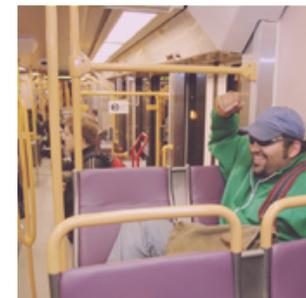


# THE REGIONAL CONCEPT FOR TRANSPORTATION OPERATIONS: A Practitioner's Guide

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# 1 Introduction

## 1.1 Purpose and Background

This practitioner’s guide is a collection of the observed successes and lessons learned from four metropolitan regions as they developed Regional Concepts for Transportation Operations (RCTOs), a management tool used by planners and operations practitioners to define a strategic direction for improving regional transportation management and operations in a collaborative manner. The purpose of this document is to provide information on how to develop and implement an RCTO effectively and efficiently by highlighting practices that have been used successfully to overcome challenges by the four implementing regions that forged ahead into this new territory. This guide offers lessons from these pioneering sites that can help other implementing regions to select the methods that are most effective in improving regional transportation system performance.

In 2005, the Federal Highway Administration (FHWA) began working with four regions interested in increasing collaboration and improving operations through the use of an RCTO. These regions served as “demonstration sites” and were willing to share insights into how best to carry out the process of developing an RCTO with FHWA and the public. This document combines the insights gained from observing and learning from the demonstration site teams over the course of approximately 5 years into a collection of techniques and approaches to be considered as practitioners work together to develop their RCTOs.

The idea for an RCTO was first identified by a broad-based working group on linking planning and operations, sponsored by FHWA and the Federal Transit Administration (FTA), as an effective way to link transportation operations and transportation planning. FHWA later published *Regional Concept for Transportation Operations – The Blueprint for Action*,<sup>1</sup> a primer on the RCTO that describes the elements of an RCTO and its development.

Building on this work, FHWA invited public agencies to apply for demonstration projects through which participating jurisdictions and agencies within a region could increase collaboration by developing an RCTO. Initially, three sites were selected for RCTO demonstration projects: the greater Tucson region, with the Pima Association of Governments (PAG) as the lead entity; Southeast Michigan, with the Southeast Michigan Council of Governments (SEMCOG) as the lead entity; and Portland, Oregon, with the City of Portland as the lead entity. Shortly after the initiation of the demonstration initiatives, agencies led by the Hampton Roads Transportation Planning Organization (HRTPO) and the Virginia Department of Transportation (VDOT) in the Hampton Roads region began developing an RCTO, and this collaborative activity was incorporated into the demonstration effort. Each of the four demonstration sites created its own process to develop an RCTO, tailored to the region’s needs, current activities, and inter-agency relationships.

This guide highlights insights gained from the four Federal Highway Administration RCTO demonstration sites:

- Southeast Michigan
- Tucson, Arizona metropolitan area
- Portland, Oregon
- Hampton Roads, Virginia

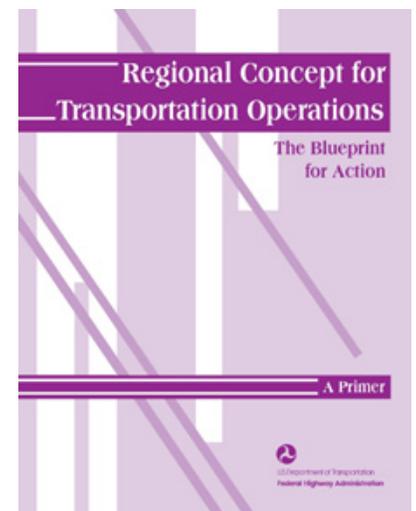


Figure 1. The 2007 FHWA Publication, *Regional Concept for Transportation Operations – The Blueprint for Action*

<sup>1</sup> U.S. Department of Transportation, FHWA, *Regional Concept for Transportation Operations – The Blueprint for Action*, FHWA-HOP-07-122 (Washington, DC, 2007). Available at: <http://ops.fhwa.dot.gov/publications/rctoprimer/index.htm>, last accessed June 13, 2011.

Common features across all four demonstration sites include:

- Strong and persistent leadership to guide the effort and maintain momentum for developing and implementing an RCTO.
- An iterative process for bringing participants into the RCTO process as the RCTO objectives are formulated and agreed to by all participating agencies.
- Leveraging and building upon existing relationships to gain support for an RCTO.
- Focusing on current or anticipated needs as a motivation for developing an RCTO.

The RCTO and the process for developing an RCTO proved to be valuable in the demonstration sites and, at least in some cases, were institutionalized as the mechanism for identifying operations projects to be funded through the regional transportation improvement program (TIP). While the RCTO process can be independent of the planning process in cases where it focuses primarily on how operators work together on a day-to-day basis, it can be an effective mechanism for incorporating operations considerations into the planning process so that funds needed to implement operations strategies can be integrated into regional capital investment plans.

This guide is designed first to give the reader a brief background on the RCTO and the demonstration sites and then to showcase insights and lessons on developing an RCTO based on the demonstration sites' experiences. Following that design, the remainder of this chapter defines an RCTO, its benefits, and its maintenance needs. Chapter 2 provides a snapshot of the four demonstration sites, including their RCTOs' focus areas, approaches, and outcomes. Key insights derived from the demonstration sites' experiences for the successful development of an RCTO are captured in Chapter 3. The guide concludes with a look to the future of the RCTO and a checklist for developing and sustaining an RCTO in Appendix A. Throughout its contents, the document highlights the role of the RCTO in the transportation planning process.

## 1.2 What is an RCTO?

As defined in *Regional Concept for Transportation Operations – The Blueprint for Action*, an RCTO is a management tool that assists 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 accomplish it in the region. 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). An RCTO helps to formalize existing collaborative relationships and defines a common 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 they will sustain over the long term. While the 3- to 5-year timeframe may be adjusted to meet the needs of the region, this shorter duration allows time for many management and operations strategies to be implemented while keeping the RCTO 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 20 to 25 years into the future.

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 reflects regional expectations and opportunities and may be motivated by a growing awareness of diminishing levels of service, a mandate from officials, a recent natural disaster, a special event, or a shortage of resources. Within a region, there may be multiple RCTOs that focus on different operations functions or services.

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, metropolitan 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. The following are

examples of 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.
- Trucking association representatives.
- Chamber of commerce representatives.
- Economic development advocates.

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 elements that serve as a common framework for developing an RCTO for a specific region. Central to an 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 four 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 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.

The six key elements of a Regional Concept for Transportation Operations are:

- **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 and related performance measures.
- **Approach (“How”):** Overall description of how the operations objective will be achieved.
- **Relationships and Procedures:** Institutional arrangements, memoranda of understanding (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 an RCTO. It is an issue observed by the partners that prompts the initiation of an RCTO and is then recorded. The first phase is largely driven by values and needs, and 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 operations objectives or the approach may need to be revised once the necessary relationships, resources, and other commitments are fully understood.

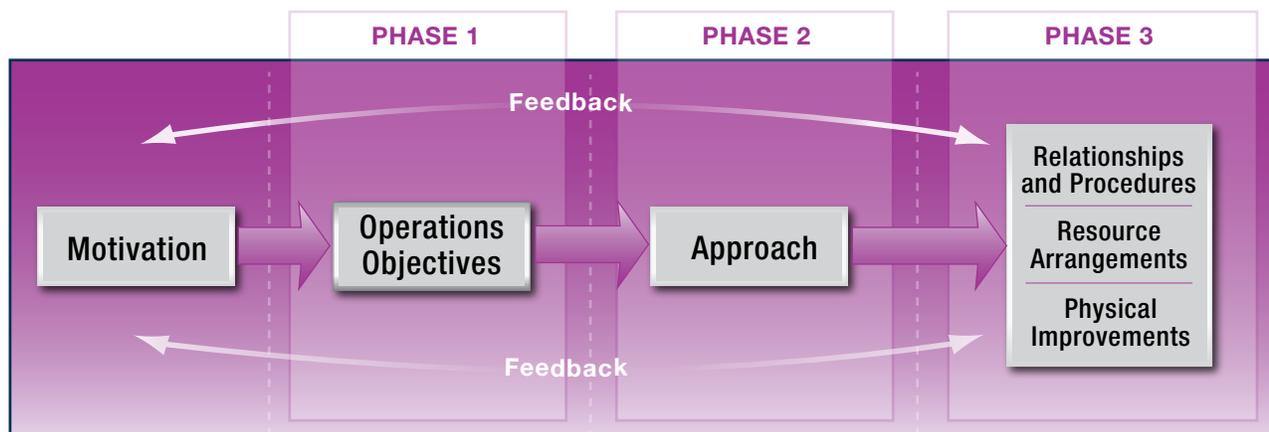


Figure 2. Development Phases of an RCTO

## 1.3 Benefits of an RCTO

An RCTO imparts significant benefits to operators and planners, who are part of a collaborative effort to advance management and operations strategies in a region. An RCTO helps to advance and strengthen

“The RCTO, with an emphasis on transportation outcomes, made it feasible to bring planners and operators together. Talking about outcomes of operations is a great way to achieve the bridge between planners and operators.”

– Jonathon Makler, Oregon Transportation Research and Education Consortium; formerly with Metro and City of Portland, Oregon

the collaboration, and, in turn, the collaboration brings tangible benefits to the participating agencies and the public. The ultimate benefit of an RCTO is the improvement in regional transportation system performance that is realized when jurisdictions and agencies work together toward commonly held operations objectives.

### Strengthening the Collaborative Effort

The collaborative effort between operators and planners is strengthened because an RCTO:

- Brings together varied transportation operations perspectives, priorities, and cultures from different agencies and jurisdictions.
- Facilitates the coordination of priorities, leveraging of resources, and alleviating of duplicative efforts.
- Clarifies the roles and responsibilities of the partners in the collaborative effort.
- Garners commitments from agencies and jurisdictions to a common regional approach to transportation management and operations.
- Establishes credibility with decisionmakers and the public by demonstrating that multiple agencies are standing behind the same operations objective.
- Provides a foundation for expanded collaboration that supports outreach to and engagement with new partners for the purpose of promoting expanded functions, in effect providing a “rallying point” for regional transportation systems management and operations.

A further advantage of developing and implementing an RCTO comes in the form of the institutional memory created by following a process for developing operations objectives and the strategies for achieving them. Operational improvements often come about because of the effort, interest, and expertise of individuals or individual agencies, and there may be little or no record of how potential improvements were identified or adopted. An RCTO leaves an “audit trail” of decisions, agreements, and actions taken collectively and by individual agencies and, importantly, how these decisions, agreements, and actions relate to achieving operations objectives.

### Benefits to Transportation Planners

Participating in the development of an RCTO offers several benefits to metropolitan transportation planners. Planners from MPOs are responsible for fostering the involvement of all users (including operators) of the transportation system in preparing and maintaining a metropolitan transportation plan. Additionally, MPOs must respond to requirements in the Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)—the funding and authorization bill that governs U.S. Federal surface transportation spending—for considering management and operations in the transportation planning process. “Promote efficient system management and operation”<sup>2</sup> is one of the eight planning factors that must be addressed in metropolitan transportation plans. According to SAFETEA-LU, the metropolitan transportation plan must include “Operational and management strategies to improve the performance of existing transportation facilities to relieve vehicular congestion and maximize the safety and mobility of people and goods.”<sup>3</sup> Furthermore, a congestion management process that provides for the “safe and effective integrated management and operation of the multimodal transportation system”<sup>4</sup> is required in transportation management areas (TMA).

To help address these requirements, metropolitan planners can use an RCTO as a tool to bring operators and operations considerations into the planning process.

<sup>2</sup> United States Code, Title 23, Chapter 1, Section 134(h).

<sup>3</sup> United States Code, Title 23, Chapter 1, Section 134(i).

<sup>4</sup> United States Code, Title 23, Chapter 1, Section 134(k).

Among its many benefits, an RCTO can:

- Offer a mechanism for identifying and introducing operations objectives and performance measures into the transportation planning process.
- Provide a pathway to broad support for regionally significant operations initiatives.
- Facilitate the exchange of system performance data with operating agencies to be used in assessing system needs and the impacts of transportation programs.
- Identify regionally supported operations strategies that can be entered into the plan and used to create projects and programs for the TIP.
- Engage operators and other stakeholders in the planning process and bring in the perspective of non-traditional stakeholders such as public safety personnel.

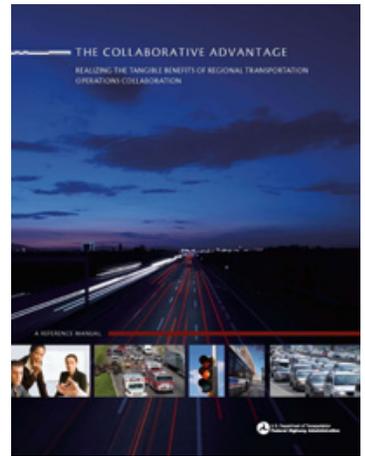
### Benefits to Transportation Operators

The primary benefits to transportation operators are realized as the participating jurisdictions and agencies take action on what they agree to do in an RCTO. Most regions do not have an overarching entity (jurisdiction or agency) with executive control over reporting organizations and functions. Consequently, benefits depend upon individual agencies acting together to implement an RCTO. This requires that participating agencies have the support and commitment of their leadership and that they be able to demonstrate anticipated benefits to the leadership as the benefits accrue.

FHWA recently published *The Collaborative Advantage – Realizing the Tangible Benefits of Regional Transportation Operations Collaboration*.<sup>5</sup>

Figure 4 shows some of the tangible benefits that can accrue directly to the agencies working together. The benefits can accrue in terms of the quantity or quality of resources available, agency operations, and outcomes that help achieve agency goals. When agencies work together to secure resources and perform the functions needed to achieve the RCTO objectives, they find ways to acquire and apply resources efficiently: sharing critical skills, negotiating favorable terms in joint purchasing decisions, sharing facilities, developing standards for materials and supplies that allow resource sharing, etc. They also establish common procedures and practices and share information so that they perform key functions more effectively and in ways that are seamless from the perspective of system users. Through collaboration, agencies can reduce duplication in service or combine project needs and submit a joint application for funding.

The collaborating partners—those responsible for developing, implementing, and maintaining the RCTO—must realize, measure, and publicize the benefits of the RCTO to senior decisionmakers and the public in ways that enable those groups to understand the importance of a regional approach to transportation systems management and operations.



**Figure 3.** The 2007 FHWA Publication, *The Collaborative Advantage— Realizing the Tangible Benefits of Regional Transportation Operations Collaboration*

In the Southeast Michigan demonstration site, the close work between the Southeast Michigan Council of Governments (SEMCOG) and operating agencies helped the participants to recognize more opportunities and benefits of collaborating on operations issues. The leader from SEMCOG noted that the RCTO operating agency participants saw that they could benefit from SEMCOG's regional data analysis and forecasting, helping them attain a broader understanding of current and future conditions. The leader also noted that regional planners at SEMCOG have an even better understanding of the needs of operators in the region as a result of their RCTO development and are now in a better position to provide input on operations improvements from a regional perspective.

<sup>5</sup> U.S. Department of Transportation, FHWA, *The Collaborative Advantage – Realizing the Tangible Benefits of Regional Transportation Operations Collaboration*, FHWA-HOP-08-001 (Washington, DC, 2007). Available at: [http://ops.fhwa.dot.gov/publications/benefits\\_guide/index.htm](http://ops.fhwa.dot.gov/publications/benefits_guide/index.htm), last accessed June 13, 2011.

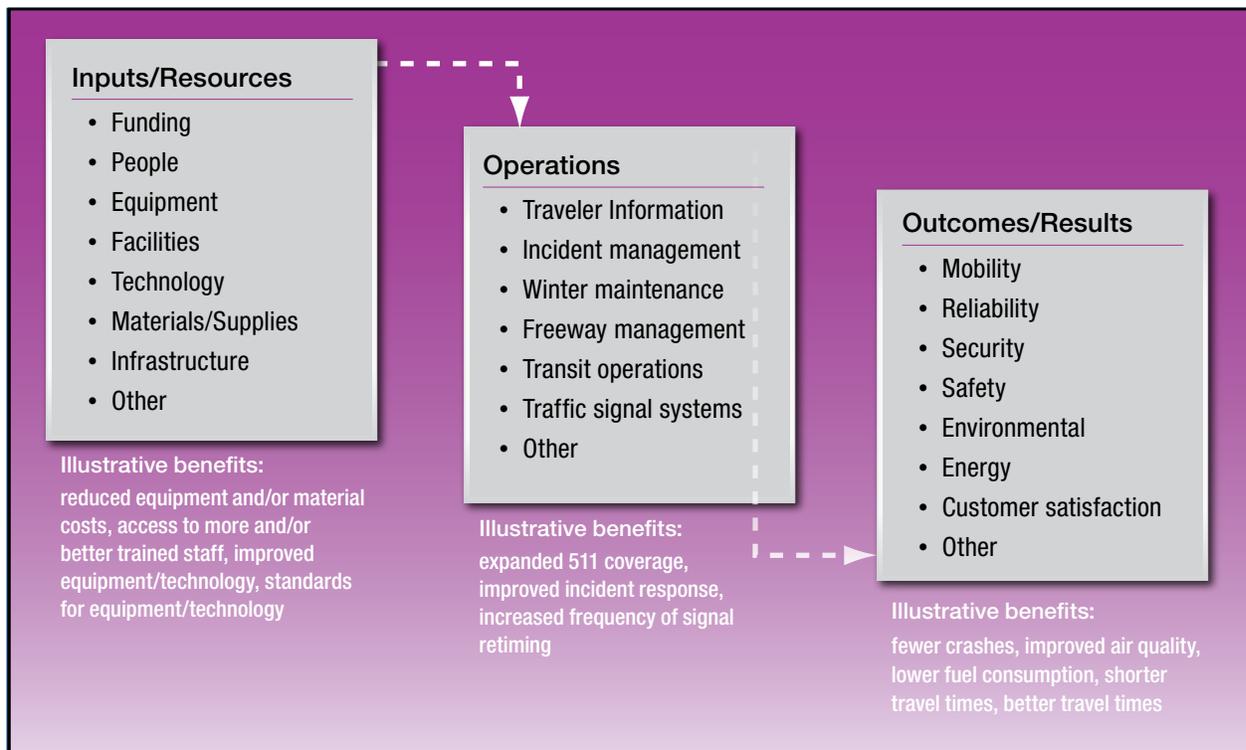


Figure 4. Benefits of Implementing an RCTO can Accrue to Individual Agencies and to End Users of the Regional Transportation System.<sup>6</sup>

## 1.4 Updating and Maintaining an RCTO

An RCTO has a recommended time horizon of 3 to 5 years and requires updating as operational objectives are achieved, new demands are realized, new requirements are established, and new possibilities are conceived. Ideally, a schedule for re-visiting the RCTO objectives, performance measures, and approaches should be established during the development of the RCTO along with responsibilities for leading that effort. Updating the RCTO will ensure that it stays useful and relevant given current circumstances.

