

# TRANSPORTATION SYSTEM MANAGEMENT AND OPERATIONS

## Background and Introduction

SAFETEA-LU and the associated implementing regulations include “promote efficient system management and operation” as a required planning factor in the MPO planning process. SAFETEA-LU also states that “A [long-range] transportation plan...shall contain, at a minimum...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.” While federal law and regulation has required some focus on transportation system management and operations for a number of years, management and operations strategies such as incident response, special event planning, and work zone management have received relatively little attention. However, during the last two decades, various constraints have highlighted the need for coordination of regional operations strategies within the planning process. Among the factors making it increasingly difficult to construct new highway and transit capacity are:

- Environmental, Community, and Space Constraints - In many metropolitan areas, there are fewer opportunities for highway or transit capacity expansion along congested corridors. Often the environmental and community impacts that would result from new or widened roadways go beyond what is acceptable to the public. In some cases, there is little or no additional space within public right-of-ways. These constraints on traditional infrastructure construction have placed increased pressures on public officials and transportation agencies to find new ways of enhancing the effective capacity and reliability of the existing transportation network.
- Funding Constraints - As transportation construction costs have increased, State and local budgets have become more strained. Some transportation capacity projects move forward despite community, environmental, and space constraints, but overcoming these constraints requires longer construction periods, frequent project mitigations, and more complex construction techniques. This means that each project consumes a bigger share of available funds. At the time that project costs are increasing, many States and localities are facing infrastructure deterioration from years of deferred maintenance. These funding challenges mean that few agencies can build all of the facilities that might be desired.
- Inability to Respond to Short-term Problems - Major construction projects rarely deliver new capacity in the short term. In fact, some large-scale projects take well over a decade to complete. At the same time, transportation patterns are more diverse and less predictable than ever. New transportation challenges emerge unexpectedly as a result of economic shifts or short-term trends. Thus, there is a need for transportation solutions that can respond quickly to congestion, safety, and economic concerns.

Thus, interest in improving the reliability and operating efficiency of the transportation system is now becoming paramount in importance for MPOs. This is because an effective transportation system requires not only the provision of highway and transit infrastructure for movement of the public and freight, but also the efficient and coordinated operation of the regional transportation network in order to improve system efficiency, reliability, and safety. Furthermore, linking planning and operations is important to improve transportation decision-making and the overall effectiveness of transportation systems.

### ***Planning for Operations***

“Planning for operations” can be defined as a set of activities with the intent of making investment decisions and/or establishing and carrying out plans, policies, and procedures that enable and improve transportation systems management and operation. For a regional transportation system Management and Operations (M&O) program to be effective, those directly responsible for operating the system must agree on what measures to use to assess performance, a concept for how the system should be operated on a regional basis, and how to make changes to achieve desired improvements in system operating performance.

The statutes and regulations that govern the transportation planning process have the flexibility to accommodate and, in fact, encourage M&O solutions. It has become clear that MPOs, State DOTs, and other agencies that lead transportation planning efforts can use the planning process as an important forum and tool for collaboration between planners and operators. Coordination between planners and operators helps ensure that regional transportation investment decisions reflect full consideration of all available strategies and approaches to meet regional goals and objectives.

### **Metropolitan Planning Organization’s Management and Operations Goal**

The **Metropolitan Planning Organization’s** goal is to link operations and planning of the regional transportation system to solve operational problems, improve system performance, and improve communication across transportation-related agencies. There are many programs in the **MPO’s** region that, in order to be successful, must cross functional and jurisdictional boundaries; examples include corridor signal system coordination, pavement management, traveler information services, response to weather events, and emergency management. These programs depend on an unprecedented level of collaboration, coordination, and integration to achieve optimum performance and truly benefit the region’s residents, businesses and travelers. The **Metropolitan Planning Organization’s** planning for operations at the regional level is therefore a deliberate, collaborative, and coordinated activity that takes place when transportation agency managers responsible for day-to-day operations work together at a regional level with transportation planners.

### ***Measuring Performance of the Regional Transportation System***

One of the critical components in developing regional management and operational strategies is establishing performance measures. Performance measurement involves the act of developing specific transportation system performance criteria and

quantitatively tracking those measures. Performance measures have many functions and can be used to:

- Identify what attributes of the transportation system are most important
- Provide information on current system conditions and performance
- Evaluate the success of implemented and on-going projects and programs
- Provide a metric for communicating with decision-makers and the public about past, current, and expected future transportation system conditions
- Serve as criteria for investment decisions made in the transportation planning process

Efforts to focus on system performance often result in better recognition of the value associated with management and operational improvements. 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.

