

MAKING THE CONNECTION:

Advancing Traffic Incident Management
in Transportation Planning

A Primer



U.S. Department of Transportation
Federal Highway Administration



Quality Assurance Statement

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

Notice

This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof. This report does not constitute a standard, specification, or regulation.

1. Report No. FHWA-HOP-13-044	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Making the Connection: Advancing Traffic Incident Management in Transportation Planning A Primer		5. Report Date July 2013	
		6. Performing Organization Code	
7. Author(s) Jocelyn Bauer (SAIC), Phillip Worth (KAI), Lisa Bedsole (SAIC), Gary Millsaps (Delcan), Anna Giragosian (SAIC)		8. Performing Organization Report No.	
9. Performing Organization Name and Address Science Applications International Corporation (SAIC) 8301 Greensboro Drive McLean, VA 22102 Kittelson & Associates, Inc. 610 SW Alder, Suite 700 Portland, OR 97205 Delcan Corporation 2055 Sugarloaf Circle, Suite 500 Duluth, Georgia 30097		10. Work Unit No. (TRAIS)	
		11. Contract or Grant No. DTFH61-06-D-00005	
12. Sponsoring Agency Name and Address United States Department of Transportation Federal Highway Administration 1200 New Jersey Ave., SE Washington, DC 20590		13. Type of Report and Period Covered	
		14. Sponsoring Agency Code HOP	
15. Supplementary Notes Mr. Wayne Berman, Federal Highway Administration, GTM			
16. Abstract The intent of this primer is to inform and guide traffic incident management (TIM) professionals and transportation planners to initiate and develop collaborative relationships and advance TIM programs through the metropolitan planning process. The primer aims to inspire planners and TIM professionals to create transportation plans and programs that support regional TIM programs through TIM-focused objectives, performance measures, and TIM strategies and projects. The ultimate goal of this primer is to strengthen, support, and elevate regional TIM programs as a crucial, lower-cost strategy for reliability, safety, environmental improvements, and mobility. The primer explains the benefits for TIM professionals and planners of linking planning and TIM. It contains specific opportunities, supported by case studies, to integrate TIM considerations and stakeholders into the planning process. TIM planning sheets provide tangible examples of TIM objectives that can be drawn from, in whole or in part, to develop metropolitan transportation plans or related operations or TIM-focused plans.			
17. Key Words Traffic incident management, metropolitan transportation planning, planning for operations, transportation systems management and operations, regional collaboration.		18. Distribution Statement No restrictions.	
19. Security Clasif. (of this report) Unclassified	20. Security Clasif. (of this page) Unclassified	21. No. of Pages 72	21. Price N/A

Acknowledgements

This document was developed with input from practitioners from metropolitan planning organizations, State departments of transportation, public safety agencies, and other organizations. The Federal Highway Administration would specifically like to thank the following individuals who helped shape this document through participation in a peer exchange, interviews, and reviews of the document during its development:

Sam Belfield, Hampton Roads Transportation Planning Organization

Joe Bovenzi, Genesee Transportation Council

Sarah Burnworth, Metropolitan Transportation Commission

Chief Grady Carrick, Florida Highway Patrol

Chief David Covington, City of Schertz Fire Department

Matt Edelman, TRANSCOM

Michael Floberg, Kansas Department of Transportation

Frank Horne, Tennessee Department of Transportation

Christopher King, Delaware Valley Regional Planning Commission

Chief Stephen Kopczynski, York County Department of Fire and Life Safety

Walter Kraft, Vanasse Hangen Brustlin, Inc.

Todd Long, Georgia Department of Transportation

Laurie Matkowski, Delaware Valley Regional Planning Commission

Jim McGee, Nebraska Department of Roads

Richard Perrin, Genesee Transportation Council

Captain Mike Prochko, Arizona Department of Public Safety

Brian Purvis, North Carolina Department of Transportation

Eileen Singleton, Baltimore Metropolitan Council

Radiah Victor, Metropolitan Transportation Commission

Kofi Wakhisi, Atlanta Regional Commission

John Ward, Delaware Valley Regional Planning Commission

Nicholas Weander, Metropolitan Area Planning Agency

Michael Zezeski, Maryland State Highway Administration



SEP 11 2013

1200 New Jersey Ave., SE
Washington, D.C. 20590

Dear Colleague:

Unexpected delays caused by traffic incidents contribute significantly to Americans' safety and productivity. The Federal Highway Administration (FHWA) recognizes the importance of traffic incident management (TIM) and sees a significant opportunity for the metropolitan transportation planning process to support and sustain these efforts. The purpose of this primer is to showcase how transportation planners and TIM professionals can work together to create transportation long term plans and programs that support regional objectives, performance measures, and strategies to improve safety and reliability.