In many cases, an RCTO is developed in response to a particular event or concern that gains visibility because of its immediate effect on customers or, importantly, individuals in leadership positions. The *motivation* for developing an RCTO is driven by a particular problem that needs to be addressed either because of its inherent urgency or because of the visibility it has gained with senior leadership. While developing an RCTO in response to an urgent need may be desirable, it may not be sustainable beyond the time the event or incident

was “front page” news. Consequently, updating and maintaining an RCTO should be a more deliberate, thoughtful, collaborative activity that transitions from addressing mutual problems to identification of opportunities for improving regional transportation system performance through a wide range of strategies. Ultimately, an RCTO becomes a fully integrated element of the way a regional transportation system is *managed*.

The transition from “problem solving” to “performance management” to “regional transportation system integration” is both important and non-trivial as illustrated in Figure 3.<sup>7</sup> It is important because, unless the partners seek the higher level approaches, the RCTO will continue to focus exclusively on the visible problems, overlooking opportunities for regional integration (institutional, policy, technical) where greater benefits can be realized. It is non-trivial because it is at the higher levels of integration where greater trust is required among participating agencies and jurisdictions since regional integration typically requires data and resource sharing, more complex institutional arrangements, and, importantly,

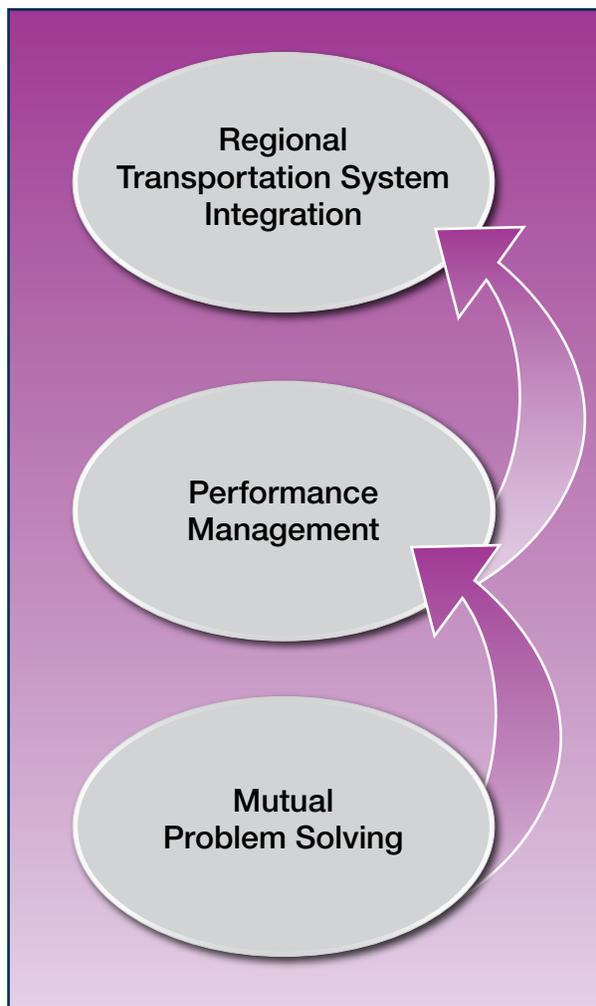
<sup>6</sup> U.S. Department of Transportation, FHWA, The Collaborative Advantage – Realizing the Tangible Benefits of Regional Transportation Operations Collaboration, FHWA-HOP-08-001 (Washington, DC, 2007). Available at: [http://ops.fhwa.dot.gov/publications/benefits\\_guide/index.htm](http://ops.fhwa.dot.gov/publications/benefits_guide/index.htm), last accessed June 13, 2011.

<sup>7</sup> U.S. Department of Transportation, FHWA, Regional Transportation Operations Collaboration and Coordination A Primer for Working Together to Improve Transportation Safety, Reliability, and Security (Washington, DC, 2003). Available at: [http://ntl.bts.gov/lib/jpodocs/repts\\_te/13686.html](http://ntl.bts.gov/lib/jpodocs/repts_te/13686.html), last accessed June 14, 2011.

greater reliance on partner agencies and jurisdictions in performing functions related to achieving regional goals. When agencies and jurisdictions seek integrated approaches at a regional level, they demonstrate a long-term commitment to addressing needs of individual jurisdictions *in the context* of meeting *regional* needs. The challenge decisionmakers face is that of satisfying their individual constituencies while at the same time thinking regionally. An RCTO can help capture the vision of transportation system operation that can be used to secure funding, improve performance, build solid partnerships, and communicate benefits to senior decisionmakers and the traveling public.

Accountability during implementation of an RCTO is needed to ensure that the approach identified in the RCTO is acted on and that the work of the group actually leads in the direction of the operations objective. Performance measurement is needed and is an essential part of “acting together.” Monitoring performance and measuring progress toward common objectives helps to maintain the RCTO by providing feedback that reinforces the commitment to the objectives and identifying opportunities for expanding the RCTO to include additional jurisdictions, agencies, and functions.

Reaching an operations objective and then halting is not enough effort to attain sustained benefits from an RCTO. While an RCTO describes how the participants should work together to reach an objective, an RCTO should also put in place relationships and processes for acting together that sustain an operations objective. For example, if an RCTO objective is to synchronize traffic signals throughout a network of major arterials in the region, individual jurisdictions may need to acquire (or participate in acquiring through joint purchasing agreements) and install the hardware and software required to achieve the objective. Moreover, once the necessary technology is deployed, individual jurisdictions (or agencies within jurisdictions) must consent to signal timing plans that achieve the agreed upon operational objectives, e.g., giving priority to major arterials during peak demand periods or agreeing to timing designed to move traffic to and from special events. To sustain the benefits of reaching the operations objective, the RCTO must also include commitment from the participants to continue to use coordinated signal timing plans and update them regularly.



**Figure 5.** The RCTO can Evolve from "Problem-Driven" to a Broader, Integrated Approach to Regional Transportation System Management and Operation.<sup>8</sup>

<sup>8</sup> U.S. Department of Transportation, FHWA, *Regional Transportation Operations Collaboration and Coordination A Primer for Working Together to Improve Transportation Safety, Reliability, and Security* (Washington, DC, 2003). Available at: [http://ntl.bts.gov/lib/jpodocs/repts\\_te/13686.html](http://ntl.bts.gov/lib/jpodocs/repts_te/13686.html), last accessed June 14, 2011.

## 2 Putting the RCTO into Practice – RCTO Demonstration Sites

The objective of the demonstration initiative was to help the FHWA demonstrate and further develop—from the realm of theory to that of practice—the Regional Concept for Transportation Operations. The sites receiving the demonstration grant were to enhance existing regional transportation operations collaborative activities, which may address one or more transportation systems management and operations activities through the development of an RCTO. Although Hampton Roads, Virginia did not apply for or receive a demonstration grant from FHWA, the participants of the RCTO development effort in that region were willing to participate alongside the other sites and open up their processes for the benefit of others interested in developing an RCTO.

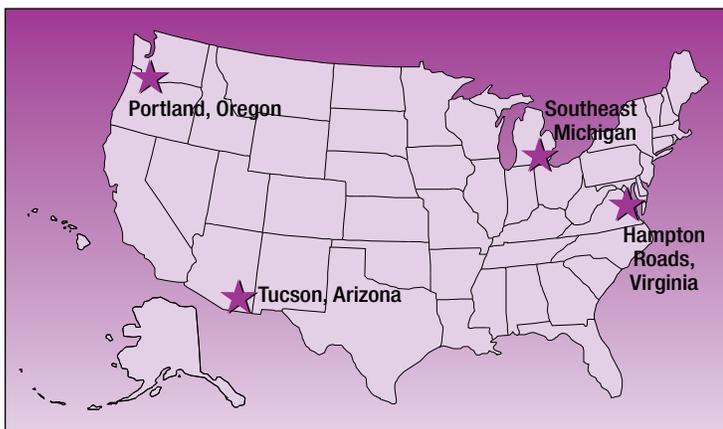


Figure 6. Map of the RCTO Demonstration Sites

The four sections below provide a brief overview of the demonstration sites, the processes for RCTO development, highlights of their RCTOs, links to the metropolitan transportation planning process, and initial outcomes. The outcomes listed reflect the successes during the development and up to approximately 3 years after the RCTO had been drafted. Sites often began to implement some of the actions from the RCTO while it was being developed.

### 2.1 Portland, Oregon<sup>9</sup>

Operating agencies and other stakeholders in Portland have been working together for more than 15 years on the deployment of intelligent transportation systems (ITS) involving many aspects of the transportation system such as freeways, arterials, transit, and freight movement. Through the RCTO project, these agencies were able to fully engage Metro, the region's MPO, as a means to increase institutional support in the region and to formalize relationships that have enabled the unique culture of collaboration.



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#### Organization and Process for Developing the RCTO

To organize for the development of the RCTO, the Portland grant was used to create a staff position within Metro rather than to retain a consultant. One significant motivation for this decision was to help effect institutional change in the region by installing staff, albeit temporary (for the 2-year duration of the grant), at Metro to build an operations program. The City of Portland served as grantor and hiring agency and detailed the temporary employee to Metro.

The champion for Portland's RCTO was the Portland City Commissioner in charge of Transportation. As a result of witnessing a minor fender-bender cause major traffic delays on Interstate 5 in downtown Portland, the

<sup>9</sup> City of Portland Bureau of Transportation, *Regional Concept for Transportation Operations*, November 2007 (Unpublished).

Commissioner called for a detailed analysis of the crash as well as a multi-agency meeting to discuss ways to address these types of incidents in the future.

A few months later, the Commissioner convened a group, which comprised executives from agencies in the region and representatives from both other relevant City of Portland offices and the business community. After brainstorming on ways to improve management of minor incidents, the group reached the consensus that the City of Portland Bureau of Transportation would organize an inter-agency staff-level task force that would delve into the issue collaboratively. Staff involved in the RCTO project offered to help facilitate the group and the resulting task force was called the Traffic Incident Management (TIM) Team.

In this situation, a formal collaborative process was created where none were active with respect to the topic. This process established a two-tier system. The higher-level group, which was titled the Portland Operations Steering Team (POST), worked to form a consensus on the topics that needed to be addressed, including but not limited to traffic incident management, and to receive briefings on the progress being made by the staff-level task forces to which the work was delegated.

After a series of TIM Team meetings that involved brainstorming and discussions of strategies, the team developed a “menu of options” as well as a recommendation and an action plan.

## Operations Focus Area

The RCTO focus area for Portland was the management of minor traffic incidents within the City of Portland. The objective for the RCTO was articulated as: “reduce unnecessary (excess) delay associated with minor (non-injury) incidents that occur on freeways within the City of Portland.”<sup>10</sup> Operations objectives identified in the early stages of the process were to:

- Reduce the economic cost of congestion.
- Reduce incident-induced delay.
- Reduce tow truck arrival and on-scene times.
- Reduce secondary crashes.
- Reduce lane-hours of blockage.<sup>11</sup>

## Link to Planning

One of the primary goals for the Portland demonstration site team was to improve the coordination of planning and operations. Metro saw the FHWA demonstration project as an opportunity to become more engaged with the operations community in Portland and fully incorporate operations into the metropolitan transportation planning process. The demonstration initiative led to the establishment of an operations program at Metro. The RCTO laid the groundwork for Metro to develop a Regional Transportation System Management and Operations (TSMO) Plan that defines how management and operations can be used to support the desired performance outcomes.<sup>13</sup> The TSMO Plan is a 10-year investment strategy that is part of the 2035 Regional Transportation Plan completed in 2010.

**Table 1.** Overview of Portland, Oregon Demonstration Site

<b>Regional characteristics</b>	<ul style="list-style-type: none"> <li>• Located in Northwest U.S. close to the Pacific Ocean.</li> <li>• More than 1.5 million residents in metropolitan area.<sup>12</sup></li> </ul>
<b>Leadership team</b>	<ul style="list-style-type: none"> <li>• Metro (MPO).</li> <li>• City of Portland.</li> <li>• Oregon Department of Transportation (DOT).</li> <li>• TriMet (local transit operator).</li> </ul>
<b>History of collaboration</b>	Operating agencies and other stakeholders in Portland have been working together for more than 15 years primarily through TransPort TAC (Transportation Portland Technical Advisory Committee). Collaborative efforts in the region have focused primarily around the design and implementation of ITS. Partners have included city, county, and State transportation departments as well as the local transit operator and university. The TransPort partnership was formalized as an MPO advisory committee in 2005.
<b>RCTO Focus area</b>	Traffic incident management.

<sup>10</sup> City of Portland Bureau of Transportation, Regional Concept for Transportation Operations, November 2007 (Unpublished).

<sup>11</sup> Ibid.

<sup>12</sup> Metro Regional Government, About Metro, 2011. Available at: <http://www.oregonmetro.gov/index.cfm/go/by.web/id=24201>, last accessed June 13, 2011.

## Outcomes or Successes

The near-term outcome of the effort in Portland resulted in a framework of procedures, policies, and physical capital needs as well as a list of action items that the TIM Team used to advance incident management. The region made progress on several actions identified in the RCTO during the RCTO development and following its completion:

- Portland Bureau of Transportation introduced State legislation regarding quick clearance and “Move It” practices. Oregon State Legislature passed these into law during the 2007 session.
- The TIM Team task force met several times over approximately 1 year.
- Metro established a transportation operations program that includes a permanent staff position.
- A programmatic allocation of funding for ITS/operations projects was established in the TIP.
- Stakeholders developed an awareness of the importance of transportation operations through monthly newsletters, MPO and other stakeholder briefings, and an executive-level operations workshop.
- The City of Portland Bureau of Transportation hosted a 2-day FHWA course on incident management.
- Portland Police Bureau Traffic Division undertook the creation of a new training video for field officers related to the management of an incident.

The development of the RCTO in Portland led to a much stronger role for operations in the planning and programming processes. Shortly after the development of the RCTO, Metro began the process of updating its metropolitan transportation plan and recognized the need to create a more detailed strategy for managing and operating the transportation system over the next 10 years. The TSMO Plan was guided by the collaborative efforts of TransPort (the operations subcommittee), the Regional Travel Option (RTO) Subcommittee, and a newly formed TSMO Policy Work Group. The TSMO Plan addressed the issue of how to best use the programmatic allocations of funding for ITS/operations and travel demand management. It broadened the scope

of operations from just TIM in the RCTO to cover four management and operations areas:

1. Multimodal traffic management;
2. Traveler information;
3. Traffic incident management; and
4. Transportation demand management.

The goals, objectives, and projects for traffic incident management in the TSMO Plan built on the content of the RCTO. Through the TSMO Plan, projects to expand incident management teams and training, integrate voice and data networks to improve inter-agency communication during incidents, and increase overall incident management capabilities were included as part of the 2035 Regional Transportation Plan. The 2010–2013 Metropolitan Transportation Improvement Program<sup>14</sup> contains \$1.65 million for “Active Traffic Incident Management” including improved towing performance. In addition, the TSMO Plan and the 2010–2013 Metropolitan Transportation Improvement Program include projects to develop RCTOs on arterial performance measurement and active traffic management.

## 2.2 Tucson, Arizona Metropolitan Area<sup>15</sup>

The Pima Association of Governments (PAG) embarked on this demonstration project to build on existing collaborative efforts in the region and to prepare for major reconstruction of Interstate 10 through Tucson. With a 60 percent increase in population between 1982 and 2003, advancing transportation operations on a regional level was needed to keep up with the influx of people and vehicles. Table 2 presents an overview of the Tucson demonstration site.



Source: Pima Association of Governments

<sup>13</sup> Metro Regional Government, *Regional Transportation System Management and Operations Plan*, June 2010. Available at: [http://library.oregonmetro.gov/files/regional\\_tsmo\\_refinement\\_plan\\_june2010\\_final.pdf](http://library.oregonmetro.gov/files/regional_tsmo_refinement_plan_june2010_final.pdf), last accessed June 13, 2011.

<sup>14</sup> Metro, *2010-13 Metropolitan Transportation Improvement Program*, September 21, 2010. Available at: [http://library.oregonmetro.gov/files/mtip\\_draft\\_council\\_adapt\\_web.pdf](http://library.oregonmetro.gov/files/mtip_draft_council_adapt_web.pdf), last accessed June 13, 2011.

<sup>15</sup> Pima Association of Governments, *Regional Concept for Transportation Operations*, Final Report, July 2007 (Unpublished).

