

Regional Concept for Transportation Operations

The Blueprint
for Action

A Primer



U.S. Department of Transportation
Federal Highway Administration

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Technical Report Documentation Page

1. Report No. FHWA-HOP-07-122	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Regional Concept for Transportation Operations: The Blueprint for Action A Primer		5. Report Date June 2007	
		6. Performing Organization Code	
7. Authors Jocelyn Bauer, Michael Smith, and John Mason		8. Performing Organization Report No.	
9. Performing Organization Name and Address Science Applications International Corporation (SAIC) 1710 SAIC Drive M/S T1-12-3 McLean, VA 22102		10. Work Unit No. (TRAIS)	
		11. Contract or Grant No. DTFH61-01-C-00180	
12. Sponsoring Agency Name and Address Federal Highway Administration U.S. Department of Transportation 1200 New Jersey Ave SE Washington, DC 20590		13. Type of Report and Period Covered Final Report August 2004 – June 2007	
		14. Sponsoring Agency Code HOP	
15. Supplementary Notes Mr. Wayne Berman, Contracting Officer's Task Manager			
16. Abstract A Regional Concept for Transportation Operations (RCTO) is a management tool to assist in planning and implementing management and operations strategies in a collaborative and sustained manner. Developing an RCTO helps partnering agencies think through and reach consensus on what they want to achieve in the next 3 to 5 years and how they are going to get there. The purpose of this document is to explain what an RCTO is, the development of its elements, and its applicability.			
17. Key Words regional concept for transportation operations, planning, regional operations, transportation systems management and operations, planning for operations, operations objective, operations strategies, regional ITS architecture		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 35	22. Price N/A

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1 INTRODUCTION

1.1 USING MANAGEMENT AND OPERATIONS STRATEGIES TO ADDRESS CUSTOMER DEMAND

In every sector of our economy we see rising customer expectations and growing demand as the public becomes more aware of what is possible with advanced technology. Efforts to meet these expectations lead to increased complexity, cross-functional systems, and institutional relationships that transcend single entities. We see this in health care, homeland security, public safety, energy distribution, financial systems, and global supply chains. Similarly, increased demand on the transportation network and service expectations coupled with limited funds, time, and access to land has led to an emerging trend in transportation. Several regions across the U.S. have begun to make a shift toward optimizing the use of existing infrastructure across modes and jurisdictional boundaries through the application of transportation systems management and operations (TSM&O) strategies.

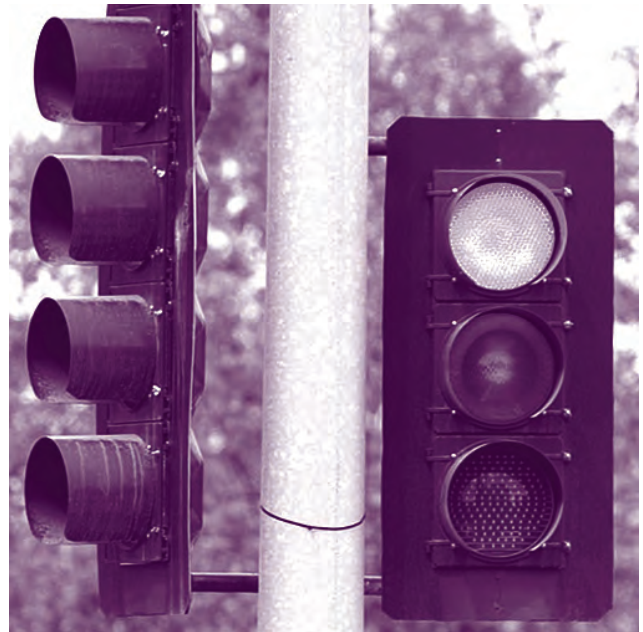
Examples of TSM&O Strategies

- Traffic incident management
- Traveler information services
- Traffic signal and arterial management
- Transit priority systems
- Freight management
- Road weather management

TSM&O strategies enable transportation practitioners to provide higher levels of customer service in the near-term without incurring the high cost associated with major infrastructure projects. Examples of TSM&O strategies include multi-State traveler information systems, electronic transit payment services, traffic signal coordination, and traffic incident management. Benefits can be seen in the Denver metropolitan area where the Denver metropolitan planning organization and 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.

TSM&O strategies have benefits for both transportation planners and operators. 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, operators are able to make their limited staff time and other resources go further by collaborating with planners and other operators to pro-actively 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, for example, 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.



1.2 MOVING TOWARD COMMON GROUND TO ADVANCE TSM&O

Effective planning and implementation of TSM&O strategies requires planners and operators to make a fundamental cultural shift that allows them to meet on common ground. Management and operation of the transportation system is generally left to individual operating agencies

(e.g., local departments of public works, transit agencies, State departments of transportation) within the region and is often performed on an ad hoc basis without a view toward the transportation system on a regional level. TSM&O requires operators to broaden their traditional perspective to one where individual facilities are viewed as interconnected pieces of a regional system and neighboring jurisdictions and agencies work together as partners in providing transportation services to customers. This transition necessitates new action: anticipating needs rather than only “putting out fires,” managing the system on a 24/7 basis rather than only during the peak period commutes, measuring system performance rather than only agency output, and reaching outside of your agency to coordinate your piece of the system with other jurisdictions and modes rather than working in functional stovepipes.

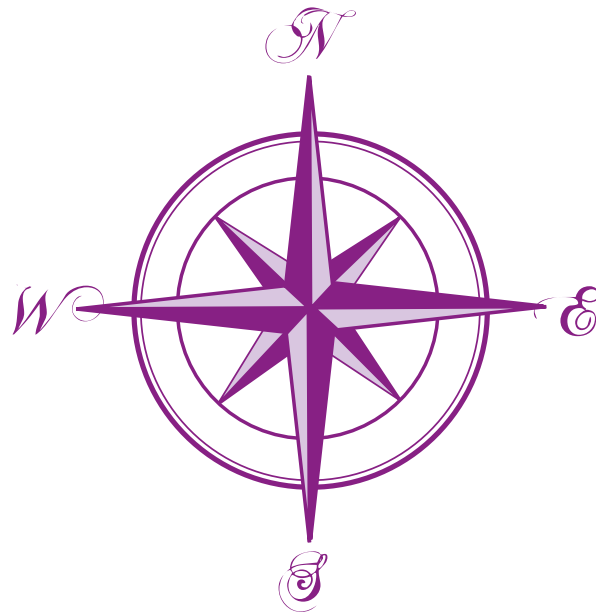
For transportation planners, the shift to TSM&O requires planners to expand their traditional focus on long-range infrastructure projects to include managing and operating the existing and planned infrastructure. This means engaging operations managers on a regular basis to address management and operations needs through regional strategies and

As Lewis Carroll wrote, “If you don’t know where you are going, any road will take you there.” By establishing specific and measurable objectives, partnering agencies can choose the best “road” to follow.

establishing specific goals, objectives, and performance measures for the performance of the transportation system. Additionally, a shift toward TSM&O requires full consideration of management and operations strategies in the investment decisionmaking process.

1.3 A TOOL FOR DEVELOPING REGIONAL TSM&O STRATEGIES

Successfully managing and operating the regional transportation system depends upon deliberate, sustained collaboration among operators, planners, and other key stakeholders to establish direction and decide how to move forward. Meaningful and realistic objectives are necessary to guide the effort. As Lewis Carroll wrote, “If you don’t know where you are going, any road will take you there.”¹ By establishing specific and measurable objectives, partnering agencies can choose the best “road” to follow. Lacking shared objectives to guide operations efforts, agencies risk unnecessary duplication with neighboring agencies, limited progress due to fund-



ing or staffing shortages, inconsistent traveler information, and underutilized or incompatible technologies.

Deliberate, sustained collaboration among participating jurisdictions is evident in a number of regions across the United States. In the National Capital Region more than 30 participating agencies from the District of Columbia, Maryland, and Virginia have established a formal partnership to implement and use the Capital Wireless Integrated Network (CapWIN). CapWIN enhances information sharing and communications among public safety and transportation agencies as they coordinate their efforts during special events and incidents. In Detroit, Michigan transportation and public safety professionals have met regularly since 1992 as an incident management committee wherein the participants jointly plan and implement initiatives such as a freeway courtesy patrol and an incident management center. Although the group retains its incident management title, it has expanded in scope to freeway operations and arterial traffic management.

A common thread among these partnerships and others like them is the agreed objectives and the strategies for achieving them, including institutional relationships and performance expectations. This thread is the *concept* for how they want to improve *regional* transportation system performance by working together. A **Regional Concept for Transportation Operations (RCTO)** formalizes this thread by providing a framework that guides collaborative efforts to improve system performance through management and operations strategies.

¹ *Alice in Wonderland* by Lewis Carroll, New York : Grosset & Dunlap, 1946.

The fundamental thinking behind an RCTO is not new. The RCTO brings together systems engineering concepts and the experience of successful transportation operations partnerships. The idea of an RCTO came out of a broad-based Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) working group on linking planning and operations in 2000 and 2001. The working group consisted of operations, planning, and public safety officials in local, regional, State, and Federal agencies. The idea was advanced in 2003 when a special policy committee of the Transportation Research Board (TRB) supported and endorsed it and recommended further development and demonstration.

1.4 PRIMER OVERVIEW

This primer will introduce transportation operators and planners to the Regional Concept for Transportation Operations, a blueprint for action. The primer will describe an RCTO and its essential components, explain its potential role in the transportation planning process, and illustrate its development through examples. Additionally, the primer will highlight the benefits gained from partnerships that develop an RCTO and the keys for success as partners work toward an RCTO.

2 WHAT IS AN RCTO?

A Regional Concept for Transportation Operations is a management tool to assist in planning and implementing management and operations strategies in a collaborative and sustained manner. Developing an RCTO helps partnering agencies think through and reach consensus on what they want to achieve in the next 3 to 5 years and how they are going to get there. The RCTO formalizes the collaboration and defines its direction for the future, essentially “getting everyone on the same page.” By implementing an RCTO, partners put into action within 3 to 5 years operations strategies that will be sustained over the long term. The 3- to 5-year timeframe allows time for many management and operations strategies to be implemented

An RCTO is a management tool to assist in planning and implementing management and operations strategies in a collaborative and sustained manner.

An RCTO focuses on operations objectives and strategies within one or more management and operations functions of regional significance such as traveler information, road weather management, or traffic incident management. The topic of an RCTO is determined by the collaborating partners who are interested in advancing TSM&O in their region and it is driven by operations objectives that reflect regional expectations and opportunities. The partners may be motivated by a growing awareness of diminishing levels of service, a mandate from officials, a recent natural disaster, a special event, or shortage of resources.

Within any given region, there may be multiple RCTOs that focus on different operations functions or services. For the purposes of an RCTO, a region is considered to be any multi-jurisdictional area defined by the collaborative partners. That area may or may not coincide with the boundaries of a metropolitan planning organization (MPO).

The RCTO fosters objectives-driven collaboration by focusing the partners on a specific operations objective and strategy to achieve it.

while keeping the RCTO tool responsive to current system performance needs. Additionally, the timeframe offers a middle ground between operators who are focused on day-to-day activities and planners who are looking out 20 to 25 years.

