

Management & Operations in the Metropolitan Transportation Plan

A Guidebook for Creating an Objectives-Driven,
Performance-Based Approach

Interim Draft



U.S. Department of Transportation
Federal Highway Administration
Federal Transit Administration

Quality Assurance Statement

The Federal Highway Administration (FHWA) provides high-quality information to serve Government, industry, and the public in a manner that promotes public understanding. Standards and policies are used to ensure and maximize the quality, objectivity, utility, and integrity of its information. FHWA periodically reviews quality issues and adjusts its programs and processes to ensure continuous quality improvement.

Technical Report Documentation Page

1. Report No. FHWA-HOP-08-007	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Management & Operations in the Metropolitan Transportation Plan: A Guidebook for Creating an Objectives-Driven, Performance-Based Approach Interim Draft		5. Report Date November 2007	
		6. Performing Organization Code	
7. Authors J. Mason (SAIC), M. Grant (ICF), W. Messenger (ICF), J. Bauer (SAIC), M. Smith (SAIC)		8. Performing Organization Report No.	
9. Performing Organization Name and Address Science Applications International Corporation (SAIC) 1710 SAIC Drive McLean, VA 22102 ICF International 9300 Lee Highway Fairfax, VA 22031-1207		10. Work Unit No. (TRAIS)	
		11. Contract or Grant No. DTFH61-06-D-00005	
12. Sponsoring Agency Name and Address United States Department of Transportation Federal Highway Administration 1200 New Jersey Ave., SE Washington, DC 20590		13. Type of Report and Period Covered Interim Draft August 2006 - November 2007	
		14. Sponsoring Agency Code HOP	
15. Supplementary Notes Wayne Berman (COTM), FHWA Office of Operations			
16. Abstract This guidebook is designed to provide a basis on which to integrate transportation system management and operations (M&O) into the metropolitan transportation planning process and to assist MPOs in meeting Federal requirements under SAFETEA-LU calling for M&O strategies to be incorporated into the metropolitan transportation plan (MTP). It highlights effective practices that result in an MTP with a more optimal mix of infrastructure and operational strategies, founded on the inclusion of measurable, performance-based regional operations objectives.			
Key Words Metropolitan transportation planning, MPO, management and operations, objectives-driven planning, performance-based planning, operational strategies		18. Distribution Statement No restrictions. This document is available to the public from: The National Technical Information Service, Springfield, VA 22161.	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21.No of Pages 64	22. Price N/A



U.S. Department
of Transportation

**Federal Highway
Administration**

**Federal Transit
Administration**

FEB 6 2008

1200 New Jersey Avenue, SE
Washington, DC 20590

Dear Colleague,

The Federal Highway Administration's (FHWA) Office of Planning, Environment, and Realty, and Office of Operations, and the Federal Transit Administration's (FTA) Office of Planning and Environment have developed two complementary documents: *An Interim Guidebook on the Congestion Management Process in Metropolitan Transportation Planning*, and *Management & Operations in the Metropolitan Transportation Plan: An Interim Guidebook for Creating an Objectives-Driven, Performance-Based Approach*. These two companion guidebooks reflect strong, continuing collaboration among FHWA, FTA, and professionals in the planning and operations communities nationwide.

These interim guidebooks are intended to be viewed as one integral package that promotes effective approaches to integrating management and operations strategies into metropolitan and statewide transportation planning processes, including the Congestion Management Process (CMP) requirement in larger metropolitan areas. They stand as products of our on-going effort to provide assistance in implementing key provisions of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). These documents present both a policy basis and the business case for stronger coordination and cooperation between planners and those managers of day-to-day transportation system operations on a multi-modal, area-wide basis. These documents do not create new requirements, but merely provide suggested approaches for addressing operations in the planning process.

We are designating these documents as "interim" at this time to enable the opportunity for a greater understanding of the approaches suggested. Based upon the input received from an extensive outreach and marketing effort, the documents will be revised and presented as final versions of the guidebook to be published at a later date. We look forward to receiving your feedback, reactions, and experiences in implementing these concepts. Please direct any comments, questions, and suggestions on these guidebooks to any of the following members of our staff:

Wayne Berman at wayne.berman@dot.gov and 202.366.4069;
Charlie Goodman at charles.goodman@dot.gov and 202.366.1944; or,
Harlan Miller at harlan.miller@dot.gov and 202.366.0847.

Sincerely,

Gloria M. Shepherd
Associate Administrator
Office of Planning, Environment
and Realty, FHWA

Jeffrey F. Paniati
Associate Administrator
Office of Operations, FHWA

Susan Borinsky
Associate Administrator
Office of Planning and
Environment, FTA

Enclosures

**MOVING THE
AMERICAN
ECONOMY**



CONTENTS

Preface	vii
Executive Summary	ix
1.0 Introduction	1-1
1.1 Creating an Objectives-Driven Approach to Management and Operations.....	1-1
1.2 What Is Management & Operations?.....	1-1
1.3 Motivation for Integrating M&O in the Metropolitan Transportation Plan.....	1-2
1.4 SAFETEA-LU Requirements	1-3
Federal Requirements	1-3
M&O in the Context of Multiple Metropolitan Planning Requirements	1-3
1.5 The Role of Regional Operations Objectives and the Congestion Management Process	1-5
Regional Operations Objectives	1-5
The Congestion Management Process.....	1-5
1.6 Overview of this Guidebook	1-6
2.0 An Objectives-Driven Performance-Based Approach to M&O In The MTP	2-1
2.1 Motivation for a New Approach to M&O in the MTP	2-1
Current Practice: Challenges And Opportunities	2-1
Rationale for an Objectives-Driven Approach to M&O in the MTP	2-2
2.2 A Framework for Objectives-Driven Performance-Based M&O in Planning.....	2-2
Overview of the New Approach	2-2
What the Resulting MTP Looks Like.....	2-4
2.3 Benefits of Applying Regional Operations Objectives in the MTP.....	2-4
2.4 The Role of M&O Goals	2-5
2.5 The Role of Regional Operations Objectives	2-6
2.6 What Do Regional Operations Objectives Look Like?.....	2-6
Characteristics of Regional Operations Objectives	2-6
Examples of Regional Operations Objectives.....	2-7
3.0 Getting Started – Engaging Stakeholders in Developing Regional Operations Objectives.....	3-1
3.1 Regional Coordination and Collaboration	3-1
3.2 Who is Involved.....	3-1
3.3 Engaging Participants.....	3-2
Engage Existing Operations Agencies in Thinking About M&O.....	3-2
Engage New Stakeholders in the Planning Process	3-2
3.4 Institutionalizing the Process	3-3

Developing MPO Committees Focused on Operations Issues.....	3-4
Building on the its Architecture	3-4
Developing a Regional Concept for Transportation Operations	3-5
4.0 How to Use Operations Objectives in the MTP.....	4-1
4.1 How Operations Objectives are Applied in the Planning Process.....	4-1
Role of the Congestion Management Process.....	4-2
4.2 Developing Performance Measures for M&O.....	4-2
How Operations Objectives Relate to Performance Measures	4-2
Examples of M&O Performance Measures	4-3
Collecting Data for Performance Measures.....	4-8
4.3 Using Performance Measures for M&O	4-8
Identifying Deficiencies.....	4-8
Developing And Evaluating Strategies	4-9
4.4 Selecting M&O Strategies and Projects	4-10
5.0 Outcomes.....	5-1
5.1 The Resulting MTP and Tip	5-1
5.2 On-Going Monitoring and Evaluation.....	5-1
5.3 Overall Benefits.....	5-2
6.0 Self-Assessment.....	6-1
A. M&O In The Metropolitan Transportation Planning Process –Getting Started	A-1
B. Understanding the Communications And Information Needs of Elected Officials for Transportation Planning and Operations.....	B-1
C. Acronyms.....	C-1
D. Glossary.....	D-1
E. References.....	E-1

FIGURES

Figure 1. M&O in the Context of Metropolitan Transportation Planning Requirements	1-4
Figure 2. Transportation Concerns Addressed by M&O Strategies.....	2-1
Figure 3. Integrating Regional Operations Objectives in the Metropolitan Transportation Planning Process	2-3

Figure 4. Relationship Between the Metropolitan Transportation Planning Process and the Regional Concept for Transportation Operations..... 3-6

Exhibit 1. Example of How Regional Operations Objectives Carry through the Planning Process..... 4-1

Figure 5. Relationship Between Management & Operations and the CMP 4-3

PREFACE

For several decades, the transportation community – especially in our metropolitan regions – has increasingly been challenged by growing congestion, while simultaneously grappling with the increased recognition that we cannot “build our way out of congestion.” Central to this challenge has been the need to squeeze greater efficiency out of existing and programmed infrastructure and to manage travel demand. Moreover, in recent years, increasing recognition of the vital role of transportation system operations on traveler safety, security, and mobility across modes and jurisdictions has placed greater attention on opportunities associated with regional transportation system management and operations (M&O).

The passage of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) brought a renewed emphasis on the role of regional transportation system management and operations in the metropolitan planning process. Specifically, SAFETEA-LU includes “promote efficient system management and operations” as one of the planning factors that must be considered in transportation planning, and requires that the Metropolitan Transportation Plan include not only capital projects, but also M&O strategies. This guidebook, focused on the inclusion of management and operations in the long range plan through an *objectives-driven, performance-based approach* is the product of over a decade of dialogue among transportation planners and operators.

In 1999, a pair of FHWA and FTA-sponsored conferences on Refocusing Transportation Planning for the 21st Century engaged Federal, State, metropolitan planning organizations (MPOs), transit, academic, and non-traditional stakeholders in a discussion of key transportation planning issues emerging from the recently passed TEA-21 legislation. “Mainstreaming Management, Operations, and ITS into the Planning Process,”¹ a conference resource paper highlights one of the key topics of

discussion. The challenges of incorporating M&O and ITS in the transportation planning process presented in this paper include:

- Movement towards a customer service-delivery orientation to surface transportation in response to growing and changing demands on infrastructure.
- Full incorporation of the benefits of M&O into resource-allocation decisions by focusing on system performance.
- Development of new kinds of partnerships among operating agencies and with members of the private sector.

The conceptual foundations for this guidebook emerged from the FHWA-FTA Linking Planning and Operations Working Group, a group of operations, planning, and public safety officials who met together over a period of 15 months to discover ways to increase coordination between transportation operations and planning. Key conclusions included:

- A “cultural shift” is essential to engaging planners and operators; they have different timeframes, institutional arrangements, responsibilities, incentives, and performance measures.
- A common language to communicate ideas, agenda, and activity among day-to-day transportation operators and long-term oriented planners is needed.
- Effective *system management* maximizes transportation *system performance* through a *coordinated and integrated decision making approach* to (1) construction, (2) preservation, (3) maintenance, and (4) operation of transportation facilities, with the goal of safe, reliable, predictable and user-friendly transportation.

Also during this time, a National Dialogue on Transportation Operations initiated by the Institute of Transportation Engineers was conducted among transportation professionals to develop ideas on how to conduct effective transportation operations in a regionally coordinated and proactive dialogue. Subsequently, local leaders were reached out to through national operations local dialogue sessions

¹ Stephen Lockwood, “Mainstreaming Management, Operations, and Intelligent Transportation Systems into the Planning Process,” *Transportation Research Board Conference Proceedings 20 Refocusing Transportation Planning for the 21st Century*, National Academy Press (Washington, DC: 2000).

held in five major metropolitan areas. Among the participants, there was broad-based recognition for the need to enhance management and operation of the transportation system, although many remained skeptical on to how best to accomplish regional M&O given that “no one has the ‘charge’ for regional M&O.” Participants acknowledged that, although TEA-21 encouraged thinking about operations, the planning process did not encourage it.

The National Dialogue culminated in late 2001 with a broad-based national summit on operations that produced the following recommendations:

- Increase focus on transportation operations
- Enhance performance of transportation system through performance-based decision-making
- Create linkages between traditional capital planning process and planning for operations.

In 2003, a Transportation Research Board study² concluded:

- Regional collaboration and cooperation are essential to improving the performance of transportation systems in metropolitan areas.
- Establishing objectives and performance measures at the regional level is critical to assessing progress toward goals and achieving those goals.

These efforts were followed by the development of FHWA handbooks promoting enhanced collaboration between the planning community and the operations community, as well as reaching out to a broader range of stakeholders, especially public safety.

- *Regional Transportation Operations Collaboration and Coordination*³ stressed regional collaboration and coordination as the mechanism for advancing M&O. It provides principles and a framework for achieving the need collaboration.
- *Getting More by Working Together – Opportunities for Linking Planning and*

Operations⁴ lays out the mechanisms that aid in linking planning and operations – the transportation planning process, data sharing, performance measurement, the congestion management process, shared funding and resources, institutional arrangements, the regional ITS architecture, regional M&O projects, and use of the regional concept for transportation operations (RCTO) as a tool for working through M&O ideas.

- *The Regional Concept for Transportation Operations: A Blueprint for Action*⁵ encourages the use of an RCTO as a management tool in planning and implementing operations strategies.

Additionally, in *The Metropolitan Transportation Planning Process: Key Issues*,⁶ FHWA and FTA noted the requirement to incorporate system management and operations (M&O) into the regional planning process and encourage user-oriented performance measurement following the passage of SAFETEA-LU in 2005. The SAFETEA-LU implementing regulations⁷ state “Because transportation systems management and operations is emerging as an important aspect of regional transportation planning, it is strongly encouraged that a set (or sets) of objectives be set forth in the metropolitan transportation plan for operational and management strategies that will lead to regional approaches, collaborative relationships, and funding arrangements for projects.”

The evolution of ideas on planning for operations over the past decade has set the stage for the requirements in SAFETEA-LU for the inclusion of management and operations strategies in the metropolitan transportation plan and for the recommended approach in this guidebook. The key themes of regional collaboration, objective-focused operations, and performance measurement resonate throughout the previous dialogues and publications. This guidebook combines these themes and offers a recommended approach for including operations in the metropolitan planning process.

⁴ *Getting More by Working Together – Opportunities for Linking Planning and Operations*, FHWA-HOP-05-016, 2005.

⁵ *The Regional Concept for Transportation Operations: A Blueprint for Action*, FHWA-HOP-07-122.

⁶ <http://planning.dot.gov/documents/BriefingBook/BBook.htm>.

⁷ “Statewide Transportation Planning; Metropolitan Transportation Planning; Final Rule. Department of Transportation. 23 CFR Part 613, February 14, 2007.

² Transportation Research Board Committee on Developing a Regional Concept for Managing Surface Transportation Operations, report to FHWA, June 30, 2003.

³ *Regional Transportation Operations Collaboration and Coordination*, FHWA-OP-03-008, 2003.

EXECUTIVE SUMMARY

For several decades, the transportation community – especially in our metropolitan regions – has increasingly been challenged by growing congestion, while simultaneously grappling with the increased recognition that we cannot “build our way out of congestion.” Through the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), management and operations (M&O) strategies are highlighted as an important component in combating congestion as well as increasing safety and security. Specifically, SAFETEA-LU includes “promote efficient system management and operations” as one of the planning factors that must be considered in transportation planning, and requires that the Metropolitan Transportation Plan include not only capital projects, but also M&O strategies.

M&O is an integrated approach to optimize the performance of existing and programmed infrastructure through the implementation of multimodal, intermodal, and often cross-jurisdictional systems, services and projects. This includes regional operations collaboration and coordination activities between transportation, public safety agencies and other potential stakeholders. M&O strategies aim at improving service efficiency, enhancing public safety and security, reducing traveler delays, and improving access to information for travelers.

Implementing a planning process with a strong M&O component is best accomplished by a new way of thinking about management and operations in transportation planning – one that is objectives-driven and performance-based. A recommended approach to including M&O in metropolitan transportation planning is through establishing regional operations objectives in the metropolitan transportation plan (MTP). Regional operations objectives are specific, measurable statements of performance objectives relating to the operation of the transportation system on a regional basis. Regional operations objectives provide agreed-upon measures of system performance that can be tracked on the regional level and will inform investment decisions. The objectives may relate to issues such as recurring and non-recurring congestion, access to traveler information, emergency

response, and ease of movement across modes and jurisdictions, among others. The objectives should be specific, measurable, agreed-upon, realistic, and time-sensitive. An example of a regional operations objective is: “By 2012, reduce the clearance time of traffic incidents on freeways and major arteries in the region from a current average of 60 minutes to an average of 40 minutes.”

An objectives-driven performance-based approach to planning for management and operations includes the following elements conducted in collaboration with operating agencies and other stakeholders within the region:

- Engage transportation planners and operators, as well as non-traditional entities to ensure a regional perspective of transportation system performance informs the planning process.
- Establish one or more goals that focus on the efficient management and operation of the transportation system.
- Develop regional operations objectives that will lead to accomplishing the goal or goals.
- Create a set of performance measures that allow tracking of progress towards the objectives. Performance measures (and objectives) should be established based on data availability.
- Using performance measures, analyze transportation performance issues and develop management and operations strategies for inclusion in the MTP. This may be addressed as part of the congestion management process (CMP) for those MPOs that have a CMP.
- Select management and operations strategies within fiscal constraints that can best address the region’s needs.

It is suggested that MPOs include in their MTPs discussion of M&O strategies that are funded by state, regional and local transportation agencies even without use of Federal funding. Because many M&O strategies (e.g., incident clearance, emergency response) are planned and executed within these agencies, this added discussion in

MTPs will provide a more holistic picture of the totality of M&O strategies being employed within a region.

While metropolitan areas have flexibility to use different approaches to organizing the MTP, in all cases, the MTP should include:

- A vision and goals that includes effective management and operations of the transportation system;
- Measurable regional operations objectives that allow the region to track progress toward achieving its M&O goals; and
- Identification of M&O strategies, backed by specific performance measures for evaluation.

In order to sustain a successful integration of objectives-driven, performance-based M&O in the planning process, MPOs need to institutionalize the process of engaging operating agencies and stakeholders in developing operations objectives. An increasing number of MPOs support inter-agency committees that deal directly and regularly with regional systems management and operations. In hosting such committees, the MPO facilitates a

vital forum where inter-jurisdictional coordination, funding strategies, and data sharing can be addressed. In addition, the MPO can use the committee's diverse operations expertise to inform M&O issues in regional planning process, to identify ITS systems and data needed to support operations and to influence the MPO's annual work program.

The benefits of an objectives-driven, performance-based approach to planning for management and operations include:

- Facilitates a more objective (rather than subjective) way to allocate resources and screen improvement strategies.
- Prioritizes regional investments in management and operations.
- Increases accountability through performance measurement.
- Engages the operations community in a more substantive way.
- Expands the focus of the MTP to include both short-range and long-range needs related to the operation of the transportation system.

1.0 INTRODUCTION

1.1 CREATING AN OBJECTIVES-DRIVEN APPROACH TO MANAGEMENT AND OPERATIONS

Transportation agencies and their customers are increasingly concerned about the performance of the transportation system. While the metropolitan transportation planning process traditionally has focused on long-range project needs, challenges associated with transportation system reliability, safety, and security require near-term and long-term operational solutions. Moreover, the time and resources required to implement new transportation infrastructure emphasize the need to optimize the effectiveness of the transportation system through improved transportation system management and operations (TSM&O or M&O, which will be used most commonly in this guidebook).

This guidebook is designed to provide a basis on which to integrate transportation system management and operations (M&O) in the metropolitan transportation planning process, and to assist metropolitan planning organizations (MPOs) in meeting Federal requirements under the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) calling for M&O strategies to be incorporated into the metropolitan transportation plan (MTP). It highlights effective practices that result in an MTP with a more optimal mix of infrastructure and operational strategies, founded on the inclusion of measurable, performance-based regional operations objectives.