## Organization and Process for Developing the RCTO

The Tucson area demonstration was led and hosted by PAG, the region’s MPO, and its member agencies: the City of Tucson, Arizona DOT, Pima County Department of Transportation, and the Pima County Office of Emergency Management and Homeland Security. The individual who served as the leader and convener for the RCTO was a senior planner from PAG. Through the FHWA grant, PAG hired a consultant to assist in facilitating the multi-agency meetings, to synthesize and document the input of the participants, and to work one-on-one with the RCTO leader to propose elements of the RCTO for discussion. PAG formed an RCTO working group drawing primarily from members of

the Transportation Systems Subcommittee to develop the RCTO. The RCTO was developed using a series of stakeholder interviews and regular meetings of the RCTO development group.

## Operations Focus Areas and Objectives

During facilitated RCTO working group meetings, participants developed a wide variety of operations objectives and related performance measures for each of six operations areas. During the RCTO process, stakeholders recognized that significant effort and collaboration would be required to fully develop and implement action plans for each operations area. Because of this, stakeholders focused their efforts on three operations areas, which are shown in Table 3.

**Table 2.** Overview of Tucson, Arizona Demonstration Site

Regional characteristics	<ul style="list-style-type: none"> <li>• Population of metropolitan region approximately 980,000.<sup>16</sup></li> <li>• Region is experiencing rapid population growth.</li> <li>• From 1982 to 2003, vehicle miles traveled (VMT) grew by 213 percent.</li> </ul>
Leadership	<ul style="list-style-type: none"> <li>• Pima Association of Governments.</li> </ul>
History of collaboration	Formal ITS planning began in the region in 1994, and PAG members provided financial and in-kind support for the effort. In 1996 the ITS Working Group, made up of operators in the region, was formed to guide the implementation of the 1996 ITS Strategic Deployment Plan. Members of the group increasingly used their meetings to discuss operations topics outside of ITS, which led to the group’s renaming as the Transportation Systems Subcommittee in 2002.
Primary participants	<ul style="list-style-type: none"> <li>• Arizona Department of Transportation (ADOT).</li> <li>• Arizona Department of Public Safety (DPS).</li> <li>• City of Tucson.</li> <li>• Pima County Department of Transportation.</li> <li>• Pima County Office of Emergency Management and Homeland Security.</li> <li>• Eight PAG member agencies (cities, towns, and tribes).</li> </ul>
RCTO focus areas	<ul style="list-style-type: none"> <li>• Arterial management operations.</li> <li>• Traveler information.</li> <li>• Work zone management.</li> </ul>

<sup>16</sup> U.S. Census Bureau, *American Fact Finder, Population and Housing Occupancy Status: 2010 - United States -- Metropolitan and Micropolitan Statistical Area; and for Puerto Rico*. Available at: <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>, last accessed June 13, 2011.

**Table 3. The Tucson Team's RCTO Focus Areas, Objectives, and Performance Measures<sup>17</sup>**

RCTO Focus Area	Operations Objectives	Performance Measure
<p><b>Arterial management operations</b></p> <p>Motivation: Arterial roads dominate the transportation system in the Tucson region, and they are becoming even more vital as I-10, a primary freeway through Tucson, is undergoing a major reconstruction effort over the next several years.</p>	<ul style="list-style-type: none"> <li>• Provide more predictable travel times and reduce traveler delay due to both recurring events and non-recurring incidents on Tucson metropolitan arterials by:               <ul style="list-style-type: none"> <li>• Improving traffic signal timing, coordination, and management across all jurisdictional boundaries.</li> <li>• Improving traffic incident management.</li> <li>• Improving coordination among traffic, public safety, and transit agencies.</li> </ul> </li> <li>• Improve traveler safety.</li> </ul>	<ul style="list-style-type: none"> <li>• Number of signals for which traffic signal timing plans were reviewed and updated each year.</li> <li>• Arterial travel times and standard deviation as measured by PAG travel time data program.</li> <li>• Crash rates.</li> </ul>
<p><b>Traveler information</b></p> <p>Motivation: The stakeholders saw the need to coordinate traveler information systems in the region, reduce duplicative efforts, and make better use of the existing systems in disseminating information.</p>	<ul style="list-style-type: none"> <li>• Reduce traveler delay by improving the quality, quantity, accessibility, and use of multi-modal traveler information services in the region.</li> <li>• Improve the data management and storage of traveler information.</li> <li>• Educate roadway users to improve driver habits.</li> <li>• Provide current and accurate information to Tucson metropolitan area traveler information services (work zones, incidents, other closures).</li> </ul>	<ul style="list-style-type: none"> <li>• Number of calls placed to 511 telephone system from the Tucson metropolitan area and number of website hits for Tucson-specific travel information.</li> <li>• Number of events (incidents and planned events) that are entered into HCRS per year for the Tucson metropolitan area.</li> <li>• Number of media outlets using traveler information to distribute to the public.</li> </ul>
<p><b>Work zone management</b></p> <p>Motivation: Construction in the Tucson area is performed by individual agencies with no formal coordination to schedule the work in ways that minimize the impact on travelers. In addition, there will be a significant increase in new construction projects in the region due to the 2006 passage of a 20-year Regional Transportation Authority (RTA) Plan and the ½-cent excise tax to fund the plan.</p>	<ul style="list-style-type: none"> <li>• Improve multi-agency coordination for large-scale work zones.</li> <li>• Reduce traveler delay due to work zones.</li> <li>• Improve speed management and travel time reliability within work zones.</li> <li>• Maintain/improve work zone safety.</li> <li>• Reduce the number of traffic-related incidents within work zones.</li> <li>• Minimize the impact of work zones on emergency response routes.</li> </ul>	<ul style="list-style-type: none"> <li>• Number of Work Zone Safety and Mobility Rule training and certification classes held per year and number of attendees.</li> <li>• Number of traffic related incidents within work zones.</li> <li>• Jurisdictional partnership in the Construction Planning and Programming Coordination program.</li> </ul>

<sup>17</sup> Pima Association of Governments, *Regional Concept for Transportation Operations*, Final Report, July 2007 (Unpublished).

## Approach for Meeting Objectives

During the RCTO process, stakeholders began developing action plans for each of the operations areas. These approaches are described in Table 4.

### Link to Planning

The link between the RCTO and the metropolitan planning process was facilitated in the Tucson region by the demonstration site leader, a senior planner from PAG. Once operations strategies were identified and agreed upon by the participating agencies, the leader from PAG helped include operations programs for consideration for regional funding. As a result, PAG established a regional traffic signal program in its 2040

Regional Transportation Plan and allocated funding in its TIP. Additionally, operators in the region are increasingly seeking out PAG as the host for regional operations coordination efforts. The Tucson region also used its RCTO as a starting point in establishing objectives, performance measures, and initiatives in its congestion management process.

### Outcomes or Successes

Coordination of existing practices such as traveler information and work zone management allows agencies to provide better service to travelers:

- PAG has secured funding for a regional traffic signal program.

**Table 4.** Approach for Meeting Operations Objectives<sup>18</sup>

RCTO Focus Area	Approach
Arterial management operations	<ul style="list-style-type: none"> <li>• Implement a program to review and optimize traffic signal timing plans on major arterials, state highways, and at freeway interchanges regularly (every 3 to 5 years).</li> <li>• Identify multi-jurisdictional opportunities for sharing resources to support transportation operations. A specific opportunity that should be explored is deployment and operations of arterial dynamic message signs (DMS).</li> </ul>
Traveler information	<p>Establish compatibility between Arizona 511 system and TransView:</p> <ul style="list-style-type: none"> <li>• Improve the Tucson area maps within the Highway Condition Reporting System (HCRS) to be commensurate with ½ mile grid system.</li> <li>• Integrate filtered CAD information into regional traveler information system.</li> <li>• Improve quantity and quality of work zone information that is input into the ADOT HCRS.</li> <li>• Implement real-time bus arrival capability into traveler information system.</li> </ul>
Work zone management	<ul style="list-style-type: none"> <li>• Develop practices to facilitate inter-agency and inter-jurisdiction coordination of construction work zones: <ul style="list-style-type: none"> <li>» Establish and support a region-wide construction planning and programming coordination working group.</li> <li>» Improve quantity and quality of work zone information that is input into the ADOT HCRS.</li> <li>» Provide current and accurate work zone/closure/restriction information to Tucson metropolitan area emergency service providers, transit agencies and the public via traveler information services.</li> </ul> </li> <li>• Implement regular training and certification for Work Zone Safety and Mobility Rule (23 CFR 630 Subpart J). Attendees should include both jurisdiction staff and contractors.</li> </ul>

<sup>18</sup> Pima Association of Governments, *Regional Concept for Transportation Operations*, Final Report, July 2007 (Unpublished).

- Multi-jurisdictional coordination of work zones began through meetings between construction representatives from multiple agencies, although this effort slowed down approximately a year after the RCTO due to challenges implementing a common system for tracking construction activities.
- PAG has been identified as an effective regional table for operations collaboration and is used to help coordinate and improve traffic incident management for major projects such as the I-10 reconstruction project.
- ADOT and local agencies in Tucson have worked through road blocks to sharing and coordinating traveler information. Real-time bus information and computer aided dispatch (CAD) data from the Pima County Sheriff’s Office and the City of Tucson Police Department is now fed into TransView.org, an online traveler information system operated by the City of Tucson.

In the 3½ years since PAG and its operations partners developed the RCTO, they are still working together to implement the approach set out in the RCTO. There have been several successes, as noted above, and regional coordination for operations continues through the PAG Transportation Systems Subcommittee. Additionally, a smaller multi-agency traffic signal program group and traveler information group work specifically on those RCTO focus areas. The PAG RCTO leader reports that the RCTO has led to other collaborative efforts between planners and operators because the RCTO effort “got operators to think like planners.” One follow-on success has been acquiring the resources needed to bring all of the operators onto the same wireless network for signal communications resulting in significant cost savings.

### 2.3 Southeast Michigan<sup>19</sup>

With numerous jurisdictions, agencies, and service providers responsible for safely and efficiently operating various aspects of the transportation system, the agencies in Southeast Michigan must cross agency and jurisdictional boundaries to be successful. Development of an RCTO allowed the agencies in the Metropolitan Detroit area to continue, formalize, and expand their collaborative efforts.

Table 5 presents an overview of the Southeast Michigan demonstration site.

#### Organization and Process for Developing the RCTO

The kick-off meeting for the Metro Detroit initiative was held by SEMCOG and included stakeholders, both administrative and technical, from State, regional, county, local, and private sector transportation operating agencies. The major outcome of the meeting were that the direction, scope, and elements of the RCTO program introduced to region-wide stakeholders.

Following the meeting, extensive stakeholder interviews were conducted. Over 70 delegates from approximately 40 agencies in traffic management, operations, law enforcement, communications, and transit in the Metro



**Figure 7.** Map of Southeast Michigan  
Source: Southeast Michigan Council of Governments

<sup>19</sup> Southeast Michigan Council of Governments, *Regional Concept of Transportation Operations (RCTO) for Southeast Michigan*, June 2007 (Unpublished) and *Regional Concept for Transportation Operations (RCTO) Final Report: Southeast Michigan Experience*, July 2007 (Unpublished).

Detroit tri-county area were interviewed regarding their agencies' operations needs and priorities. The RCTO objectives were developed using the results of these interviews. The objectives were refined and the approach for the RCTO was developed through a series

of meetings between an RCTO development team made up of approximately 10 representatives from SEMCOG, Michigan DOT, and Michigan State Police. Additionally, two workshops were held on the RCTO development with a larger group of stakeholders in the region.

**Table 5.** Overview of Southeast Michigan Demonstration Site

Regional characteristics	<ul style="list-style-type: none"> <li>• The Southeast Michigan region has a population of 4.7 million.<sup>20</sup></li> <li>• Located in southeast Michigan on the Detroit River.</li> <li>• Encompasses 7 counties, 2 MDOT regions, 233 local units of government.</li> </ul>
Leadership team	<ul style="list-style-type: none"> <li>• Southeast Michigan Council of Governments.</li> <li>• Michigan Department of Transportation (MDOT).</li> <li>• Michigan State Police (MSP).</li> </ul>
History of collaboration	<ul style="list-style-type: none"> <li>• Regional collaborative efforts on incident management date back to 1991, and include incident management conferences, incident management committees, and the development of a “Blueprint for Action.”</li> <li>• MDOT, several counties, and SMART transit have been collaborating on managing snow and ice removal since 1998.</li> <li>• Collaboration on ITS has been ongoing since 1999.</li> <li>• MDOT, several counties, and several cities began working to improve traffic signal timing and progression over 10 years ago.</li> </ul>
RCTO Focus area	<ul style="list-style-type: none"> <li>• Priority corridors for future investments.</li> <li>• Traffic signal management.</li> <li>• Traffic incident management.</li> <li>• Operations information sharing.</li> </ul>

<sup>20</sup> SEMCOG and U.S. Census Bureau, *2010 Census Data for Southeast Michigan*, March 25, 2011. Available at: <http://library.semco.org/InmagicGenie/DocumentFolder/QuickFacts2010Census.pdf>, last accessed June 13, 2011.

## Operations Focus Areas and Objectives

The Southeast Michigan RCTO focus areas are shown in Table 6 along with the operations objectives.

**Table 6.** The Southeast Michigan Team's RCTO Focus Areas and Objectives<sup>21</sup>

RCTO Focus Area	Operations Objectives
Priority corridors for future investments	Identifying priority corridors: <ul style="list-style-type: none"> <li>• Establish and maintain a region-wide list of priority corridors for operations improvements.</li> </ul>
Traffic signal management	Retiming traffic signals regularly: <ul style="list-style-type: none"> <li>• Facilitate a region-wide traffic signal retiming program:               <ul style="list-style-type: none"> <li>» Priority corridors would be the top candidates for signal retiming.</li> <li>» Signals along corridors that cross multiple jurisdictions will be coordinated.</li> </ul> </li> </ul>
Traffic incident management	Clearing incidents quickly and safely: <ul style="list-style-type: none"> <li>• Significantly reduce incident clearance times by establishing quick clearance legislation and enhancing the Freeway Courtesy Patrol (FCP) program.</li> </ul>
Operations information sharing	Disseminating operations information: <ul style="list-style-type: none"> <li>• Continue to promote freeway camera video sharing among agencies.</li> <li>• Standardize, expand and improve communications between agencies.</li> <li>• Assist the development of the Michigan Advanced Transportation Management System (ATMS).</li> <li>• Disseminate operations information via a unified website.</li> </ul>

*Note: Performance measures for the objectives were not identified.*

<sup>21</sup> Southeast Michigan Council of Governments, *Regional Concept of Transportation Operations (RCTO) for Southeast Michigan*, June 2007 (Unpublished).

## Approach for Meeting Objectives

During the RCTO development process, stakeholders began to identify the approach for each of the operations focus areas. These approaches are described in Table 7.

**Table 7.** Approach for Meeting Operations Objectives<sup>22</sup>

RCTO Focus Area	Approach
Priority corridors for future investments	<p>Supported by the Regional Operations Committee, the Arterial Traffic Management Committee will take the lead and act as the champion to:</p> <ul style="list-style-type: none"> <li>• Develop a consensus for operations improvements.</li> <li>• Prioritize corridors specifically for the traffic signal retiming program.</li> <li>• Establish additional criteria for setting priorities.</li> </ul>
Traffic signal management	<p>A traffic signal retiming program will be facilitated by the Arterial Traffic Management Committee in two phases:</p> <ul style="list-style-type: none"> <li>• Phase I, Analysis—Conduct fundamental analysis work and prepare the initial proposal, which will lay out the entire plan describing the overall scope, specify the projects for each year, outline the implementation plan, and develop a financial plan.</li> <li>• Phase II, Implementation—Collect data, optimize signal timing plans, and install new signal timing plans.</li> </ul>
Traffic incident management	<p>The Incident Management Committee will act as champion to:</p> <ul style="list-style-type: none"> <li>• Promote the development of vehicle removal legislation.</li> <li>• Promote the development of obstruction removal legislation.</li> <li>• Facilitate the enhancement of the Freeway Courtesy Patrol (FCP) program.</li> </ul>
Operations information sharing	<p>The Communications Committee will be champion to:</p> <p>Communications enhancement:</p> <ul style="list-style-type: none"> <li>• Facilitate the establishment of “Talk Groups” to share information/resources.</li> <li>• Promote the adoption of 800 MHz radio that is currently used by all City of Detroit departments.</li> <li>• Promote better coverage of communication systems.</li> <li>• Promote better communication and coordination between MSP and local law enforcement.</li> </ul> <p>Michigan ATMS:</p> <ul style="list-style-type: none"> <li>• Review Control Software Replacement Project.</li> <li>• Meet with stakeholders from across the state to assess the needs of a wide range of users.</li> <li>• Provide one-stop shopping for information.</li> <li>• Disseminate operations information.</li> <li>• Significantly facilitate data and resource sharing among agencies.</li> </ul> <p>Unified Web Site:</p> <ul style="list-style-type: none"> <li>• Continue to improve web site.</li> <li>• Periodically distribute newsletter among agencies with news of RCTO development and operations information.</li> </ul>

<sup>22</sup> Southeast Michigan Council of Governments, *Regional Concept of Transportation Operations (RCTO) for Southeast Michigan*, June 2007 (Unpublished).

## Link To Planning

In Southeast Michigan, the RCTO provided a significant link to the planning process in at least three ways. Through its RCTO, SEMCOG has incorporated a traffic signal retiming program into its 2030 and 2035 metropolitan transportation plans and recent TIPs to optimize traffic signals. Secondly, as part of the RCTO development, a region-wide ranking of priority corridors was performed with operating agencies. The ranking will be used to inform decisions on future operations projects. Finally, the RCTO provided SEMCOG planners the opportunity to expand their understanding of operations needs in the region and grow the network of operations stakeholders.