Participants in developing and implementing an RCTO may be managers and decisionmakers from local, State, or regional transportation agencies responsible for day-to-day operations, metropoli-

tan planning organizations, and public safety entities. Depending on the scope of the RCTO, non-traditional participants such as freight operators, tourism bureaus, and economic development agencies may need to be engaged. Well-respected

leaders who are willing to champion the common goals of the partners and guide the development of the RCTO are necessary for its success. It may be most effective to have a leader involved with transportation planning as well as a leader from the operations community in order to bridge the two communities and bring an understanding of both planning and operations to the task of developing an RCTO. Frequently, collaborative operations efforts have a hosting organization. The selection of host depends on the composition of the partners, the operations focus of the collaboration, and available time and skills among the participants.

A sample is given below of transportation-related participants who could be involved in developing an RCTO:

- Traffic operations engineers and managers.
- Transportation planners.
- Transit operations managers.
- Police and fire officials.
- Emergency medical service (EMS) officials.
- Emergency managers.
- Port authority managers.
- Bridge and toll facility operators.

For the purposes of an RCTO, a region is considered to be any multi-jurisdictional area defined by the collaborative partners.



2.1 BENEFITS OF AN RCTO

An RCTO imparts several important benefits to operators and planners who are part of a collaborative effort to advance TSM&O strategies in a region:

- Increases the efficiency and effectiveness of the partners by forcing them to collectively think through what they want to accomplish and how they will work together to reach that operations objective in the near future.
- Guides the collaborative effort by bringing together varied transportation operations perspectives, priorities, and cultures from different agencies and jurisdictions.
- Presents a mutual direction for one or more aspects of transportation systems management and operations based on a holistic view of the region.
- Creates operations objectives and performance measures that can be used in the transportation planning process.
- Facilitates coordinating priorities, leveraging resources, and alleviating duplicative efforts.
- Clarifies the roles and responsibilities of the partners in the collaborative effort.
- Garners commitment from agencies and jurisdictions for a common regional approach to transportation management and operations.

Maricopa Association of Governments Regional Concept of Transportation Operations

As a trailblazer in coordinating regional operations, the Maricopa Association of Governments (MAG) Intelligent Transportation Systems (ITS) Committee spearheaded the development of a concept for advancing coordinated operations in the Phoenix metropolitan region in 2002. Over the next year under the leadership of MAG, the concept took the shape of a Regional Concept of Transportation Operations, a product that helped inform what is referred to as a Regional Concept for Transportation Operations in this primer. The members of the MAG ITS Committee are representatives from Federal Highway Administration, Arizona Department of Transportation (ADOT), Arizona Department of Public Safety, Valley Metro, Arizona State University and twelve MAG member agencies. Additionally, stakeholders such as police, fire, and public safety answering point managers helped develop the MAG RCTO. Eleven initiatives were selected for the MAG RCTO including a regional traffic signal optimization program, transit signal priority, and travel information.

Contact Sarath Joshua: sjoshua@mag.maricopa.gov

- Provides an opportunity to strengthen the linkage between regional planners and managers responsible for transportation operations by offering a coherent operations strategy for consideration in the planning process.
- Establishes credibility with decisionmakers and the public by demonstrating that multiple agencies are standing behind the same operations objective.

The RCTO elevates the focus from agencies' individual responsibilities to a holistic view of the region's transportation system.

2.2 FOUNDATIONS IN SYSTEMS THINKING

The RCTO promotes a more systemic and sustained approach to collaboration. Consistent with well established systems engineering principles, the RCTO elevates the focus from agencies' individual responsibilities to a global view of the region's transportation system. By considering the interconnections within the region's transportation system, partners develop higher level operations objectives that address those systemic issues that cut across multiple agencies and jurisdictions. The RCTO is a living guide that partners update and amend as circumstances and priorities evolve in the region and among partners. While it may require some initial investment in operations infrastructure, an RCTO is more than a "project" because it effects lasting changes in how partners work together to improve system performance.

The RCTO is a living guide that partners update and amend as circumstances and priorities evolve in the region and among partners.

In this sense, the RCTO encourages sustained collaboration:

- An RCTO requires developing and sustaining working relationships between agencies that transcend particular individuals.
- An RCTO defines a new way of "doing business" for the participants that is stimulated through the development of the RCTO.
- The result of developing an RCTO is not a collection of projects stapled together, but a coherent collaborative strategy that sets the future direction for operations in the region.

- Although the time horizon for an RCTO is only 3 to 5 years, the RCTO establishes collaborative activities that typically must continue beyond that timeframe in order to maintain the operations objective.
- An RCTO creates a precedent in the region for how to organize multiple participants interested in working together to improve transportation management and operations.
- Once developed, an RCTO can serve as a template for further collaboration on other aspects of transportation operations.

2.3 RCTO SCOPE

The scope of an RCTO is defined in terms of three major dimensions: functional, institutional, and geographic. The functional dimension defines the operations areas addressed within the RCTO, the institutional dimension defines the partnering entities engaged in the developing and carrying out the RCTO, and the geographic dimension defines the region (i.e., political boundaries) for which the RCTO is developed. Each dimension is shaped by the collaborative activity among transportation operators from multiple jurisdictions.

Operations functions that tend to be of regional significance and could benefit from an RCTO include:

- Congestion management.
- Traffic incident management.
- Traveler information.
- Electronic payment services (e.g., transit, parking, tolls).
- Emergency response and homeland security.
- Traffic signal coordination.
- Road weather management.
- Freight management.
- Work zone traffic management.
- Freeway management.

FUNCTIONAL SCOPE

An RCTO can address a single TSM&O area (e.g., traffic incident management, traveler information services, or electronic fare payment), a collection of related areas (e.g., congestion management for arterials and freeways), or capabilities that cut across several functions (e.g., area-wide communications, surveillance and control, or vehicle detection and location). The functional scope of an RCTO may change over time in response to changes in the collaboration between participants. For example, an RCTO can help expand collaboration on incident management to include emergency management.



GEOGRAPHIC SCOPE

The geographic and institutional scope of the RCTO may coincide with the jurisdictions and agencies represented in an MPO. However, an RCTO may be developed for a multi-state corridor, adjoining transportation management areas, neighboring local jurisdictions within an MPO area, or any other self-defined multi-jurisdictional area. Many non-urban or rural areas may find significant benefit in creating an RCTO as they often do not have a regional planning process or metropolitan planning organization to bring focus to the region.



INSTITUTIONAL SCOPE

An RCTO's institutional scope may range from corresponding agencies in neighboring jurisdictions that collaborate around a function that falls within their individual responsibilities, to all of the transportation and public safety agencies within an MPO area that collaborate on multiple functions throughout the metropolitan region, to a collection of agencies that span several States along a major interstate corridor.



3 UNDERSTANDING THE RCTO IN CONTEXT

Within any region, there are many existing processes and structures that will influence the contents of an RCTO, how it is developed, and the role it will play in the management and operation of the region's transportation system. This section discusses how the RCTO may relate to three of those processes or structures: the transportation planning process, the regional intelligent transportation systems (ITS) architecture, and a concept of operations.

3.1 THE RCTO AND THE TRANSPORTATION PLANNING PROCESS

Connecting the RCTO to the transportation planning process offers benefits for planners who are interested in advancing cost-effective strategies to improve regional transportation system performance and operations-oriented partners who are seeking regional support for their joint efforts. An RCTO is one opportunity among several to link transportation planning and investment decisionmaking to TSM&O as illustrated below.

By linking to the planning process, partners can gain recognition within the region for operations and increase

credibility with elected leaders whose support may be crucial in advancing operations. RCTO partners can ground their work in formally established regional needs, goals, and objectives. Additionally, they can increase the stability of their partnership by selecting the MPO to be an impartial and long-term host for the collaborative development and implementation of their RCTOs. RCTO partners may also be able to influence the selection of performance measures and data collection procedures used during regional planning to better track the progress toward the RCTO operations objective.

Opening funding avenues for operations from sources such as the Congestion Mitigation and Air Quality (CMAQ) Improvement Program, Surface Transportation Program (STP), and State, regional, or local tax programs is a compelling reason to link regional operations activities to the planning process. The ability of RCTO partners to apply and receive funding in the near term depends on the flexibility of the planning organization to allocate funding for management and operations projects. All projects need to be part of the metropolitan transportation plan (MTP) in order to be eligible for funding through the metropolitan planning process. In many regions, obtaining funding within one to two years is very difficult because all available funding is designated for specific projects many years

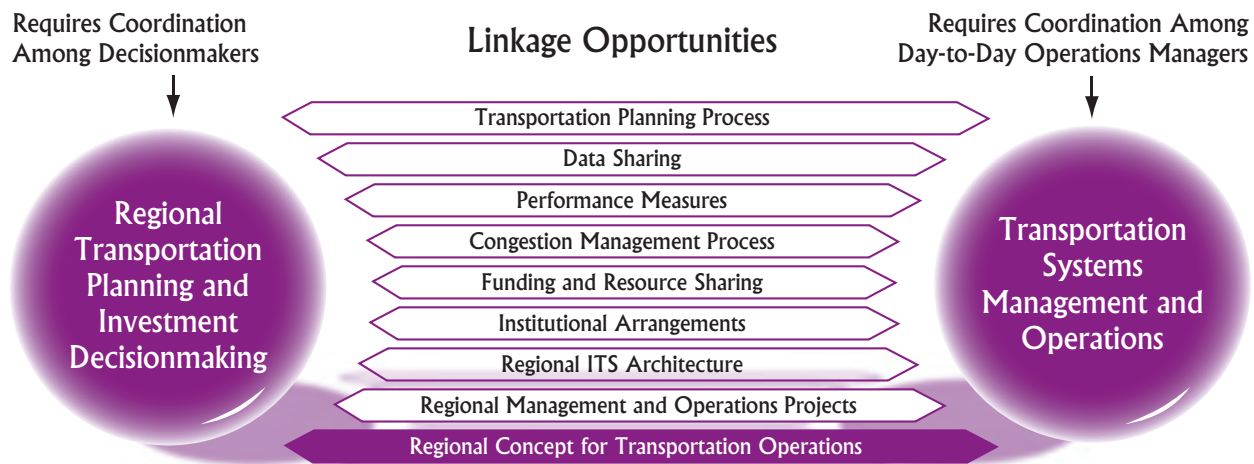


Figure 1: The RCTO is one of several opportunities to link planning and operations.²

² U.S. Department of Transportation, FHWA, *Getting More By Working Together Opportunities for Linking Planning and Operations* (Washington, DC, 2004).

Denver Traffic Signal System Improvement Program led by DRCOG

In 1989, traffic engineers in the Denver area concluded that there was a need for interjurisdictional timing and coordination of traffic signals. The engineers selected the region's MPO, Denver Regional Council of Governments (DRCOG), to develop a regional program because DRCOG was an agency that was regional in nature and viewed as having the capabilities to facilitate cooperation between multiple jurisdictions. DRCOG and the traffic signal operating agencies worked together to begin a small signal timing and coordination program funded by an energy grant. The program provided for one traffic engineer to assist in signal timing and coordination in the region and no capital improvements.

Although the benefits were modest, the first few years of the program proved its worth to the region and impressed the DRCOG Board of Directors. When the Denver region began to receive CMAQ funds due to the adoption of the United States Intermodal Surface Transportation Efficiency Act of 1991, more funding became available for traffic signal improvements. In 1994, the Traffic Signal System Improvement Program (TSSIP) was officially adopted and an annual budget of \$1 million was provided in the TIP. As of 2005, the program budget was approximately \$3.7 million per year.