Performance measures can also help link planning and operations by focusing attention on customer-oriented outcomes and elevating attention to M&O strategies within the transportation planning process. By focusing attention on system characteristics that are important to the traveling public, the issues faced by operators such as incident response, work-zone management, and provision of traveler information take on greater importance. Incorporating these issues into the planning process will help focus the **Metropolitan Planning Organization's** planning on those issues which are of the highest importance to the traveling public in the region.

## **Metropolitan Planning Organization's Approach to Management & Operations**

In order to integrate transportation system M&O into the regional planning process, the **Metropolitan Planning Organization** will develop a program that identifies key transportation performance measures of relevance to the region, coordinate with transportation system operators and providers to collect appropriate data for those measures, compile and analyze the data and produce regular reports on the performance of the region's transportation system. This information will be used by the **Metropolitan Planning Organization** to help develop Long Range Transportation Plans and Transportation Improvement Programs by facilitating the development of more cost-effective and performance-based transportation investments and actions.

### ***Creation of Performance Measures***

Performance measures developed for this region will be multimodal (e.g., highway, transit, non-motorized modes) and address a cross-section of key issues, including congestion, safety, mobility, reliability and accessibility. As the **Metropolitan Planning Organization's** experience and capabilities related to M&O evolve, the number and categories of performance measures may be expanded to provide additional detail on the performance of the region's transportation system for planners, policy-makers and the public.

Performance measures can be grouped into three categories:

- Input measures - which generally address the supply of resources;
- Output measures - which address the delivery of transportation programs, projects, and services; and
- Outcome measures - which address the degree to which the transportation system meets policy goals and objectives.

While input and output measures are the easiest to implement, outcome measures focus on the effects that the traveling public most cares about - issues such as travel time and delay, safety, and reliability.

The **Metropolitan Planning Organization** will initially focus on a core set of *output* measures. Using simpler output performance reporting can inspire the attention and collaboration necessary to design measures that address the most important aspects of the system performance. As the **Metropolitan Planning Organization** gains experience and temporal data on various measures, a blend of both output and *outcome* measures may be preferable to using either type alone. Output measures provide an immediate indication of accomplishment for those activities whose benefits accrue over the long term (i.e., where “outcomes” are not immediately apparent). However, the MPO will attempt to monitor outcomes over the long term as data and expertise allow.

Categories of performance measures that the **Metropolitan Planning Organization** will use to frame development of a set of core regional performance measures include:

Category	Examples of Possible Core Performance Measures
Safety	<ul style="list-style-type: none"> <li>• Change in Number of K (Fatal) and A (incapacitating injury) types of crashes</li> <li>• Change in Number of Crashes/Million Miles Traveled</li> <li>• Pedestrian or Bike Accidents per Year</li> <li>• Number of Traffic Fatalities/Injuries within Region</li> </ul>
Congestion & Reliability	<ul style="list-style-type: none"> <li>• Change in average travel time between selected origins &amp; destinations</li> <li>• Total hours of delay in region</li> <li>• Person-miles (or hours) of travel in congested conditions</li> <li>• Travel Time Index</li> </ul>
Accessibility & Mobility	<ul style="list-style-type: none"> <li>• Percent of region's population within ¼-mile (OR 15 minute walk distance) of transit services</li> <li>• Total transit ridership OR transit mode share</li> <li>• Number of access permits granted on congested roadway segments</li> </ul>
Environmental	<ul style="list-style-type: none"> <li>• Change in mobile source emissions (or appropriate proxy)</li> <li>• Change in energy consumption (or appropriate proxy)</li> <li>• Acres of wetlands created/impacted/banked due to transportation projects</li> </ul>

The actual performance measures ultimately employed by the **Metropolitan Planning Organization** will be dictated to a great extent by (1) the system operation and management priorities determined to be of highest importance by the MPO and its planning partners and (2) the extent to which data to support a particular measure can

be obtained in a cost-effective and usable manner. The focus on management and operations requires more detailed data than has traditionally been analyzed by the MPO. The system focus means that data on conditions are needed virtually everywhere on the transportation system, across jurisdictions and modes. Issues such as data formats, accuracy, consistency, and appropriate use can complicate the process of establishing inter- and intra-agency data sharing programs.

The **Metropolitan Planning Organization** will work collaboratively with the Illinois Department of Transportation (IDOT), **local governments and the local transit agency** to address these challenges and develop a core performance measurement program. In particular, the **Metropolitan Planning Organization** will work with IDOT to use information available through the Illinois Roadway Information System (IRIS) for developing and reporting performance measures. IRIS is a computerized database managed by IDOT in which a variety of condition and performance data is collected and maintained on all public highways as defined in Illinois Compiled Statutes.