Source: Southeast Michigan Council of Governments

## Outcomes or Successes

A major success resulting from the development of the RCTO in Southeast Michigan is that effective procedures and relationships have been established to discover the high priority needs of the

region for operations improvements, and these needs have been translated into specific actions and projects. Other outcomes and successes include:

- Development of a Southeast Michigan transportation operations website featuring RCTO work.
- A ranking of the region-wide corridors based on the selected criteria.
- A change of the law regarding abandoned vehicles, reducing the time limit from 48 hours to 18 hours.
- Establishment of an internet-based utility to permit public safety, transportation, and other government agency representatives access to a subset of the 164 closed-circuit cameras owned and operated by MDOT for real-time freeway traffic surveillance across the Detroit metropolitan area.
- Identification of funding for signal retiming projects in the region.

Three and a half years after the Southeast Michigan operations stakeholders developed the RCTO, the operations objectives from the RCTO still help to guide collaborative operations activities. The objectives and action items have been revised over time and incorporated into the second generation of the region's operations "Blueprint for Action." Objectives and associated initiatives/actions and champions are linked to the five RCTO focus areas on the SEMCOG Regional Operations website.<sup>23</sup> The "Blueprint for Action" provides direction for the activities of the Regional Transportation Operations Steering Committee (includes the former Incident Management Committee as of 2009), Freeway Operation Subcommittee, and the Arterial Traffic Management Subcommittee.

## 2.4 Hampton Roads, Virginia<sup>24</sup>

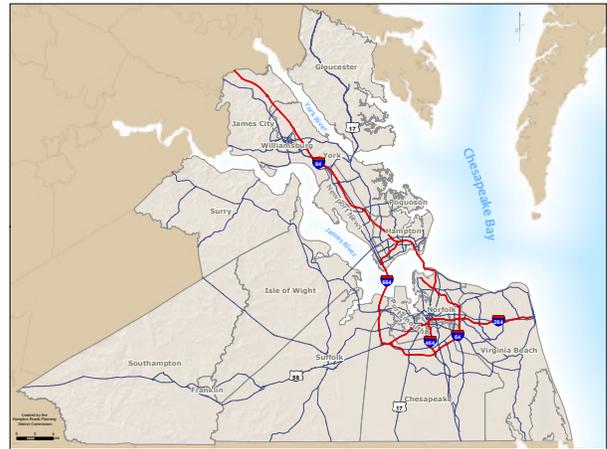


Figure 8. Map of Hampton Roads, Virginia

Source: Hampton Roads Transportation Planning Organization

The agencies in Hampton Roads viewed the RCTO as a mechanism to enhance the existing spirit of collaboration in the face of new challenges faced by the region in terms of continued growth and constrained capacity.

Table 8 presents an overview of the Hampton Roads demonstration site.

<sup>23</sup> See: Southeast Michigan Council of Governments, Regional Operations. Available at: <http://www.semco.org/RegionalOperations.aspx>.

<sup>24</sup> Hampton Roads Transportation Planning Organization, *Resource Document Hampton Roads Highway Incident Management (HIM) Regional Concept for Transportation Operation (RCTO)* Version 1.0, July 2008 (Unpublished). Available at: <http://www.hrrcto.org/pdf/Hampton%20Roads%20RCTO%20SRH%207-21.pdf>, last accessed June 14, 2011. *Hampton Roads Highway Incident Management (HIM) Regional Concept for Transportation Operations (RCTO)*, June 2008 (Unpublished). Available at: <http://www.hrrcto.org/pdf/Summary.pdf>, last accessed June 14, 2011.

## Organization and Process for Developing the RCTO

A core group of representatives from participating agencies formed an RCTO working group to guide the development of the RCTO through regular meetings and other activities. In order to gain a clear picture of the current state of TIM in Hampton Roads, the RCTO working group conducted in-person interviews with six different stakeholder groups, including freight, bridge tunnel, towing, hazmat, transit, and medical examiners.

The purpose of the interview sessions was to gather information about the concerns, problems, and possible solutions regarding traffic incident management. Following the interviews, an RCTO workshop was held that brought together first responders, secondary responders, traffic operators, and representatives of several special functions related to incident management. The key stakeholders in the RCTO process also played an important role in discussions that took place within the framework of the workshop.

**Table 8.** Overview of Hampton Roads, Virginia Demonstration Site

Regional characteristics	<ul style="list-style-type: none"> <li>• Encompasses 10 cities and 6 counties in southeastern Virginia, including: Virginia Beach, Norfolk, and Williamsburg.</li> <li>• Metropolitan area population of over 1.6 million.<sup>25</sup></li> <li>• Natural harbor and home to large ports such as Newport News Marine Terminal and Norfolk International Terminals.</li> <li>• Home to many military facilities including the Norfolk Naval Base.</li> </ul>
Leadership team	<ul style="list-style-type: none"> <li>• Hampton Roads Transportation Planning Organization (HRTPO), the MPO for the region.</li> <li>• Virginia Department of Transportation.</li> </ul>
History of collaboration	<ul style="list-style-type: none"> <li>• For more than a decade, the Hampton Roads Highway Incident Management (HRHIM) Committee, which consists of a cross section of the responding agencies within the region, has been a forum for cooperation and coordination.</li> <li>• The Hampton Roads ITS Committee formed in the early 1990s, under the guidance of HRTPO to coordinate and guide cross-jurisdictional ITS initiatives. Champions on this committee wanted to strengthen the ties between planning and operations with regard to ITS and to coordinate ITS between agencies and modes. It is now titled the Hampton Roads Transportation Operations Subcommittee.</li> </ul>
Other participants	<ul style="list-style-type: none"> <li>• Virginia State Police (VSP).</li> <li>• Local fire and rescue.</li> <li>• Local traffic engineers and public works staff.</li> <li>• Local law enforcement.</li> <li>• Environmental and hazardous materials (hazmat) staff.</li> <li>• Local emergency medical services.</li> <li>• Members of the towing and recovery community.</li> </ul>
RCTO Focus area	<ul style="list-style-type: none"> <li>• Traffic incident management.</li> </ul>

<sup>25</sup> U.S. Census Bureau, 2010 Census. Available at: <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>, last accessed June 14, 2011.

## Operations Focus Areas

The Hampton Roads team chose TIM as their operations focus area. Interest in TIM came from high-profile incidents at tunnels and bridges that caused major delays. The MPO board subsequently requested improvements be made to incident management. The RCTO objectives, performance measures, and targets for the TIM focus area are shown in Table 9.

## Approach for Meeting Objectives

During the RCTO process, stakeholders developed action items for each of the operations objectives. These approaches are described in Table 10.

## Link To Planning

In Hampton Roads, the link between the RCTO and planning was established early on. The champions for the RCTO in Hampton Roads applied for and received CMAQ/STP funding to assist in developing an RCTO in that area through the region's TIP. HRTPO served as one of the two hosts for the development of the RCTO. This facilitated a flow of information between operators and metropolitan planners regarding

operations needs and funding opportunities. Through the development of the RCTO, performance measures were identified for traffic incident management and the Virginia DOT began collecting and analyzing traffic incident management performance data. Performance information was shared regularly with the MPO board and planners.

## Outcomes or Successes

As a result of the RCTO effort in Hampton Roads, the planners and operators have had a number of achievements in advancing traffic incident management including:

- Began a practice of collecting and analyzing traffic incident management performance measurement data.
- Produce quarterly and annual performance measure reports to track progress toward the RCTO's operations objectives.
- Regularly hold post-incident review meetings guided by a detailed post-incident analysis worksheet with key participants.

**Table 9.** The Hampton Roads Team's RCTO Objectives and Performance Measures for the TIM Focus Area<sup>26</sup>

Operations Objectives	Performance Measures
Increase responder safety by eliminating struck-by incidents and fatalities.	<ul style="list-style-type: none"> <li>• Ratio of crashes per 100,000 miles driven for VSP.</li> <li>• Incidents involving vehicle fires.</li> </ul>
Decrease incident clearance time.	<ul style="list-style-type: none"> <li>• Incident duration.</li> <li>• Average number of incidents lasting longer than 30, 60, and 90 minutes.</li> </ul>
Decrease secondary incident occurrences.	<ul style="list-style-type: none"> <li>• Number of secondary accidents.</li> </ul>
Improve inter-agency communication during incidents.	<ul style="list-style-type: none"> <li>• Input (e.g., what improvements have been most beneficial, where deficiencies remain, what improvements they would like to see) from survey of stakeholder agencies.</li> </ul>
Identify existing regional incident management resources and establish plans for inter-agency utilization and acquisition.	<ul style="list-style-type: none"> <li>• Identification of resource arrangements, mutual training agreements, and information sharing.</li> </ul>
Establish a regional incident management pro-active and post-incident review consortium.	<ul style="list-style-type: none"> <li>• Scheduling all post-incident review meetings.</li> <li>• Posting meeting minutes to RCTO web site in a timely fashion.</li> <li>• Creating and updating the Hampton Roads Incident Responders Contact, Jurisdiction, and Resource Guide.</li> </ul>

<sup>26</sup> Hampton Roads Transportation Planning Organization, *Resource Document Hampton Roads Highway Incident Management (HIM) Regional Concept for Transportation Operation (RCTO)* Version 1.0, July 2008 (Unpublished). Available at: <http://www.hrrcto.org/pdf/Hampton%20Roads%20RCTO%20SRH%207-21.pdf>, last accessed June 14, 2011. *Hampton Roads Highway Incident Management (HIM) Regional Concept for Transportation Operations (RCTO)*, June 2008 (Unpublished). Available at: <http://www.hrrcto.org/pdf/Summary.pdf>, last accessed June 14, 2011.

- Developed a standard hazmat reporting document.
- Held a workshop with senior management in State police, fire/rescue, local law enforcement, VDOT, and MPO.
- Planned joint outreach for “Slow Down, Move Over” law.
- Hampton Roads Highway Incident Management RCTO approved by MPO board.
- Developed a Hampton Roads RCTO website to disseminate RCTO information to the public and facilitate communication between RCTO members.<sup>28</sup>
- Worked to obtain three more total stations to be utilized by Virginia State Police in fatal incident investigations in order to reduce clearance times.
- Consolidates and distributes real-time traffic incident information gathered from different

agencies and jurisdictions to local traffic management centers and VDOT’s Hampton Roads Transportation Operations Center (TOC). The information distributed includes Virginia State Police CAD.

In the 2½ years following the development of the RCTO, Hampton Roads RCTO participants from local and State DOTs, local and State public safety agencies, and HRTPO continue to meet on a quarterly basis as the Hampton Roads RCTO subcommittee. Despite fluctuations in participation level and staff changes, the group continues to make progress on the actions identified in the RCTO. As of early 2011, a memorandum of understanding (MOU) was being developed to formalize the commitment of the agencies participating in the RCTO to collaboratively advance TIM in the region.

**Table 10.** Approach for Meeting Operations Objectives<sup>27</sup>

Operations Objective	Approach
Increase responder safety	<ul style="list-style-type: none"> <li>• Start a regional public awareness campaign concerning the “Slow Down, Move Over” law and the “Move It” law.</li> <li>• Encourage optimal lighting and traffic control equipment for secondary responder vehicles.</li> </ul>
Decrease incident clearance times	<ul style="list-style-type: none"> <li>• Implement the use of intermediate reference location signs.</li> <li>• Pursue the use of incentive based towing contracts or other innovative towing initiatives.</li> </ul>
Decrease secondary incident occurrences	<ul style="list-style-type: none"> <li>• Provide Virginia Port Authority (VPA) and other regional entities information regarding major incidents in Hampton Roads.</li> <li>• Enhance the dissemination of incident-specific information to the motoring public.</li> </ul>
Improve inter-agency communication during incidents	<ul style="list-style-type: none"> <li>• Improve external and internal communication related to traffic incident management.</li> <li>• Explore the possibility of multiple agencies being co-located at the Hampton Roads Traffic Management Center (HRTMC).</li> </ul>
Identify existing regional incident management resources and establish plan for inter-agency utilization and acquisition	<ul style="list-style-type: none"> <li>• Conduct cross-agency training.</li> <li>• Provide more total station equipment to be utilized in investigations.</li> </ul>
Establish a regional incident management pro-active and post-incident review consortium	<ul style="list-style-type: none"> <li>• Hold meetings of the post-incident review consortium following any problematic incidents.</li> </ul>

<sup>27</sup> Hampton Roads Transportation Planning Organization, *Resource Document Hampton Roads Highway Incident Management (HIM) Regional Concept for Transportation Operation (RCTO)* Version 1.0, July 2008 (Unpublished). Available at: <http://www.hrrcto.org/pdf/Hampton%20Roads%20RCTO%20SRH%207-21.pdf>, last accessed June 14, 2011. *Hampton Roads Highway Incident Management (HIM) Regional Concept for Transportation Operations (RCTO)*, June 2008 (Unpublished). Available at: <http://www.hrrcto.org/pdf/Summary.pdf>, last accessed June 14, 2011.

<sup>28</sup> See the Hampton Roads Regional Concept for Transportation Operations website at <http://www.hrrcto.org/>.

### 3 Developing an RCTO – Key Insights for Success

The demonstration site leaders embarked on developing an RCTO in collaboration with others in their region with little guidance on the process. They were forced to experiment with techniques to maintain participation among their partners and reach consensus. Throughout the demonstration initiative, development activities such as meetings and workshops were observed for lessons on what worked effectively and what did not. In addition, the RCTO leaders participated in regular conversations on their efforts and reported on their experiences, including both challenges and successes.

This chapter contains several insights conveyed by the RCTO demonstration site leaders or drawn from observations. It is intended to provide assistance to regions looking to develop an RCTO in the form of ideas or approaches to consider. The insights are not meant to be prescriptive. The insights discussed and examples offered in the sections relate to the topics listed in the table below:

**Table 11.** Guide to Topics Covered in Chapter 3

Section in Chapter	RCTO Development Topic
3.1 The Motivation Leading to an RCTO	Need for Improved Regional Operations at the Core of Motivation
	Need to Work Collaboratively - A Necessary Element of RCTO Motivation
	Need for a Strategic Approach – A Necessary Element of RCTO Motivation
3.2 Collaborative Forum for Developing an RCTO	Organizing a Collaborative Forum
	Establishing Champions and Leaders
	Engaging Participants
	Maintaining Participant Involvement
	Gathering Support From Elected or Appointed Officials and Agency Leadership
	Establishing a Process for Gathering Ideas and Making Decisions
3.3 Linking the RCTO and the Planning Process	Linking the RCTO and the Planning Process
3.4 The “What” and “How” of the RCTO	Establishing Clear Operations Objectives
	Creating an Approach
	Defining Supporting Elements of the Approach – Relationships and Procedures, Resource Arrangements, and Physical Improvements

### 3.1 The Motivation Leading to an RCTO

The path to an RCTO begins with a recognized need to improve regional transportation operations through collaboration using a formal, strategic approach. This recognized need referred to as the motivation for an RCTO has three crucial components: the need to improve regional transportation operations, the need to accomplish the improvements through regional collaboration, and the need to make these improvements in a sustained, formalized, and strategic manner. All three of these needs must be present for the RCTO to be considered as a tool for the region.

#### Need for Improved Regional Operations at the Core of Motivation

At the core of the motivation for developing an RCTO is the need to improve regional transportation operations or some aspect of operations such as arterial delay, traffic incident management, or transit system management. This need determines the functional scope of the RCTO. As mentioned previously, the functional scope of an RCTO can be a single operations area such as traffic signal management, a collection of related areas, or a capability that cuts across multiple areas such as coordinated communications. The need to improve regional operations can come to the forefront in the region in several ways.

Frequently, the need is elevated from the “grass roots” through operating and planning agency staff or set as a priority from the “grass tops” through local elected officials or other high-level decisionmakers.

#### Motivation to Improve Regional Operations May Come from High-Level Decisionmakers

In both Hampton Roads and Portland, the development of the RCTO was set in motion by local elected officials who demanded improvements in the delay caused by traffic incidents. In Portland, a high-ranking elected official called for improvements in traffic incident management after witnessing extensive delay caused by a minor incident. The elected official brought together

transportation executives in the City of Portland and other stakeholders to make changes to the way traffic incidents are handled. Based on this strong need to improve incident management, the RCTO was selected as the tool to make strategic and coordinated improvements in traffic incident management.

In Hampton Roads, traffic incident management is a hot button issue because of the bottlenecks created by the numerous bridges and tunnels that give the Hampton Roads region its unique transportation system. When an accident occurs near a bridge or tunnel, it is easy for traffic to become backed up quickly. The Hampton Roads Transportation Planning Organization’s board of elected leaders called for regional planners and VDOT to organize and improve incident management throughout the region following a major traffic incident on a bridge in the region. The MPO board told them to come back and give regular updates on their progress. This provided the motivation to improve operations that led Hampton Roads to develop an RCTO for guiding their work towards better traffic incident management in the region.

#### Motivation May Arise from the Grassroots

In contrast, the motivation for operations improvements in the Tucson metropolitan region and Southeast Michigan were established through a grassroots effort where the needs for operations improvements for the region were identified through meetings between engineers and other senior staff from operating agencies in the region and interviews with key staff members conducted by RCTO development leaders. In the Tucson region, the lack of staff time and/or staff expertise to retune, coordinate, and manage traffic signals regularly within each individual agency’s jurisdiction was a common issue that arose out of discussions with operating agencies in the region. Given that arterial roads in the Tucson region were becoming even more vital due to the major reconstruction effort just beginning on Interstate 10 through Tucson, the Tucson RCTO working group decided to use arterial management as one of their focus areas in their RCTO.