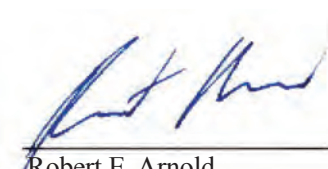
The great challenge in writing this primer, however, mirrors the challenge inherent in the planning process as a whole, i.e. finding ways to help very different and very diverse sets of stakeholders understand the benefits of reaching across institutional and cultural divides in order to work together to achieve common safety and mobility objectives. This primer does that by sharing the experiences of planners and operators who have partnered successfully to overcome the challenges and realize the benefits of collaboration and coordination – concepts both planners and incident responders embrace daily in their respective activities.

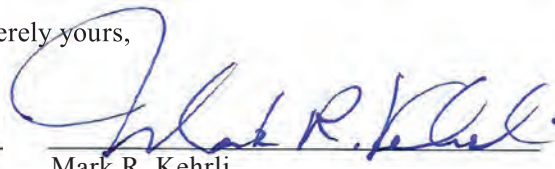
The audience for the primer includes TIM program leaders, managers and supervisors involved in TIM operations as well as transportation planners from State, regional, or metropolitan planning organizations. The contents feature the following:

- Opportunities to integrate TIM into the planning process,
- Explains the players in the regional planning process as well as in the TIM community,
- Case studies of successful collaboration,
- Examples of TIM incorporated into a metropolitan transportation plan, and
- Information sheets that provide sample regional TIM objectives, performance measures, and strategies.

We look forward to receiving your feedback, reactions, and experiences in implementing these concepts. Please direct any comments, questions, and suggestions to Wayne Berman at wayne.berman@dot.gov, 202-366-4069 or Laurie Radow at laurie.radow@dot.gov, 202-366-2855.

Sincerely yours,



Robert E. Arnold
Director, Office of Transportation Management

Mark R. Kehrli
Director, Office of Transportation Operations


Acronyms

Caltrans	California Department of Transportation
CCTV	Closed-Circuit Television
CMAQ	Congestion Mitigation and Air Quality Improvement
CMF	Crash Modification Factor
CMP	Congestion Management Process
DOT	Department of Transportation
DVRPC	Delaware Valley Regional Planning Commission
EMS	Emergency Medical Services
FHP	Florida Highway Patrol
FHWA	Federal Highway Administration
GTC	Genesee Transportation Council
ICS	Incident Command Structure
ITS	Intelligent Transportation Systems
M&O	Management and Operations
MCDOT	Monroe County Department of Transportation
MPO	Metropolitan Planning Organization
MTC	Metropolitan Transportation Commission
MUTCD	Manual on Uniform Traffic Control Devices
NFTPO	North Florida Transportation Planning Organization
NIMS	National Incident Management System
NUG	National Unified Goal
NYS DOT	New York State Department of Transportation
NYSTA	New York State Thruway Authority
RCTO	Regional Concept for Transportation Operations
RIMIS	Regional Integrated Multi-Modal Information Sharing
RTOC	Regional Traffic Operations Center
RTP	Regional Transportation Plan
SEMCOG	Southeast Michigan Council of Governments
SHRP 2	Strategic Highway Research Program 2
SPC	Southwestern Pennsylvania Commission
TIM	Traffic Incident Management
TIME	Traffic Incident Management Enhancement
TIP	Transportation Improvement Program
TSM&O	Transportation Systems Management and Operations
VMS	Variable Message Sign