Regional operations objectives are specific, measurable statements of performance objectives relating to the operation of the regional transportation system. Regional operations objectives provide specific, agreed-upon measures of system performance that are time-sensitive, and can be tracked on a regional level over time. These objectives may relate to issues such as recurring and non-recurring congestion, access to traveler information, emergency response, and ease of movement across modes and jurisdictions, among

others. Using measurable regional operations objectives helps to focus attention on the operational performance of the transportation system and ensure that M&O is integrated into the MTP, addressing both short-term and long-term system performance. An increased focus on M&O within the MTP will not only fulfill SAFETEA-LU requirements, but also address pressing issues facing the transportation system, such as congestion, air quality, and safety and security.

The content is applicable to all MPOs and recognizes the wide diversity of characteristics among MPOs and regions. The intended audience is metropolitan planning organizations, as well as state and transit planners, operators, managers and decisionmakers involved in the metropolitan transportation planning process.

1.2 WHAT IS MANAGEMENT & OPERATIONS?

M&O is an integrated approach to optimize the performance of existing infrastructure through the implementation of multimodal, intermodal, and often cross-jurisdictional systems, services and projects. This includes regional operations collaboration and coordination activities between transportation and public safety agencies. M&O strategies aim at improving service efficiency, enhancing public safety and security, reducing traveler delays, and improving access to information for travelers. M&O strategies include a broad range of activities, including:

- Traffic incident management
- Travel information services
- Roadway weather information
- Freeway management
- Automatic vehicle location
- Traffic signal coordination
- Work zone management
- Electronic payment/toll collection
- Transit priority/integration
- Emergency response and homeland security

- Freight management
- Transportation demand management
- Transit fleet management and dispatching

It is important to note that M&O does not encompass traditional maintenance activities, such as lawn cutting, pothole repair, or resurfacing. **M&O strategies focus on optimizing the performance of the transportation system.** Although M&O strategies may be implemented on a regional, area-wide, or project-specific basis, those included in a transportation plan should typically be those that have importance on a regional level. M&O strategies enable transportation agencies to provide higher levels of customer service in the near-term without incurring the high costs and time to implement major infrastructure projects.

1.3 MOTIVATION FOR INTEGRATING M&O IN THE METROPOLITAN TRANSPORTATION PLAN

Regional efforts to manage and operate existing transportation systems are becoming ever more important for several reasons:

- **Rapidly Increasing Congestion** – As travel demand continues to increase, while the amount of new infrastructure that can be developed is limited, traffic congestion in the U.S. has risen dramatically. According to data from the Texas Transportation Institute on traffic congestion levels in 85 urban areas, traffic congestion has increased in every area since 1982. Congestion is affecting more roads, extending into longer periods of the day than traditional rush hour, and impacting travel times to a greater extent⁸. The share of traffic experiencing congestion during peak travel hours has more than doubled in about 20 years, from 32 percent in 1982 to 67 in 2003. The amount of time during the day when travelers may encounter congestion has grown from about 4.5 hours to 7.1 hours per day. Travelers now experience on average 47 hours of delay per year. The worsening of congestion is

impacting mobility, the environment and economic productivity, and highlights the need for attention in transportation planning.

Recognizing these concerns, the U.S. Department of Transportation (DOT) *National Strategy to Reduce Congestion on America's Transportation Network* (the Secretary's Initiative on Congestion) is designed to achieve measurable impacts, with goals to relieve urban congestion, promote operational and technological improvements, and target major freight bottlenecks, among others.

- **Constraints on Transportation Capacity Expansion** – In many metropolitan areas, there are limited opportunities for highway or transit capacity expansion due to environmental and community constraints. Moreover, infrastructure projects can be very expensive, and limited funding constrains the ability to build all of the potential facilities that might be desired. In some cases, air quality issues also limit the ability of many metropolitan areas to construct new capacity. These constraints have placed increased pressures on decision makers and transportation agencies to find new ways to enhance the effective capacity of the existing transportation network.
- **Growing Connectivity, Interdependency and Operational Impacts Across Modes** – Over the past several years, there has been an increasing recognition of the importance of weather conditions, traffic incidents, special events, and emergency situations on the reliability and safety of the transportation system. It is estimated that about half of traffic congestion is caused by temporary disruptions that take away part of the roadway from use (“nonrecurring” congestion). Travelers and shippers are increasingly sensitive to unanticipated disruptions to tightly scheduled personal activities and manufacturing distribution procedures, and overall increases in traffic volumes often mean that even small disruptions can have a significant ripple effect on transportation system performance throughout a broad area. Moreover, emergency preparedness and homeland security concerns require regional system coordination and collaboration for emer-

⁸ For further details, see the Texas Transportation Institute (TTI) Annual Urban Mobility Report, <http://mobility.tamu.edu/ums/report/>.

gency response. Together, these new and emerging needs are pushing an increased emphasis on developing a MTP that more clearly and adequately relates regional transportation funding decisions to customer concerns, and to utilizing system management and operations solutions.

1.4 SAFETEA-LU REQUIREMENTS

Federal Requirements

Not only is addressing M&O within the MTP a reflection of good planning practice, but it is also required under Federal law. Specifically, the Safe Accountable Flexible Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) contains the following requirements for all MPOs, regardless of size:

- **Promote Efficient System Management and Operations** – SAFETEA-LU, Section 6001(h) requires consideration of M&O in the metropolitan transportation planning process – “Promote efficient system management and operation” is specifically identified as one of eight planning factors.
- **Include M&O Strategies** – SAFETEA-LU, Section 6001(i), explicitly states that the MTP shall include “operational and management strategies to improve the performance of existing transportation facilities to relieve vehicular congestion and maximize the safety and mobility of people and goods.”

In addition, Transportation Management Areas (TMAs) – urban areas with a population over 200,000 – are also required to:

- **Develop a Congestion Management Process (CMP)** – The CMP evolved from what was formerly called a Congestion Management System (CMS). The CMP is a systematic process to identify the causes of congestion and develop solutions to address congestion problems.⁹ The new language

about “process” emphasizes that congestion management is not meant to be considered as a stand-alone system, but as an integral part of the metropolitan transportation planning process. At the core, a CMP should include a data collection and monitoring system, a range of strategies for addressing congestion, performance measures or criteria for identifying when action is needed, and a system for prioritizing which congestion management strategies would be most effective. In air quality non-attainment areas, the CMP takes on even greater importance, since Federal guidelines prohibit projects that increase capacity for single occupant vehicles unless the project results from a CMP.¹⁰

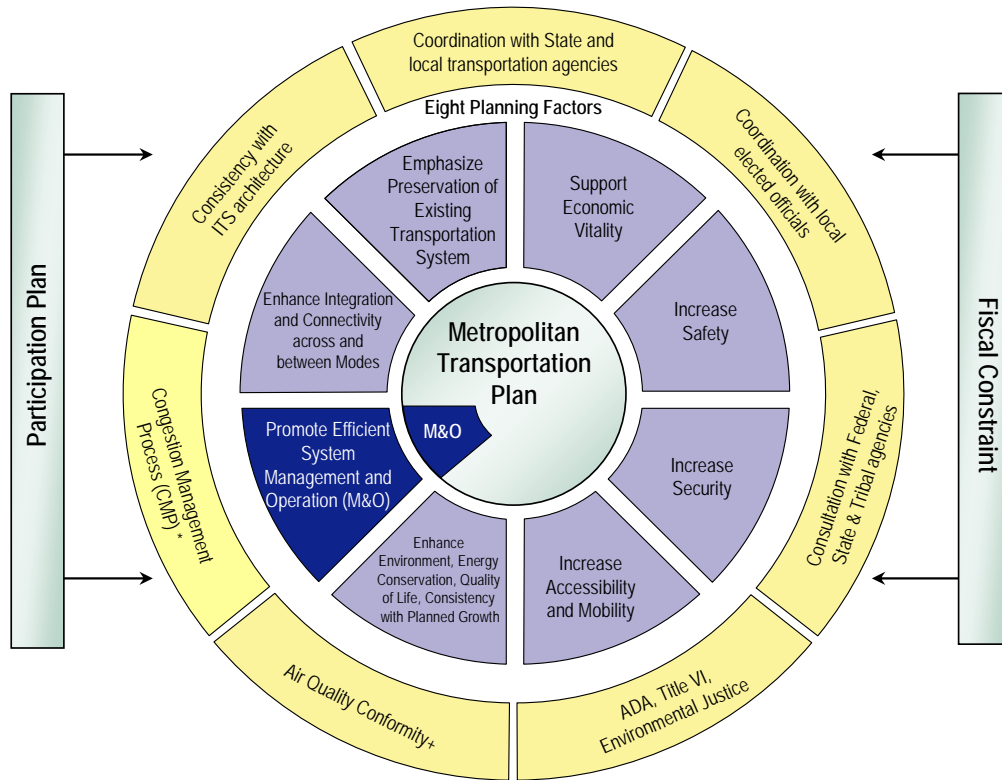
M&O in the Context of Multiple Metropolitan Planning Requirements

While this guidebook focuses on system management and operations in the metropolitan transportation planning process, it is important to recognize that MPOs face a wide range of transportation planning requirements, some of which may place competing demands on priorities for inclusion in the MTP. Figure 1 provides a representation of the many planning requirements that MPOs face in developing the MTP. Specifically, it shows the eight planning factors that must be considered in developing the MTP, including the M&O planning factor. Surrounding these factors are other planning requirements, including the requirement that TMAs develop a CMP. Highlighted within the circle in the center is the requirement that the MTP must include M&O strategies.

⁹ For a more detailed discussion of CMP, see U.S. DOT, FHWA/FTA, *A Guidebook on the Congestion Management Process in the Metropolitan Transportation Plan: Objectives-Driven, Performance-Based Management of Congestion in Metropolitan Transportation Systems*, 2007 Draft.

¹⁰ Safety improvements and the elimination of bottlenecks are exceptions to this restriction.

Figure 1. M&O in the Context of Metropolitan Transportation Planning Requirements



*Required for TMAs

+Required for nonattainment and maintenance areas

While the MTP must include M&O strategies, the M&O planning factor is not intended to be viewed in isolation. In fact, a focus on improving transportation system management and operations can support the other planning factors. For instance, M&O strategies can:

- Support economic vitality by improving system reliability, which is valued by the freight and business communities;
- Increase safety by focusing attention to operational strategies, such as driver education, speed enforcement, and technologies to improve pedestrian safety;
- Increase security by improving communication and coordination between transportation agencies and law enforcement;
- Increase accessibility and mobility by implementing strategies that reduce recurrent and non-recurrent congestion, and improve the efficiency of operations, such as transit bus priority, signal timing, and pricing;
- Enhance the environment, energy conservation, quality of life, and consistency with

planned growth by implementing programs to reduce travel demand, providing traveler information to help avoid and reduce time stuck in traffic delay, and avoiding the need to develop new transportation infrastructure with negative impacts to the environment and communities;

- Enhance integration and connectivity by implementing strategies to allow seamless travel between transit service providers and modes; and
- Emphasize preservation of the existing transportation system by focusing resources toward optimizing existing capacity rather than building new capacity.

M&O strategies clearly do not serve a narrow purpose, and the M&O planning factor should not be viewed as a “silo” in the planning process. M&O strategies can help to support a wide diversity of goals that are established through the MPO planning process. Moreover, the CMP can be an effective process for advancing M&O strategies with a focus on congestion relief.

1.5 THE ROLE OF REGIONAL OPERATIONS OBJECTIVES AND THE CONGESTION MANAGEMENT PROCESS

Regional Operations Objectives

A recommended approach to address M&O in metropolitan transportation planning is through the development and inclusion of “regional operations objectives” in the MTP. Regional operations objectives are specific, measurable statements of performance objectives relating to the operation of the transportation system on a regional basis.

While the MTP will typically contain a number of regional goals, which may include one or more goals relating to the management and operation of the transportation system, inclusion of regional operations objectives moves a step further. Not just a refinement of goals, regional operations objectives provide agreed-upon measures of system performance that can be tracked on a regional level and that will inform M&O strategies and projects that appear in the MTP. These objectives may relate to issues such as recurring and non-recurring congestion, access to traveler information, emergency response, and ease of movement across modes and jurisdictions, among others. The objectives should be specific, measurable, agreed-upon, realistic, and time-sensitive. For instance, rather than simply indicating an objective to reduce clearance time of traffic incidents, a strong regional operations objective might state: “By [year], reduce the clearance time of traffic incidents on freeways and major arteries in the region from a current average of X minutes to an average of Y minutes.”

Performance measurement can focus the attention of decisionmakers, practitioners, and the public on important characteristics of the transportation system. The act of defining specific regional operations objectives in the MTP therefore will place increased attention on the operational performance of the transportation system in investment planning. This increased attention may occur in several ways. The act of defining regional operations objectives requires coordination and collaboration among transportation system opera-

tors and planners, which can focus increased consideration of operational strategies. Moreover, the inclusion of specific objectives will enable performance to be tracked, which may place increased attention to programs and strategies that address operational concerns. Rather than focusing primarily on long-range system capacity needs, the MTP will focus on both short-range and long-range needs related to the operation of the transportation system.

The Congestion Management Process

For TMAs, the CMP is an important component of the metropolitan transportation planning process for integrating M&O strategies, with a focus on congestion, in the metropolitan transportation plan.¹¹ By changing the requirement from a “congestion management system” to a “congestion management process,” SAFETEA-LU clearly emphasizes that congestion management is as *an integral component of the metropolitan transportation planning process*, rather than a stand-alone system or activity. In addition to collecting data to measure congestion, the CMP is a larger, systematic process that involves developing performance measures, identifying operational needs and deficiencies, and developing strategies, including M&O strategies, with a focus on congestion relief.

Given the role of the CMP as part of the process for integrating M&O in the metropolitan transportation plan, a companion guidebook has been developed, *A Guidebook on the Congestion Management Process in Metropolitan Transportation Planning: Objectives-Driven, Performance-Based Management of Congestion in Metropolitan Transportation Systems*. Readers are urged to refer to this document for more specific ideas on addressing M&O considerations within the metropolitan transportation planning process through the CMP. Although a CMP is only required for TMA areas, all MPOs can benefit from using a systematic process to address congestion issues. Moreover, while the CMP focuses on congestion, the data collected as part of the CMP process can also be used to help support other system management and operations consideration, such as safety, accessibility, and connectivity.

¹¹ As discussed in Section 4, a CMP is required for Transportation Management Areas (TMAs); however the logic of the process is a useful approach for all MPOs.

1.6 OVERVIEW OF THIS GUIDEBOOK

This guidebook is designed to help metropolitan planning organizations (MPOs) and other stakeholders in the metropolitan transportation planning process to integrate management and operations considerations into planning, which will not only help fulfill SAFETEA-LU requirements, but also result in an MTP that is better able to meet customer needs, resulting in an optimal mix of transportation investments.

The guidebook includes:

- **An Objectives-driven, Performance-based Approach to M&O in the MTP (Section 2)** – This section discusses a new paradigm in thinking about incorporating M&O in metropolitan transportation planning through use of regional operations objectives. It describes a framework that involves development of measurable regional operations objectives, discusses characteristics of regional operations objectives, and highlights benefits of this approach.
- **Getting Started** – Engaging Stakeholders in Developing Regional Operations Objectives (Section 3) – This section focuses on a key element of bringing operations considerations into the planning process: the process of engaging operations stakeholders in transportation planning. It provides examples of approaches that can be used to engage operations stakeholders in planning and help decisionmakers understand the potential role of M&O strategies.
- **How to Use Regional Operations Objectives in the MTP (Section 4)** – This section focuses on the application of operations objectives throughout the planning process,

including how operations objectives are used to develop performance measures and strategies in the Plan. It discusses the role of the CMP.

- **Outcomes (Section 5)** – This section discusses outcomes of an objectives-driven, performance-based approach to M&O in the metropolitan planning process, in terms of what the MTP looks like, and additional benefits MPOs might achieve from the process.
- **A Self-Assessment for MPOs (Section 6)** – This section is designed to help MPOs assess to what extent they are addressing M&O in the MTP and using a performance-based approach.

Additionally, appendices are provided in response to several requests from MPOs:

- Appendix A is a simple, step by step outline designed to help MPOs less familiar with M&O to get started.
- Some MPOs find that explaining or encouraging new concepts to decisionmakers (particularly elected officials) is challenging. The synopsis provided at Appendix B is intended to provide help in this regard.
- Given the evolving vocabulary in the M&O arena and the potential for confusion, Appendices C and D provide common understanding of acronyms and terms that are associated with M&O.
- To assist in pursuing more detailed information about the M&O concepts discussed in this guidebook, Appendix E provides a list of references.

2.0 AN OBJECTIVES-DRIVEN PERFORMANCE-BASED APPROACH TO M&O IN THE MTP

2.1 MOTIVATION FOR A NEW APPROACH TO M&O IN THE MTP

Current Practice: Challenges and Opportunities

Over the past few decades, the metropolitan transportation planning process has evolved in response to new Federal requirements and increased public and stakeholder interest in issues such as non-motorized (bicycle and pedestrian) transportation, air quality, land use planning (“Smart Growth”), environmental justice, and transportation security, among others. Metropolitan transportation plans (MTPs) now typically include a wide range of goals addressing not only mobility, but the environment, safety, quality of life, and community development.

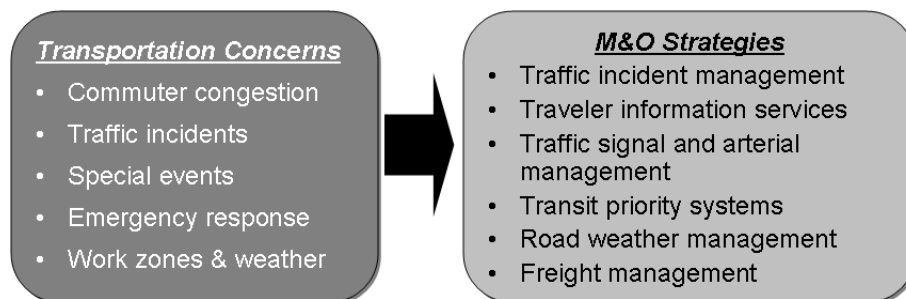
As noted earlier, increased attention is now being paid to the role of transportation system management and operations (M&O) strategies as an important means to address critical concerns relating to the performance of the transportation system, and to address customer needs without the long time delays associated with major infrastructure projects (See Figure 2). Many MPOs have taken a role in coordinating investment decisions relating to M&O strategies across modes and jurisdictional boundaries, such as regional traveler information systems, electronic transit payment services, traffic signal coordination, and traffic

incident management. For instance, many regions across the country have invested substantial resources in intelligent transportation systems (ITS) technologies, which include real-time traveler information systems. In many regions, transportation demand management (TDM) programs have been established that encourage ridesharing, transit use, and employer-based programs to reduce peak period traffic congestion.

Benefits can be seen throughout the U.S., such as in the Denver metropolitan area where the Denver metropolitan planning organization and approximately 30 traffic signal operating agencies have worked together since 1989 to reduce traveler delay and air pollution. Multiple jurisdictions participating in an arterial emergency response team in the Phoenix metropolitan region save time and money by calling on the team to manage traffic during major incidents. In the Washington, DC area, a transit “Smart Card” allows travelers to transfer more easily from one transit mode or operator to another.