Figure 9. The Three Crucial Components to the Motivation for an RCTO

The Tucson RCTO working group was motivated to focus on work zone coordination as well in their RCTO because of a combination of needs expressed by operating agency staff in the RCTO meetings and interviews as well as a new policy by the area's Regional Transportation Authority Board:

*to (1) encourage construction planning and phasing which limits the impacts of construction on parallel routes, and (2) encourage planning and phasing of safety, intersection, ITS and other program improvements so that they may be in place in advance of major construction on a nearby parallel corridor so as to facilitate traffic flow that may be impacted by construction of the corridor.<sup>29</sup>*



Source: Stephanie Sneary

The motivation for a third focus area of the Tucson area RCTO came out of the previous development of the Pima Association of Governments Intelligent Transportation System Strategic Deployment Plan. During the ITS Plan development, PAG's Transportation Systems Subcommittee developed a vision for the ideal traveler information system in the Tucson metropolitan region. The RCTO working group used that vision to set the direction for the RCTO element on improving traveler information.

In Southeast Michigan, the specific motivation to improve regional transportation operations that motivated the development of the RCTO also grew out of common needs and priorities identified by operating agency staff. The Southeast Michigan RCTO Planning Group with the support of its consultants facilitated meetings with groups of operations practitioners from at least nine agencies in the region to elicit the operations needs and priorities of the staff. The planning group found several common themes emerging for improvements such as establishing a common communications system among operating agencies, improving safety and efficiency of incident clearance, retiming traffic signals, and identifying priority corridors for operations investments.

## **Need to Work Collaboratively - A Necessary Element of RCTO Motivation**

The motivation for an RCTO also includes the recognition that the desired improvements to operations in the region require a collaborative approach involving multiple agencies, jurisdictions, or modes. The interconnected nature of the regional transportation system requires collaboration between the operators of each element in order to get the best performance from the system. Operators who work with the public on a regular basis know that travelers do not care about the jurisdictional divides among the roads and rails they use. Travelers expect a seamless experience and operators must work together to provide that. The primary purpose of an RCTO is to focus the efforts of multiple agencies in the region so that travelers can access a safe and efficient transportation system regardless of jurisdiction or mode. An RCTO helps guide operators and planners toward a common objective through an agreed-upon approach.

Each of the RCTO demonstration sites viewed collaboration as necessary to improve regional transportation operations. The sites each had a history of successful collaboration and through these collaborative efforts came to recognize the value of working together as a region to address operations issues. In the Portland area, the Transportation Portland Technical Advisory Committee (TransPort TAC) is the primary forum for collaboration on regional transportation operations. Members of this group served as advisors for the RCTO demonstration initiative.

In Tucson, the primary forum for regional operations collaboration is the Pima Association of Governments Transportation Systems Subcommittee, first known as the ITS Working Group. This group formed the basis of the PAG RCTO working group.

Much of the regional operations collaborative work in the Southeast Michigan region centers on incident management. The region's incident management committee has evolved over the past decade into a forum for discussion concerning many aspects of regional operations.

In Hampton Roads, regional collaboration on transportation operations dates back to the formation of the Hampton Roads ITS Committee in the early 1990s under the guidance of HRTPO. The committee has expanded in scope and membership over the years, now includes public safety participants, and is named the Hampton Roads Transportation Operations Subcommittee.

<sup>29</sup> Pima Association of Governments, Regional Concept for Transportation Operations, Final Report, July 2007 (Unpublished).

## Need for a Strategic Approach – A Necessary Element of RCTO Motivation

The third crucial component in the motivation to use an RCTO is the need for a strategic, formal approach to improving operations through collaboration. Through developing an RCTO, the participants define an operations objective and an approach for achieving that objective including relationships and procedures, resource arrangements, and physical improvements. While this model could be used for developing a strategic plan for a variety of transportation needs, the issue addressed by an RCTO should be complex enough to justify the effort needed to develop the elements of an RCTO. For example, retiming one signal near a jurisdictional boundary may not require a formal, strategic approach. An operations need that required developing an ongoing traffic signal retiming program for several jurisdictions, however, would be a prime candidate for an RCTO.

The RCTO leaders in Portland saw the RCTO as a way to harness the energy and momentum begun by the elected official to make improvements in traffic incident management. The motivation to develop an RCTO for traffic incident management in Portland arose from the need to collaboratively make strategic, deliberate decisions regarding a complex operations area: traffic incident management. Without a formal approach, Portland risked a piecemeal approach that would not fully resolve the issue.

### RCTO Developers Motivated to Provide Continuity in the Event of Staff Changes

At the outset of the RCTO demonstration initiative, the Portland RCTO leaders were motivated in part to develop an RCTO to provide continuity to their collaborative efforts despite staff changes. Much of the operations collaboration in Portland is based on personal relationships among the various agencies' staff, and the operations leaders in the area wanted to provide for their successors an idea of how they work together, what their priorities are, and what they want to accomplish.

### RCTO Developers Motivated to Raise Visibility of Operations in Planning Community

Additionally, Portland was motivated to develop an RCTO in order to raise the visibility of operations at the metropolitan planning table. The RCTO initiative in Portland was very much an effort to give operations more of a formal role in the planning and project review process at the metropolitan level. The Portland area succeeded in this effort on several accounts that will be described in later sections of this guide.

## 3.2 Collaborative Forum for Developing an RCTO

The foundation for developing an RCTO is the people working together within a collaborative structure that offers a forum to share ideas, make decisions, and commit to improving operations on a regional level. Because of the inherent differences among contexts for regional operations across the United States, there is no single collaborative structure that is recommended for developing an RCTO. The individuals and agencies that need to be involved differ depending on the focus of the operations improvement in both functional and geographic scope. The host or convener for the collaborative forum may be the MPO, the State DOT, or another entity within the region. Even though a one-size-fits-all solution cannot be proposed, there are approaches to organizing to build an RCTO that worked for the demonstration sites because of their individual circumstances and visions for the RCTO. Those approaches are detailed below to provide possible models for other regions.

### Organizing a Collaborative Forum

#### Build on an Existing Collaborative Group

Each demonstration site had a strong history of regional collaboration for operations and each site built off the foundation of existing relationships to advance an RCTO. Tucson and Hampton Roads used their



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existing collaborative forums for regional operations for developing their RCTOs.

In the Tucson region, the regional operations stakeholders found it unnecessary and undesirable to add another layer of organization to their efforts. The individuals participating in the existing Transportation Systems Subcommittee at the Pima Association of Governments were often the same individuals who were needed to support the development of the RCTO. Therefore, the RCTO leaders essentially extended the meeting of that group by another hour during the RCTO development phase and handled the RCTO work during that hour. Most of the TSS members participated in both the Transportation Systems Subcommittee meeting and the RCTO development meeting afterwards. The leader of the RCTO was also the convener and host of the Transportation Systems Subcommittee. Although Tucson struggled for

participation in the RCTO meetings during the early phases of the RCTO development process, the technique of piggy-backing onto an existing group that had the desired members worked well for the development as well as implementation. During the implementation of the RCTO, the operations initiatives begun with the RCTO were successfully integrated into the agenda of the Transportation Systems Subcommittee.

In the Hampton Roads region, the RCTO leaders developed a working group by drawing from an existing subcommittee of the Hampton Roads Transportation Technical Advisory Committee (Hampton Roads Transportation Operations Subcommittee) and one external committee established by local incident management leaders (Hampton Roads Highway Incident Management (HRHIM) Committee). Historically, the membership of the Hampton Roads Transportation Operations Subcommittee had been traffic engineers and planners, whereas the HRHIM Committee consisted primarily of public safety representatives. In recent years, both committees experienced “cross-pollination” of participants as each saw the need to work with the other field. The call to improve traffic incident management strategically using an RCTO provided the impetus to form a common forum where both public safety and transportation engineers and planners were committed to meeting regularly and working together.

### **Form a Tiered Collaborative Structure with a Strong Mandate**

#### **Lesson Learned**

The two-tiered organizational structure for making transportation improvements on a regional basis was highly efficient and effective in Portland. The combination of agency leaders and technical staff proved important to making major strides towards operations improvements on a regional level.

The Portland region received a strong mandate from an elected official, the city transportation commissioner, to improve traffic incident management. The commissioner brought together City of Portland agency leaders to form the Portland Operations

Steering Team (POST). Members in turn charged their respective staffs to work together to come up with a menu of solutions that the POST would select from to address traffic incident management. The staff-level working group used the RCTO as the tool to guide them in developing a collaborative strategy containing the needed menu of actions.

In many ways, the two-tiered organizational structure for making transportation improvements on a regional basis was highly efficient and effective. Both the POST and the staff-level working group were directed by someone with authority over them to work together and

develop a solution. The commitment of those involved was clear: operations efforts had become part of these staff members’ jobs. The structure used by Portland was also effective because it relied on individuals within participating agencies to perform the functions that they were best suited for: agency leaders provided guidance and made high-level decisions while senior technical staff shaped the technical approaches needed to deliver on the leaders’ vision. This combination was effective in making strides towards operations improvements in Portland.

### **Establishing Champions and Leaders Ensure at Least One Committed Champion**

As common sense would dictate, when multiple players are working together, the effort needs at least one person to serve as the champion for the group, someone who feels strongly that the effort is deeply needed and is willing to make sure it is successful. Often the champion has a clear vision of the desired outcome, brings together the needed parties, ensures that they are engaged, and works to get the support needed for achieving the desired outcomes.

Prior to the RCTO effort focused on TIM in Portland, the demonstration project staff attempted to initiate an RCTO around traveler information. This was a need identified by members of the TransPort TAC, the inter-agency ITS staff committee, but the RCTO never came to fruition, in part due to the lack of a committed champion.

### **Engaging Participants**

The progress that can be made on improving regional operations through an RCTO is limited by the participants that can be brought into the collaboration. For example, a group cannot coordinate its traffic signals with a neighboring jurisdiction if the signal owners for that jurisdiction are not at the table. This also applies to operations function. If transit agencies are not participating in a collaborative effort to provide a comprehensive traveler information service to the public, the service will only be able to include the travel modes at the table.

All of the demonstration sites had to make concerted efforts to reach out and engage the participating agencies, stakeholder groups, and individuals within those agencies or groups that were deemed necessary for reaching the desired outcomes of the RCTO. In Hampton Roads, the RCTO leaders at the MPO and State DOT were able to get the participation and commitment of public safety groups in the region for the RCTO on traffic incident management because they had done the work of reaching out to police, fire/EMS, and other first responders approximately 5 years prior during the

update of the region's ITS strategic plan. One of the six working group sessions during the update process was devoted to issues of emergency management, and one of the six program areas in the ITS strategic plan focused on incident and emergency management.

The Tucson RCTO participants did not have an existing regular collaborative forum with first responders, so during an initial phase of the RCTO work in Tucson, the RCTO leader from PAG and the supporting consultants went to the Pima County Sheriff's Office and the City of Tucson's Police Department to determine the existing conditions for regional transportation operations in terms of who performs what function, where collaboration currently exists, and where improvements are desired from a regional operations standpoint. Because of the broad distribution of fire departments across the region, the Tucson RCTO leaders struggled to determine how best to reach out to them for their input. RCTO leaders found that the best way to reach the fire community was to access the regional structure for fire departments in the area, the Pima Fire Chief's Association. Although the participation of public safety stakeholders during the RCTO development in Tucson was not substantial enough to make traffic incident management one of the focus areas for the RCTO, the outreach created the foundation for a collaborative effort to improve incident management during major freeway construction 2 years later.

### **Educate Potential Participants on the RCTO with Simple, Clear Communication**

A common challenge for the RCTO demonstration site leaders was presenting the RCTO tool in a way that potential RCTO development participants in their regions could understand and buy into. In Southeast Michigan, a mission statement, RCTO vision, and overall goals for the RCTO were enunciated so that as RCTO leaders reached out to stakeholder agencies in the region, those stakeholders had a better understanding of what the RCTO covered and what it did not. This is important in helping potential participants understand how the RCTO relates to their work and whether this is something they want to participate in.

#### **Lesson Learned**

Because of the broad dispersion of fire departments across the region, the Tucson RCTO leaders struggled to determine how to best outreach to them and get their input. They found that the best way to reach the fire community was to access the regional structure for fire departments in the area, the Pima Fire Chief's Association.

In Tucson, the RCTO leaders developed a two-page handout on the vision for the Tucson area RCTO. The handout answered questions such as "What do we mean by a Regional Concept for Transportation Operations?" and "How will the RCTO affect the way my agency is operating?"

In Portland, the RCTO leader used the term RCTO as sparingly as possible because he felt that the title could be an impediment to understanding the very basic nature of what the RCTO developers were doing: specifying what they wanted to accomplish



Source: Pima Association of Governments (PAG)

and how it would be accomplished. To audiences concerned with Federal and State policy, he explained that the RCTO is a way to "ride a wave of mandates" to plan for operations and better operate and manage the system. He observed that although the RCTO may be a difficult concept to convey, everyone can understand getting "more bang for your buck" by operating better and it is easy to demonstrate the need to talk about how to do this. This is where the RCTO can come into the discussion.

While reaching out to stakeholder agencies, the Southeast Michigan RCTO Planning Group found that it needed to reassure operating agencies in local jurisdictions that the RCTO would not take over their operations. The group also found it important to clarify the term "operations" in the context of the RCTO.

### **Ensure that the Individuals Necessary for Taking Action on the RCTO are at the Table**

One of the greatest challenges faced by the RCTO demonstration sites was establishing a sense of ownership for the RCTO among the individuals or organizations that were required for implementation. This was particularly an issue when staff members from the MPO who were not operators served as the champions and facilitators of the RCTO. In the situations where those individuals with implementation authority were involved in making decisions on the objectives and approach for the RCTO, more progress was made initially in implementing the RCTO. In Tucson, engineers responsible for traffic signal operations participated in making decisions on how to approach a collaborative venture in signal improvements. Subsequently, there has been significant progress made on implementing a joint signal program for the area under the guidance of these individuals. In Southeast Michigan, the RCTO development team

faced challenges as they worked to designate current committees in the region as champions and leaders for the four RCTO objectives and approaches that they had developed. Those who had not participated in making decisions on what was going to be done seemed less inclined to adopt the RCTO as part of their agenda or upcoming activities.

In Tucson, the RCTO participants had identified work zone coordination as one of the top three areas that they wanted to make progress on in the region, but the RCTO leader recognized that the staff members currently in the RCTO working group were not the individuals with the authority or knowledge to make improvements to work zone and construction scheduling. The RCTO leader reached out to the participating agencies and was able to bring the right individuals together to form a new working group on work zone coordination. The members recognized the need to coordinate and have made progress toward that end.

### **Host a Regional Transportation Operations Partnering Workshop**

Early on in the RCTO development process, the operations stakeholders of the Metro Detroit area held the Detroit Area Operations Partnering Workshop, hosted by the Michigan DOT. The workshop highlighted the benefits of collaboration in the region and provided an opportunity for individuals from different agencies across the region to develop or strengthen their connections. Speakers briefly highlighted best practices for coordination and informed attendees of opportunities to collaborate and access regional resources. This workshop helped to raise the awareness of regional operations collaboration and provided the foundation for building a community that would support regional operations efforts. A year following the partnering workshop, the RCTO leaders in Southeast Michigan held a second workshop to give stakeholders a chance to provide input into the RCTO.

### **Gain the Participation of the State Department of Transportation, a Critical Operations Stakeholder**

Each of the four RCTO demonstration sites found that it was imperative to have the buy-in and commitment from the State DOT for the RCTO. The State DOT owns and operates a major portion of the regional transportation system and frequently has resources, expertise, and the authority to make it a significant partner in any regional transportation operations effort. In Southeast Michigan, Michigan DOT was one of the leaders of the RCTO, and its contributions were critical in making progress, especially toward the RCTO objectives in information sharing and retiming traffic signals. Some

local traffic signal operating agencies lacked the time to carry out traffic signal retiming, even if funding for the retiming could be provided with CMAQ or other Federal funds. Michigan DOT stepped up to offer assistance in managing the contractors that the local agency could use to retime their signals. Without such assistance, the local agency would not have even applied for the CMAQ funding in the metropolitan planning process. In support of increased information sharing between transportation stakeholders in the region, Michigan DOT created a utility to share video from their freeway cameras with other agencies over the Internet.

## **Maintaining Participant Involvement**

### **Maintain Participation in the RCTO by Showing Participants the Near-Term Benefits**

The key to establishing and maintaining the participation of operators in the RCTO development process is to clearly identify the benefits that the operators can gain from the collaborative effort and work to deliver those benefits as soon as possible. Operating agencies are traditionally under-staffed, leaving staff with many competing responsibilities. Additionally, operations personnel are accustomed to performing operations-related duties and typically do not focus on planning activities. This is why it is important to show short-term benefits to operators and demonstrate that the RCTO effort addresses operators' issues and concerns.

The RCTO leader in Tucson made this a high priority in the development process after finding trouble engaging the operations staff in developing a vision and goals for the RCTO.

To keep the RCTO participants engaged, the leader capitalized on objectives and actions that would help the operators handle their responsibilities more effectively and efficiently, such as funding and staff assistance in signal timing. As an example, during one RCTO meeting the RCTO leader invited the Arizona DOT to highlight the opportunities for local operating agencies to participate in joint procurements with the Arizona DOT to save money on needed equipment and software. Tucson found it effective to show the collaborating operations participants that working together on an RCTO was not just a planning exercise, but a way to improve their ability to carry out their responsibilities successfully and efficiently.

#### **Lesson Learned**

Tucson found it effective to show the collaborating operations staff that working together on an RCTO was not just a planning exercise, but a way to improve their ability to carry out their responsibilities successfully and efficiently.

### **Gain the Attention of Operations Participants by Focusing on Actions and Resulting Projects**

Both Southeast Michigan and Tucson have learned that it is easier to gain the attention of operations participants by focusing on actions and projects that could come out of the RCTO. When conducting stakeholder interviews, the Southeast Michigan team learned that operators were more interested in discussing action rather than abstract goals and visions. Going a step further and translating the RCTO actions into specific projects that can be used to gain agency support and commitment and obtain the resources necessary for implementation helped to make the RCTO tangible and meaningful to operators in Tucson.