Contact Jerry Luor: JLuor@drcog.org

in advance. In those cases, partners may choose to work to establish funding options for future management and operations projects while implementing an RCTO in the near term that relies on available resources and technology.

In some regions, such as the Denver, Colorado area, funding pools or programs have been included in the transportation improvement program (TIP) for ITS or arterial traffic signal systems. This allows agencies to apply for and obtain funding in the near term for specific projects within those areas that have recently been defined. In the Phoenix, Arizona area, a collaborative regional traffic signal optimization initiative in the region's RCTO was

funding through the Maricopa Association of Governments (MAG) with CMAQ funds that became available for programming during the TIP closeout process. The success of the initiative caused the MPO to become very supportive of the regional signal timing program and it will likely become a permanent part of the MPO work program.³ The Maricopa County Department of Transportation in Arizona provides Highway User Revenue Funds through its TIP to support an arterial incident management initiative outlined in the region's RCTO. Additionally, the Hampton Roads, Virginia region decided that more flexibility was needed in funding ITS and operations projects so it created a line item in the metropolitan transportation plan for these projects. Agencies can apply for CMAQ and regional STP funds for management and operations projects in the near term during the development of the TIP.⁴

While linking the RCTO to the planning process can assist operations-oriented partners in advancing their collaborative efforts, it can also be useful for planners as they incorporate operations into the process. An RCTO can help planners address the requirements within the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) to link operations to the planning process. SAFETEA-LU contains the following requirements:⁵



³ Joshua, Sarath, Maricopa Association of Governments & Faisal Saleem, Maricopa County Department of Transportation. (2005, August 22). Personal interview.

⁴ Ravanbakht, Camelia, Hampton Roads Planning District Commission. (2007, January 5). Personal interview. For more information, contact Camelia Ravanbakht at cravanbakht@hrpdvva.gov.

⁵ Each requirement is contained in SAFETEA-LU, Title III Public Transportation, Section 3005 Metropolitan Transportation Planning and Title VI Transportation Planning And Project Delivery, Section 6001 Transportation Planning. The first requirement is also in Title III Public Transportation Section 3006 Statewide Transportation Planning.

Promote Efficient Management and Operations: The planning process must “promote efficient system management and operation.”

An RCTO can serve as a mechanism to translate relatively high-level concepts for management and operations defined within the planning process into specific, coordinated strategies for operations that can be acted on.

Contain Management and Operations Strategies:

A metropolitan region’s transportation plan must contain “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.”

Develop a Congestion Management Process: A metropolitan region must develop a process that effectively manages congestion through management and operational strategies for new and existing transportation facilities through the use of travel demand reduction and operational management strategies. This process must be cooperatively developed with some non-traditional planning partners, namely system operators (e.g., transit, toll authorities, private providers) and implementers (e.g., State departments of transportation, local governments, and transit agencies) in order to fully utilize system capacity on all modes of transportation.

An RCTO can also serve as a mechanism to translate relatively high-level concepts for management and operations defined within the planning process into specific, coordinated strategies for operations that can be acted on. Multiple opportunities exist to use an RCTO to advance operations in connection with transportation planning. Five scenarios were selected to demonstrate how an RCTO could link to the planning process.

Scenario 1:

A regional need has been identified as part of the congestion management process⁶ to reduce non-recurring congestion along five corridors within the jurisdictions of two counties, a city, and the State department of transportation (DOT). Unsure of how best to address this need, the MPO turns to a regional operations committee with representatives from each impacted jurisdiction. The committee takes this need and develops an RCTO by agreeing on a measurable operations objective and a specific approach to reducing congestion in that area. This short-term management and operations strategy may then be included in the regional plan and compete for funding.

⁶ Alternatively, the regional need could be identified during development of the regional ITS architecture.

Scenario 2:

An objective pertaining to management and operations is adopted as part of the metropolitan transportation plan,⁷ but specific strategies to achieve this objective are lacking. The objective states “by 2012, transfers between transit services will be seamless.” A group of transit operators with a history of collaboration take this objective and define their approach (a universal payment system and coordinated scheduling) and what will be needed to accomplish this. They provide their strategy and project description as input into the plan.

Scenario 3:

The high-level management and operations strategy, road weather management, has been named in the metropolitan transportation plan to address mobility problems in the region during winter months, but it is unknown how this strategy translates into specific, coordinated activities. A recently formed partnership between road operating agencies works to formulate a specific operations objective for winter road travel and an approach to meeting it as part of an RCTO. The partners then use information from their RCTO to develop project descriptions to apply to CMAQ funding.

Scenario 4:

A funding pool for traffic signal systems has existed in the region’s TIP for the past 6 years. Every 2 years, the MPO issues a call for traffic signal system projects and local agencies develop applications and compete for funding for projects that enhance their jurisdiction. Recently, the manager of traffic engineering from one city brought together colleagues from each jurisdiction in the region to develop an RCTO for a common operations objective and coordinated approach to traffic signal management across jurisdictions. Based on the approach and resource needs established by the signal group, a series of region-wide applications were sent in for the traffic signal systems funding pool.

Scenario 5:

Funding for three separate road pricing projects along corridors within a major metropolitan area was just granted in the most recent TIP. Three project teams were established and each began initial planning for their project. From a regional perspective, the MPO recognized the need for a consistent approach to road pricing in order to better serve customers. The MPO convened a regional road pricing committee so that regional leaders could work together with the road pricing project teams to establish an ongoing dialogue and an RCTO for coordinated road pricing.

⁷ It is expected that management and operations objectives will become part of the metropolitan transportation plan (MTP) as planning further incorporates operations approaches.

As shown in the above scenarios, products of the planning process may provide an opportunity to use an RCTO to advance planning for operations. In the diagram below, these products of the planning process are illustrated with arrows

moving from the planning process to be used as input to the RCTO. In return, the RCTO can offer several important inputs to the planning process as shown by the arrows pointing from the RCTO toward the planning process.

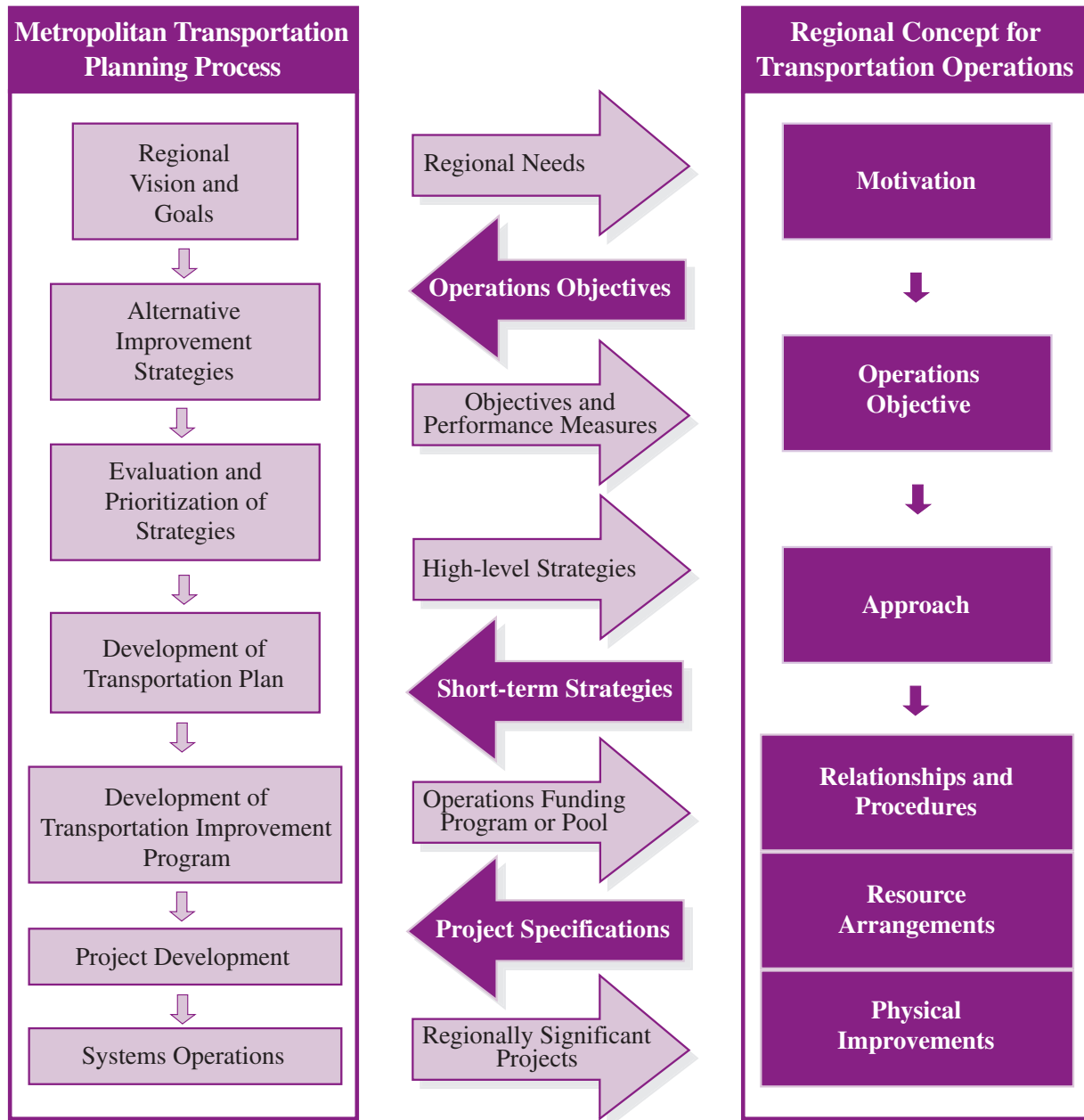


Figure 2: The RCTO can be used to translate outputs of the planning process into specific operations objectives, short-term strategies, and project specifications to be included in the MTP and TIP.⁸

⁸ Diagram for the transportation planning process was derived from *The Metropolitan Transportation Planning Process: Key Issues*, FHWA and Federal Transit Administration (Washington, DC, 2004).

3.2 HOW THE RCTO RELATES TO THE REGIONAL ITS ARCHITECTURE

Like the blueprint for a house, a regional ITS architecture creates a picture of ITS deployment and use in a region as envisioned by a broad base of stakeholders. An architecture serves as a guide to agencies as they build upon and expand their ITS capabilities. According to SAFETEA-LU, ITS projects funded through the Federal Highway Trust Fund must 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. An ITS architecture defines existing or desired sensor, computer, electronics, and communications technologies and the interconnections and information exchanges between these systems. 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.

A Planner's Perspective on the Distinctions between the RCTO and ITS Architecture

Paul Casertano, a senior planner with the Pima Association of Governments in Tucson, Arizona characterized their ITS architecture as broadly defining *what* the operations agencies in the region do with technology and what they would like to do. He explained that, in contrast, their RCTOs defined in specific terms what they were committed to achieving operationally in the short term, *how* they were going to work together, and how their collaborative effort was going to be shaped. Developing an RCTO allowed the ITS and operations stakeholders in Tucson to “drill down” on one or more user services brought out during the development of the ITS architecture.