Although M&O strategies are increasingly recognized as important by transportation planners and operators, the MTP in most regions still tends to be largely “project focused” and it is often difficult to clearly identify M&O strategies in the plan. Moreover, while the MTP typically includes a range of goals, there is limited development of measurable regional operations objectives and tracking of actual system performance against

Figure 2. Transportation Concerns Addressed by M&O Strategies



those objectives. A 2004 survey of MPOs asked, “Does your planning process reflect measurements of actual system performance, like travel time, reliability, and incidence of non-recurring congestion?” Of those that responded, 45% answered no.¹²

There are several reasons for this. Within the transportation planning process, the technical analyses and travel demand forecasting processes used tend to focus on nominal conditions on a 20 to 25 years horizon. Travel demand forecasting models, for instance, typically identify congestion levels based on average travel demands and system capacity constraints, but do not capture non-recurring congestion associated with incidents, weather conditions, work zones, or special events. Analytical tools, therefore, do not focus on many characteristics of system performance that are of concern to customers and that can be addressed by operations strategies.

At the same time, the transportation operations community historically has not taken a regional approach to developing M&O goals, objectives, and strategies. Transportation operators across a region tend to function mostly independent of each other, with limited cross jurisdictional coordination. With the exception of transit agencies, transportation operations agencies often tend to focus on a short time horizon rather than the long-term outlook required for the MTP. Therefore, it has been difficult to articulate what are the most important regional M&O investments for a region.

Despite these challenges, transportation agencies are taking steps to increase the role of M&O strategies in transportation planning. Opportunities are being taken to enhance coordination and collaboration among transportation system operators¹³, and to improve linkages between operators and planners.¹⁴ Building on those experiences, this

document describes a new approach to integrating M&O in the MTP, highlighting the importance of including M&O as a regional goal in the MTP, and in developing measurable operations objectives.

Rationale for an Objectives-Driven Approach to M&O in the MTP

Implementing a planning process with a strong M&O component is best accomplished by a new way of thinking about management and operations in transportation planning – one that is objectives-driven, rather than project-driven. This process focuses on both short-term and long-term system performance, using established system performance measures, rather than simply focusing on implementation of projects as a measure of success.

The maxim that “What gets measured gets managed,” recognizes that performance measurement can focus the attention of decisionmakers, practitioners, and the public on important characteristics of the transportation system. The act of defining regional operations objectives in the MTP will place increased attention on the operational performance of the transportation system. By including operations objectives that address system performance issues, such as recurring and non-recurring congestion, emergency response times, connectivity among modes, and access to traveler information, the MTP will yield programs and strategies that more effectively address these concerns. In addition to addressing long-range system capacity needs, the MTP will encourage operations to play a more important role in transportation investment planning, and address both short-range and long-range needs.

2.2 A FRAMEWORK FOR OBJECTIVES-DRIVEN PERFORMANCE-BASED M&O IN PLANNING

Overview of the New Approach

While the metropolitan transportation planning process takes place in the framework of existing laws and regulations, an objectives-driven approach to M&O involves the development of

¹² *Survey of MPOs on Linking Planning and Operations*, Association of Metropolitan Planning Organizations, January 2004.

¹³ See *Regional Transportation Operations Collaboration and Coordination: A Primer for Working Together to Improve Transportation Safety, Reliability, and Security*. U.S. Department of Transportation/Federal Highway Administration, Publication Number FHWA-OP-03-008, 2003. Available at: http://www.ops.fhwa.dot.gov/program_areas/rtocc.htm.

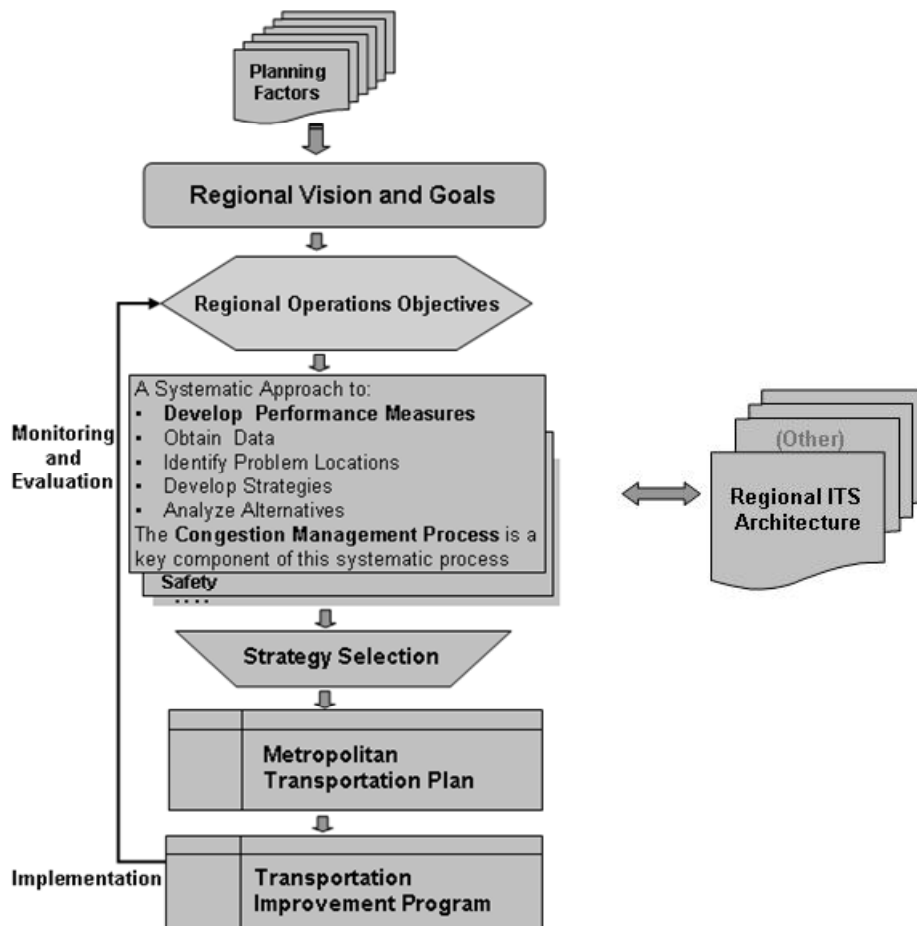
¹⁴ See *Getting More by Working Together: Opportunities for Linking Planning and Operations*. U.S. Department of Transportation/Federal Highway Administration, Publication

Number FHWA-HOP-05-016, 2005. Available at: http://www.ops.fhwa.dot.gov/program_areas/rtocc.htm.

regional operations objectives, which inform the way in which transportation investments are determined as part of the MTP, as shown in **Figure 3**.

- The development of a regional vision and goals arises from a thoughtful and deliberate regional process that takes into account the eight planning factors. It provides a broad sense of what the region agrees it wants the transportation system to achieve.
- Regional operations objectives flow directly from the goals. These objectives are measurable and define desired outcomes that help to achieve the goals. They are developed through coordination and collaboration with operating agencies and play a central role in the planning process.
- The regional operations objectives are used to develop performance measures, analyze problems, and develop and recommend strategies for inclusion in the MTP. The CMP is a key component of this approach, with a focus on managing congestion.
- Management and operations strategies are then selected within fiscal constraints.
- The result is a Metropolitan Transportation Plan, with a 20+ year outlook that includes a more optimal mix of operations strategies and capital investments, and a TIP with a near-term focus that includes specific programs and projects.
- Monitoring and evaluation of transportation system operations then feeds back into the development of the update of the regional vision, goals, and objectives in the next cycle of developing the MTP.

Figure 3. Integrating Regional Operations Objectives in the Metropolitan Transportation Planning Process



What the Resulting MTP Looks Like

The resulting MTP can be structured in different ways. It typically will include (but is not necessarily limited to) either:

- A section focused specifically on management and operations. This section of the plan would identify M&O goals, include specific, measurable, regional operations objectives, and describe M&O strategies for achieving the regional operations objectives. Such a section might describe existing system performance, projected system performance in the absence of the plan, and expected performance with the inclusion of all planned projects and strategies.
- Alternatively, the MTP can include discussion of M&O strategies within the context of different goals and strategy groups identified within the MTP. For example, a goal aimed at improving highway safety might utilize a regional operations objective related to reducing the number of fatalities on the highway system, and include M&O strategies such as emergency response teams, enhanced signalization, etc.. A goal aimed at improving mobility and access across the region might include a regional operations objective related to reducing the level of traveler delay, and include M&O strategies such as peak-period use of shoulder lanes, congestion pricing, and variable message signs.

While metropolitan areas have flexibility to use different approaches to organizing the MTP, in all cases, the MTP should include:

- A vision and goals that includes effective management and operations of the transportation system;
- Measurable regional operations objectives that allow the region to track progress toward achieving its M&O goals; and
- Identification of M&O strategies, backed by specific performance measures for evaluation.

It is suggested that MPOs include in their MTPs discussion of M&O strategies that are funded by State, regional and local transportation agencies even without use of Federal funding. Because

many M&O strategies (e.g., incident clearance, emergency response) are planned and executed within these agencies, this added discussion in MTPs will provide a more holistic picture of the totality of M&O strategies being employed within a region.

2.3 BENEFITS OF APPLYING REGIONAL OPERATIONS OBJECTIVES IN THE MTP

The process of applying regional operations objectives in the MTP will also lead to broader outcomes that improve transportation planning and links between transportation planning and operations. Specifically, the benefits of this process include:

- **A more objective (rather than subjective) approach to addressing operations in the transportation planning process** – By including operations objectives and performance measures in the metropolitan transportation planning process, resource allocation and investment decisions can be made with a clearer focus on outcomes of the plan, which will allow a better screening of strategies using objective criteria. While political considerations, public support, and tradeoffs between different goals will continue to play an important role in the process, having a clear set of agreed upon objectives will allow comparisons of alternative strategies and scenarios using specific metrics.
- **Focused transportation investment prioritization** – Use of M&O objectives and performance measures will help in prioritizing investments on a regional basis. With regional operations objectives, there are established metrics for determining which investments are most important and cost-effective in meeting regional goals. For instance, regional operations objectives naturally lead to the development of performance measures, which can be developed and utilized as part of the Congestion Management Process (CMP) to prioritize locations with the most significant recurring and nonrecurring congestion problems.
- **Improved resource allocation** – Transportation investment decisionmaking

will become more comprehensive, incorporating system operations for an optimal mix of operations and capital projects and programs. In addition to “stand alone” operations projects, M&O strategies can be actively built into transportation system preservation, capacity expansion, and safety projects to help maintain existing and future planned capacity and safety.

- **Increased accountability and measurement of performance** – Success in achieving regional operations objectives can be tracked over time. Tracking performance can help transportation agencies demonstrate to the public the benefits of their programs and investments, and can feed into future updates to the MTP, if it is determined that objectives need to be reassessed.
- **Engaging the operations community in a more substantive way** – Integrating M&O into the metropolitan transportation planning process has benefits for transportation planners and operators, and the traveling public. By working toward optimizing the transportation system with management and operations strategies, transportation planners are better able to demonstrate to the public and elected officials that progress is being made on reducing congestion in the short-term with lower cost techniques. Similarly, day-to-day managers of the operating system are able to make their limited staff time and other resources go farther by collaborating with planners and other operators to address operations from a regional perspective. Transportation operations improvements made in one jurisdiction are reinforced by coordinated improvements in neighboring areas enabling travelers to move seamlessly across the region without encountering inconsistent traveler information, toll collection technologies, or traffic signal timing.

Overall, by working together to address transportation issues of regional significance with management and operations strategies, operators and planners are able to have a greater impact on the performance of the transportation system in the region than they would by working alone. The MTP will result in a more optimal mix of transportation investments among system preservation, M&O, safety projects, and system expansion

strategies, and will more effectively integrate M&O strategies into all types of investments.

2.4 THE ROLE OF M&O GOALS

An important first step to integrating M&O in the MTP is to establish a goal or goals that focus on the efficient management and operation of the transportation system. In general, a goal should describe the end toward which an effort is directed; it establishes an aim that is desired. The goal derives from the values inherent in the regional vision.

An effectively operating transportation system involves not only the provision of highway and transit infrastructure for movement of the public and freight, but also efficient ways of operating these systems in order to improve their effective capacity, reliability, and safety. This requires quick response times and decision-making during incidents and emergencies; coordinated traffic operations across jurisdictional boundaries; coordinated travel demand management for special events; provision of reliable and timely information about traffic situations so the public can make informed travel choices; easy movement among roads and transit services managed and operated by different jurisdictions and agencies; monitoring of hazardous materials across jurisdictions to improve safety and security; and other efforts to improve the management and operation of the transportation network.

The MTP may identify an overarching regional M&O goal,¹⁵ such as:

- “The “X” region will optimize the operation of the regional highway, transit, and non-motorized transportation system.”

Alternatively, the MTP may identify a set of M&O goals that are still broad, but address different aspects of transportation system management and operations, such as:

- “The “X” region will provide a reliable regional transportation system,”
- “The “X” region will reduce unexpected traveler delay,” or

¹⁵ It is understood that words like “optimize”, “reliable”, and other similar descriptors will need to be addressed in more detail in the supporting operations objectives.

- “The “X” region will ensure effective transportation response to emergencies.”
- The MTP may also identify a wide range of other goals – relating to issues such as improving transportation safety, security, and connectivity – that also lead to the development of M&O strategies to achieve these goals, even though the goals themselves do not focus on system management or operations directly.

2.5 THE ROLE OF REGIONAL OPERATIONS OBJECTIVES

Regional operations objectives flow from the M&O goal(s) or from other goals in the Plan, and are a critical component of creating an objectives-driven, performance-based approach to integrating M&O in the MTP. Operations objectives help to actualize what it means to accomplish the goal, and should specify clear measurements for evaluating progress towards the goal. They state what a region plans to achieve in regard to the operational performance of the transportation system and thereby help to determine what strategies and investments to include in the MTP. Regional operations objectives put a focus on issues such as traffic congestion, traffic incidents, goods movement, homeland security and work zones that are not often well addressed in the MTP.

While this document focuses primarily on operations, MPOs may also recognize the value of having measurable objectives in relation to all goals in the MTP (e.g., safety, economic development, environmental, community, etc.), and may wish to consider applying the steps discussed here across the range of appropriate issues to be addressed in the MTP. Using operations objectives and performance measures in the transportation planning process puts increased emphasis on M&O.

2.6 WHAT DO REGIONAL OPERATIONS OBJECTIVES LOOK LIKE?

Characteristics of Regional Operations Objectives

Objectives are specific, measurable statements relating to the attainment of goals. In the MTP, operations objectives are typically regional or multi-jurisdictional in nature. In conjunction with selecting operations objectives, performance measures are developed to assess whether or not the objective has been met.

Given that the fundamental purpose of management and operations improvements is to better serve the transportation system user through increased system performance, operations objectives are preferably described in terms of system performance outcomes as experienced by users. Objectives focused on outcomes to the user address issues such as travel times, travel time reliability, and access to traveler information. The public cares about these measures, and in many regions, data may be available to develop specific outcome-based operations objectives.

For some MPOs – particularly smaller MPOs – outcome-based objectives may be challenging to develop due to factors such as limited operations data, limited staff resources, or lack of consensus among decisionmakers around an appropriate system-level performance objective. In these cases, the partners may develop operations objectives in terms of the performance of the system managers or operators. These objectives refer to indicators such as incident response time, percentage of traffic signals retimed, or number of variable message signs deployed. Although these objectives are not as ideal as outcome-based objectives for inclusion in the MTP since they tend to focus on specific strategies or approaches, they may be the best interim objectives until more outcome-based objectives can be developed. The step of working together to develop objectives itself may help to elevate discussion of regional system management and operations.

In all cases, an objective should have “SMART” characteristics, as defined below:

- **Specific** – It provides sufficient specificity to guide formulation of viable approaches to achieving the objective without dictating the approach.
- **Measurable** – It includes quantitative measurements, saying how many or how much should be accomplished. Tracking progress against the objective enables an assessment of effectiveness of actions.

- **Agreed** – Partners come to a consensus on a common objective. This is most effective when the planning process involves a wide-range of stakeholders to facilitate regional collaboration and coordination.
- **Realistic** – The objective can reasonably be accomplished within the limitations of resources and other demands. The objective may be a “stretch” and require substantial coordination, collaboration, and investment to achieve. Because how realistic the objective is cannot be fully evaluated until after strategies and approaches are defined, the objective may need to be adjusted to be achievable.
- **Time-bound** – The objective identifies a timeframe within which it will be achieved (e.g., “by 2012,”).

By developing “SMART” objectives, system performance can be examined and monitored over time.

Examples of Regional Operations Objectives

Operations Objectives

In order to address SAFETEA-LU requirements for consideration of M&O, the MTP should include specific goals and objectives that focus on the management and operation of the transportation system. Goals may be established that address issues such as transportation system reliability, response to emergencies and weather conditions, traffic incident clearance, or access to traveler information. In these cases, regional operations objectives will include specific measures that can help system operators to assess their collective performance.

For instance, for a goal of “Improved transportation system reliability,” an objective might include the following:

- By 2020, reduce the variability in travel time on freeways and major arteries in the region such that 95% of trips (19 out of 20) have travel times no more than 1.5 times the average travel time for a specific time of day.

Other examples of operations objectives include:

- By 2010, reduce the clearance time of traffic incidents on freeways and major arteries in

the region from a current average of X minutes to an average of Y minutes.

- Throughout the timeframe of the plan, maintain an average time of no more than Z hours to clear all emergency snow routes and priority arterials.
- By 2015, decrease average annual traveler delay associated with road closures, major incidents, and weather-related conditions on interstate highways by 20 percent from 2000 levels.
- By 2015, at least 90 percent of transit buses will arrive within no more than 5 minutes of scheduled time.
- By 2010, access to real-time information on bus arrival times will be provided for all bus routes on all transit providers within the region.

The extent to which the MTP includes these types of objectives will depend on many factors, including the size of the metropolitan area, the staffing and data available to the MPO, the extent of traffic congestion, and the degree to which regional goals focus on improving the operation of the transportation system.

In developing these types of objectives, it is important to recognize – and to communicate with elected officials and the public – that conditions may be significantly worse without the implementation of new strategies or programs, particularly in regions where population is growing rapidly. Consequently, it may not be realistic to improve some aspects of system performance (e.g., reduce traveler delay) from existing levels. Even if a plan results in significant improvements over projected “baseline” conditions, it still may not show significant improvement over current conditions. In these cases, an objective might be to hold average traveler delay to no greater than 2007 levels by 2020, to improve the provision of traveler information to a certain level so that travelers can make more informed travel choices, to optimize signal timing on major congested corridors, or another measure that is achievable and helps to achieve overall goals.

Objectives for Various Planning Goals

While the objectives above all relate directly to goals that focus on improved system management and operations, a similar approach may be used

throughout the MTP so that regional objectives are developed in relationship to multiple goals within a transportation plan. In this way, the entire plan is objectives-driven and addresses system performance. For instance, if one goal is to “Provide a safe transportation system” or focuses on safety enhancement, specific regional objectives may include:

- By 2025, reduce the number of fatalities on the highway system to X per hundred thousand vehicle miles traveled.
- By 2020, reduce the number of accidents in the transit system to Y per thousand riders.
- By 2020, reduce the number of pedestrian fatalities to no more than Z per year.

For a goal that relates to “improved mobility”, regional objectives might include the following:

- By 2025, reduce the number of lane miles experiencing severe traffic congestion by X percent.
- By 2030, increase the share of jobs within 30 minute access time of the population to Y percent.

Each of these types of objectives is specific, measurable, and time-bound, and generally exhibit the “SMART” characteristics described above. Coming under a range of goals, these objectives allow for a variety of different solutions, including both operations strategies and infrastructure enhancements. Having regional objectives places the focus of the planning process on performance, and thus plays an important role throughout the plan in raising the profile of M&O strategies.