### **Bring Participants to the Table for Only Pertinent Discussions**

Tucson found it hard to get the attention and participation of the first responder stakeholders, transit stakeholders, and the Native American tribal stakeholders. The Tucson RCTO leader found that the best way to involve participant groups not central to the focus of the RCTO is by only inviting them to the meetings that were pertinent to them. This demonstrates to the stakeholders that their input is necessary and that their time will not be wasted.

### **Formalize Agreements**

An RCTO is a “living document” in the sense that it is not intended to be a report, project, or program. It is an agreement—a commitment—among participating agencies and jurisdictions to one or more agreed-upon objectives and a set of actions, institutional relationships, and resource allocation decisions that address regionally significant needs and opportunities.

Regional value accrues when all of the participating agencies and jurisdictions work together to improve regional transportation system performance through operational objectives established in the RCTO.

The institutional mechanisms for “acting together” can vary from informal arrangement between operating agencies in neighboring jurisdictions to formal memoranda of understanding (or “Memoranda of Regional Cooperation”—MORCs—as are used in some jurisdictions) to legal entities or authorities that receive funding from participating jurisdictions and are established to carry out many of the activities described in the RCTO. However participating entities choose to institutionalize their relationship, what is important is that they maintain their commitment to the operational objectives that were agreed to and that drive the RCTO.

As an initial step for implementation of the Southeast Michigan RCTO, the leading organizations supporting the RCTO signed a memorandum for regional cooperation. The memorandum was signed by the Michigan DOT Metro Region Engineer, a Captain and District Headquarters Commander of the Department of Michigan State Police, and the Executive Director of SEMCOG. It affirms that commitment of the participating agencies to supporting work in toward the objectives defined in the RCTO. Through the memorandum, SEMCOG indicated its commitment to serve as the RCTO facilitator and to coordinate activities such as monitoring and updating the RCTO. Additionally, the RCTO development group for Southeast Michigan has established ongoing meetings on a quarterly basis to provide oversight and support to the existing committees that have taken on implementing the RCTO.



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### **Gathering Support from Elected or Appointed Officials and Agency Leadership**

Gaining the support of elected or appointed officials, agency leadership, and other senior decisionmakers within the region for the collaborative operations improvements in an RCTO is crucial to successful implementation. An RCTO requires resources to develop and to implement such as staff time, equipment, policy commitments, new operating procedures, or funding. Obtaining buy-in and commitment from those leaders that decide how resources are used is vital to an RCTO. RCTO demonstration site leaders observed that gathering that support early on in the development of the RCTO is highly important.

### **Identify an Advocate for the Effort at the Executive Leadership Level**

The operations area being addressed in an RCTO needs someone who can advocate for the effort at the executive leadership level. This is often best accomplished by someone at the executive level in the region since a peer can have more influence than someone at a less senior level. Although having a champion in a high-level position—as in the case of Portland, where the city transportation commissioner served as the champion for the TIM effort—is a highly effective approach to making changes within a region, the improvements made at the other RCTO demonstration sites show that this does not always need to be the case.

In the Tucson region, a program manager within the MPO with a history of facilitating operations efforts served as the RCTO champion. He led the group, worked to motivate the necessary players, and took the ideas for transportation operations programs that came out of the group to his management and the MPO board to get support and resources. The Tucson RCTO champion also used regular meetings among the MPO Transportation Director and the local DOT directors to keep agency leaders informed regarding key issues and gain support for RCTO initiatives.

In Hampton Roads, the championship was shared between two senior staff at HRTPO and the Virginia DOT who had a long history of working together for coordinated operations. These senior staff members provided the vision and leadership to help give the group direction and maintain its trajectory and worked to get data and personnel resource commitments from the MPO and the State DOT.

### **Create Awareness of the RCTO Effort and its Benefits by Asking Participants to Educate their Management**

The Portland and Tucson RCTO leaders recommended that the staff members participating in the development of the RCTO ensure that agency leadership is aware and supportive of the effort. The Portland RCTO leader noted that representatives of each primary stakeholder agency were involved in the oversight committee, but they were not the decisionmakers. From that experience, the Portland RCTO leader recommended that when forming the RCTO advisory or development committee, it is important to try and climb the institutional ladder to make sure that the senior level management has a solid awareness of what is going on. This is likely to pay off as representatives need resources and commitment from their agencies to implement the RCTO.

In Tucson, the staff members that participated in the RCTO working group were encouraged to take the options for operational improvements back to their agency management to get feedback. This was important because most of the agency personnel participating in the group were not authorized to make commitments or decisions for the agencies they represented.

### **Develop a Monthly Regional Operations Newsletter**

As part of the RCTO demonstration initiative in Portland, the RCTO leader hired to work at Metro developed a transportation operations program within the MPO to increase the coordination between planning and operations in the region. To raise the visibility of operations and gather support from MPO

committee members, the RCTO leader in Portland produced and distributed monthly transportation operations program updates in the form of a quick, one-page newsletter. The newsletter was distributed to Metro's technical committee. The newsletter grabs the attention of the reader with a snapshot of a mobility performance measure such as the change in percent of congested travel from July of 2005 to July of 2006. A description and the benefits of a newly implemented operations strategy are given. This is followed by a list of operations program activities in the past month and upcoming opportunities for participation.

### **Make Presentations on the RCTO Effort to the MPO Technical Committee or Board**

Even in the cases of Portland and Hampton Roads, where elected leaders were directing planning and operations agencies to work together to make operational improvements, the outreach had been conducted by the staff to raise the visibility and relevance of operations solutions. In Hampton Roads, the leaders of the early ITS Working Group in the 1990s conducted an educational campaign on the need for ITS by giving presentations to boards and committees across the region. This helped to set the tone and support for ITS and operations among leaders in the region.

In Portland, staff members who had been working together across agency lines for operations realized that they did not have the attention from elected officials on the use of ITS and operations so they began a concerted marketing effort during the start up of the RCTO. As one of the initial outreach steps, the RCTO leader in Portland made presentations to the technical committee of the MPO board to inform them of the objectives and strategies being proposed for improving operations.

### **Develop a Region-Specific Brochure on the Tangible Benefits of Regional Operations**

TransPort TAC, which coordinates ITS across the region, developed a report and companion brochure titled: *Metropolitan Mobility The Smart Way* in October of 2006. The goals of this report and brochure were two-fold:

- To increase awareness and understanding among the region's decisionmakers regarding ITS and the ways in which it can help transportation agencies in the Portland metropolitan area manage congestion and improve safety in a cost-effective manner.
- To focus attention on the benefits of collaboratively implementing system management strategies and intelligent transportation systems.<sup>30</sup>

<sup>30</sup> Metro, *Metropolitan Mobility The Smart Way*, October 2006. Available at: [http://library.oregonmetro.gov/files/its\\_mobility\\_report\\_.pdf](http://library.oregonmetro.gov/files/its_mobility_report_.pdf), last accessed June 13, 2011.

The report and brochure highlight the tangible benefits that the Portland region has already gained from ITS and operations solutions. These materials helped to make the case to public officials for operations solutions that came out of the RCTO.

### **Host an Executive-Level Panel Discussion on the Need for Improved Transportation Operations**

The leader of the Portland RCTO helped to organize an executive-level panel discussion sponsored by ITS Oregon for the release of the Metropolitan Mobility Smart Way report. Nearly 100 elected officials, legislators, and executive-level transportation professionals in Portland and throughout Oregon attended this breakfast meeting to hear the Oregon Transportation Commissioner, the Federal Highway Administrator, and other top officials speak about the need for improved mobility through ITS and operations. The meeting was successful in gaining agreement among senior decisionmakers on the need for operations improvements.

### **Publicize the Cost of Congestion and Other Mobility Issues**

One of the reasons for the elected official's support for improved operations in the Portland region was the increased awareness of the true costs to congestion. In December 2005, the Portland Business Alliance, Metro, and the Port of Portland published a report entitled "Cost of Congestion." This report brought to light the enormous price that is being paid by travelers and businesses for the time and fuel wasted by congestion. By putting a price on transportation performance issues, stakeholders can gain the attention and support of elected and appointed officials for operations improvements recommended by an RCTO.

### **Gather Traffic Reporters for a Briefing on Operations**

Another technique used to bring awareness to the issue of congestion and operations improvements in Portland was gathering together traffic reporters for a briefing on operations. The Portland RCTO leader called together traffic reporters in the region for donuts and a talk about ITS. From that meeting, the RCTO leader got editorials and front page stories on the ITS improvements being used in Portland and the need to make more improvements. From this experience, the RCTO leader found that reporters are interested in this subject and want to talk to transportation professionals, but it may require reaching out to them...and perhaps providing donuts.

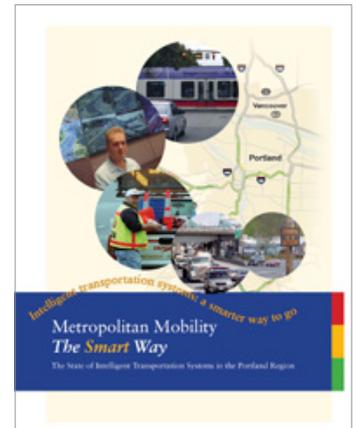
### **Establishing a Process for Gathering Ideas and Making Decisions**

At the heart of developing an RCTO is decisionmaking. An RCTO provides a framework to guide collaborating participants on what decisions will need to be made in order to move forward together to improve transportation operations. Those decisions are essentially about answering the questions "what do we want to accomplish" and "how are we going to get there." A well thought-out process for generating ideas and making decisions is necessary for developing an RCTO that can be successfully implemented.

Each RCTO demonstration site had to invent its own process for gathering ideas and making decisions. In Tucson and Southeast Michigan, ideas for the RCTO objectives and approach came from the grassroots through interviews with managers and senior staff at stakeholder agencies and workshops. The RCTO leaders and consultants conducted these interviews and combined the results to identify themes for operations improvements common to multiple stakeholder agencies. In Tucson, the interviews also involved documenting the current operations policies, practices, procedures, and existing institutional relationships in the region.

These interviews helped to identify potential new members for collaborative regional transportation operations efforts and identify opportunities for regional operations improvements. Through the interviews, the RCTO leader in Southeast Michigan, with the support of the consultants, identified the operations objectives for the RCTO. While there was interest among operating agencies for the operations objectives identified in the interviews in Southeast Michigan, one barrier that the RCTO team later encountered was a lack of a champion willing to lead the achievement of the objective.

The RCTO leaders and consultants in Tucson and Southeast Michigan helped to shape the information gathered from the stakeholders and brainstorming meetings with the RCTO development group. This information was then presented to the development group to discuss, modify, and either accept or reject.



**Figure 10.**  
*Metropolitan Mobility The Smart Way  
Executive Summary by Metro and ITS  
Oregon*

Source: Metro

### **Enable Senior Staff to Develop Options for Leadership to Select**

During the development of the RCTO on traffic incident management in Portland, ideas for potential approaches to bring about the objective set by the commissioner were generated by senior agency staff members who met regularly. They made decisions on which approaches were feasible and could bring about the desired objective. The agency leaders then decided by reaching consensus on which of the actions to improve TIM should be pursued.

### **Conduct RCTO Meetings On-Site at Participating Agencies**

Several of the RCTO demonstration sites conducted RCTO development group meetings on-site at participating agencies. They would rotate the location of the meeting so as to get a greater diversity of participation in the process. They recognized that where one or two stakeholders from a particular agency might attend a meeting at another location, more than a dozen might attend a meeting at their own agency.

### **Use Smaller, Less Formal Meetings to Talk Over Recommendations in Detail**

The RCTO leader in Tucson discovered that some of the most productive RCTO development meetings occurred when there were a small number of individuals in a less formal setting. This seemed to encourage the participants to talk more freely and delve into the details of the RCTO. While small meetings were more productive, participants from each primary collaborative agency had to be present.

### **Ensure Consultants Support the Forum Rather Than Lead It**

In each demonstration site, additional support was brought in to assist in the development of the RCTO. Southeast Michigan, Tucson, and Hampton Roads hired consultants who were familiar with the agencies' and regions' institutional dynamics, and in Portland a temporary full-time employee was brought in to Metro, the MPO, and funded through the City of Portland. The consultants served as facilitators of the regular RCTO development meetings, documented decisions, organized workshops, and helped to draft the RCTO document.

While outside support may be required to make developing an RCTO possible in some areas where agency staff has little available time or facilitation expertise, it is necessary to ensure that the outside support does not take the place of the leadership and

decisionmaking that must come from those in the region. The danger faced by regions that have consultants lead instead of support the development of the RCTO is that the RCTO becomes a document that sits on a shelf once the consultants leave. The ownership of the RCTO must reside with the organizational representatives that have the enthusiasm and capability of putting the RCTO into action.

## **3.3 Linking the RCTO and the 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 management and operations.

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.

### **Use an MPO to Provide a Neutral Table and Convene Agencies from the Region**

One of the keys to a successful collaborative effort like the development and implementation of an RCTO is finding an appropriate host or convener for the collaborative forum. Two qualities that were important to the demonstration site representatives were neutrality and coordination experience with the necessary participants. Although the MPO need not be the host for developing an RCTO, in three of the four RCTO demonstration sites, the MPO served as the host and convener. In the fourth site, HRTPO and the Virginia DOT shared the responsibilities. In some cases, operating agencies desired the MPO to take on an even greater role in facilitating the implementation of operations strategies than the MPO saw as part of its mission. The Tucson RCTO site leader noted that the

MPO was able to be an effective host because it was viewed as having a regional perspective and being a “safe place” to develop the RCTO in that it does not have operating turf. The MPO, PAG, also had the most experience among the participating agencies of coordinating among each of the operators in the region.

Demonstrating that the MPO was valued in the Tucson region as the host for regional operations forums, transportation operating agencies sought out PAG to coordinate a multi-agency effort to increase traffic incident management following the development of the RCTO. As part of this effort, PAG held an incident management workshop and has hosted weekly meetings among transportation, police, fire, and others to identify issues, resolve concerns, and conduct workshop planning.

Similarly, HRTPO had been the organization frequently called on by operators in the region to connect them to other operators on a case by case basis in the early 1990s. The MPO recognized the need for regional operators to coordinate with each other directly, and so it formed an ITS working group, an active group of transportation engineers, planners, and public safety representatives that meets regularly as a subcommittee of the MPO.

As the host of the RCTO effort, MPO staff at the demonstration sites also helped to advocate for the operations projects identified during the RCTO development within the plan and assist them in applying for funding through the TIP. At PAG and SEMCOG, the MPO work program funds were even used to support RCTO implementation activities such as improving the region’s traveler information website and conducting a study to measure the performance of signalized intersections to identify priorities for signal improvements.

### **Revise Operations Objectives Requiring Regional Funds to Account for Programming Cycle**

The Tucson RCTO team chose to extend the timeframe for some of their objectives because they were unable to get the necessary funding to accomplish those objectives within the 3–5 year timeframe. Due to the timing of the 5-year TIP cycle at PAG, the time available to the RCTO team was not sufficient to apply for, receive, and use the funding within the original timeframe. Instead of throwing out those objectives, however, the RCTO team compromised and extended the timeframe of the objectives to 5–10 years. The group applied for funding to support those objectives and the planners at PAG worked to establish an operations program that

### **Portland RCTO Demonstration Grant Led to Permanent Linkages between Planning and Operations**

The Portland, Oregon RCTO demonstration site participants viewed the demonstration grant as an opportunity to make great strides in linking planning and operations. They saw this as an opportunity to raise the visibility of operations throughout the region and with executive leadership and transportation planners in particular. The RCTO was also a way to encourage more strategic thinking about operations in the region.

The demonstration site grant in Portland was used to fund a principal planner for 2 years at the area’s MPO, Metro. This staff person was to lead the development of the RCTO as well as build a transportation operations program at Metro. The RCTO development occurred concurrently with the update of the region’s metropolitan transportation plan. The RCTO process enhanced the attention given to operations during the plan update and led to policy language that set out a strong commitment to including operations solutions in the plan.

Metro also revised the TIP project ranking and selection criteria to include ITS architecture consistency and travel time reliability and promoted the inclusion of ITS elements within conventional projects. Additionally, a programmatic allocation in the TIP for ITS projects was created because ITS projects traditionally struggled to compete against other projects. Metro approved \$3 million in 2010–2011 for ITS projects. Metro, in collaboration with operations stakeholders, then developed an operations refinement plan to determine which operations needs to address through the new ITS program. During the period of the RCTO demonstration grant, the temporary staff person at Metro brought on to lead the RCTO development was able to demonstrate the need for an operations program manager at Metro and the value of operations expertise in an MPO. A new permanent staff position at Metro was formed for a principal planner to head up the operations program.

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would facilitate funding availability in future years. Alternatively, the Portland RCTO group faced a similar challenge and chose to focus on objectives that could be accomplished with fewer resources, such as TIM training, improved procedures, and legislative changes.

### **Establish a Regional Funding Program for an Operations Area**

Opening funding avenues for operations from sources such as the Congestion Mitigation and Air Quality (CMAQ) Improvement Program, Surface Transportation Program, and State, regional, or local tax programs is another 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 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 Southeast Michigan during workshops with stakeholder agencies, the RCTO development group found that while there were significant needs from local agencies to retime traffic signals the agencies often did not have the staff or budget to do so. Because of these needs, part of the Southeast Michigan RCTO focuses on improving signal operations. Through this RCTO, a traffic signal retiming program has been incorporated into SEMCOG's 2030 metropolitan transportation plan and local agencies have applied for CMAQ funding to retime traffic signals.