The RCTO and the regional ITS architecture serve related but distinct purposes for stakeholder agencies in the region. It is important to understand both how they differ in function and how they can work together within a region to produce an even greater level of transportation system performance.

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 orga-



nized and coordinated fashion.”⁹ The purpose of an RCTO is to provide a group of collaborating agencies a common operations objective and a collaborative strategy to achieve that operations objective. The ITS architecture establishes common parameters for ITS but it does not include an implementation strategy that is part of an RCTO.

Other major distinctions between the regional ITS architecture and the RCTO include:

- The focus of the architecture is on ITS whereas the RCTO focuses on transportation management and operations strategies that may or may not necessitate the application ITS.
- Unlike the unlimited temporal scope of the architecture, the RCTO has a 3- to 5-year timeframe for achieving the operations objective.
- Funding arrangements included in the RCTO are not part of a typical architecture.
- The functional scope of the RCTO (e.g., arterial management, transit services) may be narrower than the scope of the architecture which looks across a range of user services.
- The institutional scope may also differ considerably since the partnering agencies involved with an RCTO may be just a couple of counties or all relevant agencies within multiple transportation management areas; however, frequently there will be overlap between

⁹ 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).

the individuals and agencies involved in the ITS architecture and in an RCTO. The developers of an RCTO must also include individuals within partnering agencies with the authority to commit resources (e.g., staff time, funding, equipment).

Updating Strategic ITS Plan Motivated the Creation of MAG RCTO

The idea for MAG’s Regional Concept of Transportation Operations (RCTO) surfaced during the MAG ITS Committee’s 2000 update of the region’s ITS strategic plan. During the update process, the committee was focused on infrastructure, and then they encountered instructions for an operational concept in the ITS Architecture. The Committee members decided to more fully address that in a separate effort and included the RCTO as an action item in the strategic plan.

A regional ITS architecture and an RCTO should make use of each other to advance their common goal of optimizing the transportation system. During the development of the architecture, collaborative relationships between stakeholder agencies are formed that may serve as the foundation for RCTO partnerships. The regional needs and user services identified in the architecture may motivate the creation of an RCTO to address those needs. Likewise, the operational concept, functional requirements, and system interfaces may inform the approach taken in an RCTO to achieve a common operations objective. An important interface between the ITS architecture and the RCTO is data collection for performance measurement. In order to track progress toward their operations objective, RCTO partners will likely need to use ITS that may already be specified in the regional ITS architecture.

Beyond being a source of ideas for the RCTO, any applicable ITS architecture should be consulted by RCTO partners to ensure conformity if their approach utilizes ITS. An RCTO can be a useful tool to put into action the user services defined in an architecture that require multi-agency collaboration to implement and sustain. In summary, the RCTO and the regional ITS architecture can

work in conjunction within a region to increase transportation system performance.

3.3 HOW AN RCTO RELATES TO A CONCEPT OF OPERATIONS¹⁰

The formation of a concept of operations is one of the first steps in the systems engineering process. In general, the concept of operations is a description of a system’s major capabilities. It contains user-oriented operational descriptions, operational scenarios, and a description of a system’s operating environment including facilities, equipment, hardware, software, and people. It “tells the story” of the system – how the components will operate together to accomplish a specified mission.¹¹ It is easy to see the parallels between a concept of operations and an RCTO when one thinks of the partners and their resources as “components” and their operations objective as their “mission.” This is the reason for the similarity between the names “Regional Concept for Transportation Operations” and “concept of operations,” although differences do exist.

A concept of operations gives a description of how a specific system works so that system developers can create functional requirements, system specifications, and design documents. In contrast, an RCTO is not intended to describe the detailed functioning of a single system. The focus of the RCTO is on achieving an operations objective that is independent of the possible systems used to achieve it. The RCTO is much broader and can address operations issues that are not related to the development of specific systems. Once an operations objective is set for an RCTO, the partners decide how the operations objective will be reached which may include elements such as an area wide communications infrastructure, common operating procedures, standard equipment specifications, and resource arrangements. However, the strategy defined in the RCTO would not be sufficiently detailed to serve as the foundation for the design of a system, unlike a concept of operations. The development of a concept of operations may follow the development of an RCTO if the partners decide that a system should be part of the RCTO’s approach.

¹⁰ Related concepts of operations are described in L. Neudorff, J. Harding & L. English, *Integrated Corridor Management Systems Concept of Operations for a Generic Corridor*, Report Number FHWA-JPO-06-032 (Washington, DC: April 2006) and Smith, B., et al, *Regional, Statewide, and Multi-State TMC Concept of Operations and Requirements*, FHWA TMC Pooled Fund Study, project in progress retrieved on September 29, 2006 from http://tmcops.ops.fhwa.dot.gov/cfprojects/new_detail.cfm?id=84&new=0.

¹¹ American National Standards Institute and American Institute of Aeronautics and Astronautics, *Guide for the Preparation of Operational Concept Documents*, ANSI/AIAA G-043-1992 (1993).

4 DEVELOPING AN RCTO

At the core, an RCTO defines *what* the participants would like to achieve and *how* they are going to achieve it. This core takes form in six standard elements that serve as a framework for developing an RCTO for a specific region. Central to the RCTO, the operations objective defines the desired outcome, the “what,” in specific and measurable terms. The motivation supports the operations objective by grounding the collaborative action in regional needs, agency goals, or operational concerns. The other five elements - approach, relationships and procedures, resource arrangements, and physical improvements - work in concert to define “how” the partners will attain the operations objective. While the approach is the overall scheme for the collaborative effort, the remaining elements, relationships and procedures, resource arrangements, and physical improvements, translate the approach into the

The requirements should be described in sufficient detail for decisionmakers to make informed commitments regarding resources and institutional arrangements.

specific, tangible elements that are required to achieve the operations objective. The requirements should be described in sufficient detail for decisionmakers to make informed commitments regarding resources and institutional arrangements.

In summary, a Regional Concept for Transportation Operations contains six key elements as follows:

- **Motivation (“Why”):** Reasons for developing an RCTO based on regional needs, goals, or operational concerns.
- **Operations Objective (“What”):** Desired near-term outcome(s) in terms of transportation system performance.
- **Approach (“How”):** Overall description of how the operations objective will be achieved.
- **Relationships and Procedures:** Institutional arrangements, MOUs, protocols, information sharing, etc.
- **Physical Improvements:** Facilities, equipment, systems, etc.
- **Resource Arrangements:** Sources and use of funding, staff, equipment, etc.

The following diagram illustrates how an RCTO could be developed. There are three distinct phases. As shown, the motivation element is not created during the development of the RCTO. It is an issue observed by the partners that prompts the initiation of the RCTO and is then recorded. The first phase is largely driven by values and needs, and

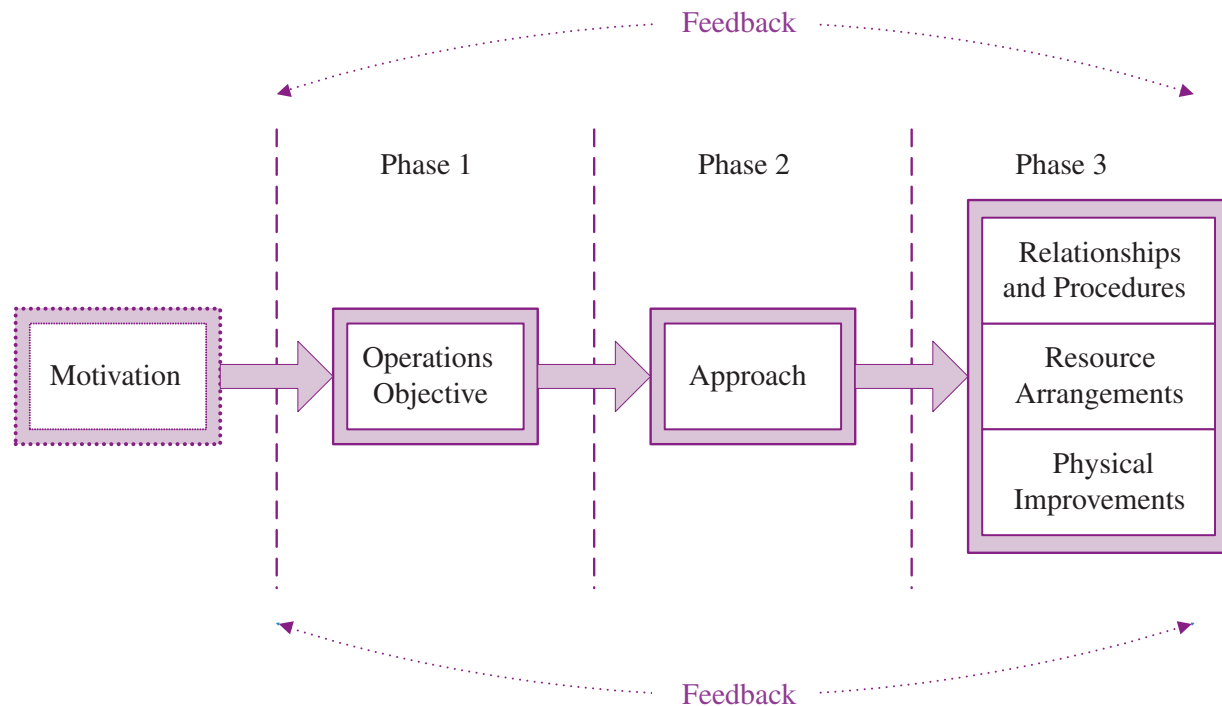


Figure 3: Development of an RCTO.

it consists of forming the operations objective which establishes the desired outcome. The second phase identifies possible approaches to achieving the operations objective and culminates in the selection of a particular course of action. The third phase translates the approach into more specific, tangible elements that guide joint or coordinated actions including system design, resource allocation, and inter-agency and multi-jurisdictional agreements.

This process is inherently iterative in nature in that a number of operations objectives may be considered for addressing the need (i.e., motivation) and similarly a number of approaches may be considered for achieving the operations objective. Once the approach is selected, it is further specified in terms of the physical, relational, and resource elements of the RCTO. However, this may lead to revisiting the approach and even the operations objective once the full implications of the approach are specified in greater detail.

Three RCTO examples are used throughout this section to illustrate each element. The examples do not prescribe a specific way to form an RCTO, but rather show how a region may choose to develop each element. Each example is inspired by a real-life collaborative effort in the United States, although the situations have been modified for the purpose of demonstrating an RCTO.

- Example 1 is based on the collaborative operations activities of the Southeast Michigan Snow and Ice Management partnership in which four road agencies and a transit agency came together to implement a coordinated snow and ice removal system.¹²
- Example 2 is motivated by the Hampton Roads, Virginia incident management RCTO working group and the activities of the Hampton Roads Planning District Commission ITS Committee.¹³
- Example 3 is inspired by the High Plains Corridor Coalition, a collaborative effort between the Nebraska Department of Roads and the Colorado and Kansas Departments of Transportation to develop a web-based traveler information network to coordinate and disseminate traveler information regarding adverse weather conditions and incidents impeding travel on common interstate highways.¹⁴

¹² For more information, see <http://www.rcocweb.org/home/semsim.asp> or contact Dennis Kolar, Road Commission for Oakland County, at dkolar@rcoc.org.

¹³ For more information, contact Camelia Ravanbakht, Hampton Road Planning District Commission, at cravanbakht@hrpdcv.gov.