3.0 GETTING STARTED – ENGAGING STAKEHOLDERS IN DEVELOPING REGIONAL OPERATIONS OBJECTIVES

3.1 REGIONAL COORDINATION AND COLLABORATION

Integrating operations in the metropolitan transportation plan requires regional collaboration among transportation planners and operations, as well as non-transportation entities (e.g., public safety officials, major employers, chambers of commerce, convention and visitors' bureaus, port authorities, and special interest groups) that routinely affect or depend upon transportation. The inclusion of such a diverse set of participants ensures a regional perspective of transportation system performance informs the planning process, rather than a focus on narrower issues involving single components of the system or a limited set of stakeholders.¹⁶

The MPO can play a crucial role in bringing stakeholders together in a regional forum. In turn, operating agencies may want to work together to take the lead in developing regional operations objectives – since, in many ways, their performance will be assessed using these metrics. Inclusion of both operators and planners in the MTP development process is vital to ensure that the objectives set forth in the plan are realistic and achievable.

3.2 WHO IS INVOLVED

A first step in the process of integrating M&O in the MTP is to involve key regional transportation system operators in the metropolitan transportation planning process. This is often quite challenging, since it requires operators and planners to make a fundamental cultural shift to integrate the near-term considerations that are the focus of transportation system operators with the long-range con-

siderations that are the focus of transportation planners. In most regions, operation of the transportation system is the responsibility of individual operating agencies (e.g., local departments of public works, transit agencies, and State departments of transportation), exacerbating the challenge of viewing the transportation system from a regional perspective. An objectives-driven, performance-based planning process will result in operators broadening their traditional perspective to one in which individual facilities are viewed as interconnected pieces of a regional system. Neighboring jurisdictions and agencies will work together as partners in providing transportation services to customers.

While the MPO serves a coordinating function in developing the MTP, the process of developing operations objectives requires involvement of a full range of agencies involved in operating the transportation system. This includes:

- State DOTs
- Local jurisdictions
- Transit agencies
- Bridge and toll facilities
- Port authorities

Moreover, there is a need to reach out to broader customer stakeholders, including the freight and business communities, and agencies responsible for emergency management, such as:

- Police and fire officials
- Emergency medical service (EMS) officials
- Emergency managers
- Public works officials
- The tourism industry
- Freight shippers
- Business organizations, such as chambers of commerce

Elected officials and the general public also need to be included in stakeholder involvement.

¹⁶ For a more detailed discussion of collaboration and coordination, see *Regional Transportation Operations Collaboration and Coordination – A Primer for Working Together to Improve Transportation Safety, Reliability, and Security*, U.S. Department of Transportation/Federal Highway Administration, Publication Number FHWA-OP-03-008

The process of integrating M&O strategies into the metropolitan transportation planning process often calls for strong regional leadership. Often this comes from MPO leadership that recognizes the practicality of solutions in the near-term that may be achieved with operational solutions. This may be as simple as the mayor of the central city responding to his constituents' demands for greater travel time reliability along major routes. It may come from the manager of the regional transit system recognizing the utility of a "smart card" that may be used for all transit systems in the region. Or it may arise from the State department of transportation's need for improving the management of work zones. These concepts may arise in the context of the MPO planning process or they may surface in the arena of transportation operating agency coordination. No matter how an issue arises, in most cases it takes a 'champion' to push it and support it through the planning process (both internally to an operating agency and in the regional transportation planning process). It usually helps if the concept is pursued both at the technical level and the policy level. This can be facilitated by an MPO having a policy committee that champions operational strategies and a technical committee that develops the "nuts and bolts" of a concept. Elected officials often can also play a key role in placing an emphasis in the MTP on the operational performance of the transportation system.

3.3 ENGAGING PARTICIPANTS

Wasatch Front Regional Council Traffic Management Committee – In the late 1980s and early 1990s, the Wasatch Front Regional Council (WFRC) recognized that it needed to make better use of the existing transportation system by expanding traffic signal coordination within the region. WFRC hosted a forum for city and county engineers to address signal coordination. This coordination helped gain the support of legislators. Based on growing interest, a signal coordination committee was formed under the Utah DOT. Committee members included representatives from cities, counties, WFRC, and the Utah Transit Authority. Over time, the committee's focus expanded, and it evolved into a traffic management committee. A significant achievement of the committee was the implementation of the traffic management system led by UDOT.

See: <http://www.wfrc.org>.

Puget Sound Freight Roundtable – In 1993 the

Puget Sound Regional Council (PSRC), the MPO for the Seattle-Tacoma metropolitan area, with the assistance of the Economic Development Council, gathered public and private freight sector representatives to form the Puget Sound Freight Roundtable. The Roundtable was created in an effort to better involve the freight industry in the planning process. The first task of the Roundtable was to provide input on freight issues to the update of the Metropolitan Transportation Plan. Since then, the Roundtable has influenced the transportation planning process by advising PSRC on freight needs and the potential impact of proposed projects on freight mobility. It educates policy-makers and the public on freight issues. And it helps to develop performance measures, data collection systems, and analysis techniques necessary to study freight movement.

See:

<http://www.psrc.org/projects/freight/roundtable/roundtable.htm>.

Engaging stakeholders in thinking about M&O is a critical factor in developing regional operations objectives, and in the ultimate success of incorporating M&O strategies in the MTP. This requires engaging operations agencies currently involved in the metropolitan transportation planning process, and engaging new stakeholders, in a new manner – one that addresses M&O as well as capital projects.

Engage Existing Operations Agencies in Thinking About M&O

Operating agencies are typically already at the MPO table and involved in the transportation planning process. However, it is important to engage day to day operating agency managers from a systems operations perspective and not simply as advocates for capital projects. As they participate, operators should identify existing operational programs and strategies that they are using and others that should be considered across agency line and jurisdictional boundaries. Currently, many operating agencies are implementing M&O strategies; the MTP should identify regionally significant activities, which may already be occurring, as well as help to identify additional areas for coordination across jurisdictions and agencies.

Engage New Stakeholders in the Planning Process

New stakeholders also need to be engaged in the metropolitan transportation planning process. One

way to achieve greater stakeholder participation is to focus discussions on specific operations concerns. This makes it clear to both operations practitioners and policy makers when the forum is within their area of expertise. For example, someone who manages first responders is more likely to attend a committee dealing with regional incident management than a committee dealing with the very broad topic of regional management and operations coordination. A focused forum will also likely benefit from participants who have a grasp of both the technical and the institutional challenges associated with regional coordination for that specific topic.

Freight transportation planning is an area where focused forums have been successful. Engaging shippers, freight carriers, and freight terminal operators in the regional planning discussion has been challenging, in part because the long time frame of planning is foreign to most private sector entities. Freight companies may also be mistrustful of government planners, and concerned about divulging proprietary business information. Some regions have successfully developed forums or task forces specifically to address regional freight operations planning. Such committees have succeeded at bringing freight needs and perspectives to the planning process, helping to promote a regional perspective on operations challenges.

3.4 INSTITUTIONALIZING THE PROCESS

National Capital Region's Management, Operations, and ITS Task Forces

The National Capital Region Transportation Planning Board (TPB) initiated the Washington Region ITS Task Force in 1997. After the region received federal earmark funding for ITS, the task force attracted interest from a number of agencies in the region. These agencies collaborated to develop CapWIN, a wireless integrated mobile communications network that supports coordination between public safety and transportation agencies. Later that year, the TPB divided the Task Force into a technical task force and a policy task force. This facilitated the direct involvement of policy-level officials in ITS activities, while maintaining the capacity to address technical details associated with ITS integration and coordination. In 2001, the TPB changed the name of the two task forces to the Management, Operations and Intelligent Transportation Systems (MOITS) Policy Task Force and the MOITS Technical Task Forces to reflect a broader focus on management and opera-

tions from a regional perspective.

See:

<http://www.mwcog.org/transportation/committee>.

In order to sustain a successful integration of objectives-driven, performance-based M&O in the planning process, MPOs need to institutionalize the process of engaging operating agencies and stakeholders in developing operations objectives.

Five major elements form a framework that can help institutionalize working together as a way of doing business among transportation agencies, public safety officials, and other public and private sector interests within a metropolitan region to create strategies for improved transportation system performance:

- **Structure** – The regional structure that supports collaboration and coordination within a region is the set of relationships, institutions, and policy arrangements that shape the activity. It provides the “table” at which operators and service providers sit with public safety and other key transportation constituencies.
- **Processes** – *Processes* are the formal and informal activities performed in accordance with written or unwritten, but collaboratively developed and accepted, policies involving multiple agencies and jurisdictions in a region. Processes describe how the “regional table” works to achieve its objectives.
- **Products** – The *products* of collaboration and coordination are the results of processes. They include a regional concept of operations, a regional ITS architecture, baseline performance data, current performance information, and operating plans and procedures that inform regional entities (public and private sector) about how the regional transportation system must operate over time (including planned improvements).
- **Resources** – *Resources* govern what is available within the region for sustaining and implementing the regional concept of operations and other operations plans on an ongoing basis, not just plans for special events, issue resolutions, or the completion

of specific projects. The resources include staff, equipment, and dollars.

- **Performance** – The *performance* element comprises how performance will be measured, and individual and collective responsibilities for monitoring and improving regional transportation system performance.

The framework creates structures through which processes occur that result in products. It implies a commitment of resources needed to initiate and sustain regional collaboration and coordination and for implementing agreed upon solutions and procedures. The collaborative spirit is motivated by a desire for measurable improvement in regional transportation system performance. The five elements of the framework are interactive and continuous.

Developing MPO Committees Focused on Operations Issues

An increasing number of MPOs support inter-agency committees that deal directly and regularly with regional systems management and operations. In hosting such committees, the MPO facilitates a vital forum where inter-jurisdictional coordination, funding strategies, and data sharing can be addressed. In addition, the MPO can use the committee's diverse operations expertise to inform M&O issues in regional planning process, to identify ITS systems and data needed to support operations and to influence the MPO's annual work program. The forum will allow operations managers to increase their awareness of broader regional trends, needs, and strategies, and can be a key mechanism for developing regional operations objectives for inclusion in the MTP.

Developing an effective structure for these MPO committees can be challenging. One reason is that regional management and operations planning must often deal with narrow technical issues. For example, one committee might address topics such as how to provide back-up power at signals, use of various signalization software programs, and measures of effectiveness for signals. These types of regional forums may be invaluable as an information exchange for operations practitioners, but less useful as a forum for addressing broader coordination issues. As a result, some MPOs have created separate subcommittees for technical and policy issues. A technical subcommittee focuses on the details of equipment coordination, while the

policy committee addresses regional funding strategies and prioritization of regional operations initiatives. Periodic meetings of the full committee allow exchange between technical and policy staff. MPOs should take advantage of the existing ITS architecture committees that are experienced in bringing diverse stakeholders to the planning process.

As noted above, it may also be beneficial to develop specific forums around aspects of operations, such as freight management, emergency management, and incident management.

Building on the ITS Architecture

Developing a regional ITS architecture and forming ITS committees can be the starting point for collaborative efforts among operators, and for interface between the MPO and operating agencies. During the development of the architecture, collaborative relationships between stakeholder agencies are formed that may serve as the foundation for stakeholder partnerships in developing the MTP.

Like the blueprint for a house, a regional Intelligent Transportation Systems (ITS) architecture creates a picture of ITS deployment and use in a region as envisioned by a broad base of stakeholders. SAFETEA-LU requires that ITS projects funded through the Federal Highway Trust Fund conform to the National ITS Architecture and applicable standards. A regional ITS architecture tailors the National ITS Architecture to the region's specific needs and interests.

Hampton Roads ITS Architecture Leads to Inclusion of ITS and M&O in Regional Long-Range Plan

One of the lasting benefits to developing a regional ITS architecture in 1995 for the Hampton Roads, Virginia region was the formation of an ITS committee hosted by the MPO. The collaboration started off with a simple meeting where several area traffic engineers got together and exchanged contact information so that they could communicate in the event of an accident or special event. This led to regular meetings where operators and planning staff got together to discuss technical and institutional issues, their individual needs, and how to work together better. They envisioned compatible technologies throughout the region that would allow for interjurisdictional cooperation.

During the 2003 update of the ITS plan and architecture, and the Hampton Roads ITS champions saw the opportunity to include ITS projects in the long-range plan, which was in the process of being

updated. ITS and management and operations strategies and projects were presented to the MPO's technical committee and approved for inclusion with funding in the Hampton Roads 2026 Regional Long-Range Plan.

See: <http://www.hrpdc.org/transport/program4.shtml>.

An ITS architecture defines existing or desired sensor, computer, electronics, and communications technologies, the interconnections and information exchanges between these systems, stakeholder agreements, and standards. In addition, the architecture describes the regional needs, ITS services that can address these needs, and the envisioned operational roles of agencies responsible for these systems.

The primary purpose of developing a regional ITS architecture is to “illustrate and document regional integration so that planning and deployment can take place in an organized and coordinated fashion.”¹⁷ This can be furthered through the MTP process and feed into establishing common M&O objectives and a collaborative operations strategy to achieve those identified objectives. Regional operations objectives are often identified as part of a regional ITS architecture, and these can serve as a good starting point for identifying regional operations objectives in the MTP. Moreover, the regional needs and user services identified in the architecture may accentuate needs and deficiencies that should be addressed in the planning process.

Developing A Regional Concept for Transportation Operations

A new way of thinking about collaboration among stakeholders on operations strategies is exemplified through what is being called a “Regional Concept for Transportation Operations” (RCTO). An RCTO is a management tool to assist in planning and implementing management and operations strategies in a collaborative and sustained manner. An RCTO can be developed and implemented by a group of transportation operators, planners, public safety agencies, or other stakeholders who want to improve regional transportation system performance by working together. An RCTO typically focuses on one or more manage-

ment and operations functions of regional significance such as traveler information, road weather management, or traffic incident management. Therefore, within any given region, there may be multiple RCTOs that focus on different operations functions or services.

The partners that develop an RCTO agree on a common operations objective and then create a specific, actionable approach to achieving that objective within the next 3 to 5 years. The RCTO specifies the relationships, procedures, resource arrangements, and physical improvements needed to achieve the operations objective, which may include specific protocols for responding to incidents, specifications for equipment, communications procedures, or other parameters.¹⁸

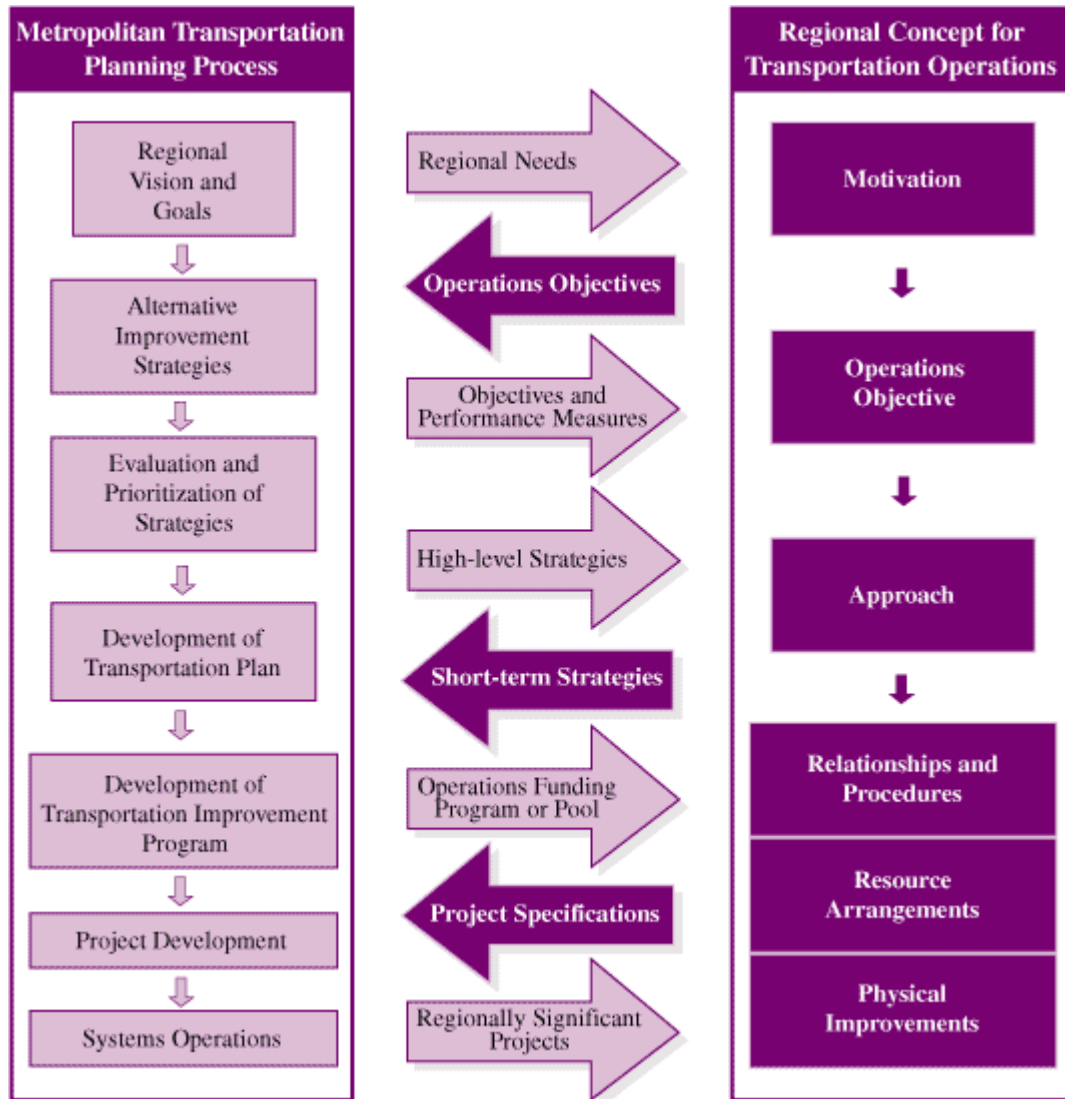
An RCTO can either feed into the process of developing regional operations objectives in the MTP, or an RCTO can build on activities that take place as part of the metropolitan transportation planning process. Operations objectives in an RCTO are similar in form and content to the regional operations objectives in the MTP. Consequently, regional operations objectives developed for the MTP may be adopted for an RCTO by partners in a metropolitan region. The partners would then use the RCTO as a tool to translate that regional operations objective into a specific and actionable strategy for achieving the objective. Therefore, the RCTO can be a tool to help planners and operators develop management and operations strategies or project descriptions that support the MTP's regional operations objectives.

Alternatively, partners developing RCTOs may create their own operations objectives, focused on a specific aspect of operations, such as traffic incident management or traveler information systems. Additionally, partners may develop an RCTO around an existing operations funding program or a combination of regionally significant projects that need to be coordinated. In these cases the RCTO development process may generate operations objectives that could be included in the MTP or could be used as a basis for developing measurable regional operations objectives. This relationship between regional operations objectives in the MTP and operations objectives in an RCTO is illustrated in the diagram below.

¹⁷ U.S. Department of Transportation, *Regional ITS Architecture Guidance: Developing, Using, and Maintaining an ITS Architecture for Your Region Version 2.0* (Washington, DC, 2006).

¹⁸ More information about the RCTO can be found in FHWA's document, “The Regional Concept for Transportation Operations – A Management Tool for Effective Collaboration.”

Figure 4. Relationship between the Metropolitan Transportation Planning Process and the Regional Concept for Transportation Operations



4.0 HOW TO USE OPERATIONS OBJECTIVES IN THE MTP

4.1 HOW OPERATIONS OBJECTIVES ARE APPLIED IN THE PLANNING PROCESS

As noted earlier, regional operations objectives flow out of goals established in the MTP, and provide measurements for evaluating progress toward

the goal. Within the planning process, regional operations objectives, in turn, lead to the development of performance measures, identification of system performance deficiencies, development and evaluation of M&O strategies, and inclusion of specific programs or projects in the MTP, and corresponding TIP. An example of how operations objectives are applied throughout the planning process is illustrated in the following exhibit.