Likewise the PAG RCTO included a regional traffic signal optimization program and applied for funding from the TIP to cover the signal program. Because the RCTO participants were unable to receive any funding through the TIP within 5 years, the RCTO participants extended the timeline of their RCTO and also looked for low-cost activities to support their operations objectives. During the development of the PAG RCTO, a transportation sales tax was passed and the RCTO developers were able to incorporate some of their traffic signal recommendations into the sales tax package.

## **3.4 The "What" and the "How" of the RCTO**

### **Establishing Clear Operations Objectives**

The operations objective provides direction for the RCTO and the collaborative effort. Through developing one or more operations objectives, the RCTO participants answer the question "what will we work to achieve?" As mentioned previously, a highly effective operations objective is one that is specific, measurable, agreed-upon, realistic, and time-bound. In developing their operations objectives, the RCTO demonstration site participants had to find the middle ground between operations objectives that embodied the large impacts they wanted to make and selecting objectives that could realistically be accomplished within 3 to 5 years.

Operations objectives typically fall into two categories: outcome-based and activity-based. Ideally, an RCTO is built around a desired system performance outcome as experienced by the system users or travelers. This is the difference that the RCTO participants would like to make in their transportation system. In situations where an outcome-based objective is not feasible, an activity-based objective may be developed to guide improvements in system manager and operator activities. The operations objectives developed by the RCTO demonstration sites included both outcome- and activity-based objectives.

### **Identify Desired Objectives before Moving on to Solutions**

One of the potential pitfalls in developing an RCTO is to begin developing solutions or projects before fully specifying and reaching agreement on an operations objective. This can lead to a collection of disparate activities and projects that are not strategically focused on reaching the outcome desired by the participants. Operators are typically more accustomed to taking action than to strategic planning and may have a tendency to jump to new technologies or operations strategies before reaching consensus on the desired outcome. Early on in the Portland demonstration initiative, the group struggled with creating an RCTO with a focus on traveler information. The RCTO leader in Portland realized that this was particularly difficult because they were focusing on how best to use traveler information rather than identifying the desired outcome for the traveler and then selecting the best strategies to reach that outcome.

## Try Identifying an Operations Objective in Terms of Risk Management

The choice of whether to pursue an operations objective or not involves managing risk. Although this terminology is more common in fields such as asset management, the leader of the Portland area RCTO strongly recommended thinking of operations objectives in these terms. When embarking on developing an RCTO, the Portland RCTO group worked to frame the outcomes in terms of “where we are going” and “why it is worth getting there.” It was helpful to examine the selection of objectives in terms of “how things turn out if we do not make this coordinated improvement to operations.” Additionally, the leader found it helpful for the RCTO group to consider what the difference is to the citizen if the group pursued this regionally or not. By getting a sense of the risk involved in deciding not to pursue a given operations objective, the RCTO participants are able to focus on the outcomes that will have the greatest impact.

## Identify Activity-Oriented Objectives to Support Outcome-Oriented Objectives

RCTO developers may find it effective to develop activity-based objectives that define improvements in operator performance that are believed to lead to the desired system outcomes. The Tucson region’s RCTO provided a combination of system outcome objectives such as “Reduce traveler delay...” and activity-based objectives such as “Improve multi-agency coordination for large-scale work zones.”<sup>31</sup> Many of the objectives that described a desired system outcome had supporting activity-based objectives that helped to direct the participants in the specific activities that would help to accomplish the outcome. An example from the PAG Regional Concept for Transportation Operations is shown below:

### **Outcome-Oriented Operations Objective:**

“Reduce traveler delay due to incidents on major arterials and freeways within Tucson metropolitan areas.”

### **Supporting Activity-Based Operations**

**Objective:** “Reduce incident response, duration and investigation times.”<sup>32</sup>

While the desired outcome experienced by the user is stated, the operator activities that they will focus on improving to reach this outcome are also specified. This process of expanding an objective into a set of more specific objectives repeatedly until reaching tangible action items is a common practice in systems engineering and can be an effective and logical way to translate desired outcomes into actions. In the case of the RCTO, developing activity-based operations objectives begins a process of developing the RCTO approach.



Source: Pima Association of Governments (PAG)

## Divide the Operations Area of Focus into Smaller Elements and Identify Any Needed Improvements in Each Element

Several operations focus areas can be broken down into smaller components. For example, traffic incident management can be divided into the detect, verify, response, clear, and recover phases. The RCTO participants in Portland looked at improvements that could be made in each phase to support the overall goal of reducing delay due to incidents. The ability to break the area down into its component parts was an effective method for facilitating a discussion of objectives and approaches to address a large and complex area.

## Keep Scope of Operations Objectives Manageable

A common recommendation coming from the RCTO demonstration site leaders was to develop operations objectives that had a manageable scope and did not overextend the capabilities of the participants. The Tucson RCTO participants began with a large scope incorporating a number of operations areas and then narrowed down the areas and objectives they would pursue initially as they began evaluating how realistic each objective was. The Tucson and Southeast Michigan RCTO leaders both expressed that the operations objectives selected for the initial RCTO should focus on low-hanging fruit. This would allow for an “early win” that could garner additional support and momentum for the RCTO effort.

<sup>31</sup> Pima Association of Governments, Regional Concept for Transportation Operations, Final Report, July 2007 (Unpublished).

<sup>32</sup> Ibid.

### **Create Performance Targets for Objectives using Baseline Data**

Hampton Roads created a set of operations objectives that included both outcome-based objectives and activity-based objectives. The RCTO working group developed specific performance targets for many of the objectives. For example, the Hampton Roads objective “Decrease Incident Clearance Time” has an associated target of “Annually Reduce Incident Clearance Time by 5.5 Percent or 1.5 Minutes.” This required a significant effort by VDOT to collect and analyze relevant data over time so that the RCTO development team could establish a reasonable target number for its traffic incident management objectives. To continue tracking system performance, VDOT brought in a full-time analyst to support the effort.

The operations objectives of the Portland RCTO were developed to support the overall goal that was articulated early on in the RCTO process: “Reduce unnecessary (excess) delay associated with minor (non-injury) incidents that occur on freeways within the City of Portland, Oregon.” The details in the goal helped the RCTO developers to clarify their objectives, given in Section 2.1 of this guide. The Portland objectives are primarily outcome-oriented, but include one activity-based objective: “Reduce tow truck arrival and on-scene times.” Due to a lack of baseline data and associated resources, the Portland RCTO objectives show the direction but not the magnitude of the improvements desired.

### **Identify Performance Measures to Track Progress toward Operations Objectives**

Tracking progress toward operations objectives through performance measures is vital to supporting the



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successful implementation of an RCTO. Regular performance measurement gives the RCTO participants important feedback on the effectiveness of their activities so that they can change their approach if they determine that progress is not being made. Performance measures also allow RCTO participants to publicize their successes in quantifiable terms to garner additional support from decisionmakers and the public.

In Tucson, performance measures were identified once operations objectives were established. This provided them a check to make sure that their operations objectives were specific and measurable. Because the performance measures the Tucson participants identified were so data intensive, the RCTO members chose to simplify their measures in order to be practical given the data they could access.

### **Do Not Limit Operations Objectives Because of Performance Measurement Capabilities – Find Surrogate Measures While Working to Improve Capabilities**

The ability to measure aspects of transportation system performance is growing in many regions across the country as transportation professionals incorporate new sources of data from roadside instruments and new performance measures are defined. While measurement capabilities are increasing, many regions are still limited in this area.

The Hampton Roads RCTO group created performance targets and measures for several of their operations objectives, but they faced challenges with others. They were unable to produce a specific performance target for their objective to “Improve Inter-Agency Communication During Incidents” because the region had not yet assessed the current state of communications through either qualitative or quantitative measures. To handle their lack of data regarding this objective, the RCTO team decided to develop a method of assessing communication by starting an annual survey of stakeholder agencies as part of their RCTO effort. This survey would ask responder agencies to identify progress made over the past year and steps for future improvement.

Additionally, the Hampton Roads working group was challenged to integrate their concerns about secondary incidents into this RCTO so that such incidents can be measured and tracked over time. The difficulty was due to the lack of a clear definition for secondary incidents. The RCTO working group resolved the issue by agreeing to the following definition of a secondary incident: “a visually confirmed incident within a queue that is formed by an earlier incident, or an incident that occurs while traveling in the opposite direction of an incident derived queue.”<sup>33</sup> The RCTO working group is also still refining the process of collecting data on secondary incidents. Furthermore, the Hampton Roads RCTO work resulted in a research study on secondary incidents conducted by the Old Dominion University Transportation Program faculty.

<sup>33</sup> Hampton Roads Highway Incident Management (HIM) Regional Concept for Transportation Operations (RCTO), June 2008 (Unpublished). Available at: <http://www.hrrcto.org/pdf/Summary.pdf>, last accessed June 14, 2011.

The inclusion of the objective on secondary incidents indicates an operations philosophy that the Hampton Roads RCTO developers had with regard to strategic improvements. The developers valued reducing secondary incident occurrences to such an extent that they believed it was necessary to begin to work toward this objective even though the performance data was not yet in place. This is typical of the difficult decisions that the other RCTO demonstration site participants had to grapple with as well.

### **Creating an Approach**

Upon reaching agreement on the RCTO operations objectives, the demonstration site RCTO development teams began to define how the objectives would be achieved. The approach and the elements of relationships/procedures, physical improvements, and resource arrangements specify how the collaborating participants will reach their desired operations objectives. The demonstration sites faced additional challenges as they worked to decide on the most effective operations strategies to employ, obtain commitment for specific actions, and identify available resources. Below are recommendations stemming from the experiences of the demonstration sites in building their approaches to an RCTO.

### **Gather Expert Practitioners in the Operations Area to Discuss and Recommend Actions**

After developing a draft set of operations objectives around traffic incident management within a defined scope, the Hampton Roads RCTO development group hosted a one-day workshop to obtain a comprehensive picture of what actions were most needed by the traffic incident management practitioners to address the objectives. The workshop drew approximately 80 expert practitioners from police, fire, transportation, EMS, medical examiner, environmental quality, department of motor vehicles, tunnel and bridge authorities, emergency dispatch, towing, and other fields. The operations objectives were presented along with the idea of the RCTO, and then the practitioners were divided into breakout groups where they were led by facilitators to discuss where the deficiencies are in TIM and what needs to improve to reach the objectives. The RCTO development group gathered a variety of perspectives and got input on the most important improvements from the TIM stakeholders. With so many TIM players at the table, the stakeholders had the opportunity to determine how they could be better

coordinated in the field and discuss this with their counterparts in the other agencies. The workshop resulted in a series of action items to be selected from for the RCTO. This included items such as “develop regional MOU template for communications between the TMC and fire operations” and “research method of having cell phone calls from Interstates route to Virginia State Police dispatchers.”<sup>34</sup>



Source: Virginia Department of Transportation

### **Provide a Menu of Options for Senior Decisionmakers to Select From**

The approach for the Portland RCTO was formed using a menu of options that a team of agency leaders selected from. The staff-level RCTO development group members compiled a set of recommended options for their agency leaders to choose from to form the activities to be pursued for improved traffic incident management. The Portland RCTO led the staff group in organizing ideas for reaching the operations objectives by the phases of traffic incident management (detect, verify, respond, clear, recover) and a revised RCTO framework including procedures/protocol, policy/legal, and physical/capital improvements. The ideas were put into a table and the group engaged in a thorough discussion of which strategies would be most effective in the short, medium, and long term. During these discussions, the group worked to decide what aspects of the complex incident management issue should be tackled first. The menu was then given to the senior-level, multi-agency operations steering team to select from and direct their staff to pursue.

### **Do Not Develop a Wish List – Make Your Approach Realistic Based on Likely Commitment and Resources**

With all of the ideas that practitioners may have for reaching the operations objectives, it is tempting to include more to be done in the RCTO approach than can be realistically accomplished given the commitment and resources available. For example, during the Hampton Roads RCTO one-day workshop with expert practitioners, multiple actions such as “keep oversized

<sup>34</sup> Hampton Roads Transportation Planning Organization, *Resource Document Hampton Roads Highway Incident Management (HIM) Regional Concept for Transportation Operation (RCTO) Version 1.0*, July 2008 (Unpublished). Available at: <http://www.hrrcto.org/pdf/Hampton%20Roads%20RCTO%20SRH%207-21.pdf>, last accessed June 14, 2011.

loads off of the roadways during rush hours” were proposed. While this was thought likely to help relieve traffic delays given the experience of the individuals in the group, it was not included in the RCTO because they did not have a commitment from the necessary parties to make those changes.

In Portland, the RCTO team developed an RCTO with an early emphasis on improving towing to work toward the incident management objectives. Towing held a prominent role because it was seen as an element of incident management where improvements could have a significant impact on the ability to reach the overall goal of reducing unnecessary delay associated with minor incidents. Portland also had political support to focus on this topic, the ability to collect data and measure performance related to towing, and it appeared to be an area ripe for early success. Additionally, the team had the participation of area towing officials and industry representatives.

### **Develop an Approach Sensitive to Participating Agencies’ Needs to Maintain Control over their Operations**

One of the most common challenges among regional transportation operations efforts is balancing agency control with a collaborative effort. The approach developed for reaching the operations objectives should reflect the participating agencies’ desires to maintain control over their operations. In regions where a strong sense of trust has developed over time between agencies, the participating agencies may choose to allow consolidated operations, equipment sharing, and other joint management of transportation systems by establishing the necessary agreements.

a jointly funded regional traffic signal operations consortium with an oversight committee comprising representatives from the participating signal operations agencies. The consortium would have staff members dedicated to controlling, monitoring, and optimizing the traffic signals in the region, although signal maintenance would still be covered by the signal owning agency. The second alternative developed by the RCTO group proposed to retain consultant services to support the local jurisdictions in actively operating and managing their respective traffic signal systems. The second option for the regional traffic signal operations program was selected to reflect the preference of local agencies to have a greater degree of control over their systems. Creating options that incorporated the preferences and needs of local agencies for more jurisdictional control helped to advance a program with regional operations benefits.

### **Defining the Supporting Elements of the Approach – Relationships and Procedures, Resource Arrangement, and Physical Improvements**

#### **Build a Structure of Champions**

Within each of Tucson’s action plans, where feasible, a structure of champions was identified to guide the implementation of the plan. As an example, the PAG Transportation Systems Subcommittee was identified to champion the Regional Traffic Signal Operations Program with oversight on the program’s focus areas, implementation, and funding. The subcommittee will be guided by PAG staff and will seek to establish a working group to guide program activities and make recommendations on the direction for consultant services and project selection. The existing PAG Transportation Planning Committee, comprising agency department heads in the region, would approve policies for the signal program and facilitate any necessary intergovernmental agreements. While actual signal timing plans will not be developed by PAG staff nor the subcommittee, staff and the working group will be responsible for overseeing the administration of the program and working both to elevate the issue within the regional transportation community and to facilitate the allocation of resources to develop and update signal timing plans. PAG staff or an identified individual from the working group will update the Transportation Systems Subcommittee, perhaps on a bi-monthly basis, concerning recent activities relating to the action plan.



Source: Pima Association of Governments

The Tucson RCTO development group worked to develop an approach for improving regional traffic signal operations that would take advantage of the cooperative spirit among signal operators in the region while still maintaining the control desired by the individual agencies. The RCTO development group formulated two options to select from for a new regional traffic signal operations program. One option created

**Gain Commitment from Participants for Actions and Specify Roles and Responsibilities**

The successful implementation of an RCTO depends on the commitment of participants to fill specific roles and take on well-defined responsibilities. Through developing an RCTO, the roles and responsibilities are documented as part of the RCTO. This represented a significant challenge for many of the RCTO demonstration sites. In an area where the political will for making improvements was high, such as Portland, agencies took on additional responsibilities, such as helping to draft new policies and develop multi-disciplinary training videos. Tucson was particularly effective in defining roles and responsibilities among collaborative partners and the existing PAG Transportation Systems

Subcommittee. The RCTO from Tucson shows a table with specific action items to reach their operations objectives and an associated agency or organization responsible for championing that item.

**Estimate Resource Needs and Identify Realistic Options for Meeting those Needs**

Most of the activities identified in an RCTO will require some kind of resource to accomplish whether it is staff time, equipment, or funding. Estimating the resource needs for the RCTO approach and identifying likely sources is a crucial element for building an RCTO that can be successfully implemented. During the development of the PAG RCTO, the developers

**Table 12.** Action Plan from the PAG RCTO showing Organizational Responsibilities in Integrating Area Traveler Information with Arizona 511.<sup>35</sup>

Action Item	Comments	Responsibility	Status
Update Tucson region maps on AZ511.com	Improve the Tucson area maps within HCRS to be commensurate with the ½ mile grid system.	ADOT	
Display Tucson region data on AZ511.com	Completion of this task is contingent upon import of TransView events into AZ511 (in IEEE1512 format).	ADOT in cooperation with TransView	
Import TransView events into AZ511.	TransView has the Tucson Police Department (TPD) and Pima County Sheriff's Department (PCSD) incident dataset available in XML but not in IEEE 1512 format. Convert XML data set into IEEE 1512 format (portion of the standard) for import to AZ511.	TransView	

<sup>35</sup> Pima Association of Governments, *Regional Concept for Transportation Operations, Final Report, July 2007 (Unpublished)*.

identified the required resources and estimated costs for each of their RCTO actions. The example below shows the projects, capital improvements, and human resources/staff needed for putting in place a regional arterial dynamic message sign program. The PAG RCTO developers use the term “capital improvements” to indicate the physical improvements needed for the RCTO.

Resource arrangements identified by the RCTO demonstration sites included CMAQ and regional sales tax funds, particularly for traffic signal management improvements. Participating agencies also contributed staff time and technology for actions such as managing work zone coordination information, developing training materials, and conducting analysis work to prepare for signal system funding applications.

