducing fuel use, and reducing air pollution and carbon emissions.⁵⁹

The TSMO plan identifies two categories of actions: those for regional programs and projects that require interagency cooperation, and those for individual travel corridors and single-agency services. Funds are allocated to TSMO projects in two categories: region-wide and corridor-specific. Investments center on the four areas indicated in Table 9.

⁵⁶ Oregon Metro, *Mission, Charter, and Code*. Available at: <http://www.oregonmetro.gov/index.cfm/go/by.web/id=24270>.

⁵⁷ Federal Highway Administration, *Outcomes Based, Performance-Driven Planning and Metro Portland*, November 2010. Available at: <http://www.ops.fhwa.dot.gov/publications/fhwahop10055/>.

⁵⁸ Oregon Metro, *2012-2015 Metropolitan Transportation Improvement Plan*, February 2012. Available at: http://library.oregonmetro.gov/files/2012-2015_mtip_adoption_final.pdf

⁵⁹ Oregon Metro, *2010 Regional Transportation Systems Management and Operations Plan*, June 2010. Available at: <http://www.oregonmetro.gov/index.cfm/go/by.web/id=21962>.

Table 9. Portland Metro's Investment Strategy for Management and Operations.⁶⁰

Investment Area	Example of Benefits to Region
Multimodal Traffic Management	<p>An adaptive signal timing project installed in Gresham in 2007 reduced average travel times by 10 percent and saves over 74,000 gallons of fuel every year.</p> <p>A typical signal timing project in Portland saves over 300 metric tons of CO₂ annually per retimed traffic signal.</p> <p>The transit signal priority project in the Portland metro area has the ability to reduce transit delay by 30 to 40 percent and improve travel time by 2 to 16 percent, based on previous studies.</p>
Traffic Incident Management	<p>The Oregon DOT (ODOT) incident response program responds to over 12,703 incidents each year in the Portland metro area. Based on 2001 data, if all delay-causing incidents in the Portland region were reduced by 5 minutes, over 270,000 hours of delay would be saved annually.</p>
Traveler Information	<p>In 2008, the TripCheck web site was visited over 23 million times, and that number has grown steadily since 2002 when data was first collected. The record month for visits was December 2008, with almost 6 million visits. Surveys show that TripCheck information influences travel decisions for up to 80 percent of survey respondents.</p> <p>In 2009, TriMet's transit tracker phone service received an average of 1.4 million calls every month, and 360,000 trips were planned online using the agency's online trip planning tool.</p> <p>The CarpoolMatchNW.org ride-matching web site has more than 11,000 registered users.</p>
TDM	<p>An individualized marketing project in North and Northeast Portland during the opening of the MAX Yellow Line reduced auto trips by 9 percent. Transit ridership grew 44 percent, while ridership in a control group grew only 24 percent.</p> <p>Employer transportation programs are in place at 1,139 worksites in the region, and 924 of those include an employer-provided transit subsidy for employees. Surveys of employees indicate that the non-single occupant vehicle mode share at these worksites exceeds 35 percent.</p> <p>A survey of residents in the Portland metro area found that nearly one out of five (19 percent) took action to reduce car trips because of what they saw, read, or heard about the Drive Less/Save More campaign.</p>

The 10-year TSMO Plan calls for expenditures for capital improvements and investments in maintaining system personnel and promoting services, as well as managing the overall operations program. Annual costs are expected to be lower in the early years of implementation and increase after full implementation of the TDM projects.

Full (10-year) implementation of the region-wide and corridor-specific transportation demand management projects will mean investing approximately \$23 million in capital improvements and up to \$44 million a year for operations and maintenance. Full implementation of the systems management and operation projects will mean investing approximately \$330 million for capital improvements and annual operation and maintenance costs of up to approximately \$11 million.⁶¹ These investments are estimated in the TSMO Plan for the near-term (1-5 years), and are shown in Table 10.

⁶⁰ Oregon Metro, *2010 Regional Transportation Systems Management and Operations Plan*, June 2010. Available at: <http://www.oregonmetro.gov/index.cfm/go/by.web/id=21962>.

⁶¹ Ibid.

Table 10. Estimated Short-Term Investments in Region-wide Projects. ⁶²

Functional Area	Capital Cost	Annual Operations and Maintenance (O&M) Cost
Regional Multimodal Traffic Management	\$18M	\$250K
Traveler Information	\$4M	\$2.5M
Incident Management	\$2M	\$700K
Transportation Demand Management	\$12.1M	\$3M
Overall Cost (Region-wide Projects Only)	\$36.1M	\$6.5M

In addition to these region-wide projects, which receive about one-third of TSMO funds, other projects are organized under the mobility corridor concept in which 24 unique, multimodal corridors have been identified in the Portland region.⁶³ Each corridor includes a combination of freeways/highways, parallel networks of arterial streets, regional multi-use paths, high capacity transit, and frequent bus service that connect major activity centers, as defined by the regional growth concept. Corridor-specific projects receive approximately two-thirds of TSMO funds.