Exhibit 1. Example of How Regional Operations Objectives Carry through the Planning Process

Stage of Planning Process	Examples			
Goal(s) Broadly describe what the region wants to accomplish, focused on <u>outcomes</u> .	Improved transportation system reliability and reduced unexpected traveler delay			
Regional Operations Objectives Specific measurable statements relating to the attainment of goals.	Reduce incident-based delay so that by 2010, travelers experience...	Reduce traveler delay associated with work zones, weather conditions, and special events (so that...)	Improve access to travel information (so that...)	Improve transit system reliability (so that...)
Performance Measures Metric used at a regional basis to track system-wide performance (used in developing a regional objective), or at a corridor, roadway, or intersection level to identify specific deficiencies within the system to address.	Incident duration (mean minutes per incident) Vehicle hours of non-recurring delay due to incidents	Total vehicle hours of non-recurring delay Buffer time (additional time to ensure travelers arrive at destination by intended time 95% of the time)	Public awareness of traveler information (through surveys) Public satisfaction with level of information available (through surveys)	Percentage of buses more than 5 minutes off schedule Number of rail system breakdowns/ delays
Strategies Approaches to achieve objectives. Includes system preservation, safety projects, management and operations, capacity expansion.	Traffic cameras and detection systems to identify incidents more quickly Roving incident response teams	Work zone information campaign Variable message signs to alert about alternative routes	Traveler alert system 511 Electronic real-time "next bus" information at bus stops	Increased rail inspections and maintenance GPS systems to track transit buses
Projects/Implementation Initiatives identified to carry out strategies.	Install traffic cameras on Route X (2009) Install variable message signs on Route X (2020) Implement incident Clearance Teams on Route X (2010)	Implement regional electronic notification system (2010) Develop and coordinate VMS software program (2009) Install VMS signs along key corridors (2010)	Design and implement regional 511 system (2010) Install "next bus" signage at selected bus stops (2011) Develop and coordinate regional traveler alert system	Install GPS locator system for bus system (2010) Install "Next Train" signage (2011) Provide integrated train departure/ arrival schedule for all connecting bus systems (2010)

In this example, a goal has been developed for the MTP that focuses on improving transportation system reliability and reducing unexpected traveler delays. Through a process of coordination and collaboration between operators and planners, four regional operations objectives have been identified in relation to this goal, focusing on different aspects of system reliability: incident-based delay; work zone, weather, and special event-related delay; access to travel information, and transit system reliability. Each of these regional operations objectives is built upon data that can serve as performance measures for on-going tracking of system performance. Regional decisionmakers can then identify M&O strategies to help achieve the operations objectives. Based on analysis of costs, effectiveness, and other factors, projects and programs will then be selected for inclusion in the MTP and TIP.

Role of the Congestion Management Process

Within TMAs, the Congestion Management Process (CMP) contributes to the development of the MTP as one element of systematic process of using regional operations objectives to develop performance measures, collect data, identify deficiencies, and develop strategies. The figure below illustrates more specifically the relationship between M&O and the CMP.¹⁹

While the CMP focuses on congestion, similar processes can be used throughout the MTP development to determine objectives focused on other areas, such as emergency management and transportation system connectivity.

Even in metropolitan areas that are not required to implement a CMP, the systematic process of defining congestion performance measures, identifying and analyzing congestion problems, collecting data, developing strategies, and monitoring system performance is valuable as a means to apply regional operations objectives in the investment decision-making process.

¹⁹ For more information on use of the CMP, see *A Guidebook on the Congestion Management Process in Metropolitan Transportation Planning*, which provides detail on the specific requirements of the CMP and best practices.

North Central Texas's Congestion Management Process

The North Central Texas Council of Governments (NCTCOG), the MPO for the Dallas-Fort Worth Metropolitan Area has fully integrated their congestion management process into their regional transportation planning. The area's rapid population growth has outpaced its abilities to expand the transportation system making operations and demand management strategies a top priority for transportation investments. NCTCOG's CMP provides for collecting system performance data including low-level aerial photography and monitoring the performance of the transportation system. This helps to identify freeway bottlenecks and areas needed improvement. The importance of their CMP is evident in NCTCOG's funding allocation priorities during the development of their metropolitan transportation plan. Funds are first allocated in the plan to the maintenance and operation of existing facilities. Next, they develop and allocate funding to congestion mitigation strategies aimed at improving the efficiency of existing facilities or removing trips from the system. The Dallas-Fort Worth region has adopted congestion mitigation strategies such as traffic signal and intersection improvements, freeway bottleneck removal, incident detection and response systems, park-and-ride facilities, and employer trip reduction programs.

See: <http://www.nctcog.org/trans/programs/cmp.asp>.

4.2 DEVELOPING PERFORMANCE MEASURES FOR M&O

How Operations Objectives Relate To Performance Measures

The establishment of regional operations objectives naturally leads to the development of performance measures that can be used to assess and track system performance. Performance measures are indicators of how well the transportation system is performing, and are inextricably tied to objectives. A range of performance measures may come out of the development of regional operations objectives. However, this is a somewhat iterative process, since performance measures need to be identified and data collected in order to select appropriate regional objectives that are specific and measurable.

Transit agencies have for a long time focused on a range of operations-based performance measures, such as on-time performance, vehicle-revenue miles, and cost per revenue mile. Increasingly,

MPOs, transit operators and DOTs are becoming customer-focused, which increases attention to the development of performance measures, which support regional operations objectives.

By focusing attention on system characteristics that are important to the traveling public, performance measures can help planners to focus on the day-to-day experience of transportation system users. This provides important balance in settings where planners have been exclusively focused on very long-term development of the network. With greater focus on the day-to-day characteristics of the system, the issues faced by operators, such as incident response, work-zone management, and provision of traveler information, take on greater importance. As a consequence, mid- and long-term planning will reflect greater consideration of management and operations planning and investment needs.

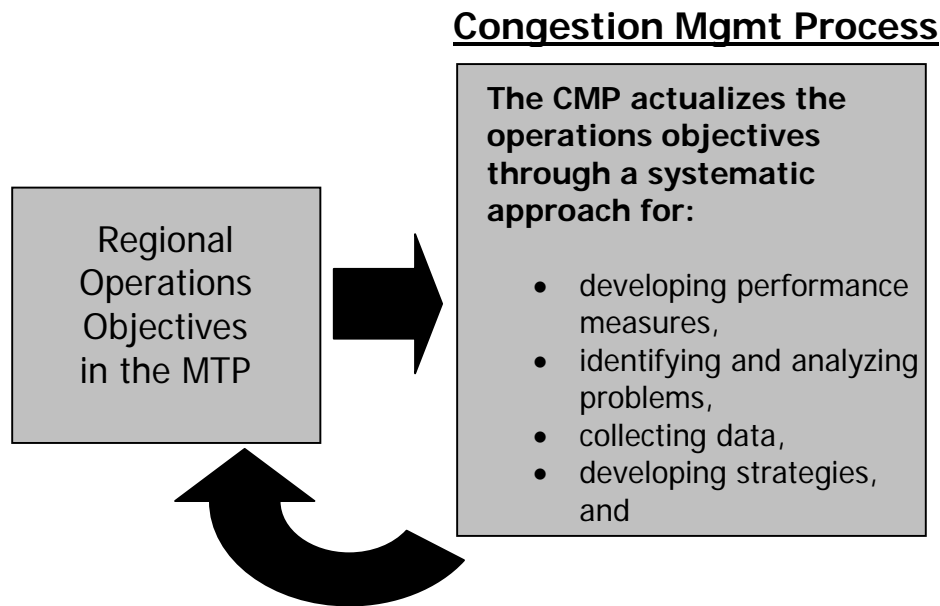
Although MPOs are generally not responsible for transportation system operations, there are several

reasons why an MPO is logically suited to playing a role in performance measurement as part of the transportation planning process: (1) It is responsible for deciding the regional investments in transportation; it's logical for it to measure how well those investments are doing; (2) It is a "neutral" observer of performance, in that most MPOs have no direct operating responsibilities.

Examples Of M&O Performance Measures

Performance measures may be used either at a system-wide scale or at a corridor or transportation facility-level in order to determine where deficiencies exist and to prioritize strategies and funding to the most critical problems. For instance, by identifying locations with the greatest recurrent and non-recurrent traffic congestion using performance measures in the CMP, an MPO can help to direct funding toward facilities with the greatest scope, extent, or duration of congestion.

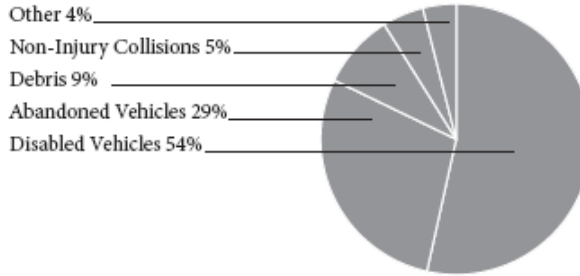
Figure 5. Relationship between Management & Operations and the CMP



Performance Measurement: An Example from WSDOT, "Measures, Markers and Mileposts," 2007.

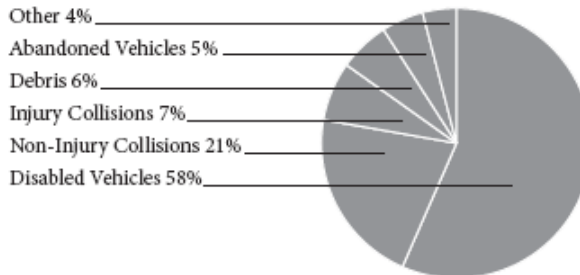
Incidents Lasting Less Than 15 Minutes (8,554)

Injury Collisions were less than 1% (not shown). There were 7 Fires and 2 Hazardous Materials involved incidents in addition to or as a result of above incidents.



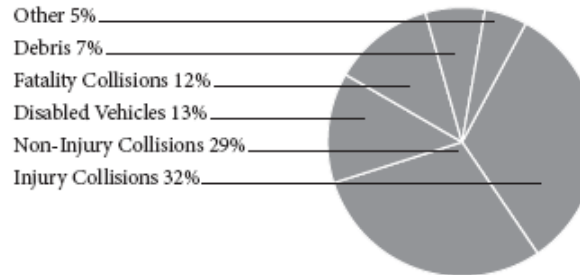
Incidents Lasting 15 to 90 Minutes (5,196)

There were 26 Fires and 9 Hazardous Materials involved incidents in addition to or as a result of above incidents.



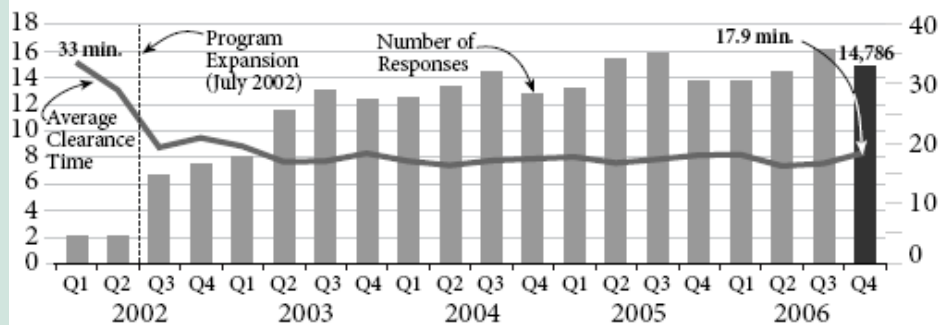
Incidents Lasting 90 Minutes and Longer (241)

There were 5 Fires and 10 Hazardous Materials involved incidents in addition to or as a result of above incidents.



Number of Responses and Overall Average Clearance Time

January 2002 - December 2006
Number in Thousands



Data Source: WSDOT Incident Response Tracking System.

Although this example comes from a State DOT, a similar approach could be applied at a regional level.

See: <http://www.wsdot.wa.gov/accountability/>.

Examples of performance measures relevant to management and operations include²⁰:

- **Travel time** – Travel time measures focus on the time needed to travel along a selected portion of the transportation system, and can be applied for specific roadways, corridors, transit lines, or at a regional level. Common travel time metrics include:
 - Average travel time, which can be measured based on travel time surveys;
 - Average travel speeds, which can be calculated based on travel time divided by segment length or measured based on real-time information collection;
 - Travel time index: the ratio of peak to non-peak travel time, which provides a measure of congestion.
- **Congestion extent** – Congestion measures can address both the **spatial** and **temporal** extent (duration). Depending on how these measures are defined and data that are collected, these measures may focus on recurring congestion or address both recurring and non-recurring congestion. Examples include:
 - Lane miles of congested conditions (defined based on volume to capacity (V/C) ratio, level of service (LOS) measures, or travel time index);
 - Number of intersections experiencing congestion (based on LOS)
 - Percent of roadways congested by type or roadway (e.g., freeway, arterial, collector)
 - Average hours of congestion per day
 - Share of peak period transit services experiencing overcrowding
- **Delay** – Delay measures take into account the amount of time that it takes to travel in excess of travel under unconstrained (ideal or freeflow) operating conditions, and the number of vehicles affected. These measures provide an indication of how problematic traffic congestion is, and can address both

recurring and **nonrecurring** congestion-related delay. Examples of delay measures include:

- Vehicle-hours of recurring delay associated with population and employment growth
- Vehicle-hours of nonrecurring delay associated with incidents, work zones, weather conditions, special events, etc.
- **Incident occurrence / duration** – Incident duration is a measure of the time elapse from the notification of an incident until the incident has been removed or response vehicles have left the incident scene, and can be used to assess the performance of service patrols and incident management systems. Incident occurrence can also be measures used to assess the performance and reliability of transit services. Examples of this measure include:
 - Median minutes from time of incident until incident has been removed from scene
 - Number of transit bus breakdowns
 - Average number of transit rail system delays in excess of X minutes
- **Travel time reliability** – Travel time reliability measures take into account the variation in travel times that occur on roadways and across the system. Examples of measures include:
 - Buffer time, which describes the additional time that must be added to a trip to ensure that travelers will arrive at their destination at, or before, the intended time 95% of the time
 - Buffer time index, which represents the percent of time that should be budgeted on top of average travel time to arrive on time 95% of the time (e.g., a buffer index of 40 percent means that for a trip that usually takes 20 minutes, a traveler should budget an additional 8 minutes to ensure on-time arrival most of the time)
 - Percent of travel when travel time is X percent [e.g., 20%] larger than average travel time.

²⁰ See NTOC “Performance Measurement Initiative – Final Report,” http://www.ntoctalks.com/ntoc/ntoc_final_report.pdf.

- **Person throughput** – Examines the number of people that are moved a roadway or transit system, which can account for efforts to improve the flow of traffic, encourage high occupancy vehicle movement, or increase seats occupied on transit. Example measures include:
 - Peak hour persons moved per lane
 - Peak hour persons moved on transit services
- **Customer satisfaction** – Examines public perceptions about the quality of the travel experience, including the efficiency of system management and operations. Customer satisfaction is typically measured through surveys and may include measures such as:
 - Percent of the population reporting being satisfied or highly satisfied with travel conditions
 - Percent of the population reporting being satisfied or highly satisfied with access to traveler information
 - Percent of the population reporting being satisfied or highly satisfied with the reliability of transit services
- **Availability of or awareness of information** – These measures focus on public knowledge of travel alternatives or traveler information.

Performance measures related to congestion will be developed through the Congestion Management Process. In the CMP, different measures of congestion may be used, addressing the scope, extent, or duration of congestion; recurring and nonrecurring congestion; and other issues related to congestion.

Incorporating performance measures relating to system reliability, incidents, and nonrecurrent delay can have an important role in changing how an MPO examines and defines its current or baseline conditions. Often, agencies describe baseline conditions as broad averages. However, such descriptions are not very useful when agencies seek to avoid transportation disruptions caused by non-recurrent congestion including special events, incidents, work zones, weather or other disturbances. Using baseline data that do not account for these common departures from average conditions

makes it difficult to assess the value of M&O such strategies. As a result, some regions are calculating the contribution of incident delay to traffic congestion and air pollution in order to better show the benefits of programs that address this form of delay.

Examples of M&O Performance Measures

North Jersey Transportation Planning Authority

The North Jersey Transportation Planning Authority (NJTPA) has selected a reliability index that compares non-recurring delay to total delay. NJTPA uses a special post-processing module to its travel demand model to help produce this indicator.

See:

www.njtpa.org/planning/strat_eval/strat_eval.html.

Boston MPO

As another example of using performance measures, the Boston MPO measures peak-period passenger crowding and on-time performance by transit line. Using data collected on the regional transit system, the Massachusetts Bay Transportation Authority (MBTA), the Boston MPO reports number of passengers per seat on transit lines in the peak period as well as the percentage of trips operating within five minutes of scheduled times.

See:

www.ctps.org/bostonmpo/resources/reports.htm.

M&O Performance Measures: Examples from Puget Sound Regional Council

The Puget Sound Regional Council, in Washington State, has proposed a range of performance measures across different modes of transportation, as shown by the examples below.

Measure	Highway	HOV	Transit	Ferries	Non-Motorized	Freight
Travel Time and Delay	<ul style="list-style-type: none"> Point-to- Point Peak Travel Time Point-to-Point Peak Congestion Delay Congestion Duration 	<ul style="list-style-type: none"> Point-to- Point Peak Travel Time Point-to-Point Peak Congestion Delay Congestion Duration 	<ul style="list-style-type: none"> Point-to-Point Peak Travel Time by Type Point-to-Point Peak Congestion Delay Congestion Duration 	<ul style="list-style-type: none"> Point-to- Point Peak Travel Time Point-to-Point Congestion Delay 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Point-to-Point Mid-day Travel Time Point-to-Point Congestion Delay
Travel Time Reliability	<ul style="list-style-type: none"> Standard Deviation of Peak Travel Time “Buffer Index”¹⁴ 	<ul style="list-style-type: none"> Standard Deviation of Peak Travel Time 	<ul style="list-style-type: none"> On-time Performance 	<ul style="list-style-type: none"> Schedule Reliability (% on-time departures and % on-time arrivals) 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Standard Deviation of Peak Travel Time “Buffer Index”
System Access	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Percent of Park and Ride Capacity Used 	<ul style="list-style-type: none"> Percent of Park and Ride Capacity Used Percent of Population within x Distance of Transit Percent of Ridership with 2 or More Transfers 	<ul style="list-style-type: none"> Percent of Park and Ride Capacity Used Percent of Peak-Period Transit Access Capacity Used Percent of Trips Require a Ferry-to-Ferry Transfer 	<ul style="list-style-type: none"> Sidewalk Completeness Bicycle Route Completeness 	<ul style="list-style-type: none">
Throughput	<ul style="list-style-type: none"> Peak Hour Person Movement 	<ul style="list-style-type: none"> Peak Hour Person Movement 	<ul style="list-style-type: none"> Peak Hour Person Movement 	<ul style="list-style-type: none"> Peak Hour Person Movement 	<ul style="list-style-type: none"> Regional Trail segments at or over capacity 	<ul style="list-style-type: none">
Crowding	<ul style="list-style-type: none"> Lane Density or Occupancy 	<ul style="list-style-type: none"> Lane Density or Occupancy 	<ul style="list-style-type: none"> Peak Hour Load Factor Lane Density (HOV or Bus Lanes) Percent of Terminal Capacity Used 	<ul style="list-style-type: none"> Boat Wait Time Percent of Terminal Capacity Used 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Lane Occupancy or Occupancy Percent of Terminal Capacity Used
Safety	<ul style="list-style-type: none"> Accident Rate 	<ul style="list-style-type: none"> Accident Rate 	<ul style="list-style-type: none"> Transit Accidents and Crimes 	<ul style="list-style-type: none"> Accident Rate 	<ul style="list-style-type: none"> Pedestrian or Bicycle Accidents or Crimes 	<ul style="list-style-type: none">

See: <http://www.psrc.org/>

Collecting Data For Performance Measures

Data is a prerequisite for the use of performance measures, and MPOs often face a struggle between the desire to measure regional performance and data limitations and cost considerations that place constraints on the extent to which performance measures can be used. At the same time, a wealth of data is currently being collected in most regions by transportation system operators that are running systems that keep track of real-time travel information. Intelligent Transportation System (ITS) components, in particular, such as toll tag readers and transponders, video detector systems, and traffic management systems that are used to provide travelers with real time travel information can be used to measure performance of the transportation system on an on-going basis.