**Table 13.** Example of a Resource Estimate for Activities Identified in the PAG RCTO.<sup>36</sup>

<b>Resources Required and Estimated Costs</b>		
<p>The required resources for operating the regional arterial DMS program include a physical facility, staff, and communications system to operate the DMS. It is proposed that support staff be jointly funded by participating agencies and jurisdictions.</p> <p>TOC [traffic operations center] Operator Cost</p> <p>Two TOC Operators are needed to provide monitoring of DMS operations at the ADOT ITOC [Interim Traffic Operations Center]. These staff could also be used for other TOC activities other than DMS operations. The required number of maintenance staff would depend on the number of DMS. Maintenance can be provided through a maintenance contract with a private contractor. It is anticipated that maintenance requirements may not require a full-time staff person.</p>		
<b>Projects</b>	<b>Capital Improvements</b>	<b>Human Resources/Staff</b>
<p>Arterial dynamic message sign deployment projects. Could be funded by individual agencies, or alternatively through a regional project.</p>	<p>Improved communications to support DMS Operations (by local jurisdictions).</p> <p>Funding to make the ITOC permanent upon conclusion of the I-10 reconstruction project.</p>	<p>TOC Operator (2) 2 @ \$40,000.....\$80,000</p> <p>Overhead (50%).....\$40,000</p> <p><b>Total.....\$120,000 / year</b></p>

<sup>36</sup> Pima Association of Governments, *Regional Concept for Transportation Operations, Final Report, July 2007 (Unpublished)*.

## 4 Looking Ahead

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The experiences of RCTO developers and implementers in Tucson, Portland, Southeast Michigan, and Hampton Roads show that the RCTO does indeed fill a need within regions where there is the motivation to make improvements to transportation operations through a collaborative and strategic process. Through the demonstration sites, the RCTO has successfully gone from concept to reality.

The ideas underlying the RCTO and how to develop it have been advanced as a result of collaborative teams in four regions willing to take the initial framework of an RCTO, experiment with it, and apply it to the operations needs in their region. The pathway was not always clear for the demonstration teams, but along the way several significant shifts took place among the organizations and collaborative groups. The result was a closer linkage between planning and operations for all sites. In Tucson, participants are working to transform single-agency projects into projects that are regional in nature, and this has helped infuse operations into some of the smaller jurisdictions. In Southeast Michigan, operating agencies have gained a greater understanding of the planning process and potential resources: funding, data, and support. In Portland, the demonstration initiative has led to a much greater consideration of operations needs and performance measures in the planning process. Operators working in collaboration across agencies no longer need to work under the radar as they have increased support from the public, elected officials, and the MPO. According to the Portland RCTO leader, “Ultimately, the project has produced stronger relationships and a stronger commitment across agencies to collaborating in this field.” In Hampton Roads, a tool to closely monitor and adjust operations based on performance measurement has been established. The effort has further expanded communication and cooperation between public safety

and transportation in Hampton Roads as they work as a team to improve incident management for their customers and each other.

At the end of the demonstration site initiative, the RCTO leaders were asked to give an honest evaluation of the usefulness of the RCTO tool. All site leaders agreed that the RCTO is beneficial and serves an important purpose. It helps to keep the process of planning for operations on track and focused on achieving desired outcomes. The Tucson leader remarked that stakeholders in Tucson benefited from the development of the RCTO because it provided them a way to make needed improvements in operations that no single agency was willing or able to do alone. In Portland, the participants saw the RCTO as an effective way to harness political energy for operations improvements that led to a strategic, well thought-out approach for bringing about the desired changes. Without such a tool, there is “a risk that the benefits of a transportation strategy will not be fully realized and/or implementation will not occur in the most efficient manner possible.”<sup>37</sup>

As the demonstration sites continue implementing their RCTOs, the concept has begun to take hold in a few other regions in the United States. The Puget Sound Regional Council and the Niagara International Transportation Technology Coalition among others have recently spearheaded the development of RCTOs or similar collaborative strategies (see text box).

With transportation funding and environmental concerns on the rise, agencies are looking to maximize the performance of their transportation infrastructure. The RCTO is a tool that transportation stakeholders are increasingly using to improve strategic and collaborative operations and to connect to the metropolitan planning process.

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<sup>37</sup> City of Portland Bureau of Transportation, *Regional Concept for Transportation Operations*, November 2007 (Unpublished).

## **Puget Sound Regional Transportation Operations Committee RCTO**

In 2007, the Puget Sound Regional Council (PSRC) and its member organizations began the joint development of an RCTO and a Regional ITS Implementation Plan (RITSIP). The RCTO was intended to define a coordinated approach for regional signal operations whereas the RITSIP was to identify 25 key arterial multi-jurisdictional corridors and the recommended ITS physical improvements for each corridor including signal improvements.<sup>38</sup> The motivation for developing an RCTO on signal operations arose when signal operations were evaluated for the Institute of Transportation Engineers (ITE) Traffic Signal Report Card and weaknesses were identified. In response to the assessment, the PSRC Regional Transportation Operations Committee formed as a coalition of city, county, and State agencies to promote a coordinated approach to traffic operations and it continues to meet regularly.

The operations stakeholders first established the mission, vision, goals, objectives, and associated performance measures for coordinated operations in the region to guide the operations committee, and by extension, the RCTO and RITSIP.

Signal-related objectives include:

- “Maximize throughput on regional arterials by improving signal timing, coordination, and management across jurisdictional boundaries.”
- “Improve reliability of traffic flow on regional arterials through improved incident/event management.”
- “Promote implementation of ITS measures (equipment and/or operational) that will provide arterial operational improvements to mitigate the impact of mega-project construction on the freeways in the region.”<sup>39</sup>

Early in the process of developing the RCTO and RITSIP, PSRC surveyed the operations committee agencies to gather information on signal systems and other ITS and to gauge interest and perceived barriers in increased levels of collaboration and coordination. One of the barriers identified for center-to-center data sharing and operations was the variety of different types of central control system software and traffic signal controllers being used across the region. Another finding that proved important for the RCTO was that a significant number of agencies were planning to replace their central software and signal controllers in the near future.

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<sup>38</sup> Personal interview, Stephanie Rossi, Puget Sound Regional Council, and Jill McKay, IBI Group, November 18, 2009.

<sup>39</sup> Puget Sound Regional Traffic Operators Committee, *Regional Intelligent Transportation Systems (ITS) Implementation Plan: Volume 1: Regional ITS Approach and Strategy*, August 17, 2009. Available at: <http://psrc.org/assets/2790/ritsip-Volume1.pdf>, last accessed June 14, 2011.

PSRC also looked across the country and gathered best practices for regional signal operations to inform the selection of a strategy for the RCTO. Through a workshop and several committee meetings, the region's operators agreed upon a common strategy for implementing coordinated signal operations. The operations committee developed a flexible, scalable framework for implementation that allows for both time-based coordination on corridors where center-to-center operation costs outweigh benefits and strategic application of center-to-center operation on other corridors.<sup>40</sup> The RCTO was created at a higher level than the RCTOs developed as part of the FHWA demonstration initiative. The PSRC RCTO provides steps such as "Define Program," "Define Performance Measures," "Develop and Sign Agreement," and detailed instructions for implementing the common signal operations strategy. It is a plan for action that would be implemented once one or more multi-jurisdictional corridor projects defined in the RITSIP are funded. PSRC also provided a template for a regional signal operations agreement based on a review of multiple signal agreements in the U.S.<sup>41</sup>

The PSRC RCTO and RITSIP were created during the update of the 2040 Regional Transportation Plan and could therefore be easily integrated into the plan. The ITS corridor projects were included in the plan, but were generally not selected for funding during the 2008 call for projects for inclusion in the 2010-2013 TIP. PSRC suggests that the initial difficulty in getting project funding was likely due to a lack of champions among decisionmakers and selection criteria that benefitted centers rather than corridors.

In reflecting on lessons learned through the RCTO development, PSRC remarked that they would have benefitted from a senior-level champion. It may have also helped to develop the RCTO before the start of the regional transportation plan update for additional time to educate decisionmakers on the projects well before funding was programmed.

One of the RCTO benefits noted by PSRC was that it helps to keep operators engaged and collaborating as part of the operations committee. The process has engaged engineers in the planning process and better equipped them to champion the selection of operations/ITS projects. The planners involved have benefited by having an ITS/operations strategy to incorporate into the regional plan.

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<sup>40</sup> Puget Sound Regional Council, *Regional Signal Operations Strategy*, March 29, 2010. Available at: [http://psrc.org/assets/4034/TTM\\_SignalOpsStrategy\\_2010-03-29.pdf](http://psrc.org/assets/4034/TTM_SignalOpsStrategy_2010-03-29.pdf), last accessed June 14, 2011.

<sup>41</sup> Puget Sound Regional Council, *Regional Concept of Transportation Operations Signal Operations Agreement Template*, May 2010. Available at: [http://www.psrc.org/assets/4032/TTM\\_Final\\_AgreementTemplate\\_20100527.pdf](http://www.psrc.org/assets/4032/TTM_Final_AgreementTemplate_20100527.pdf), last accessed June 14, 2011.

## Niagara International Transportation Technology Coalition's RCTO

The Niagara International Transportation Technology Coalition (NITTEC) completed the development of an RCTO in 2010 to define specific, tangible operations activities for the Coalition over the next 10 years.<sup>42</sup> With recent turnover of leaders in the region, the Coalition wanted to provide a record of how it currently operated, what the participating members had agreed upon for the future, and the rationale for its collaborative activities. The RCTO would serve as a legacy for future operations leaders, planners, and Coalition staff. The development of the RCTO was an action item in the NITTEC Strategic Plan 2007, a higher level document. In conjunction with the RCTO, NITTEC also began an integrated corridor management (ICM) initiative. The ICM initiative focused on priority corridors in contrast to the RCTO which covered the entire region. Additionally, the ICM initiative had more aggressive performance targets (referred to as goals in the NITTEC and ICM literature) because it was more narrowly focused.

The RCTO was developed through bi-national workshops with NITTEC management and stakeholder groups. The workshops focused on U.S. and Canadian policy, operations, incident management, and border crossings. Already involved in the Coalition activities, the region's operating and planning agencies' leadership participated in the workshops and RCTO development. A regional operations engineer at the New York State DOT and the executive director of NITTEC led the development of the RCTO.

NITTEC's RCTO defined 19 operations objectives, associated performance measures, and short-term and long-term performance targets. The RCTO discussed how the operations objectives related to current regional operations activities and identified actions to support the objectives. The RCTO was developed along five operational categories: agency coordination, traveler information, mobility (arterial, border, freeway, and transit), incident management, and policies and procedures.

A challenge encountered by NITTEC in the development of the RCTO was a decrease in interest and participation from stakeholders as the process continued.<sup>43</sup> The development approach requested several reviews of content developed from the workshops and meetings and it was difficult for participants to see the benefit of this work. A related challenge for the group continues to be keeping up levels of participation as member agencies become increasingly strained for financial and human resources.

As a final step in the RCTO development, NITTEC blended the activities identified in the RCTO into its work plan and assigned each activity to one or more of the Coalition's committees or councils.

The RCTO was heavily used in updating the congestion management process (CMP) by the MPO serving much of the region, the Greater Buffalo-Niagara Regional Transportation Council. The CMP adopted a subset of the RCTO's operations objectives and performance measures. The RCTO is also one of the primary sources for congestion management strategies for the CMP.

### Contact:

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<sup>42</sup> Niagara International Transportation Technology Coalition, NITTEC Transportation Operations – Regional Concept for Transportation Operations: Final Report, January 6, 2010. Available at: <http://www.nittec.org/RCTO/RCTO%20Final%20Report.pdf>, last accessed June 14, 2011.

<sup>43</sup> Personal interview, Thomas George, Executive Director, NITTEC on January 13, 2010.

## Appendix A: A Practitioner's Checklist for Developing and Maintaining an RCTO

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This checklist offers RCTO developers the opportunity to assess their process for developing and maintaining an RCTO according to several factors that contribute to the success of an RCTO. The questions cover important actions to consider as practitioners progress through the development and implementation of an RCTO.

### Motivation – the “Why”

- Is there a compelling need to improve one or more elements of transportation operations that crosses jurisdictional and/or functional boundaries?
- Is there a recognized need for a strategic, formal approach to improving regional transportation operations through inter-agency collaboration?
- Are there potential benefits associated with this topic or area that justify significant multi-jurisdictional and inter-agency collaboration?

### Organizing for Action

- Is there a host or convener that can provide a table for the regional collaboration?
- Is there at least one committed champion who has a clear vision of the desired outcome and will work to get support among decisionmakers for the RCTO?
- Have all of the necessary stakeholders for accomplishing the operations objective(s) been engaged (both those needed to implement the RCTO and those who might oppose it)?
- Are there adequate resources (staff time and support services) allocated to support the collaborative activities needed to develop an RCTO?
- Is there a plan for maintaining participant involvement during the development and implementation of the RCTO?

### Identifying the Operations Objectives

- Have the operations needs been accepted and endorsed by the participating jurisdictions and agencies?
- Has a specific, measurable, and realistic operations objective(s) been established to guide further development of the RCTO?
- Have the collaborating agencies defined the operations objective(s) in sufficient detail to make it actionable?

### Knowing What Success Looks Like

- Have appropriate performance measures been developed to judge how well the RCTO operations objective(s) have been met?
- Are the data needed to assess performance generally available and, if not, have provisions been made for collecting the data needed to monitor performance?
- Are the performance measures expressed in terms that are meaningful to both operating agencies and system users?

## Getting Specific

- Have the collaborating agencies identified the strategies and actions that must be accomplished to achieve the operations objective(s) and the schedule for completing these strategies and actions?
- Do the strategies and actions include both those needed to implement the RCTO and those needed to sustain the level of performance associated with the objectives?
- Have all of the physical elements (technology, facilities, equipment) needed to achieve the objective been identified?
- Have the collaborators developed a joint strategy for acquiring the facilities, technology, and equipment needed for achieving the objectives?
- Have the collaborators agreed on primary roles and responsibilities associated with the strategies and actions needed to achieve the objectives?
- Have the means for holding collaborators accountable for their responsibilities been developed so that each of the partners can proceed with “good faith” that all will perform as agreed?
- Have the collaborators agreed on information sharing protocols (content, form, communication methods, archiving, protection, liability) associated with implementing the RCTO and measuring performance?
- Have all of the resources (funds, staff time, materials) needed to implement the RCTO been identified and have collaborating agencies agreed on how those resources will be acquired and allocated?

## Measuring What Matters

- As the RCTO is implemented, is performance measured as planned using the best data available?
- Are trends being tracked over time so that problems can be detected and the RCTO can be adjusted?
- Is performance routinely reported to key decision makers and system users so that participating agencies are held accountable for their activities and the consequences (positive and negative) of those actions (or lack thereof)?

## Keeping It Going

- Do participating agencies convene regularly to discuss progress toward achieving objectives and addressing obstacles to success?
- Do participating agencies look for ways to expand and extend the RCTO to address additional functions, expand the number of jurisdictions covered, and engage agencies whose participation would contribute to sustaining the RCTO?
- Do participating agencies regularly report the status of the RCTO to key decisionmakers so that they understand the progress made in regional transportation system performance?

## Appendix B: RCTO Fundamentals

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### B.1 Foundations in Systems Thinking

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

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.

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.

### B.2 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.
- Bus rapid transit.

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

### **Functional Scope**

An RCTO can address a single management and operations 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.

## **B.3 RCTO Initiatives**

The idea for the RCTO evolved from a series of activities and programs involving Federal, State, regional, and local entities working together to find ways to improve transportation system performance on a regional basis.

The National Dialogue on Transportation Operations, initiated in 1999, greatly accelerated the evolution of transportation agencies from that of building and maintaining roads to that of managing the transportation system. The National Dialogue, and especially the National Summit on Transportation Operations, held in Columbia, Maryland, in October 2001, made clear the need for deliberate and sustained collaboration and coordination in regional operations to achieve safe, reliable, integrated, and secure transportation. The Summit brought together over 240 professionals from academia, operating agencies, interest groups (e.g., safety and pedestrians), and elected and appointed officials from local and regional governments. A consensus on key issues to move forward an operations agenda was achieved.

In 2001, the working group, "Linking Planning and Operations," sponsored by the Federal Highway Administration and the Federal Transit Administration identified ways in which transportation planning and transportation operations can be more effectively linked. During its December 2001 meeting, the working group developed a self-assessment tool for linking planning and operations which identified the need for a "regional concept of operations that informs a regional operations action plan," which eventually became known as the Regional Concept for Transportation Operations or RCTO.

The RCTO was described further in the FHWA publication "Regional Transportation Operations Collaboration and Coordination – A Primer for Working Together to Improve Transportation Safety, Reliability and Security,"<sup>44</sup> published in 2003, encouraging more effective collaboration and coordination of operations within a region by transportation managers and public safety officials from cities, counties, and States and was listed as a key linkage between planners and operators in the FHWA "Getting More by Working Together – Opportunities for Linking Planning Operations," published in November 2004.<sup>45</sup>

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<sup>44</sup> U.S. Department of Transportation, FHWA, *Regional Transportation Operations Collaboration and Coordination – A Primer for Working Together to Improve Transportation Safety, Reliability, and Security*, FHWA-OP-03-008 (Washington, DC, 2003). Available at: [http://ntl.bts.gov/lib/jpodocs/repts\\_te/13686.html](http://ntl.bts.gov/lib/jpodocs/repts_te/13686.html), last accessed June 14, 2011.

<sup>45</sup> U.S. Department of Transportation, FHWA, *Getting More by Working Together – Opportunities for Linking Planning and Operation*, FHWA-HOP-05-016 (Washington, DC, 2005). Available at: [http://www.ops.fhwa.dot.gov/publications/po\\_ref\\_guide/index.htm](http://www.ops.fhwa.dot.gov/publications/po_ref_guide/index.htm), last accessed June 14, 2011.









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