

**TRANSPORTATION SYSTEM MANAGEMENT AND OPERATIONS
AND THE CONGESTION MANAGEMENT PROCESS
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TRANSPORTATION SYSTEM MANAGEMENT AND OPERATIONS AND THE CONGESTION MANAGEMENT PROCESS FOREWORD

The reaction and discussion around the topic of congestion, congestion management, and operation's planning elicits a response that is as varied as the country's metropolitan areas. In many respects the Rockford region, it's MPO, and the member agencies should be commended for transportation decisions and investments over the last 25 years that have served to keep travel at a very high level of service. In particular, the following significant initiatives are noteworthy:

1. The Rockford MPO made a decision in 1992 to build and maintain a transportation model when most medium-sized MPOs decided to curtail modeling activities. Moreover, the Rockford MPO made a decision to maintain a "peak hour" model, which is crucial to analyses of travel demand that directly impact the type of intersection-based, minimal-duration style of congestion that is experienced by travelers in the region.
2. The capital programs of the member agencies consistently contain TSM-style projects which can positively affect congested segments of the transportation network with small investment. Many of these projects were presented in the Transportation System Management documents of the 1970's and early 1980's, which is no longer a required MPO document. The members have diligently worked to fund these projects over time and have successfully completed the vast majority of them.
3. The MPO and its members have successfully partnered with non-traditional agencies, such as Northern Illinois University, to fund the build out of the communications backbone necessary to implement the approved ITS architecture with local dollars, despite a non-existent Federal or downstate-Illinois ITS program.
4. With the support and leadership of the Wisconsin Department of Transportation, the Interstate Alternate Route Guide for I-90/39 was created over a 5-7 year period that is now fully mature. All of the partner agencies from planning, engineering, roadway operations, transit, law enforcement, emergency responders and tow operators have come together to devise and implement an operational framework to deal with non-recurrent incident based events that traditionally have caused severe delay for travelers, caused secondary crashes that have endangered both travelers and the personnel trying to work the event, and caused driver confusion as they tried to self-direct an alternate route.
5. The implementation of "Open Road Tolling" by the Illinois State Toll Highway Authority has virtually eliminated the recurring delay caused by weekend travelers between Illinois and Wisconsin. Moreover, the elimination of the traffic backups and idling of vehicles that were common prior to the introduction of ORT has had a positive affect on air quality in the region.
6. The member agencies have continuously funded the local subsidy required to keep mass transit a stable force in the region despite historic ridership primarily consisting of transit-dependent people. That forward thinking leadership is now paying dividends as non-traditional riders are finding transit as a cost effective alternative to single occupant vehicular travel as fuel prices have soared.

While the 2008 Certification Review by the UDSOT "retains concern over the applicability of the congestion management-related documents to the larger planning process, specifically project selection", the balance of project selection opportunities must be considered. It is extremely difficult to justify a statement of concern when the MPO has been able to fund only a single project over the combined life of ISTEA, TEA-21 and SAFETEA-LU with discretionary dollars that are given to the MPO directly! It is hoped that the following document will alleviate that concern and in fact change the opinion of the USDOT in this regard.

TRANSPORTATION SYSTEM MANAGEMENT AND OPERATIONS AND THE CONGESTION MANAGEMENT PROCESS AN INTRODUCTION

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.

RMAP Management and Operations Goal

The RMAP MPO'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 RMAP 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 RMAP MPO'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 RMAP MPO's planning task on those issues which are of the highest importance to the traveling public in the region.

RMAP MPO's Approach to Management & Operations

In order to integrate transportation system M&O into the regional planning process, the MPO 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 RMAP to help develop its 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 RMAP MPO'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.

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

The actual performance measures ultimately employed by RMAP 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 RMAP MPO will work collaboratively with the Illinois Department of Transportation (IDOT), local governments, the Rockford Mass Transit District and the Boone County Council on Aging to address these challenges and develop a core performance measurement program. In particular, the RMAP MPO 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.

TRANSPORTATION SYSTEM MANAGEMENT AND OPERATIONS AND THE CONGESTION MANAGEMENT PROCESS

M & O Goals

The RMAP 2035 Long-Range Transportation Plan provides the following planning goals:

- Support the economic vitality of the Rockford MPA, especially by enabling global competitiveness, productivity and efficiency
- Increase the safety and security of the transportation system for motorized and non-motorized users
- Increase the accessibility and mobility options available to people and freight
- Protect and enhance the environment, promote energy conservation, and improve the quality of life
- Integrate and connect the transportation modes for people and freight
- Promote efficient system management and operation
- Efficiently preserve the existing transportation system

Several of these goals relate directly to a congestion management process embedded within an overall management and operations plan. For many years the Rockford MPO, and its member agencies, have strived to plan, program and implement transportation projects that adhere to these goals. But the process that was used was never formalized and in some cases the federally-required MPO products such as the LRTP, UWP, and TIP were never tied together in such a way as to document the effort. Moreover, many of the special studies were seen as standalone efforts and were never tied back to the goals and objectives of the LRTP, even though these products produced significant efforts related to management & operations and the congestion management process. This document supplements and ties these previous efforts together to meet the requirements of SAFETEA-LU and fosters meaningful local discussion and action.