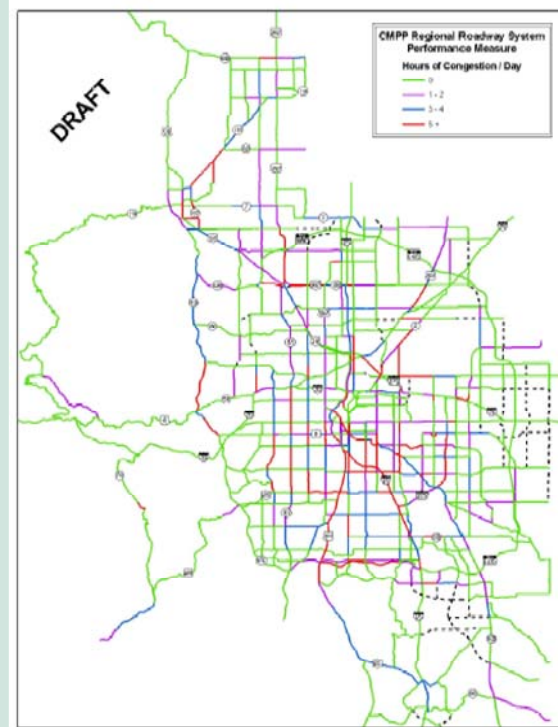
4.3 USING PERFORMANCE MEASURES FOR M&O

Identifying Deficiencies

A regional operations objective may lead to the development of not only regional performance measures, but development of performance measures that may be used at a more localized level – whether specific geographic areas or specific facilities – in order to assess deficiencies in system performance. For instance, in the CMP, a region must define what it means to have unacceptable congestion, which may vary by type of roadway functional classification and by location (e.g., a lower speed will generally be more acceptable on an urban arterial than on a rural freeway). Once performance measures are established for different types of roadways, these measures can be used at a local scale to identify the areas with the greatest congestion problems and to target strategies and investments to these areas in order to maximize the value of the investment.

For instance, as part of its CMP, the Capital Area Metropolitan Planning Organization (CAMPO), in Austin, Texas, utilizes travel-speed-related measures to identify congested locations. For roadway segments, CAMPO has defined minimum threshold acceptable speeds, based on the type of road and the type of area through which that road travels, with lower speeds more acceptable in a

Denver MPO's Use of Performance Measurements in CMP



The Denver Regional Council of Governments' (DRCOG) Congestion Management Process (CMP) involves collecting data on several performance measures for segments of the regional roadway system, including: hours of congestion/day; peak hour delay per user (in minutes), percent of peak hour travel time in delay; and travel time index (ratio of peak hour travel time to free flow travel time). These data are then used to assess areas with the most significant congestion problems, and to identify and prioritize strategies.

See: <http://www.drcog.org/index.cfm>.

central business district location than in a rural area. The East-West Gateway Coordinating Council (EWGC) in St. Louis, Missouri, used aerial photography with multiple photographs taken during three-hour a.m. and p.m. peak periods, producing traffic volume and density numbers for several time points at the same location. This information allowed EWGC to track the duration of congestion along congested links, distinguishing links with prolonged congestion from those that are congested over short portions of the peak periods.²¹

²¹ For more information, see: www.ewgateway.org/trans/transportation.htm.

A number of regions have developed systems to provide the public with real-time information on the condition of the transportation system (e.g., location and severity of delays, location and status of accidents, status of the transit network, weather-related traffic problems, and disruptions from special events). Much of this information can be evaluated to identify trends and current variation in system performance and to assess performance on specific sub-elements of the system. Agencies can examine on-going system monitoring efforts as a starting place for a performance measurement program.

Developing and Evaluating Strategies

Using performance measures leads to the identification, development, and assessment of strategies that are best geared toward achieving results. Therefore, utilizing operations objectives and related performance measures focused on issues such as reliability, travel delay, and other operating issues will naturally lead to the development of M&O strategies. Use of measurable objectives for a wide range of goals, addressing safety, security, the environment, etc. can also lead to greater attention to M&O strategies since the planning process focuses on performance, rather than looking narrowly at categories of projects, such as highways, transit, and bicycle and pedestrian projects.

Overall, efforts to focus on system performance result in better recognition of the value associated with M&O approaches. Data on system performance can highlight the value of investments in programs that minimize incident-related delays, provide information on real-time travel conditions, and improve emergency response times by showing how they can improve transportation system reliability and reduce travel times for customers. For example, information pulled from the CMP can be particularly useful in developing M&O strategies.

The limited number of tools to quantify the benefits of operational strategies is often noted as a constraint in bringing greater attention to M&O strategies. However, there are several tools available to predict the effects of operational strategies on system performance.

- Sketch planning tools, such as the ITS Deployment Analysis System (IDAS) and Screening for ITS (SCRITS). The IDAS

software works with the output of traditional transportation planning models, and enables planners to evaluate both the relative costs and benefits of ITS investments.²² SCRITS is similar in that it is intended to allow practitioners to obtain an initial indication of the possible benefits of various ITS applications. It involves a more simplified spreadsheet analysis to expedite a benefit-cost analysis.²³

- Travel demand forecasting model post-processors, such as *DYNASMART-P*. *DYNASMART-P* is a dynamic network analysis and evaluation tool, which models the evolution of traffic flows in a traffic network.²⁴
- Simulation models, which include microscopic, mesoscopic, and macroscopic applications. Microscopic models, such as *COR-SIM*, have been used for operations planning by Wisconsin DOT, Indiana DOT (INDOT), New York State DOT Region 11, New Jersey DOT, Miami-Dade County, Florida DOT, and California DOT (Caltrans). *COR-SIM* is a comprehensive microscopic traffic simulation, applicable to surface streets, freeways, and integrated networks with a complete selection of control devices (i.e., stop/yield sign, traffic signals, and ramp metering). It simulates traffic and traffic control systems using commonly accepted vehicle and driver behavior models. INDOT is using *PARAMICS* to evaluate and address future operational needs. The tool is being applied to determine future growth and design needs for I 465, I 70, and I 69 within Marion County. The City of El Paso and the University of Texas – El Paso has combined *DYNASMART-P* and *CORSIM* to evaluate downtown traffic and the environmental impacts of one-way and two-way traffic flow reconfigurations.
- Use of archived data, which allows measurement of performance before and after implementation of operations-oriented projects.

²² For more information, see: <http://idas.camsys.com/>.

²³ For more information, see: <http://www.fhwa.dot.gov/steam/scrits.htm>.

²⁴ For more information, see: <http://www.dynasmart.umd.edu/>.

It is important to note that the process of bringing operations stakeholders to the table with a focus on M&O in the planning process can help to identify strategies that are already being implemented or considered by operating agencies but which may have never before appeared in the MTP.

4.4 SELECTING M&O STRATEGIES AND PROJECTS

M&O strategies may be implemented as “stand alone” projects, such as a regional incident management system, traveler information system, or transit smart card. They can also be implemented as part of transportation preservation projects, safety projects, or capacity improvements. It may be useful to consider M&O strategies in connection with any transportation investment in the Plan. For instance, as part of any new highway expansion, it may be useful to consider the role of transportation pricing, high-occupancy vehicle lanes, flexible design to accommodate concurrent flows of traffic, or demand management programs during the construction period. Applying regional operations objectives therefore can also affect the

specific project parameters, as the project moves from planning through more detailed project development and design.

The Miami RUSH Program

Miami's RUSH (Resourceful Use of Streets and Highways) addresses congestion bottlenecks that do not justify a full corridor study. Projects that cost less than \$500,000 and that are determined to have insignificant environmental impacts are prioritized by member agencies. A lump sum of TIP money is set aside for projects that will be selected through the RUSH process, allowing for swift implementation of the designated improvements.

See: <http://www.miamidade.gov/mpo/m9-plan-tip.htm>

Strong consideration of M&O strategies in the MTP will naturally lead to M&O programs and projects that appear in the MTP and in the Transportation Improvement Program (TIP). The TIP will contain M&O projects that carry out the regional operations objectives. As noted earlier, a Regional Concept of Transportation Operations (RCTO) can also be developed as a result of the identification of regional operations objectives and strategies in the MTP.

5.0 OUTCOMES

5.1 THE RESULTING MTP AND TIP

The metropolitan transportation plan is developed through a coordinated process between local jurisdictions, agencies, and the public, in order to develop regional solutions to transportation needs. By institutionalizing an objectives-driven, performance based planning process incorporating M&O strategies into the MTP, involving a range of stakeholders, the planning process will continue to evolve to reflect the growing challenges of metropolitan transportation planning. The MTP that results from this process will clearly address management and operations of the transportation system. It should include:

- A vision, goals and objectives that address management and operations;
- Measurable objectives that allow the region to track progress toward achieving its goals;
- Clear strategies for M&O, backed by specific performance measures for evaluation.

The MTP should include discussion of M&O goals, objectives, and strategies, but this can be structured in different ways. Typically, the MTP may contain a section on M&O goals, objectives, and strategies. However, M&O does not need to be discussed in a stand-alone section of the document.

The resulting M&O aspects of the MTP will:

- Be performance-focused, rather than solely project-focused;
- Address non-recurring congestion, in addition to recurring;
- Identify regionally important M&O strategies that are applied in the region, regardless of funding source;
- Include strategies addressing both short-term and long-term system performance.

The results of this entire process will be seen in improved regional transportation system performance and less urban congestion.

5.2 ON-GOING MONITORING AND EVALUATION

Incorporating operations objectives in the MTP can provide better information to customers and stakeholders on the progress being made toward desired goals and objectives, and can therefore, serve to make long-range plans more “real” to the public. Performance measures in the MTP can then be used by the MPO to report regularly on the performance of the metropolitan transportation system (e.g., an annual performance report).

Periodic performance reports provide an excellent mechanism to make M&O more relevant to everyday experience. A number of MPOs, transit operators and State DOTs use performance reports to inform decisionmakers about the trends in system performance.

Such reports inform transportation planning in a number of ways:

- One, they provide a realistic view of system performance improvements achievable through management and operations investments.
- Second, they provide operations managers with guideposts and goals that provide some measure of how operations programs are contributing to the long-term goals of the system.
- Third, they support policy that is realistic about system constraints and that supports the role of management and operations in maintaining acceptable transportation performance.

Agencies that report performance measures in a quarterly or annual performance report encourage a sustained communications link between planning and operations staffs. There are many cases where a particular activity or project requires temporary coordination or exchange between planners and operators, but sustaining such communication is critical for changing the everyday perspective of these departments to routinely consider operations tools within the planning process. Routine, sustained, performance reporting is therefore, particularly valuable.

Examples of Performance Reports:

The Mid-Region Council of Governments

(MRCOG), the MPO for the Albuquerque metropolitan area, demonstrates the region's transportation system performance through traffic flow maps, a list of the top 25 most congested intersections, and an annual publication called Local Motion. This performance information is available to the public on MRCOG's website and is intended to educate the public, the staff of local governments, and elected officials. Local Motion summarizes continuously collected traffic count data on freeways, arterials, and collector streets. Every three years, Local Motion includes a report card for the area's transportation system to assist in developing the long-range Metropolitan Transportation Plan. The report card rates the system based on criteria that relate to management and operations such as emergency vehicle response time, congestion levels, and miles of roadway with ITS coverage. Additionally, the traffic flow maps depict the annual average weekday traffic volumes. As a result of these performance reports, transportation officials and the public are able to evaluate the success of existing programs and target future projects accordingly.

See: http://www.mrcog-nm.gov/documents_online.htm.

The North Central Texas Council of Governments

(NCTCOG), the MPO for the Dallas-Fort Worth region, used data on system performance to develop an annual performance report to the MPO board. The performance report presented a forthright statement to local officials about the significant transportation, air quality, and funding constraints facing the region. The performance report helped local officials appreciate the important place of M&O strategies in the regional transportation vision.

Measurement of performance in terms of incident-based delay also yielded other positive impacts in the planning process in the Dallas-Fort Worth Region. Although many regions that struggle with air quality issues do not consider the delay (and associated pollution) caused by incidents when estimating vehicle emissions, NCTCOG measured the contribution of incident delay to regional emissions. As a result, the MPO was able to take credit in its air quality conformity analysis for emissions reductions resulting from a successful incident response program.

See: <http://www.nctcog.org/trans/outreach/stateofregion/>.

5.3 OVERALL BENEFITS

Not only will the regional transportation system see direct benefits through improved performance

and less urban congestion, but broader benefits will be realized through a transportation planning process that is objectives-driven and performance-based. Specifically, an MPO may also expect additional benefits and results, such as:

- Clearer links between the MTP and the TIP, which often includes short-term projects focused on operations. A MTP may identify funding sources that can be set aside for projects that will be selected in more short-range planning analyses to address congestion and reliability issues.
- Stronger links between transportation planning and the NEPA process – An objectives-driven, performance-based planning process offers potential to strengthen the project development process and review of transportation projects. Specifically:
 - By clearly articulating regional goals and objectives, this can help to ensure that infrastructure projects in the MTP have a clearly identified purpose and need.
 - Moreover, since the approach places increased attention on M&O strategies, it will inherently involve stronger consideration of TSM alternatives to projects.
 - By considering M&O strategies in connection with infrastructure projects, this may help to shape project decisions as the project moves from planning through project development and design. For instance, as part of any new highway expansion, M&O strategies such as transportation pricing, development of high-occupancy vehicle lanes, or flexible design to accommodate concurrent flows of traffic can be put forward and incorporated into the proposed project alternatives.
- Improved ability to meet customer needs in the short-run and long-run, rather than just focusing on long-term needs.
- Improved ability to meet a range of regional goals, as M&O strategies help to address safety, security, mobility, recurring and non-recurring congestion, and other issues.

6.0 SELF-ASSESSMENT

The purpose of this section is to provide metropolitan planning organizations (MPOs) a tool with which they may make their own self-assessment of the degree to which they are accomplishing the aims of this guidebook.

This self-assessment is focused on the management and operations thinking required by SAFETEA-LU. It is not a comprehensive tool covering all aspects of MPO transportation planning, but will help clarify the areas of opportunity and linkage need.

1. An objectives-driven, performance-oriented approach to inclusion of operations strategies in the planning process.	
a.	List the potential partners and stakeholders that should be involved in thinking about operations in the metropolitan transportation plan (MTP)?
	1) State DOT(s):
	2) Jurisdictional transportation agencies:
	3) Transit agency(ies):
	4) Independent authorities (sea/airport, tunnel, turnpike, etc.):
	5) Freight operators:
	6) Rail operators:
	7) Business community (e.g., chambers of commerce, tourism)”
	8) Public safety (police and fire/rescue):
	9) Others:
b.	Describe the institutional mechanisms for engaging – and sustaining the engagement – of the operating agencies? For example:
	1) Representation on the policy-making board:
	2) An operations committee:
	3) Collaboration with an independent operations coordinating body:
	4) Other:

1.	An objectives-driven, performance-oriented approach to inclusion of operations strategies in the planning process.
c.	How do you ensure that a balanced (planning and operations) perspective is offered to the decision-makers?
d.	Have you incorporated the Congestion Management Process (CMP) into the overall development of your plan? How?
e.	Has ITS architecture been related to M&O within the planning process? How?
f.	In developing regional goals, has system management and operation been considered? If so, how?
g.	How did you develop your operations objectives/strategies? Was the operations community (and other stakeholders) involved?
h.	Have you compiled an inventory of current management and operations strategies in effect within the region, including those that are not traditionally incorporated into the MTP planning process?

2.	Objectives-driven, performance oriented operational strategies in the metropolitan transportation plan (MTP).
a.	Does your plan identify M&O goal(s) (desired end state(s)) supported by measurable objectives? What is it or are they?
b.	Does your plan clearly identify operational strategies in a manner that lets decision-makers clearly see the level of investment? If so, how?
c.	Are investment decisions included within the plan based on the best combinations of capital investments and operations strategies (performance-based planning)? What procedure was used to evaluate mix?
d.	Has the plan clearly prioritized the implementation of regional operations objectives?

3.	Plan execution with respect to M&O strategies
a.	What are your mechanisms for measuring performance of M&O goals/objectives?
b.	Are the necessary data collection methods in place?
c.	Are real-time and archived data shared, linked, and made accessible to system managers and delivered to system users?
d.	Have current operations conditions been adequately assessed to form a baseline?
e.	Do you have a process for informing the public on progress of MTP toward its goals and objectives on a regular basis?

A. M&O IN THE METROPOLITAN TRANSPORTATION PLANNING PROCESS – GETTING STARTED

- 1. Making the case to MPO decisionmakers (see Appendix B for further discussion)**
 - a. Identify the key regional challenges (e.g., congestion)
 - b. Identify the constraints (e.g., funding, environmental) on traditional capital investment
 - c. Gain policy agreement on pursuing M&O options for MTP and TIP
- 2. Developing internal MPO leadership and advocacy for M&O**
 - a. Design a structure appropriate to your MPO that establishes advocacy within the decision making process (e.g., an M&O Policy Committee and/or an M&O Technical Committee)
 - b. Ensure the full range of necessary stakeholders are at the table and invested in the effort
 - c. Develop a mechanism to allow for continual participation in the iterative process, which can help institutionalize the consideration of M&O
- 3. Gaining regional participation in integrating M&O into planning**
 - a. Coordinate with transportation operators in the region to develop an M&O subcommittee or group that will build consensus on the direction for operations in the region
 - b. Utilize regional actors to obtain operations data to support development and evaluation of M&O strategies in order to identify what data is currently being collected in the region and what data collection devices are available
- 4. Incorporating M&O into regional transportation goals and objectives**
 - a. Engage key operations participants in the region in developing the regional goals and objectives during the MTP process, including State DOT, local DOT, transit, public safety, etc.
 - b. Ensure objectives meet the “SMART” criteria: specific, measurable, agreed-upon, realistic, and time-sensitive
 - c. Include measurements of actual system performance, like travel time, reliability, and incidence of non-recurring congestion, in the planning process to inform decision-making
- 5. Incorporating M&O objectives-based performance measurement into the planning process**
 - a. Conduct assessment of operations data collection
 - b. Decide on operations objectives through the regional M&O group based on current data availability
 - c. Develop procedures for measuring performance
 - d. Utilize the CMP, if applicable to your MPO, to inform performance measurement
 - e. Identify strategies for achieving operations objectives and include objectives in long-range plan
- 6. Evaluate regional progress towards M&O goals and objectives**
 - a. Collect baseline data for new objectives.

- b. Identify and use tools to evaluate the impacts of operations improvements.
- c. Develop a method to allocate funding to M&O projects. This may be done by competing M&O projects against all other types of projects or the M&O projects may compete against each other for funding allocated through a line item reserved for M&O projects.
- d. Be sure to include discussion of M&O strategies that are funded by state, regional and local transportation agencies, even without use of Federal funding, in the MTP.