Table 11. Estimated Short-Term Investments in Corridor-specific Projects. ⁶⁴

Project Type	Capital Cost	Annual O&M Cost
Transportation System Management (TSM) Projects - Regional Multimodal Traffic Management/Traveler Information/ Traffic Incident Management	\$89M	\$2M
Transportation Demand Management	\$200K	\$14M
Overall Cost	\$89.2M	\$16M

Traditionally, TSMO projects were funded using CMAQ funds. However, beginning this fall Metro will be shifting to using more STP funds for operations and focusing the CMAQ funds on “green” projects.

The 2012-2015 MTIP identifies 18 TSMO projects. This listing includes a project title/description, lead agency, funding amount, and status (e.g., scheduled, underway, completed). Examples of these projects are shown in the table below.

⁶² Oregon Metro, *2010 Regional Transportation Systems Management and Operations Plan*, June 2010. Available at: <http://www.oregonmetro.gov/index.cfm/go/by.web/id=21962>.

⁶³ Oregon Metro, *Atlas of Mobility Corridors*, July 2010. Available at: www.oregonmetro.gov/mobilityatlas

⁶⁴ Oregon Metro, *2010 Regional Transportation Systems Management and Operations Plan*, June 2010. Available at: <http://www.oregonmetro.gov/index.cfm/go/by.web/id=21962>.

Table 12. Examples of TSMO Projects Included in the 2012-2015 MTIP. ⁶⁵

Project	Category	Lead Agency	Funding	Status
Regional ITS Communications Master Plan - <i>Develop master plan for enhancing and maintaining the region's ITS communications network.</i>	Region-wide	Metro	\$50K	Scheduled for 2014
Portland Oregon Regional Transportation Data Archive Listing (PORTAL) - <i>Support maintenance and enhancements to regional transportation data archive.</i>	Region-wide	Portland State University	\$450K	Ongoing
Regional ITS Communications Infrastructure Improvements - <i>Complete gaps and deficiencies identified in the Regional ITS Communications Plan.</i>	Region-wide	ODOT	\$530K	Scheduled for 2015
N/NE Columbia Blvd: Signal System Upgrade - <i>Upgrade signal hardware, communications and detection. Install air quality monitoring stations. Add transit and truck signal priority. Install pedestrian countdown heads and Leading Pedestrian Intervals at high volume.</i>	Corridor-specific	City of Portland	\$500K	Scheduled for 2015
Bi-state Travel Time Signage - <i>Provide destination travel time signage on I-5 and I-205 between northern (WA) and southern (OR) I-5/I-205 interchanges.</i>	Corridor-specific	ODOT	\$100K	Scheduled for 2014

TSMO Staffing

Metro recently succeeded in establishing the line item in the TSMO Program funds for support to manage the TSMO Program and recommends creating this support at the initiation of a TSMO Program. In addition, the UPWP identifies several programs under which TSMO is supported. The Transportation Planning activity supports the development of the TSMO Plan, among other activities. In addition, two program areas under the TSMO heading, Regional Mobility and Regional Travel Options, coordinate the development, implementation, and performance monitoring of regional demand and system management strategies.⁶⁶

Project Selection

Every two years, the Joint Policy Advisory Committee on Transportation (JPACT) and Metro Council decide how to allocate Regional Flexible Funds (STP, CMAQ, and Transportation Alternative grant funds).⁶⁷ The allocation process involves three funding steps. In Step 1, funding levels are set for regional programs, including the TSMO Program. Step 2 is a competitive process in which local agencies submit project applications. Step 3 was created in 2012 and established a Regional Economic Opportunity Fund (REOF) that is used to fund larger projects (\$5 - \$10 million) that are difficult to fund at the local level.⁶⁸ Operations projects have successfully received funding through the Step 2 competitive process as well as through the

⁶⁵ Oregon Metro, *Current List of TSMO Projects*. Available at: <http://www.oregonmetro.gov/index.cfm/go/by.web/id=21962>.

⁶⁶ Oregon Metro, *Fiscal Year 2012-2013 Unified Planning Work Program*, April 2012. Available at: <http://www.oregonmetro.gov/index.cfm/go/by.web/id=40743>.