Contents

1. Introduction	2
Bridging the Divide between Traffic Incident Management (TIM) and Transportation Planning	2
Purpose and Audience for Primer	3
2. Benefits for TIM Professionals and Planners	6
Benefits for TIM Professionals	6
Expanded Access to Resources	7
Forum for TIM Coordination.....	7
Input on Transportation Projects	7
Access to Multi-Agency Training.....	8
Elevated Visibility Among Transportation Decisionmakers.....	8
<i>Case Study: Genesee Transportation Council Fosters TIM as a Strategic Priority</i>	<i>8</i>
Benefits for Regional Planners	8
Address Major Source of Congestion	8
Lower Cost Mobility and Safety Solutions	9
Expertise and Recommendations on Operations Priorities, TIM Strategies and Projects.....	9
Data to Justify Investments	9
Meet Planning Regulations	10
<i>Case Study: Benefits Gained from MPO Reaching out to State Police: TIMe4SAFETY Program – North Florida Transportation Planning Organization.....</i>	<i>11</i>
3. Opportunities to Advance TIM in Transportation Planning and Investments	14
Getting Together: Connecting TIM Professionals and Transportation Planners	14
Connecting with TIM Professionals as a Metropolitan Planner	14
<i>Case Study: San Francisco Metropolitan Transportation Commission – A Forum for TIM Collaboration</i>	<i>15</i>
Connecting with Metropolitan Transportation Planners as a TIM Professional	17
Opportunities to Engage the TIM Community	18
<i>Case Study: SEMCOG’s Annual TIM Partnering Workshops Promote Regional Transportation Operations in Michigan</i>	<i>18</i>
Involving the TIM Community in Planning	19
What Can Be Accomplished?	19

Integrating TIM into Transportation Planning.....	20
Integrating TIM in the Development of the Metropolitan Transportation Plan	20
<i>Case Study: DVRPC Surveys TIM Practitioners to Identify Regional Priorities</i>	<i>22</i>
Regional TIM Priorities and Performance Measures.....	22
<i>Case Study: Portland Focuses on Performance Measurements to Gauge Investments</i>	<i>23</i>
Examples of How TIM has been Integrated into the Transportation Plan	24
<i>Case Study: PAG Aims to Increase Safety through TIM.....</i>	<i>26</i>
Regional Investment in TIM	27
<i>Case Study: TIM Plays Leading Role in DVRPC's Data-Driven Future.....</i>	<i>30</i>
 4. Information Resources for Planners on TIM.....	32
 Appendix A. Regional TIM Planning Sheets	36
 Appendix B. Case Study: A Metropolitan Transportation Plan and an Operations Plan Incorporating TIM	50



In the Philadelphia region, local and State emergency responders learn about traffic incidents in real-time from a web-based network connecting highway operations centers, 9-1-1 call centers, and responders in their vehicles. In Hampton Roads, Virginia, State police are clearing incidents more quickly with two new total incident investigation stations funded in the metropolitan transportation program. Incident responders in North Florida and beyond are now more aware of how to protect themselves and other motorists at incident scenes and work seamlessly with fellow responders from other disciplines to quickly clear incidents thanks to a major training program led by the metropolitan planning organization. In the Genesee-Finger Lakes, New York region, a strategic plan for transportation operations has elevated the priorities and needs of traffic incident management professionals for current and future investment decisions. In Atlanta, incident responders review infrastructure designs to ensure that incident response requirements, such as water connections and turnaround locations on highways, are planned and implemented.

How did these regions make it happen?

It begins with creating a strong relationship between traffic incident management and transportation planning.

1. Introduction

Bridging the Divide between Traffic Incident Management (TIM) and Transportation Planning

Transportation planners and traffic incident management professionals are two groups of professionals who traditionally have had little interaction, but there are real and sustainable benefits to be gained for incident responders, planners, and the traveling public when the connection is made. In the examples mentioned above, tangible improvements for TIM happened when metropolitan transportation planners and incident responders began working together.

On the surface, planners and TIM professionals appear to have little in common. Planners focus on envisioning transportation systems and communities in the future, coordinating stakeholders, and preparing planning documentation, whereas TIM professionals operate in the present, dealing with immediate needs of managing the safe and efficient detection and clearance of traffic incidents on a daily basis. They have far different work cultures and talk in terms that are unfamiliar to the other group. Despite their significant differences, however, transportation planners and TIM professionals have important goals in common – safety and mobility for all road users. By working together, TIM professionals and planners can offer each other crucial pieces of the puzzle for making significant gains in safety and mobility.

TIM professionals need greater access to funding, equipment, and other resources as well as better coordination among responders regionally. By working with planners and connecting to the regional or statewide planning process, TIM professionals increase their opportunities for accessing resources and interacting with other TIM professionals across the region. By interacting with regional or statewide planning organizations, TIM professionals can increase the visibility of TIM as a vital public service that reduces costly congestion.

Despite their significant differences, transportation planners and TIM professionals have important goals in common – safety and mobility for all road users.