B. UNDERSTANDING THE COMMUNICATIONS AND INFORMATION NEEDS OF ELECTED OFFICIALS FOR TRANSPORTATION PLANNING AND OPERATIONS

There are over 100,000 State and local elected officials in the United States, ranging from governors to village selectmen. There are tens of thousands of appointed officials who are key to the transportation perspective of the elected officials. The challenge is how to communicate to State and local decision-makers emerging transportation planning and operations concepts. The premise of this paper²⁵ is that effective communications must be built on knowing who the players are, understanding the context in which they operate, and identifying some principles to consider when designing outreach strategies.

State and Local Transportation Decisionmakers

- **State level** – Elected officials include governors and State legislators. Appointed officials typically include secretaries of transportation, commissioners, and often some form of State transportation board.
- **Local level** – Mayors (or whatever the chief local elected official may be called) range from “strong” mayors in major cities where they are the chief executive officers to “weak” mayors in most cities and towns that operate on a “council-manager” form of governance. In these cases, the city or town manager is usually the CEO. Additionally, there will be a council of some sort. Appointed officials typically include a director of transportation or public works.

Environment in Which Elected Officials Operate

Elected officials...

- represent constituencies.

“I am elected from a place, by its people. My job is to speak up for their interests and concerns. It’s that simple.”

- *John G. Milliken, former member of Arlington Board and Secretary of Transportation (Virginia)*

- must be sensitive to fulfilling the promises or commitments made in their campaign.
- are sensitive to the process, tend to abide by the ‘rules of the road’ for their organization.
- are dependent on staff.

“The chair of the legislative committee has great power. The chair controls the agenda, the testimony, and the amount of time allotted to the issue. Committee members defer to the chair and it is rare the chair does not prevail.”

- *Thomas D. Rust, Member, House of Delegates, Virginia*

- live in an arena of competing imperatives – economic development vs. environmental and quality of life issues, the “American dream” vs. sprawl, social needs vs. school needs vs. transportation needs, and so on.

“Local elected officials must manage public expectations about transportation. We walk a fine line between almost unlimited public demand for unfettered mobility on the one hand, and very limited public support for increased tax revenue with which to finance these improvements on the other. In addition, achieving a public consensus about best solutions to congestion is riven with the challenges of NIMBY-ism, smart growth resistance, and roads vs. transit debate. It is a painful conundrum.”

- *Gerry Connolly, Chairman, Fairfax County Board of Supervisors, Virginia*

- tend to be respectful of colleagues’ turf
- recognize that inter-personal relationships are usually the key to getting things done have some particular area of interest – affordable housing, social services, education, etc.

²⁵ Drawn from a white paper, “Understanding the Communications and Information Needs of Elected Officials for Transportation Planning and Operations,” by John Mason, Science Applications International Corporation, for the Federal Highway Administration

- have limited time in which to address any specific issue.
- like to be given credit and recognition for successful projects, programs or solutions.
- are extremely sensitive to fiscal constraints; virtually all decry the growing shortfalls.
- prefer “plain speak.”

“Have you often asked yourself, ‘Who were those guys and what did they say?’ The most frustrating part of an elected official’s job is to listen to a presentation by a group of engineers, planners, or other highly technical individuals, who use their own language, often filled with acronyms, technical terms, and other professional forms of communication. These dynamics tend to create an environment that can prevent elected officials from taking a proverbial leap of faith to acceptance.”

- *Randall Morris, Commissioner of Seminole County, Florida*

And, finally, elected officials like to get re-elected.

Communicating with Elected Officials

Political reasons why elected officials get involved

- Issue is of particular interest to elected official’s party or constituency group.
- Involvement affords opportunity to become a leader with legislative body Engagement may afford opportunity for alignment(s).
- Issue may be high visibility, has potential for media coverage.
- Constituents will perceive elected official is doing important work.

Personal reasons why elected official may become involved

- Keen personal interest.
- Desire to tackle tough or relevant challenge.
- Enhanced knowledge of an issue.
- Response to concerns raised by personal friend, political advisor, or family.

Factors that affect decisionmakers decisions:

- Merits/Content of a recommendation – germane and relevant.

- How the issue is framed – framed in a manner that is relevant to elected official and his/her role.
- Timing of proposal – need time for reflection and consultation with others Reality check – a recognition of the reality in which the specific official operates.
- Form of message – what form selected, information must be concise and easily absorbed.
- Who delivers the message – absolutely critical. Peers in whom the elected/appointed official has confidence are often the best messenger.

Outreach Principles to Consider

- Understand and appreciate the environment in which elected officials operate.
- Identify the key leaders and champions relevant to the issue being pursued.

“Three key points need to be made in any communication: 1) What action do you want me to take? 2) Why should I support this action? And 3) How does it impact my constituents?”

- *Sarah Siwek, President of Sarah J. Siwek and Associates*

- Appreciate that elected/appointed officials are heavily influenced by peers.
- Express issues and recommendations in a manner that will be relevant and understood by elected officials.

“First, do your research. To communicate effectively with elected officials, start by identifying why they should care. Understand their perspectives and the issues in the area they represent. Maybe they have congestion of a major arterial in their district. Perhaps safety is a key concern for their community. By making clear connections to the issues they face, elected officials will be more likely to respond positively.”

- *Anne Canby, President, Surface Transportation Policy Project*

- Consider how local elected officials can leverage funds.

“What impresses members of the General Assembly is how you can leverage public funds.”

- *Whittington W. Clement, Secretary of Transportation, Virginia*

- Design a path that may include key advisory staff and/or the associations within which the elected official operates.
- Don't wait until an issue is critical to establish a relationship with key decisionmakers. It is important to have ongoing, credible relationships.

- Recognize that key staff members influence both substance and the process.

“Working with gatekeepers is necessary and crucial to securing the desired support from elected officials.”

- *Sarah Siwek, President of Sarah J. Siwek and Associates*

- Be realistic and forthright.
- Appreciate the need for short term products or deliverables.
- Listen to them!

C. ACRONYMS

Selected Acronyms of Regional Transportation Planning Terms, including Management & Operations

AASHTO. American Association of State Highway and Transportation Officials

AMPO. Association of Metropolitan Planning Organizations

CMP. Congestion Management Process

CMS. Congestion Management System

CORSIM. Corridor Simulation software

DOT. Department of Transportation

EMS. Emergency medical service

FHWA. Federal Highway Administration

FTA. Federal Transit Administration

DYNASMART. Dynamic network simulation and analysis tool

IDAS. ITS Deployment Analysis System

ITS. Intelligent Transportation System

LOS. Level of service

M&O. Management and operations

MPO. Metropolitan Planning Organization

MTP. Metropolitan Transportation Plan

PARAMICS. Parallel Microscopic Traffic Simulator

RCTO. Regional Concept for Transportation Operations

SAFETEA-LU. Safe Accountable Flexible Efficient Transportation Equity Act: A Legacy for Users

SCRITS. Screening for ITS

TMA. Transportation management area

TDM. Transportation demand management

TIP. Transportation Improvement Program

TSM. Transportation system management

TSMO or TSM&O. Transportation system management and operations

D. GLOSSARY

Selected Glossary of Regional Transportation Planning Terms, including Management & Operations

Administrative modification. A minor revision to a long-range statewide or metropolitan transportation plan, transportation improvement program (TIP), or statewide transportation improvement program (STIP) that includes minor changes to project/project phase costs, minor changes to funding sources of previously-included projects, and minor changes to project/project phase initiation dates.

An administrative modification is a revision that does not require public review and comment, redemonstration of fiscal constraint, or a conformity determination (in nonattainment and maintenance areas).
[23 CFR 450.104.]

Amendment [to plan or STIP/TIP]. A revision to a long-range statewide or metropolitan transportation plan, TIP, or STIP that involves a major change to a project included in a metropolitan transportation plan, TIP, or STIP, including the addition or deletion of a project or a major change in project cost, project/project phase initiation dates, or a major change in design concept or design scope (e.g., changing project termini or the number of through traffic lanes).

Changes to projects that are included only for illustrative purposes do not require an amendment. An amendment is a revision that requires public review and comment, redemonstration of fiscal constraint, or a conformity determination (for metropolitan transportation plans and TIPs involving “non-exempt” projects in nonattainment and maintenance areas). In the context of a long-range statewide transportation plan, an amendment is a revision approved by the State in accordance with its public involvement process. [23 CFR 450.104.]

Annual listing of obligated projects. A required listing of all projects and strategies listed in the transportation improvement program (TIP) for which Federal funds were obligated during the immediately preceding program year.

The development of the annual listing “shall be a cooperative effort of the State, transit operator, and MPO.” SAFETEA-LU gave special emphasis to listing two project types - investments in pedestrian walkways and bicycle transportation facilities, to ensure they are not overlooked. The listing shall be consistent with the funding categories identified in each metropolitan transportation improvement program (TIP).
[SAFETEA-LU, 23 U.S.C. 134(j)(7)(B), 23 U.S.C. 135(g)(4)(B), 49 U.S.C. 5303(j)(7)(B), and 49 U.S.C. 5304(g)(4)(B) as described in FTA/FHWA Preliminary Guidance on Annual Listing of Obligated Projects, February 28, 2006, <http://www.fhwa.dot.gov/HEP/annualistatt.htm>.]

Attainment area. Any geographic area in which levels of a given criteria air pollutant (e.g., ozone, carbon monoxide, PM10, PM2.5, and nitrogen dioxide) meet the health-based National Ambient Air Quality Standards (NAAQS) for that pollutant.

An area may be an attainment area for one pollutant and a nonattainment area for others. A “maintenance area” (see definition below) is not considered an attainment area for transportation planning purposes. [23 CFR 450.104.]

Collaboration. Any cooperative effort between and among governmental entities (as well as with private partners) through which the partners work together to achieve common goals.

Such collaboration can range from very informal, ad hoc activities to more planned, organized and formalized ways of working together. The collaborative parties work toward mutual advantage and common goals. They share a sense of public purpose, leverage resources to yield improved outcomes, and bridge traditional geographic, institutional, and functional boundaries. Collaboration leads to improved understanding of the ways various levels of government interact and carry out their roles and responsibilities. The resulting effect frequently streamlines

operations and enhances quality of life for residents of the localities involved.

[Public Technology, Inc., January 2003, Crossing Boundaries – On the Road to Public-Private Partnerships. Note: Inserted phrase “through which the partners work together to achieve common goals” for clarity.]

Conformity. A Clean Air Act (42 U.S.C. 7506(c)) requirement that ensures that Federal funding and approval are given to transportation plans, programs and projects that are consistent with the air quality goals established by a State Implementation Plan (SIP).

Conformity, to the purpose of the SIP, means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the NAAQS. The transportation conformity rule (40 CFR part 93) sets forth policy, criteria, and procedures for demonstrating and assuring conformity of transportation activities. [23 CFR 450.104.]

Congestion management process (CMP). A systematic approach to addressing congestion through effective management and operation.

A systematic approach required in transportation management areas (TMAs) that provides for effective management and operation, based on a cooperatively developed and implemented metropolitan-wide strategy, of new and existing transportation facilities eligible for funding under title 23 U.S.C., and title 49 U.S.C., through the use of operational management strategies. [23 CFR 450.104.]

Congestion management system (CMS). A systematic and regionally accepted approach for managing congestion that provides accurate, up-to-date information on transportation system operations and performance and assesses alternative strategies for congestion management that meet State and local needs.

[23 CFR 500.109.]

Through SAFETEA-LU, the congestion management system has been replaced by the congestion management process. According to SAFETEA-LU, under certain conditions the congestion management system may constitute the congestion management process.

[23 U.S.C. 135 (i).]

Consideration. One or more parties takes into account the opinions, action, and relevant information from other parties in making a decision or determining a course of action.

[23 CFR 450.104.]

Consultation. One or more parties confer with other identified parties in accordance with an established process and, prior to taking action(s), consider the views of the other parties and periodically inform them about action(s) taken.

This definition does not apply to the “consultation” performed by the States and the MPOs in comparing the long-range statewide transportation plan and the metropolitan transportation plan, respectively, to State and Tribal conservation plans or maps or inventories of natural or historic resources (see § 450.214(i) and § 450.322(g)(1) and (g)(2)). [23 CFR 450.104.]

Cooperation. The parties involved in carrying out the transportation planning and programming processes work together to achieve a common goal or objective.

[23 CFR 450.104.]

Coordinated public transit-human services transportation plan. Locally developed, coordinated transportation plan that identifies the transportation needs of individuals with disabilities, older adults, and people with low incomes, provides strategies for meeting those local needs, and prioritizes transportation services for funding and implementation.

[23 CFR 450.104.]

Proposed projects under three separate FTA formula funding programs (Special Needs of Elderly Individuals and Individuals with Disabilities, Job Access and Reverse Commute, and New Freedom) must be derived from a locally developed public transit-human services transportation plan. This plan must be developed through a process that includes representatives of public, private, and non-profit transportation and human services providers, as well as the public. An areawide solicitation for applications for grants under the latter two programs above shall be made in cooperation with the appropriate MPO.

[SAFETEA-LU, Sections 3012, 3018, and 3019.]

Coordination. Cooperative development of plans, programs, and schedules among agencies and entities with legal standing and adjustment of such plans, programs, and schedules to achieve general consistency, as appropriate.

[23 CFR 450.104.]

Financially constrained or fiscal constraint. The metropolitan transportation plan, TIP, and STIP includes sufficient financial information for demonstrating that projects in the metropolitan transportation plan, TIP, and STIP can be implemented using committed, available, or reasonably available revenue sources, with reasonable assurance that the federally supported transportation system is being adequately operated and maintained.

For the TIP and the STIP, financial constraint/fiscal constraint applies to each program year. Additionally, projects in air quality nonattainment and maintenance areas can be included in the first two years of the TIP and STIP only if funds are “available” or “committed.” [23 CFR 450.104.]

Goals. Generalized statements that broadly relate the physical environment to values.

[FHWA Transportation Planning Capacity Building Glossary.
[http://www.planning.dot.gov/glossary.asp.](http://www.planning.dot.gov/glossary.asp)]

Intelligent transportation system (ITS). Electronics, communications, and information processing used singly or integrated to improve the efficiency or safety of surface transportation.

[U.S. Department of Transportation, *Regional ITS Architecture Guidance – Developing, Using, and Maintaining an ITS Architecture for Your Region*, Version 2.0, July 6, 2006.]

Intermodal. The ability to connect, and the connections between, modes of transportation.

[[http://www.planning.dot.gov/glossary.asp.](http://www.planning.dot.gov/glossary.asp)]

ITS architecture. Defines a framework within which interrelated systems can be built that work together to deliver transportation services.

An ITS architecture defines a framework within which interrelated systems can be built that work together to deliver transportation services. It defines how systems functionally operate and the

interconnection of information exchanges that must take place between these systems to accomplish transportation services. [U.S. Department of Transportation, *Regional ITS Architecture Guidance – Developing, Using, and Maintaining an ITS Architecture for Your Region*, Version 2.0, July 6, 2006. Combines definitions of “architecture” and “ITS architecture.”]

Long-range transportation plan (LRTP). A document resulting from regional or statewide collaboration and consensus on a region or state’s transportation system, and serving as the defining vision for the region’s or state’s transportation systems and services.

A document resulting from regional or statewide collaboration and consensus on a region or state’s transportation system, and serving as the defining vision for the region’s or state’s transportation systems and services. In metropolitan areas, the plan indicates all of the transportation improvements scheduled for funding over the next 20 years. It is fiscally constrained, i.e., a given program or project can reasonably expect to receive funding within the time allotted for its implementation. [FHWA Transportation Planning Capacity Building Glossary.
[http://www.planning.dot.gov/glossary.asp.](http://www.planning.dot.gov/glossary.asp)]

Maintenance. In general, the preservation (scheduled and corrective) of infrastructure.

The preservation of the entire highway/transit line, including surface, shoulders, roadsides, structures, and such traffic-control devices as are necessary for safe and efficient utilization of the highway/transit line. [23 U.S.C. 101(a). Added transit line to the definition.]

Maintenance area. Any geographic region of the United States that the EPA previously designated as a nonattainment area for one or more pollutants pursuant to the Clean Air Act Amendments of 1990, and subsequently redesignated as an attainment area subject to the requirement to develop a maintenance plan under section 175A of the Clean Air Act, as amended.

[23 CFR 450.104.]

Management and operations (M&O). See transportation systems management and operations.

Management system. A systematic process, designed to assist decisionmakers in selecting cost

effective strategies/actions to improve the efficiency or safety of, and protect the investment in the nation's infrastructure.

A management system can include: Identification of performance measures; data collection and analysis; determination of needs; evaluation and selection of appropriate strategies/actions to address the needs; and evaluation of the effectiveness of the implemented strategies/actions. [23 CFR 450.104.]

Metropolitan planning area. The geographic area in which the metropolitan transportation planning process required by 23 U.S.C. 134 and Section 8 of the Federal Transit Act (49 U.S.C. app. 1607) must be carried out.

[FHWA Transportation Planning Capacity Building Glossary.
<http://www.planning.dot.gov/glossary.asp>.]

Metropolitan planning organization (MPO). The policy board of an organization created and designated to carry out the metropolitan transportation planning process.

[23 CFR 450.104.]

Regional planning body, required in urbanized areas with a population over 50,000, and designated by local officials and the governor of the state. Responsible, in cooperation with the state and other transportation providers, for carrying out the metropolitan transportation planning requirements of federal highway and transit legislation. Formed in cooperation with the state, develops transportation plans and programs for the metropolitan area. For each urbanized area, a Metropolitan Planning Organization (MPO) must be designated by agreement between the governor and local units of government representing 75% of the affected population (in the metropolitan area), including the central city or cities as defined by the Bureau of Census, or in accordance with procedures established by applicable state or local law. [23 U.S.C. 134(b)(1) and Federal Transit Act of 1991 Sec. 8(b)(1).]

Metropolitan transportation plan (MTP). The official multimodal transportation plan addressing no less than a 20-year planning horizon that is developed, adopted, and updated by the MPO

through the metropolitan transportation planning process.

[23 CFR 450.104.]

Multimodal. The availability of transportation options using different modes within a system or corridor.

[FHWA Transportation Planning Capacity Building Glossary.
<http://www.planning.dot.gov/glossary.asp>.]

National ITS Architecture (also "national architecture"). A common framework for ITS interoperability.

The term "national architecture" means the common framework for interoperability that defines--(A) the functions associated with intelligent transportation system user services; (B) the physical entities or subsystems within which the functions reside; (C) the data interfaces and information flows between physical subsystems; and (D) the communications requirements associated with the information flows. [SAFETEA-LU Section 5310.] The National ITS Architecture is maintained by the United States Department of Transportation (DOT) and is available on the DOT web site at <http://www.its.dot.gov>.

Nonattainment area. Any geographic region of the United States that has been designated by the EPA as a nonattainment area under Section 107 of the Clean Air Act for any pollutants for which a National Ambient Air Quality Standard exists.

[23 CFR 450.104.]

Areas of the country where air pollution levels persistently exceed the National Ambient Air Quality Standards may be designated nonattainment. EPA uses six criteria pollutants [ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter, and lead] as indicators of air quality, and has established for each of them a maximum concentration above which adverse effects on human health may occur. These threshold concentrations are called National Ambient Air Quality Standards (NAAQS).

[The Environmental Protection Agency, The Green Book,

<http://www.epa.gov/air/oaqps/greenbk/>. March 15, 2006. Names of the pollutants added to definition.]

Objectives. Specific, measurable statements related to the attainment of goals.

[FHWA Transportation Planning Capacity Building Glossary.
<http://www.planning.dot.gov/glossary.asp>.]

Obligated projects. Strategies and projects funded under title 23 U.S.C. and title 49 U.S.C. Chapter 53 for which the supporting Federal funds were authorized and committed by the State or designated recipient in the preceding program year, and authorized by FHWA or awarded as a grant by the FTA.