⁶⁷ Oregon Metro, *2012-2015 Metropolitan Transportation Improvement Program Appendix*, May 2012. Available at: <http://www.oregonmetro.gov/index.cfm/go/by.web/id=3814>.

⁶⁸ Oregon Metro, *Regional Flexible Fund Allocation - Project Nomination Process for Allocation of 2016 - 18 Funds*, January 2013. Available at: http://library.oregonmetro.gov/files/2016-2018_nomination_packet.pdf.

TSMO Program funding allocation in Step 1. The success of the operations projects in the competitive process is likely due to their lower relative cost.

Shortly after the allocation of funding for the TSMO Program in the MTIP, Metro will work through TransPort to evaluate and select projects for the TSMO Program funds. The TSMO Program funds are divided into two pools, with one-third of the funding going to projects that benefit the entire region and two-thirds of the funding going to corridor-based projects. TransPort typically reaches consensus easily on which regional projects to fund. These projects may include supporting a regional data archive or updating the regional ITS architecture. For the corridor-level projects, Metro agencies submit project applications, and TransPort develops evaluation criteria and performs an analysis of the projects. During the latest project selection cycle, Metro held a series of workshops with Metro's technical advisory committee to obtain feedback from a broader audience on both operations and travel demand management program projects and to look for opportunities for joint projects. Projects submitted by multiple sponsors are given additional points in the project evaluation process.

For the competitive process in Step 2, Federal FY2014-2015 regional flexible funds are allocated using a new collaborative project nomination process and new focus areas on which to spend funds. The project focus areas for this allocation cycle are:

- Active Transportation and Complete Streets (75 percent of available funds)
- Green Economy and Freight Initiatives (25 percent of available funds)⁶⁹

For each focus area, nomination, scoping, and selection criteria have been established. For Active Transportation and Complete Streets, the higher priority criteria include improving access to and from priority destinations (e.g., mixed-use centers, large employment areas, schools, essential services for Environmental Justice/underserved communities), improving safety, improving user experience, and increasing use of and serving high growth areas. For Green Economy and Freight Initiatives, the higher priority criteria include reducing freight delay, increasing freight access to industrial and employment centers, greening the economy, improving safety, reducing air toxins, reducing impacts to underserved communities, and improving freight reliability.⁷⁰

Operations projects also receive funding in the Portland region through local and State programs. For example, residents of Washington County contribute to a county transportation fund which has been used for operations projects. Local governments in the region also apply for ITS funding through the State's programming process.

For More Information

Contact	Deena Platman deena.platman@oregonmetro.gov
TIP Link	http://library.oregonmetro.gov/files/20122015_mt看_adoption_final.pdf
UPWP Link	http://library.oregonmetro.gov/files//metro-2011-12-unified-planning-work-plan.pdf

⁶⁹ Oregon Metro, *Regional Flexible Fund Allocation - Project Nomination Process for Allocation of 2016 -18 Funds*, January 2013. Available at: http://library.oregonmetro.gov/files/2016-2018_nomination_packet.pdf.

⁷⁰ Oregon Metro, *2012-2015 Metropolitan Transportation Improvement Program Appendix*, May 2012. Available at: <http://www.oregonmetro.gov/index.cfm/go/by.web/id=3814>.

San Diego Association of Governments (San Diego, California)

Background

The San Diego Association of Governments (SANDAG) is the MPO for the San Diego area. SANDAG is comprised of the San Diego County government and 18 cities within it. In addition to being a large metropolitan area, the SANDAG region is a major gateway route to and from Mexico via Interstate 5.

SANDAG has nine staff members that work on TSMO projects, including three who provide support to information systems that support regional traffic management. Day-to-day active operational support is provided by the State DOT, transit agencies, and at local government traffic operations centers.

In the next 40 years, the region is expected to add another 1.25 million residents.⁷¹ SANDAG's *2050 Regional Transportation Plan* identifies transportation system management as critical to alleviating traffic congestion and maximizing the efficiency of the regional transportation network.

SANDAG is still more focused on the delivery of capital projects, but there is also increasing effort to integrate operations into these projects. Operations elements are considered in every step of the transportation facility design process, and conduits are included along corridors for deployment of operations technologies in the future. However, about 2 percent of funds programmed for 2012 in the Regional TIP were allocated for standalone traffic flow improvements (transportation management system/ITS and traffic management/signal projects).⁷²

TIP Project Selection

SANDAG developed its project selection process by working collaboratively with its regional partners (California DOT (Caltrans), North County Transit District, Metropolitan Transit System, and local agencies). The TIP represents a financial commitment to implementing or advancing key regional projects that support regional transportation goals in the LRTP.