4.1 MOTIVATION

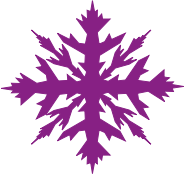
The decision to undertake an RCTO requires the commitment of agencies and individuals who want to work together to improve upon the way they currently “do business” so that they can better address common challenges. The starting point for each RCTO is unique and depends on the current state of collaboration between the interested participants. An RCTO may be created by agencies that have come together for the first time with the sole purpose of addressing a mutual concern through an RCTO. Alternatively, an RCTO may be begun by participants who have already been meeting regularly to exchange information and update each other regarding their individual activities but now want to take their collaborative relationship to the next level and take collaborative action toward achieving a set operations objective. Additionally, partners who have been jointly operating may want to advance or expand their existing effort through an RCTO.

In general, the starting point for an RCTO is an identified regional need, goal, or widely acknowledged regional operations concern. The motivation captures why the partners have decided to undertake this common effort, why their action is needed, and why the focus of the RCTO is important to the region that they collectively serve. This may originate from a political directive, regional crisis, a spike in accident rates, or a basic desire to provide good service. Additionally, the motivation for an RCTO may come out of the long-range planning process in which operations needs are derived from regional plans or the development of a regional ITS architecture or ITS strategic plan. It may also spring from a grassroots initiative among operators in the region who wish to improve transportation systems performance throughout the region. Frequently the motivation provides the linkage between regional plans and day-to-day management and operation of the transportation system and serves as the primary catalyst for collaboration. It grounds the effort in the public’s interest as embodied in regional plans and agency responsibilities and priorities.

Although the motivation may be clear in the minds of the participants as they begin developing an RCTO, by making this explicit, the partners can use it as a guide amid inevitable challenges encountered during the implementation.

¹⁴ For more information, contact Jaimie Huber, Nebraska Department of Roads, at jhuber@dor.state.ne.us.

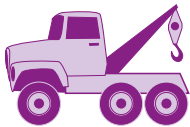
Motivation Example 1: Tri-County Winter Maintenance RCTO



A major snowstorm in December of 2005 overwhelmed Able City's and Baker County's capabilities to clear snow emergency routes and other major arterials within their respective jurisdictions. In response, Marlin and Quincy counties volunteered staff and equipment to assist. Because of this unprecedented level of cooperation, Able City and Baker County were able to resume transit and other public services far earlier than anticipated, saving residents and businesses of Able and Baker thousands of dollars in potentially lost wages and revenue. This event heightened awareness among the four agencies of the need for a regional concept for winter road maintenance.

During this time, Baker County was finishing a study focused on the application of automatic vehicle location (AVL) on maintenance vehicles as a means to improve fleet management and resource allocation. When Baker County shared the results of this study with the Marlin and Quincy counties and Able City, the transportation department managers of the four agencies recognized this as an opportunity to leverage Baker County's study and develop a coordinated approach to winter road maintenance in the region. This approach would help the four agencies address their respective goals for effective and efficient snow removal.

Motivation Example 2: Quick Clearance RCTO



The Janesville region faces unusual transportation challenges that stem from its coastal geography. Three rivers divide this region and flow into the Foster Bay which separates the peninsula in the north from South Janesville where most of the population lives. One bridge and two bridge-tunnels allow traffic to pass between the peninsula and the southern land. Because even minor incidents on a bridge or bridge-tunnel can trigger severe congestion and delay for travelers, the Janesville Planning District Commission's (JPDC) developed a regional goal to improve traffic incident management. The JPDC Intelligent Transportation System (ITS) Committee put special emphasis on that goal during the 2004 update of the regional ITS architecture and strategic plan. As part of the update, the ITS Committee held joint workshops with the public safety community where a common vision for regional incident management was established. The vision states "In 2026, surface transportation managers are prepared with systems and operational procedures for handling day-to-day incidents on the transportation grid that enable quick response and

quick clearance. Effective coordination and data-exchange between transportation officials and emergency managers and responders are routine."¹⁵ To bring about this vision, the ITS Committee initiated a 7-year project to develop an integrated communications system between the State and local police and State and local departments of transportation in the Janesville region.

Less than a year into the communications project, a multiple car accident on a major commuter bridge-tunnel caused over 8 hours of delay for most commuters. In response to numerous complaints from the public, Janesville MPO Board tasked the State department of transportation and JPDC to act to ensure more efficient and coordinated incident clearance in the near term and to put into practice the region's goal for improved traffic incident management.

The Janesville Planning District Commission and the State DOT brought together the JPDC ITS committee and an existing incident management committee to agree on strategies for incident clearance. A Joint ITS/IM Committee was formed.

¹⁵ PB Farradyne for the Hampton Roads Planning District Commission, "Hampton Roads ITS Strategic Plan" (Chesapeake, Virginia, 2004).

Motivation Example 3: Multi-State Traveler Information RCTO



In June of 2005, the Warren State Department of Transportation was forced to close a 20-mile section of Interstate 40 due to wild fires. The manager of the Warren Transportation Management Center (TMC) wanted to be able to warn long-distance travelers of the closing in

Grover State where drivers have an opportunity to choose an alternate route. The TMC manager placed a call to the Grover ITS Program Specialist to inquire about deploying a Warren DOT portable variable message sign in Grover. Since this would be difficult institutionally, the Grover specialist posted messages on her signs about the fire in Warren.

Travelers in this primarily rural multi-State region have few alternate routes available to them and even fewer are acces-

sible to commercial vehicle operators who have difficulty taking detours on smaller, State routes. In many cases, alternate routes for major highway routes must be chosen in a previous State. Additionally, the multi-State region frequently experiences severe winter storms that force extended road closures. Interstate travelers caught unaware by a road closure have often complained to the State DOTs that they need road condition information on the other side of the states' lines.

The variable message sign request from Warren State provided the catalyst for the ITS and operations managers of Cantwell, Warren, Byrd, and Grover States to come together to better coordinate traveler information on adverse weather conditions and incidents impeding travel on their common interstate highways.

4.2 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 and cannot be achieved by a single entity or jurisdiction. In conjunction with deciding on an operations objective, performance measures are developed by the participants to assess whether or not the operations objective has been met. There are two types of operations objectives: user-oriented objectives and operator-oriented objectives.

USER-ORIENTED OBJECTIVES

The operations objective is preferably described in terms of system performance outcomes as experienced by users, given that the fundamental purpose of management and operations improvements is to better serve the transportation system user through increased system performance. Operations objectives focused on outcomes to the user include "improved mobility and travel opportunities, individual travel times and trip time reliability, or travel costs."¹⁶

OPERATOR-ORIENTED OBJECTIVES

If an outcome-based operations objective is not feasible for the partners due to factors such as lack of operations data or lack of consensus among decisionmakers around an appropriate system-level performance operations objective, the partners may develop an operations objective in terms

of the performance of the system managers or operators. These operations objectives refer to indicators such as percentage of traffic signals retimed, number of variable message signs deployed, or incident response time.

Key criteria¹⁷ for an operations objective include:

- *Specific:* It provides sufficient specificity to guide formulation of viable approaches to achieving the operations objective without dictating the approach.
- *Measurable:* It is measurable in terms that are meaningful to the partners and users. Tracking progress against the operations objective provides feedback that enables the partners to assess the effectiveness of their actions. An operations objective is chosen that is measurable within the partners' means.
- *Agreed:* Necessary for the development and implementation of the RCTO, partners come to a consensus on a common operations objective.
- *Realistic:* The participants are reasonably confident that they can achieve this operations objective within resource limitations and institutional demands. Because this cannot be fully evaluated until the approach of the RCTO is defined, the partners may need to iteratively adjust the operations objective once the approach of the RCTO is determined.
- *Time-bound:* Partners specify when the operations objective will be achieved. This promotes efficiency and accountability.

¹⁶ Turner, S. M. & Stockton, W. R., *A Proposed ITS Evaluation Framework for Texas*, (Texas Transportation Institute, 1999).

¹⁷ Objective criteria are adapted from the Government Communication Office, United Kingdom. Retrieved on October 2, 2006 from <http://engage.comms.gov.uk/knowledge-bank/strategic-planning/aims-and-objectives/making-your-objectives-smart.html>.

Operations Objective Example 1: Tri-County Winter Maintenance RCTO



By 2009, the partnering agencies, Baker, Marlin, and Quincy counties, and Able City will achieve and maintain an average time to clear of no more than 5 hours on all emergency snow routes and priority arterials. In addition, the average vehicle miles traveled (VMT) per snow event for all partner agencies combined will decrease by 10 percent by 2009 compared to the 2000-2005 average per snow event of 1790 miles.

The partners will measure improvements in efficiency by:

- Time to clear snow emergency routes and priority arterials within the combined jurisdictions of the

partner agencies. The 2005 Northern Ketchikan Association of Governments Regional ITS Architecture contains the list of designated emergency routes and priority arterials.

- Winter maintenance VMT by all partner agencies (average VMT per snow event).

The average time to clear emergency snow and priority routes within Baker, Marlin, and Quincy counties, and Able City was 7.5 hours per storm from the fall of 2000 to the spring 2005.

A snow event is defined by snow accumulation of 4" or more in 12 hours, or 6" in 24 hours.

Operations Objective Example 2: Quick Clearance RCTO



- The partners will reduce the annual average recovery time to 30 minutes or less by 2009 for minor incidents in the Janesville region. This requires a decrease in recovery time of 10 minutes from the 2005 average of 40 minutes per incident.
- The partners will reduce the annual average recovery time to 60 minutes or less by 2009 for major incident in the Janesville region. This requires a decrease in recovery time of 15 minutes from the 2005 average of 75 minutes per major incident.

For roads that are not instrumented with traffic speed detectors, the partners will work to achieve a secondary set of operations objectives:

- Reduce the annual average roadway clearance time to 25 minutes or less by 2009 for minor incidents in the Janesville region. This requires a decrease in clearance time of 10 minutes from the 2005 average of

35 minutes per minor incident.

- The partners will reduce the annual average roadway clearance time to 50 minutes or less by 2009 for major incident in the Janesville region. This requires a decrease in clearance time of 15 minutes from the 2005 average of 65 minutes per major incident.

Major incidents are defined as incidents that require emergency medical services and cause multiple lanes to be closed. Minor incidents are all other incidents such as stalled vehicles or non-injury crashes.

Recovery time is defined as the time between the awareness of an incident and the restoration of impacted roadway/roadways to within the average non-incident range of speed for those roads and time of day.

Roadway clearance time is defined as the time between awareness of an incident and restoration of lanes to full operational status.

Operations Objective Example 3: Multi-State Traveler Information RCTO



The partners will decrease traveler delay associated with road closures and restrictions, major incidents

and disasters, and weather and storms on I-40, I-50, I-46, I-35, and I-55 within the four-State area by 20 percent by 2011.

4.3 APPROACH

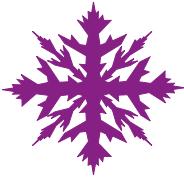
The approach describes how the operations objective will be achieved. It provides the needed transition from an operations objective to what is required to achieve it. The approach is not a collection of tasks, but a cohesive design containing elements that support each other to bring about a common outcome.