[23 CFR 450.104.]

Operational and management strategies.

Actions and strategies aimed at improving the performance of existing and planned transportation facilities to relieve congestion and maximizing the safety and mobility of people and goods.

[23 CFR 450.104.]

Operational concept [in ITS architecture]. An operational concept identifies the roles and responsibilities of participating agencies and stakeholders.

It defines the institutional and technical vision for the region and describes how the system will work at very high-level, frequently using operational scenarios as a basis. [U.S. Department of Transportation, *Regional ITS Architecture Guidance – Developing, Using, and Maintaining an ITS Architecture for Your Region*, Version 2.0, July 6, 2006.]

Operations. See Transportation Systems Management and Operations.

Operations and maintenance (O&M). The range of activities and services provided by a transportation agency and the upkeep and preservation of the existing system.

Specifically, operations includes the range of activities/services provided by transportation system agencies or operators (routine traffic and transit operations, response to incidents/accidents, special events management, work zone traffic management, etc; see “Operations”). Maintenance relates to the

upkeep and preservation of the existing system (road, rail and signal repair, right-of-way upkeep, etc; see “Maintenance”).

Operations objective. The operations objective expresses the desired outcome that can be achieved by the partners through operations strategies.

In the context of an RCTO, it is multi-jurisdictional in nature. It should be specific, measurable, agreed upon by the partners, realistic, and time-bound. [U.S. Department of Transportation, Regional Concept for Transportation Operations: A Management Tool for Effective Collaboration, Draft Version, January 5, 2007.]

Participation plan. MPOs must develop and utilize a “Participation Plan” that provides reasonable opportunities for interested parties to comment on the content of the metropolitan transportation plan and metropolitan TIP. This “Participation Plan” must be developed “in consultation with all interested parties.”

[23 U.S.C. 134(j)(5)(B) and 49 U.S.C. 5303(I)(5)(B).]

Performance measurement. A process of assessing progress toward achieving predetermined goals.

Performance measurement is a process of assessing progress toward achieving predetermined goals, including information on the efficiency with which resources are transformed into goods and services, the quality of those outputs (how well they are delivered to clients and the extent to which clients are satisfied) and outcomes (the results of a program activity compared to its intended purpose), and the effectiveness of government operations in terms of their specific contribution to program objectives.[Transportation Research Board, *Performance Measures of Operational Effectiveness for Highway Segments and Systems – A Synthesis of Highway Practice*, NCHRP Synthesis 311; Washington, DC; 2003.]

Performance measures. Indicators of transportation system outcomes with regard to such things as average speed, reliability of travel, and accident rates.

Used as feedback in the decisionmaking process. [FHWA Transportation Planning Capacity Building Glossary. <http://www.planning.dot.gov/glossary.asp>. Substituted the word “outcomes” for “performing.”]

Planning factors. A set of broad objectives defined in Federal legislation to be considered in both the metropolitan and statewide planning process.

Both SAFETEA-LU and its predecessors, TEA-21 and ISTEA, identify specific factors that must be considered in the planning process. TEA-21 consolidated what were previously 16 metropolitan and 23 statewide planning “factors” into seven broad “areas” to be considered in the planning process, both at the metropolitan and statewide level. SAFETEA-LU increased the number of planning factors to eight by creating separate planning factors for safety and security. SAFETEA-LU added language to emphasize the correspondence between transportation improvements and economic development and growth plans.

Below are the planning factors for the metropolitan planning process. SAFETEA-LU specifies identical factors for the statewide planning process with the exception that the emphasis is on the state instead of the metropolitan area.

SAFETEA-LU states that in general the metropolitan planning process for a metropolitan planning area under this section shall provide for consideration of projects and strategies that will—

- A. Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency;
- B. Increase the safety of the transportation system for motorized and nonmotorized users;
- C. Increase the security of the transportation system for motorized and nonmotorized users;
- D. Increase the accessibility and mobility of people and for freight;
- E. Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local

planned growth and economic development patterns;

- F. Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight;
- G. Promote efficient system management and operation; and
- H. Emphasize the preservation of the existing transportation system.

[SAFETEA-LU Section 6001(a) and 23 U.S.C. 134 (h) (1) and 49 U.S.C. 5303(h)(1)(E).]

Planning for operations. Coordination of activities among transportation planners and managers with responsibility for day-to-day transportation operations.

These activities when conducted in harmony enhance the planning process and result in improved system performance—a more flexible, reliable, and efficient system—cheaper, faster, better. FHWA, Planning for Operations Fact Sheet, January 2006.

Programming. Prioritizing proposed projects and matching those projects with available funds to accomplish agreed upon, stated needs.

[FHWA Transportation Planning Capacity Building Glossary. <http://www.planning.dot.gov/glossary.asp>.]

Project selection. The procedures followed by MPOs, States, and public transportation operators to advance projects from the first four years of an approved TIP and/or STIP to implementation, in accordance with agreed upon procedures.

[23 CFR 450.104.]

¹**Region.** A metropolitan or other multi-jurisdictional area.

²**Region.** The geographical area that identifies the boundaries of the regional ITS architecture and is defined by and based on the needs of the participating agencies and other stakeholders.

In metropolitan areas, a region should be no less than the boundaries of the metropolitan planning area. [23 CFR Part 940.3.]

Regional concept for transportation operations. A management tool to assist in planning and implementing management and operations strategies in a collaborative and sustained manner.

[FHWA, *Draft Regional Concept for Transportation Operations Primer*, December 18, 2006.]

A Regional Concept for Transportation Operations (RCTO) serves as a guide for partners in thinking through what they want to achieve in the next 3 to 5 years and how they are going to get there. The primary components of an RCTO are a shared objective for transportation operations and a description of what is needed to achieve that objective.

[FHWA, *Fact Sheet: A Regional Concept for Transportation Operations – At a Glance*, August 2, 2006.]

Regional ITS architecture. A regional framework for ensuring institutional agreement and technical integration for the implementation of ITS projects or groups of projects.

[23 CFR 450.104, 23 CFR Part 940.3.]

The regional ITS architecture shall include, at a minimum, the following: (1) A description of the region; (2) Identification of participating agencies and other stakeholders; (3) An operational concept that identifies the roles and responsibilities of participating agencies and stakeholders in the operation and implementation of the systems included in the regional ITS architecture; (4) Any agreements (existing or new) required for operations, including at a minimum those affecting ITS project interoperability, utilization of ITS related standards, and the operation of the projects identified in the regional ITS architecture; (5) System functional requirements; (6) Interface requirements and information exchanges with planned and existing systems and subsystems (for example, subsystems and architecture flows as defined in the National ITS Architecture); (7) Identification of ITS standards supporting regional and national interoperability; and (8) The sequence of projects required for implementation.

[23 CFR 940.9.]

Development of the regional ITS architecture should be consistent with the transportation planning process for Statewide and Metropolitan Transportation Planning.

[23 CFP 940.5.]

Regional planning organization (RPO). An organization that performs planning for multi-jurisdictional areas. MPOs, regional councils, economic development associations, rural transportation associations are examples of RPOs.

[FHWA Transportation Planning Capacity Building Glossary.
<http://www.planning.dot.gov/glossary.asp>.]

Regional transportation operations collaboration and coordination. Working together in a sustained manner to address regional transportation operations.

Regional transportation operations collaboration and coordination is working together in a sustained manner to address regional transportation operations. Regional operations collaboration and coordination is a deliberate, continuous, and sustained activity that takes place when transportation agency managers and officials responsible for day-to-day operations work together at a regional level to solve operational problems, improve system performance, and communicate better with one another.

[FHWA, *Regional Transportation Operations Collaboration and Coordination: A Primer for Working Together to Improve Transportation Safety, Reliability, and Security*, 2003.]

Regionally significant project. A transportation project that is on a facility which serves regional transportation needs and would normally be included in the modeling of the metropolitan area's transportation network.

A transportation project (other than projects that may be grouped in the TIP and/or STIP or exempt projects as defined in EPA's transportation conformity regulation (40 CFR part 93)) that is on a facility which serves regional transportation needs (such as access to and from the area outside the region; major activity centers in the region; major planned developments such as new retail malls, sports complexes, or employment centers; or transportation terminals) and would normally be included in the modeling of the metropolitan area's transportation network. At a minimum, this includes all principal arterial highways and all fixed guideway transit facilities that offer a significant alternative to regional

highway travel.
[23 CFR 450.104.]

Revision. A change to a long-range statewide or metropolitan transportation plan, TIP or STIP that occurs between scheduled periodic updates.

Note also: A major revision is an “amendment,” while a minor revision is an “administrative modification.” [23 CFR 450.104.]

Stakeholder. Person or group affected by a transportation plan, program or project. Person or group believing that they are affected by a transportation plan, program or project. Residents of affected geographical areas.

[FHWA Transportation Planning Capacity Building Glossary.
[http://www.planning.dot.gov/glossary.asp.](http://www.planning.dot.gov/glossary.asp)]

State transportation improvement program (STIP). A statewide prioritized listing/program of transportation projects covering a period of four years.

Must be consistent with the long-range statewide transportation plan, MPO plans, and TIPs; required for projects to be eligible for funding under title 23 U.S.C. and title 49 U.S.C. Chapter 53.. [23 CFR 450.104.]

Strategic highway safety plan (SHSP). A statewide-coordinated safety plan that provides a comprehensive framework, and specific goals and objectives, for reducing highway fatalities and serious injuries on all public roads. OR A plan developed by the State DOT in accordance with U.S.C. 148(a)(6).

[FHWA, Strategic Highway Safety Plans: A Champion’s Guide To Saving Lives, Guidance to Supplement SAFETEA-LU Requirements, April 5, 2006,
[http://safety.fhwa.dot.gov/safetealu/shspguidance.htm.](http://safety.fhwa.dot.gov/safetealu/shspguidance.htm)]

Transportation demand management (TDM). Programs designed to reduce demand for transportation through various means, such as the use of transit and of alternative work hours.

[FHWA Transportation Planning Capacity Building Glossary.
[http://www.planning.dot.gov/glossary.asp.](http://www.planning.dot.gov/glossary.asp)]

Transportation improvement program (TIP). A prioritized listing/program of transportation pro-

jects covering a period of four years that is developed and formally adopted by an MPO as part of the metropolitan transportation planning process.

Must be consistent with the metropolitan transportation plan; required for projects to be eligible for funding under title 23 U.S.C. and title 49 U.S.C. Chapter 53.
[23 CFR 450.104.]

Transportation management area (TMA). An urbanized area with a population over 200,000, as defined by the Bureau of Census and designated by the Secretary of Transportation, or any additional area where TMA designation is requested by the Governor and the MPO and designated by the Secretary of Transportation.

[23 CFR 450.104.]

Transportation planning. A continuing, comprehensive, and cooperative process to encourage and promote the development of a multimodal transportation system to ensure safe and efficient movement of people and goods while balancing environmental and community needs.

Statewide and metropolitan transportation planning processes are governed by Federal law and applicable state and local laws.
[Based on language found in 23 U.S.C. Sections 134 and 135.]

Transportation systems management and operations (TSM&O). An integrated program to optimize the performance of existing infrastructure through the implementation of systems, services, and projects designed to preserve capacity and improve security, safety, and reliability of the transportation system.

The term includes (i) regional operations collaboration and coordination activities between transportation and public safety agencies; and (ii) improvements to the transportation system such as traffic detection and surveillance, arterial management, freeway management, demand management, work zone management, emergency management, electronic toll collection, automated enforcement, traffic incident management, roadway weather management, traveler information services, commercial vehicle operations, traffic control, freight management, and coordination of highway, rail, transit, bicycle, and

pedestrian operations. [H.R. 5689, proposed technical corrections to SAFETEA-LU.]

Unified planning work program (UPWP). A statement of work identifying the planning priorities and activities to be carried out within a metropolitan planning area.

At a minimum, the UPWP includes a description of the planning work and resulting products, who will perform the work, time frames for completing the work, the cost of the work, and the source(s) of funds. [23 CFR 450.104.]

Update. Making current a long-range statewide transportation plan, MPO, TIP, or STIP through a comprehensive review.

Updates require public review and comment, a 20-year horizon year for the MTPs and long-range statewide transportation plans, a four-year program period for TIPs and STIPs, demonstration of fiscal constraint (except for long-range statewide transportation plans), and a conformity determination (for MTPs and TIPs in nonattainment and maintenance areas. [23 CFR 450.104.]

Vision. An agreed statement of the overall aims of a transportation plan.

A vision is an agreed statement of the overall aims of a transportation plan. In the context of regional transportation, a vision is the regionally-agreed statement of the overall aims of the regional transportation plan; describes the target end-state. Typically, a regional transportation vision will drive its

goals (policy statements – the ends toward which effort is directed), objectives (measurable results), and strategies (ways/means to achieve objectives). Note also that the definition of Long Range Transportation Plan reflects that the LRTP serves “as the defining vision . . .” [While no specific FHWA source has been identified for this definition, it is useful to have a common understanding of the term “vision” such as offered here. For further perspective, below is a selected regional comment on vision.]

“The vision statement reflects what the organization is striving for at the regional (external) and organizational (internal) levels. Everything we do at MPC should meet our vision for the future.” [Metropolitan Planning Council [Chicago] Board of Governors 2005-2008 Strategic Plan – <http://www.metroplanning.org/about/strategicplan.asp>.]

Visualization techniques. Methods used to present information in a format that will promote the understanding of transportation plans and programs during the development process.

Methods used by States and MPOs in the development of transportation plans and programs with the public, elected and appointed officials, and other stakeholders in a clear and easily accessible format such as maps, pictures, and/or displays, to promote improved understanding of existing or proposed transportation plans and programs. [23 CFR 450.104.]

E. REFERENCES

- Michael D. Meyer, *A Toolbox for Alleviating Traffic Congestion and Enhancing Mobility*, Publication No. IR-054B (Institute of Transportation Engineers, 1997)
<<http://ntl.bts.gov/lib/8000/8700/8780/toolbox.pdf>>.
- Transportation Research Board, Freeway Operations, “High-Occupancy Vehicle Systems, Traffic Signal Systems, and Regional Transportation Systems Management,” *Journal of the Transportation Research Board*, no. 1925 (2005).
- U.S. Department of Transportation, FHWA, *Getting More by Working Together Opportunities for Linking Planning and Operations*, FHWA-HOP-05-016 (Washington, DC: 2004),
<www.ops.fhwa.dot.gov/publications/lpo_ref_guide/index.htm>.
- Richard Margiotta, Timothy J. Lomax, Mark E. Hallenbeck, Shawn M. Turner, Alex Skabardonis, Christopher Ferrell, William L. Eisele, *Guidebook to Effective Freeway Performance Measurements*, National Cooperative Highway Research Program 03-68 (Washington, DC: August 2006),
<http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_w97.pdf>.
- U.S. Department of Transportation, Research and Innovative Technology Administration, *ITS/Operations Resource Guide 2007*, FHWA-JPO-07-17 (Washington, DC: 2007),
<<http://www.resourceguide.its.dot.gov/ResourceGuide2007.pdf>>.
- U.S. Department of Transportation, FHWA, *Managing Travel Demand – Applying European Perspectives to U.S. Practice*, FHWA-PL-06-015 (Washington, DC: May 2006),
<<http://www.international.fhwa.dot.gov/traveldemand/index.htm>>.
- Washington State Department of Transportation, *Measures, Markers and Mileposts*, The Gray Notebook for the quarter ending December 31, 2006 (Washington: February 16, 2007),
<http://www.wsdot.wa.gov/Accountability/GrayNotebook/gnb_archives.htm>.
- Denver Regional Council of Governments, *Measuring Progress – Regional Performance Measures and Indicators*, April 2005,
<<http://www.drcog.org/documents/Measuring%20Progress%20final%2004-05.pdf>>.
- University of California, Berkeley Institute of Transportation Studies and ICF Consulting, “Metropolitan-Level Transportation Funding Sources,” Prepared as part of NCHRP Project 08-36, Task 49, December 2005,
<[www.transportation.org/sites/planning/docs/NCHRP%208-36\(49\)%20Final%20Report.pdf](http://www.transportation.org/sites/planning/docs/NCHRP%208-36(49)%20Final%20Report.pdf)>.
- U.S. Department of Transportation, FHWA, *Mitigating Traffic Congestion – The Role of Demand-Side Strategies*, FHWA-HOP-05-001 (Washington, DC: October 2004),
<http://www.ops.fhwa.dot.gov/publications/mitig_traf_cong/index.htm>.
- National Transportation Operations Coalition, “National Transportation Operations Coalition (NTOC) Performance Measurement Initiative Final Report,” July 2005,
<http://www.ntoctalks.com/ntoc/ntoc_final_report.pdf>.
- Transportation Research Board, *Operations Data for Planning Applications: Identifying Needs, Opportunities, and Best Practices*, Transportation Research E-Circular No. E-C095 (Washington, DC: April 2006),
<www.onlinepubs.trb.org/onlinepubs/circulars/ed095.pdf>.
- American Association of State Highway and Transportation Officials, *Optimizing the System: Saving Lives, Saving Time*, Publication No. OTS-1 (Washington, DC: 2004),
<<http://downloads.transportation.org/OptimizingTheSystem.pdf>>.
- U.S. Department of Transportation, FHWA, *Regional Concept for Transportation Operations: The Blueprint for Action - A Primer*, FHWA-HOP-07-122 (Washington, DC: June 2007),
<<http://www.ops.fhwa.dot.gov/publications/rctoprimer/index.htm>>.
- U.S. Department of Transportation, FHWA, *Regional Transportation Operations*

Collaboration and Coordination – A Primer for Working Together to Improve Transportation Safety, Reliability, and Security, FHWA-OP-03-008 (Washington, DC: September 2003), <http://www.itsdocs.fhwa.dot.gov/JPODOCS/REPTS_TE/13686.html>.

Public Technology Institute and U.S. Department of Transportation, FHWA, *Show Me the Money: A Decision-Maker's Funding Compendium for Transportation Systems Management and Operations*, FHWA-HOP-06-003 (Washington, DC: December 2005), <http://www.pti.org/docs/Trans_Funding_PTI_FHWA_2006.pdf>.

U.S. Government Accountability Office, *Surface Transportation: Strategies Are Available for Making Existing Road Infrastructure Perform Better*, GAO-07-920 (Washington, DC: July 2007), <<http://www.gao.gov/new.items/d07920.pdf>>.

U.S. Department of Transportation, FHWA, *Traffic Analysis Toolbox Volume II: Decision Support Methodology for Selecting Traffic*

Analysis Tools. FHWA-HRT-04-039 (Washington, DC: June 2004), <http://ops.fhwa.dot.gov/trafficanalysistools/tat_vol2/index.htm>.

U.S. Department of Transportation, FHWA, “Traffic Congestion and Reliability: Trends and Advanced Strategies for Congestion Mitigation,” September 2005, <http://www.ops.fhwa.dot.gov/congestion_report/congestion_report_05.pdf>.

Institute of Transportation Engineers and U.S. Department of Transportation, FHWA, *Transportation System Management and Operations Action Kit – Immediate Solutions for Transportation Operational Issues* (Washington, DC: 2005).

Public Technologies Incorporated and U.S. Department of Transportation, FHWA, *Unclogging Arterials: Prescriptions for Relieving Congestion and Improving Safety on Major Local Roadways*, FHWA-OP-03-069 (Washington, DC: 2003).



**Federal Highway Administration
Federal Transit Administration
U.S. Department of Transportation
1200 New Jersey Avenue SE
Washington, DC 20590
Toll-Free "Help Line" 866-367-7487
www.ops.fhwa.dot.gov**

Publication No.: FHWA-HOP-08-007