The MPO regularly updates project evaluation criteria (about every 4 years) to address emerging issues. The current project evaluation criteria align with the goals set forth in the *2050 Regional Transportation Plan* and incorporate pressing regional concerns, such as greenhouse gas emissions and social equity.

Some projects in the TIP are inserted by local governments. The selection process for local TIP projects is managed by member local governments and generally follows existing processes or policy directions established at each local government. The inputs reflect the capital improvement programs of each local government. Local government procedures are guided by SANDAG's regional goals and initiatives.

FAQs about SANDAG

MPO Population	3.1 million
TSMO Dedicated Funding	Local funds only
Dedicated TSMO Staff	9 FTE
TSMO included in UPWP	Yes

⁷¹ San Diego Association of Governments, *2050 Regional Transportation Plan*, October 2011.

http://www.sandag.org/uploads/2050RTP/F2050rtp_all.pdf

⁷² San Diego Association of Governments, *Regional Transportation Improvement Program*, September 2012. Available at:

<http://www.sandag.org/index.asp?projectid=410&fuseaction=projects.detail>

Other projects in the TIP are identified by SANDAG. These projects are initiated (or re-affirmed) as part of the LRTP development every 4 years. The LRTP includes a discussion of the project prioritization process that should be used to select regional projects for the TIP.

Project Prioritization and Scoring

The project evaluation criteria use a 100-point scoring process. The criteria are grouped into three broader categories. SANDAG has criteria for various modes (transit services, highway, freeway connector, and HOV connector); the criteria are tailored for each mode, though they are generally the same. Criteria related to (or may favor) operations are included into each of the categories.

- Serves Travel Needs (40 percent weighting) – Movement of people and goods. Operations-related criteria are congestion relief and high crash area.
- Network Integration (20 percent weighting) – Connectivity between transportation network and surrounding land use. Operations-related criterion is the facilitation of carpooling or managed lanes.
- Addresses Sustainability (40 percent weighting) – Promotion of healthy environment, economic prosperity and social equity. Operations-related criterion is cost-effectiveness of congestion relief.⁷³

The cost-effectiveness and ability to provide benefits in a relatively short period of time makes operations prime for public support during the transportation planning process. SANDAG provides ample opportunities for the public to participate in transportation planning and programming process, but hosting workshops for citizens can review information about proposed projects and submit comments.

Funding Sources for TSMO Projects

As many ITS and operations projects are incorporated into larger capital projects, SANDAG doesn't track funding (amounts or sources) for ITS and operations projects that are incorporated into larger projects. However, a number of Federal, State and local funding sources are used for operations projects, including CMAQ, Regional STP, State Highway Operations Protection Program, and toll revenues. A major local funding source for operations projects is TransNet, a half-cent countywide sales tax for local transportation projects. Seventy percent of TransNet revenues are used for congestion reduction, including operations projects. Voters first approved the sales tax in 1988, and in 2004 voted to extend it for 40 years. TransNet has funded the traveler information network, the construction of HOV or managed lanes, traffic signal optimization, and a citywide study to identify operations strategies and other solutions for congestion reduction. SANDAG's TransNet Independent Taxpayer Oversight Committee works to ensure that expenditures of TransNet funds are compliance with voter mandates.⁷⁴

Lessons Learned

- SANDAG has done an effective job of educating the public about the importance of TSMO, particularly in providing congestion relief. Voters approved of the TransNet sales tax, and then later an extension, to provide local funds for operations, and other congestion relief projects.
- There is significant amount of collaboration among regional transportation stakeholders: SANDAG, Caltrans, cities, transit operators, etc. Through the use of memoranda of understanding (MOUs), these partners work together to implement solutions to regional transportation needs. SANDAG also works closely with these partners to develop project selection criteria for the TIP.

⁷³ San Diego Association of Governments, *2012 Regional Transportation Improvement Program*, September 2012. Available at: http://www.sandag.org/uploads/publicationid/publicationid_1696_14968.pdf.

⁷⁴ San Diego Association of Governments, *TransNet Independent Taxpayer Oversight Committee*. Available at: <http://www.sandag.org/index.asp?committeeid=75&fuseaction=committees.detail>.

For More Information

Contact

Alex Estrella

alex.estrella@sandag.org

Jim Linthicum

jim.linthicum@sandag.org

TIP Link

<http://www.sandag.org/index.asp?projectid=410&fuseaction=projects.detail>

Regional Transportation Plan UPWP Link

http://www.sandag.org/uploads/2050RTP/F2050rtp_all.pdf

<http://www.sandag.org/?fuseaction=about.workprogram>