The approach may be based on an expansion of capabilities or services that one of the partners currently offers, adoption of best practices from similar regions, institutional arrangements that enable mutual support and coopera-

tion, enhanced information sharing among partners, or implementation of new systems and related user services. Developing an approach allows the partners to agree on an overall strategy for achieving the operations objective so that they can determine what is needed to implement it, the relationships and procedures, the resource arrangements, and the physical improvements.

The remaining elements of an RCTO lay out the requirements of achieving the operations objective in sufficient detail for decisionmakers to make informed commitments regarding resources and institutional arrangements.

Approach Example 1: Tri-County Winter Maintenance RCTO¹⁸



The partnering agencies will work together to become more efficient and save money on winter road maintenance throughout the region. The effort will focus on 1) obtaining and sharing real-time information on the status of winter maintenance trucks and 2) providing mutual assistance as needed.

Partner agencies will approach regional snow maintenance through increased collaboration and targeted utilization of technology and communications systems to coordinate partner operations. They will increase efficiency by reducing miles traveled by trucks and decreasing the time to clear snow and ice from the roads. This will save on the cost of fuel, vehicle maintenance, and overtime paid to drivers.

Currently, each jurisdiction acquires and maintains its own equipment without regard to other jurisdictions. Further, each jurisdiction plans and executes its snow removal program independently and is largely unaware of either road conditions or equipment status in other jurisdictions.

The partners will jointly procure an automatic vehicle location (AVL) system that allows them to observe snowplow activity throughout the region and gather real-time informa-

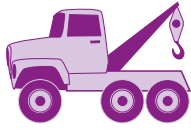
tion on pavement conditions. With this data, partners can improve real-time management of their fleets and request winter road maintenance assistance from other partners as needed. For example, during a snow clearing effort, Baker County may view on the common AVL system that a Marlin County snow plow is close to the Baker/Marlin border, an area where Baker County roads still need to be plowed. Baker could request assistance from Marlin County.

Additionally, the AVL system includes a mobile weather monitor that will allow fleet managers to assign tasks in real-time to their drivers based on the temperature readings from the plows.

A radio communications backbone will allow the in-vehicle computers to continuously send location and weather data to a common server. The data will then be put onto the Internet where only partnering agencies can receive it. Work stations at each partnering agency will display a map-based interface that maintenance managers will view to identify weather threats, track snowplow locations, and route diversions. Each maintenance vehicle will appear on the map with a color-coded trace indicating where plows have been.

¹⁸ Approach based on information from the SEMSIM website (<http://www.rcocweb.org/home/semsim.asp>) accessed on January 9, 2007.

Approach Example 2: Quick Clearance RCTO



There are several strategies that can improve roadway recovery time after incidents, but the partners have chosen to focus their efforts on quick clearance, an area where they believe they can realize the greatest improvement. Quick clearance is defined by the Federal Highway Administration as the process of removing wreckage, debris, or any other elements that disrupt the normal flow of traffic or force lane closures, and restoring the roadway capacity to its pre-incident condition. Improvements in quick clearance have been shown to provide significant benefits to traffic flow impacts and safety. Public safety and transportation partners will work together on quick clearance through education and knowledge sharing, policy and procedure development, and expanded service.

Education and Knowledge Sharing

Cross-agency training.

The partners will develop and implement a joint transportation and public safety training program that involves both classroom instruction and exercises. The multi-agency aspect of the training will allow traffic management personnel, law enforcement, fire and rescue, emergency medical, and towing and recovery to share practices and clarify roles and responsibilities. The classroom training will increase knowledge of current quick clearance laws, policies, and agreements. The exercises will provide practice in traffic incident removal procedures applicable to a wide range of incident types.

Post-incident debriefing.

Partners will establish regular post-incident debriefings between the key players from multiple agencies. The debriefings will give the responders a chance to review what went well and what needs improvement with regard to incident management.

Public information campaign on MOVE IT law.

The traveling public can play a key role in reducing traffic delays due to minor, non-injury incidents. The MOVE IT law in the State of Burke declares that drivers must move their vehicles from an active traffic lane in cases of minor, non-injury incidents. The public is not widely aware of

this law and in order to bring about greater compliance, the partners will undertake a public information campaign.

Policy and Procedure Development

Traffic fatality certification policy.

Currently, a body at the scene of a traffic fatality in the State of Burke cannot be moved until the medical examiner from the Burke State Office of the Chief Medical Examiner (OCME) arrives on the scene. There have been several occasions in the past few years in which the medical examiner has been unable to arrive at the scene of an accident within the first 3 hours, significantly prolonging the traffic impacts of an incident. In order to make this process more efficient, some States have developed traffic fatality certification policies. The partners aim to develop a policy that will allow law enforcement personnel to relocate accident victims in special circumstances.

Regional towing request procedure.

The partners will develop a common towing request procedure such that qualified towing and recovery operators are requested in an equitable and efficient manner. This will facilitate fast and predictable response times.

Procedures for early identification of equipment needs and mobilization of equipment.

A standard procedure regarding classification of equipment needs and mobilization will be documented and disseminated to all traffic incident responders. The partners recognize that an unnecessary source of delay and cost in the incident clearance process is lack of knowledge about towing and recovery equipment needs and equipment mobilization.

Expanded Service

Arterial incident action team.

The partners will implement an arterial incident action team similar to the existing Burke Highway Helpers program. The arterial patrol will assist in traffic management allowing first responders focus on their incident clearance responsibilities. A similar arterial incident management team, Regional Emergency Action Coordinating Team, operates in the Phoenix metropolitan area and a recent study estimated a benefit to cost ratio for the service at 6.4:1.¹⁹

¹⁹ Battelle Memorial Institute for the Maricopa County Department of Transportation, *Regional Emergency Action Coordination Team (REACT) Evaluation* (Phoenix, Arizona, 2002).

Approach Example 3: Multi-State Traveler Information RCTO



The partners will work to decrease interstate traveler delay by providing timely and accurate traveler information on road conditions and recommended alternate routes. The partners' collaborative effort will be focused on exchanging information between the

partnering DOTs that will affect travel along the I-40, I-50, I-46, I-35, and I-55 corridors. Shared information will help operations staff in the partnering States make educated decisions when disseminating traveler information based on the conditions and actions of the other states.

The partners will approach this effort by establishing 1) shared procedures, 2) an electronic, multi-State contact list, and 3) a web-based traveler information system.

1. The partners will establish procedures for sharing information and standardized regional traveler information messages.

2. The partners will also create a shared electronic contact list with current information on who to call during major incidents or emergencies. Partners will have the capability of updating the shared list almost instantaneously.
3. To facilitate information sharing among the partnering states, the partners will build a web-based system that will integrate and disseminate highway condition information to travelers and partnering operations staff. Travelers will be able to view alerts and road conditions over the Internet via a color-coded map of the 4-State area. In addition to the map, operators will be able to view other agencies highway traffic cameras and road weather information system (RWIS) data through a protected portion of the Internet site. This system will take the information that is already entered by the State DOTs into their individual systems and transfer it into a common web-based system.

4.4 RELATIONSHIPS AND PROCEDURES

The relationships and procedures of an RCTO define how the partners will work together to achieve the operations objective. This includes multi-agency and multi-jurisdictional working agreements, institutional arrangements, memorandums of understanding (MOUs), and interoperability standards. While the actual agreements may not be present in the RCTO, the RCTO gives a detailed description of agreements that will be created during the implementation. This is a crucial element of the RCTO as much of what it will take to achieve the operations objective depends on relationship building and information sharing.

The relationships and procedures in an RCTO should reflect the fact that although agencies and jurisdictions retain control of their operations, they may have responsibilities for operating and managing their systems and services in ways that provide for a more collective regional benefit. The relationships and procedures will typically include agency or individual responsibilities for implementation of the RCTO as well as ongoing management and operations resulting from the RCTO.

The relationships and procedures may address:

- How will stakeholders achieve coordination, integration and/or interoperability for optimum performance?
- How is information obtained, managed, and shared?
- How do agencies and systems work together in specific situations?
- How can the RCTO leverage the regional ITS architecture?
- How will data be collected for measuring progress toward the operations objective?
- Who are the champions who will be responsible for leading individual aspects of the RCTO implementation?



Champions Identified in the MAG RCTO to Advance Implementation

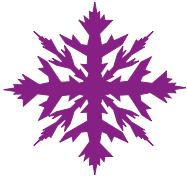
The MAG RCTO initiative areas were divided between existing committees and working groups. One or two individuals volunteered to champion each initiative. Each champion was responsible for reporting back to the ITS Committee periodically with an update on the initiative. Faisal Saleem, ITS Coordinator for Maricopa County, is the champion for the travel information initiative which is being pursued under the umbrella of AZTech, a partnership of Federal, State, local, and private entities that work together to address a variety of regional transportation issues. Saleem led the formation of an advanced traveler information system (ATIS) committee of 15 to 20 stakeholders. The committee adopted the RCTO's quantitative goals for traveler information and developed a baseline for travel time for the freeways and major arterials. Every month the committee updates its travel time information collected by the participating agencies and work on related initiatives.

Contact Faisal Saleem, faisalsaleem@mail.maricopa.gov

Denver Traffic Signal Program Relationships and Procedures

DRCOG approaches this program as a partnership among DRCOG and the traffic signal operating agencies. Regular updates are made every few years through a collaborative dialogue led by DRCOG. Operating agencies work with each other to implement the projects defined in the program. In addition to coordinating TSSIP, DRCOG is responsible for conducting timing and coordination tasks on a project-by-project basis for those projects identified in the TSSIP and as requested by individual operating agencies. Through these tasks, DRCOG identifies corridors to retime, develops and fine-tunes timing plans, and documents improvements and benefits. In turn, the operating agencies are responsible for maintaining and operating their signals, maintaining the timing, and reviewing and approving plans.

Relationships and Procedures Example 1: Tri-County Snow Maintenance RCTO



Part A: Implementing the RCTO

A steering committee composed of the transportation department directors from each partner agency will provide direction for the collaborative effort and make recommendations to the city and county officials for resource investment.

A users committee will be formed by staff from each agency to discuss and resolve implementation and usage issues. Committees will meet on at least a monthly basis and will work to maintain and advance the collaboration past the implementation phase of the AVL system.

Part B: Day-to-day operations

Legal.

The partnering agencies recognize the need for each agency to limit liability that may be incurred when maintenance is performed by a partner agency outside of its home jurisdiction. The agencies will develop an agreement that allows an agency to be assisted by a partner agency without being subject to unreasonable liabilities.

Information sharing.

Participating partners will make available in real-time location and status information of their winter maintenance vehicles and roadway conditions via established protocols. Frequency, content, and format will be determined as the system is developed.

Performance measuring.

Partners will collect and share performance data on the time to clear and maintenance vehicle miles traveled. Time to clear extends from the initiation of winter maintenance operations in anticipation of snow event until all emergency snow routes and priority arterials in the partners' jurisdiction are clear. Clearance will be mea-

sured by visual inspection by the partnering agencies. Partners will send performance data electronically to the lead agency, Marlin County Department of Transportation. Additionally, vehicle miles traveled (VMT) for maintenance vehicles per snow event will be emailed to Marlin County DOT which will aggregate VMT across the region and track performance trends.

Procedures for mutual assistance.