Combining previous planning products with the aforementioned goals in mind leads to the following specific M & O Goals:

- Identify strategies that will keep the percentage of congested roadway sections at or near 2005 levels
- Identify strategies that promote transit and keep the percentage of single occupancy vehicles at or near 2005 levels
- Identify strategies that capitalize on the investment in Intelligent Transportation Systems
- Identify a project development process at both the local and regional level that rewards and places priority on transportation investment decisions that meet the M & O objectives
- Identify a planning work program that captures field data to provide an analytical framework that measures the performance of the selected M & O strategies
- Focus the M & O strategies on the proposed Strategic Regional Arterial System (SRA) that was documented in the 2035 LRTP (shown on following page)

M & O Objectives

The major missing piece of previous efforts in the M & O / CMP has been the definition of a planning process that is objectives-driven and performance-based that enhances collaboration between planners, engineers and system operators. Moreover the strategies and objectives need to be time sensitive. Since SAFETEA-LU was enacted best practices have become available to MPOs and their members agencies that allow tangible actions to be identified that advance the planning for operations at a regional scale. The following objectives have been identified to meet the M & O goals of the Rockford MPA region:

- By 2010, collect field data which verifies the Level Of Service objective from the 2035 LRTP, as shown below:

Classification/Level of Service	C or better	D or worse
Interstate Freeway	91%	9%
Principal Arterial	94%	6%
Minor Arterial	95%	5%
Collector	95%	5%

The LOS objective from the 2035 LRTP was based on the transportation model. This M & O objective will replace modeled data with field data collected in the 2007 and 2008 via the comprehensive ground count of the entire urban area. The Illinois Department of Transportation will make hourly speed data available from the ground count. As documented in Appendix A the speed data will be correlated to a roadway level of service. The work products from the Transportation Planning Study Phase I-B, as shown in Appendix B, will be updated with field collected data to create a regional congestion map.

- By 2015, all traffic signals on the SRA system will be modernized to provide fully actuated operation and will be coordinated with a fiber optic interconnect system. All modern traffic signal hardware will be NTCIP-compliant to meet the requirements of the adopted regional ITS architecture.
- By 2015, a regional transportation management center (TMC) will be located, planned and designed, and possibly constructed, staffed and operated. All regional ITS activities will be coordinated at the TMC. As shown in Appendix G the TMC will incorporate the ITS initiatives of the North-Central Illinois Regional ITS Architecture, Illinois Statewide ITS Architecture, Illinois Statewide ITS Strategic Plan, Wisconsin DOT Smartways ITS Strategic Plan, Illinois Municipal Broadband Communications Association, Beloit-Janesville-Rockford Arterial Management Workgroup, Illinois Century Network, RockNet, NIUNet, Prairie SHIELD and IDOT Operation Greenlight.
- By 2015, complete an Alternate Route Guide for the US20 Bypass from Winnebago Road to the interchange with I-90/39. Require the new route guide to be compatible with the I-90/39 route guide documented in Appendix C. Establish a working group of planners, engineers, system operators, transit providers, law enforcement, emergency responders and tow operators to regularly meet to update the guide, debrief on previous incident management history, and plan for upcoming special events. Consider execution of the alternate route for any incident which closes the US 20 Bypass for more than 30 minutes.

- By 2010, design, execute and compile a user satisfaction survey specifically designed to measure regional attitudes about congestion, its impacts to stakeholders, and investment priorities to meet CMP goals. Align the user survey to coincide with all regular updates of the LRTP and the M & O / CMP process and repeat the cycle.
- By 2010, develop an interactive web-based ridesharing database for commuters in the region travelling to Metra stops at Elgin Big Timber and Harvard. Coordinate the ride matching with transit providers including Rockford Mass Transit District, Pace Suburban Bus, and Van Galder / Coach USA.
- By 2009, revise the project selection criteria as documented in Appendix E. Modify the criteria with a numerical point system to make the project selection process more objective. Incorporate the results of project criteria in the TIP.

M & O Strategies

The MPO staff and the members of the Technical Committee will use the congestion management strategy matrix shown on the following page as a guide to development of all future work programs of the MPO (UWP). Yearly work tasks will be established based on changing regional priorities, funding opportunities and the results of the user satisfaction survey. The matrix will be considered as a living document and will be updated as often as necessary to guide the regional congestion management process.

As a congestion management strategy becomes mature a schedule, an identification of responsibilities, and identification of funding sources for implementation will be added to the matrix.

APPENDIX A

LEVEL OF SERVICE CONSIDERATIONS FOR MODEL FORECASTING

APPENDIX B

**TRANSPORTATION PLANNING STUDY
PHASE I-B
CONGESTION FORECASTS**

APPENDIX C

**JANESVILLE-BELOIT-ROCKFORD
ARTERIAL MANAGEMENT GROUP
ALTERNATE ROUTE GUIDE**

APPENDIX D

**CONGESTION MANAGEMENT ACTIVITIES REPORT
TRANSCORE - 1997**

APPENDIX E

**RATS RESOLUTION 94-2
SELECTION OF STP-URBAN PROJECTS**

APPENDIX F

**2035 LONG-RANGE TRANSPORTATION PLAN
CHAPTER 10
PLAN REFINEMENT**

APPENDIX G

ILLINOIS TOMORROW CORRIDOR PLANNING GRANT APPLICATION ITS COMMUNICATION SUBSYSTEM DEPLOYMENT PLAN