Mutual assistance may occur when one jurisdiction seeks assistance that requires equipment owned and operated by one jurisdiction to operate within a partnering jurisdiction. Unless otherwise agreed in advance, mutual assistance requires consent on a per request basis. Assistance may be requested by a partner in need of additional support or may be offered by a partner whose equipment is available and positioned to provide service. However, unless both parties consent, equipment shall not cross jurisdictional boundaries. Consent may be routine (i.e., prearranged), conditional (i.e., assistance occurs when specific conditions occur), or responsive (i.e., because of current conditions, in real-time we will offer or accept assistance). Routine or conditional consent may be specified in multi-jurisdictional agreements; responsive consent requires a record of the consent.

Cost recovery for assistance.

The partners will reimburse one another for the cost of providing assistance. The partners will agree on a formula to provide appropriate compensation based on staff time, chemical use, and vehicle mileage. Mileage will be tracked on the AVL system. Staff time and chemical use will be reported to the lead agency, Marlin County Department of Transportation, by the assisting agency. At the end of each month, Marlin County DOT will settle the accounts, bill partners as needed, and then reimburse partners with outstanding costs.

Relationships and Procedures Example 2: Quick Clearance RCTO



Towing and recovery working group.

Representatives from the partner agencies and the region's towing and recovery operator community will form a working group to develop regional towing and recovery procedures. The group will develop the zone-based towing procedure and early identification of equipment needs and mobilization of equipment procedures. The working group will be led by a representative from the Foster Police Department and a public safety agency will be designated as the lead for each zone. The group will meet on a bi-monthly basis until the procedures have been established and documented. After that time, representatives from the lead agencies for each zone will give status reports to the JPDC ITS/IM Committee as needed. Updates to the procedures will be handled by the zone leaders with input from the Joint ITS/IM Committee on an as needed basis.

Zone-based towing procedure.

The partners will develop a common procedure for handling towing and recovery needs. The region will be divided into at most five districts and each district will create a list of pre-qualified towing and recovery operators that will be used to contact a tow operator at the time of an incident. Due to the geography of the region, a single tow list would not be as efficient. Responsibility for implementing and maintaining this list will be given to the local police departments and State police. When an incident occurs, the local dispatcher will call the first operator on the list to the incident scene and then move it to the end of the list.

The partners will decide what qualifications the towing and recovery operators must meet in order to be placed on a zone's towing list. These qualifications should minimize time to dispatch the appropriate tow equipment to the scene. Factors to be considered include maximum allowable response time, insurance, 24-hour availability, and availability of heavy-duty tow trucks.

Traffic fatality certification policy.

Led by the Burke State Police (BSP), a working group of the region's law enforcement agencies will meet with the Burke State Office of the Chief Medical Examiner to develop a policy that will define an alternative method for handling traffic fatalities in special circumstances. The policy will likely be modeled after Maryland's practice: law enforcement agencies that need to remove a fatal crash victim from the scene of an incident must follow these steps: fill out the OCME form, take pictures of crash and victim position, and then call the OCME 24-hour center to request permission to relocate the body.²⁰

Cross-agency training.

The classroom training and full-scale exercise will be developed by contractors to the Burke DOT. The overall design of the training will be guided by a working group composed of management-level representatives from each partnering agency. The classroom training will be a full day of instruction to be held four times annually. The full-scale exercise will last approximately 4 hours and will allow first responders to cooperate across agencies while working in a simulated accident scene. A different full-scale exercise will be held every 18 months. Participating agencies will require their incident management personnel to attend training on a yearly basis. Burke DOT and BSP will update training materials on an as needed basis because of new procedures, policies, or laws.

Post-incident debriefing practice.

JPDC will take the lead in developing a standard template to use for multi-agency reviews of major incidents. JPDC will host three to four post-incident debriefing sessions to be attended by all key players who participated in responding to the incident. Incidents that were not cleared within 30 minutes are candidates for a debriefing session. Other criteria will be decided upon by the Joint ITS/IM Committee. Requests for debriefings will be handled by JPDC.

MOVE IT campaign working group.

Led by the City of Winchester Department of Transportation, a working group of partnering agencies will determine the content, design, and distribution strategy of the MOVE IT public information brochure. A standard design for a road sign to educate drivers on this law will also be developed and transportation agency representatives will work within their agencies to get support for purchasing and posting MOVE IT signs in their jurisdictions.

Arterial incident action team.

The departments of transportation from the cities of Twinfolk, Winchester, and Foster will form an arterial incident action team. Led by the City of Twinfolk DOT, the team will jointly apply for funding, procure the necessary equipment, and provide guidance for the initiative. The City of Twinfolk will be responsible for the administration of the team. Joint funding will be used to procure equipment and contract with a private company to operate the service.

The action team will assist in traffic incident management by setting up emergency lane/road closures, installing and maintaining signed detour routes, and providing directional information to motorists. The arterial team will be on call 24 hours a day, 7 days a week and respond to incidents when requested by local police, fire, or transportation agencies.

²⁰ This is a practice developed by the Maryland Office of the Chief Medical Examiner (OCME) and described on page 32 of the *NCHRP Synthesis 318*

Safe and Quick Clearance of Traffic Incidents by W. Dunn and S. Latoski (Transportation Research Board, 2003).

Relationships and Procedures Example 3: Multi-State Traveler Information RCTO



The State departments of transportation of Grover, Cantwell, Warren, and Byrd will form a coalition to improve coordination on interstate traveler information. The Coalition will be led by the Grover DOT and have a tiered organizational structure consisting of:

- An executive committee made up of the four DOT directors who will decide on resource commitments and the overall direction of the effort.
- A steering committee established between State DOT ITS managers who will manage the effort and provide input to the executive committee.
- A working committee made up of technical staff from the four DOTs that work together to develop the technical and day-to-day operational aspects of the collaboration.

The partners will establish a common approach for measuring their performance toward their operations objective. The roads of interest for this effort, I-40, I-50, I-46, I-35, and I-55, have existing traffic detection instrumentation that will allow for delay to be estimated during major incidents, inclement weather, road construction, and disasters based on vehicle speeds and volume. It is not anticipated that delay will need to be assessed for every event but that a sampling of events will be sufficient. Developing a common performance measurement approach will be one of the first efforts of the coalition. A baseline of delay will need

to be established during the first year of the effort, prior to the implementation of the information sharing system and procedures.

An interagency agreement will be established to formalize the partner agencies' funding commitments to this effort.

Common procedures for information sharing on interstate road conditions will be developed. The partners have agreed to share information on road closures, restrictions, major incidents and disasters, and weather. Procedures to be developed will cover what information will be shared (e.g., road closures, work zone activities, inclement weather, detours), how the information will be shared (e.g., format, timing, via Internet or cell phone), and who will be responsible within each agency for gathering information. It is not expected that agencies will need to collect information beyond their current levels with the exception of delay data for performance measuring.

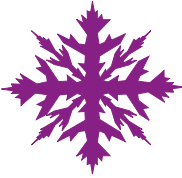
Standard procedures for rapid updating of the electronic contact list will also be developed. It is expected that this list will be hosted on the coalition's web-based system.

The partners will follow a standard systems engineering approach to developing the traveler information system. This will include the following steps: define requirements, perform high-level design, develop installation plan to install the system in each State, complete system integration across the 4-State region, and test the system.

4.5 PHYSICAL IMPROVEMENTS

The physical improvements defined in an RCTO describe the facilities, equipment, and systems that will be put in place to achieve the operations objective. Additionally, an RCTO shows what investments are needed for these improvements and how they fit together to deliver better customer service and system performance. Some partnerships may decide to construct an RCTO without significant physical improvements. For example, the MAG ITS Committee decided to focus on making operations improvements with their existing ITS infrastructure because they already had considerable ITS deployments and additional funding was not readily available.

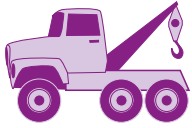
Physical Improvements Example 1: Tri-County Snow Maintenance RCTO



The following table lists the physical improvements needed to implement the snow maintenance system.

Item	Function	Estimated Price	Quantity
Global positioning system tracking device	Each vehicle is equipped with a tracking device that allows satellites to pinpoint its exact location.	\$400/unit	Marlin County: 60 Baker County: 45 Able City: 50 Quincy County: 35
Environmental sensors	Mounted on the vehicle, the sensors continuously record both air and pavement temperatures to help determine if salting is required.	\$500 for both air and pavement sensors	Marlin County: 60 Baker County: 45 Able City: 50 Quincy County: 35
In-vehicle Unit	Each vehicle is equipped with a dashboard-mounted computer display, known as an in-vehicle unit (IVU), which automatically collects data from the various sensors on the vehicle, displays the information for the driver, and sends this data over the radio to the data server.	\$1000/unit	Marlin County: 60 Baker County: 45 Able City: 50 Quincy County: 35
900 MHz Radio System	Links the in-vehicle unit in each vehicle with the data server and computer base stations at the garages.	Donated by Marlin County Transit	1
Data server	To collect the data from the radio system and put onto the Internet where only partnering agencies can receive it.	Donated by Able City	1
Software	For web-based interface.	\$20,000	1

Physical Improvements Example 2: Quick Clearance RCTO



The necessary physical improvements are eight trucks equipped with variable message signs, radios, traffic cones, detour signs, and public address systems. The signs, cones, and public address

system allow the drivers to better manage traffic during incidents. The radio communications system will enable drivers to communicate with each other and central dispatch. Cost per equipped truck is approximately \$45,000.

Physical Improvements Example 3: Multi-State Traveler Information RCTO



The web-based traveler information exchange system will require the following equipment:

- Web application software.
- Database.
- Web server.
- Internet site.
- High-speed internet access within State departments of transportation.

4.6 RESOURCE ARRANGEMENTS

Resource arrangements identify how resources such as funding, staff time, and equipment will be obtained and applied in the collaborative effort to actualize and sustain the operations objective. Some of these investments involve partner agency budget allocations; others are commitments of staffing, equipment, or facilities to support regionally significant activities. The resource arrangements element may include plans to fund the regional effort by jointly applying for funding through the regional Transportation Improvement Program or a local, State, or Federal grant. In several regions, applications for regional, State, or Federal funds are given greater weight when several agencies have joined together.

Examples of resource arrangements between participants of collaborative management and operations efforts provide ideas for how resources could be organized within an RCTO:

- The High Plains Corridor Coalition State DOT partners formed a Transportation Pooled Fund Study and have committed to providing \$300,000 each over 5 years.
- Phoenix International Raceway event management stakeholders have partnered to plan and implement effective event management strategies to get out timely and accurate motorist information, manage traffic, and reduce demand. Participants include Maricopa County DOT (MCDOT), Maricopa County Sheriff's Office (MCSO), ADOT, the Arizona Department of

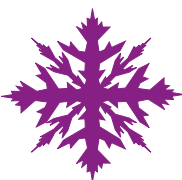


Public Safety (DPS), PIR officials, and M&M Parking Consultants. The partners coordinated their ITS resources and staff time in order to stage traffic control posts staffed by public safety and transportation agencies and utilize three control centers, lane reversal, radio, freeway VMS, and limited arterial VMS.

- Funding for Southeast Michigan Snow and Ice Management (SEMSIM) has come from Federal earmark grants, CMAQ, and funds from each of the four road maintenance organizations. SEMSIM uses extra capacity in the transit agency's radio communications system.

The following illustrates the resource arrangements used to fund the implementation of an RCTO:

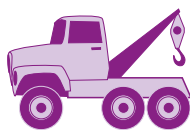
Resource Arrangements Example 1: Tri-County Snow Maintenance RCTO



A joint purchasing agreement will be established between the four partnering agencies to share the cost of the AVL system and its components equitably. The partners will divide equally the cost of the software and radio communications system, but the cost of the workstations, vehicle transponders, and mobile weather monitors will be prorated based on the number of systems purchased by each agency.

The 900 MHz Radio System will be donated by Marlin County Transit for the ongoing use by the partners for the regional winter maintenance system. Able City will donate a spare data server for the joint initiative that will be housed at the Marlin County DOT. Software and hardware maintenance of the AVL system will be handled by a contractor. Contractor cost will be divided equally among the four partners.

Resource Arrangements Example 2: Quick Clearance RCTO



The local partnering agencies, with the City of Twinfolk DOT acting as the lead agency, will apply for CMAQ funding to cover the initial equipment costs for Arterial Incident Action Team and the annual operating costs for Action Team over the first 3 years. The funding requested will be approximately \$400,000 for the first year and \$300,000 for the second and third years. The first year will require a 20 percent match of approximately \$100,000 be split evenly among the local jurisdictions. They second and third years will require approximately \$75,000 in matching funds split evenly between the local jurisdictions. After the first 3 years, the local jurisdictions will pool their funds and will split the full cost of the team equally.

The City of Twinfolk will enter into a joint purchasing agreement with the Burke DOT to acquire the arterial incident action team trucks and equipment. The Burke DOT currently holds a contract with a private agency to supply trucks for the Burke Freeway Courtesy Patrol.

Twinfolk, Winchester, and Foster DOTs will develop an

intergovernmental agreement (IGA) that will allow the arterial incident action team to operate within their jurisdictions when requested. IGA will also commit each local jurisdiction to share equally the 20 percent match required for CMAQ funds.

Burke Department of Transportation will utilize its on-call consultant to support the training development of classroom instruction and a full-scale exercise. Estimated cost for the training development is \$200,000.

Once developed, Burke DOT and Burke State Police will contribute two incident management experts from their staff to serve as instructors for the full-day classroom instruction twice a year.

The City of Winchester will contribute 40 hours of staff time to lead the design and development of a public information brochure on the Move It law. All partnering agencies will contribute \$1000 to print the brochures. Local law enforcement and transportation partners will then contribute 8 hours each to distribute brochures at locations such as grocery stores and rest stops during a special awareness week to be agreed upon.

Resource Arrangements Example 3: Multi-State Traveler Information RCTO



The States of Cantwell, Warren, Byrd, and Grover will create a pooled fund study as part of the FHWA Transportation Pooled Fund Program. Funding will be provided in equal amounts by the four States and the administration

of the pooled fund study will be carried out by FHWA. The pooled fund study will last over 5 years. In years 1 and 2, each agency will contribute \$100,000 each year for implementation costs and in years 3, 4, 5, each agency will contribute \$50,000 each year for operating costs.

5 KEYS FOR ADVANCING AN RCTO



Below is a list of strategies for successful development and implementation of an RCTO.

Coalescing on a feasible operations objective that is agreeable to all.

Because of many competing transportation needs within a region, reaching a decision to pursue a single operations objective through an RCTO can be one of the most difficult tasks for the partners. This challenge typically comes early in the development process when the commitment of the participants may not yet be solidified. The partnership is more likely to be successful if the operations objective is manageable and achievable within the short timeframe of implementing an RCTO. A well-chosen operations objective invigorates the partnership and gives participants a central focus to rally around. Early accomplishments give the partnership the momentum and support needed to tackle increasingly complex issues.

Sustaining adequate participation. Inevitably the strength of the partners' participation will ebb and flow as agencies cope with staff turnover and demands on staff members to meet other responsibilities. Additionally, engineers or operators accustomed to demand-driven, day-to-day operations may be less motivated to participate in strategic planning activities. Planning for operations requires sustained, deliberate collaboration among the participants. Sustained participation requires that:

- Partners understand the importance of their individual contributions.
- Outcomes of the RCTO are at the forefront of the collaborative discussions.
- Every partner anticipates the benefits from implementing the RCTO.
- Leaders or champions fully embrace all of the partners through regular contact and even holding meetings at underrepresented agencies' locations.

Focusing on an issue that has wide support and visibility.

The development of an RCTO may be most successful when it addresses an issue that is highly visible to the public and elected officials such as quick incident clearance. By addressing fundamental needs of a region, RCTO partners can gather the momentum and support needed to establish an RCTO and carry it out.

Approval for MAG RCTO

The MAG RCTO was signed by the MAG Regional Council after receiving unanimous approval by city managers and the MPO board, which consisted of mayors and agency leaders.

Identifying a champion for the collaborative effort.

A champion or set of champions is crucial to the successful development and implementation of an RCTO. An appropriate champion for the collaborative effort has a vital interest in the issue and is willing and capable of advocating for the effort. A possible champion for an RCTO on traveler information may be a freight operators committee. Alternatively, a city council member or senior planner at the MPO may rise to champion the cause.

Getting buy-in from agency management and elected officials.

Developers of an RCTO may have difficulty gaining support and agreement from their agencies' management and elected officials, particularly if implementing the RCTO requires substantial contribution of resources. Expected benefits to the traveling public (i.e., voters) and to the agencies themselves should be used to promote the partners' efforts. A powerful argument for developing an RCTO is that it allows agencies to expand their capabilities or increase their efficiency beyond what would be possible working alone.

Overcoming the roadblocks to interagency agreements.

An RCTO requires agreement between multiple parties that each have their own organizational mission, culture, and standard operating procedures. If not properly managed, these divergent organizational characteristics can be major impediments to the collaboration.

Securing any necessary funding for implementation.

For many collaborative efforts, partners will need to identify a funding source to accomplish the desired operations objective. Possible funding sources include agency budgets, State and local transportation taxes, and Federal CMAQ and STP dollars. RCTO partners may want to work with their MPO to set up a line item within the plan for management and operations projects.

Monitoring performance of the collaboration and its impact.

An essential part of successfully achieving and maintaining an operations objective through collaborative action involves monitoring and assessing the collaborative

activities and the impact of these activities on the transportation system and its users. It provides the feedback necessary for the partners to gauge the effectiveness of their approach and make adjustments accordingly. Only through performance measurement can the partners reliably demonstrate the benefits of the effort to the public and to decisionmakers who have committed resources to the effort.

Documenting a new way of operating.

The RCTO represents a joint decision on a new way of operating and as such, documentation of the RCTO is needed to provide a single source for all partners to refer to as they work to achieve and maintain their common operations objective over time. The shape and format of the documentation is not important as long as the essential elements exist somewhere within.

Incident Management Accountability in Hampton Roads

Public safety and ITS stakeholders in Hampton Roads, Virginia are developing an RCTO for incident management. The RCTO Working Group chair from the Virginia DOT reports quarterly to the MPO on the progress of their effort. This includes up-to-date information on delays due to incidents.

Contact Camelia Ravanbakht: cravanbakht@hrpdcva.gov.

As part of the RCTO development, the collaborative partners should develop a program to measure both internal and external performance regularly. Internal performance measures track the performance of the collaboration itself and enable partners to determine how well they are carrying out the approach. Sample measures may include meeting attendance, amount of funding acquired, number of traffic signals installed, and percent compliance with new procedures.

Additionally, the partners need to use external performance measures to determine their progress toward their operations objective and the influence their effort has on the performance of the transportation system. Sample measures include customer satisfaction, incident duration, throughput, and delay.

Committing the resources necessary to develop an RCTO.

The resources necessary for developing an RCTO consist primarily of agency staff time and labor. The commitment of agency staff time to meet and work through ideas with other partners is necessary to create the content of the RCTO. Staff needs may differ depending on the phase of RCTO development. While establishing the operations objective and the general direction for the RCTO, senior agency management and decisionmakers may be primarily relied upon whereas more technically oriented staff may be necessary to flesh out the details of the approach, procedures, and physical improvements.

6 GETTING STARTED

An RCTO can be developed in several ways. For those ready to explore using an RCTO as a tool to develop TSM&O strategies but are unsure of what to do next, select one or two of the actions listed below to get started. The steps are divided into three general categories of activity: building the momentum for operations partnering, identifying the RCTO focus, and developing the RCTO.

6.1 BUILDING THE MOMENTUM FOR OPERATIONS PARTNERING

- Hold an executive level workshop to obtain agreement that operations strategies are a needed complement to capital infrastructure investments.
- Host a transportation operations partnering summit where planners and operators from the region come together to share successful collaborating experiences and identify opportunities to work together on operations activities that would be difficult to accomplish alone.
- Distribute monthly newsletters to share the current status of individual or joint operations efforts in the region and provide information on the tangible benefits of operations improvements to mobility, safety, security, and the environment.

6.2 IDENTIFYING THE RCTO FOCUS

- Begin by tackling a relatively simple operations issue, such as traffic signal timing, in which the need for improvement is widely acknowledged and easily understood by agencies in the region.
- Identify common operations needs and explore ways to take advantage of economies of scale and leverage resources. For example, excess capacity on communications lines such as fiber could be shared with neighboring agencies in return for access to video cameras.
- Talk to the MPO staff member heading up the congestion management process and find out if an RCTO could be a useful tool to further refine and put into practice operations strategies identified in the CMP.

- Examine the regional needs and desired user services identified during the development of the ITS architecture and talk to those who were involved in it. Key ideas brought out in the architecture may provide needed groundwork for taking action with an RCTO.

6.3 DEVELOPING THE RCTO

- Look for similarities between your region and the RCTO examples used in this document and consider adapting elements to fit your specific situation.
- Host a peer-to-peer session where leaders of a RCTO or strategic operations planning effort in another region visit with members of your operations group to share their experiences, lessons learned, and create ideas on how to develop the RCTO for your region.

7 SUMMARY



Transportation entities are turning to integrated and innovative approaches that reflect regional system level thinking, leverage available technology, and form new institutional relationships. Because these new approaches typically transcend individual agencies, political jurisdictions, and transportation functions, they only work when participating agencies share a common vision for how transportation system planners, owners, and operators will work together to improve the way the transportation system is managed and operated.

This primer introduces a management tool that offers partners a systematic way to organize efforts and resources toward common operations objectives. It helps senior managers and elected officials focus their interests and energies on cost-effective strategies for improving transportation system performance in the region. This tool, the Regional Concept for Transportation Operations (RCTO), contains six key elements that guide partners in developing and addressing regional transportation needs: motivation, operations objective, approach, relationships and procedures, physical improvements, and resource arrangements.

An RCTO can serve as a mechanism to translate relatively high-level concepts for management and operations defined within the planning process into specific, coordinated strategies for operations that can be acted on. Multiple opportunities exist to use an RCTO to advance operations in connection with transportation planning.

An RCTO can increase the efficiency and effectiveness of the partners by bringing together varied transportation operations perspectives, priorities, and cultures from different agencies and jurisdictions and by helping them to think collectively through what they want to accomplish and how they work together to reach that operations objective in the near future. It facilitates coordinating priorities, leveraging resources, and alleviating duplicative efforts and it clarifies the roles and responsibilities of the partners in the collaborative effort.

The collaborative effort required to develop the RCTO establishes credibility with decisionmakers and the public by demonstrating that multiple agencies stand behind and are working toward the same operations objective for improving regional transportation system performance.



**Federal Highway 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-07-122