Planners in regions and States faced with dwindling public funds to improve mobility need low-cost strategies that allow regions to get the most use out of their current transportation infrastructure. Traffic incidents may cause significant regional roadway congestion, and some metropolitan planning organizations (MPOs) in lower population density areas view incidents to be their greatest congestion source. Planners find that they must account for incident management if they are to address congestion adequately. TIM is a low-cost way of reducing congestion that has a very high return on investment – using a traffic simulation program, analysts determined that Maryland State Highway Agency's Coordinated Highways Action Response Team (CHART) program reduced travel delay on major Maryland corridors by 32.43 million vehicle-hours in 2009, equating to a savings in delay, fuel, and emissions valued at more than \$1 billion.¹ Additionally, with the 2012 passage of the Federal surface transportation legislation, Moving Ahead for Progress in the 21st Century Act (MAP-21),

“We don’t just prioritize traffic incident management because it’s effective. We rely on it because it’s **cost-effective**.”

— Richard Perrin, Executive Director,
Genesee Transportation Council

¹ Chang, G., and S. Rochon. CHART Input and Analysis: Performance Evaluation and Benefit Analysis for CHART in Year 2009, University of Maryland: n.d.

there is a greater shift toward the use of performance-based planning in which transportation system performance measures and data are used to make planning and investment decisions. Collaboration with TIM professionals is important in developing, tracking, and meeting operations-related objectives and measures.

Purpose and Audience for Primer

The intent of this primer is to inform and guide TIM professionals and transportation planners to initiate and develop collaborative relationships and advance TIM programs through the metropolitan planning process. The primer aims to inspire planners and TIM professionals to create transportation plans and programs that support regional TIM programs through TIM-focused objectives, performance measures, and TIM strategies and projects. The ultimate goal of this primer is to strengthen, support, and elevate regional TIM programs as a crucial, lower-cost strategy for reliability, safety, environmental improvements, and mobility. The primary audiences for this primer are transportation planners, TIM program leaders, and managers and supervisors involved in TIM operations from organizations such as law enforcement, State and local departments of transportation, fire and rescue, emergency medical services (EMS), public safety communications, emergency management, towing and recovery, hazardous materials response teams/contractors, medical examiners/coroners, and transit providers.

Throughout this primer, examples from across the country are provided to illustrate effective practices in linking TIM and planning. Examples are drawn from these metropolitan areas listed in order of increasing population size:²

- Madison, Wisconsin (Madison Area Transportation Planning Board)
- Genesee-Finger Lakes Region, New York (Genesee Transportation Council)
- Tucson, Arizona (Pima Association of Governments)
- Jacksonville, Florida (North Florida Transportation Planning Organization)
- Portland, Oregon (Metro)
- Chesapeake, Virginia (Hampton Roads Transportation Planning Organization)
- Pittsburgh, Pennsylvania (Southwestern Pennsylvania Commission)
- Denver, Colorado (Denver Regional Council of Governments)
- Phoenix, Arizona (Maricopa Association of Governments)
- Detroit, Michigan (Southeast Michigan Council of Governments)
- Atlanta, Georgia (Atlanta Regional Commission)
- Philadelphia, Pennsylvania (Delaware Valley Regional Planning Commission)
- San Francisco, California (Metropolitan Transportation Commission)

² Population is for MPO planning region and obtained from the 2010 U.S. Census.



2. Benefits for TIM Professionals and Planners

There are numerous benefits to integrating TIM into the transportation planning process at a State or regional level. Those benefits start with safer, more efficient transportation system performance for the traveling public. With greater regional support, incidents can be cleared safely in less time, minimizing congestion and the impacts of traffic incidents on overall mobility and safety. The figure below gives a sample of benefits that TIM and planning professionals may gain through connecting TIM and planning. The sample focuses on items that help those groups fulfill their missions more effectively or efficiently.

Benefits for TIM Professionals

TIM professionals can open up more opportunities to advance TIM in the region by becoming involved with transportation planning and the leaders of that

process at MPOs and State departments of transportation (DOTs). The benefits to TIM may be in the form of increased funding, equipment, or training to support TIM activities. There are many ways to connect to the transportation planning process, as described later in this primer, but one of the most important is to help set specific priorities for transportation in the region in terms of regional objectives and performance measures. These will guide the selection of strategies, programs, and projects for investment. Regional objectives should reflect the interests of all transportation stakeholders in the community, and involvement in the planning process is a good way to elevate the importance of incident management as a tool for improving road safety and reducing congestion in the region.

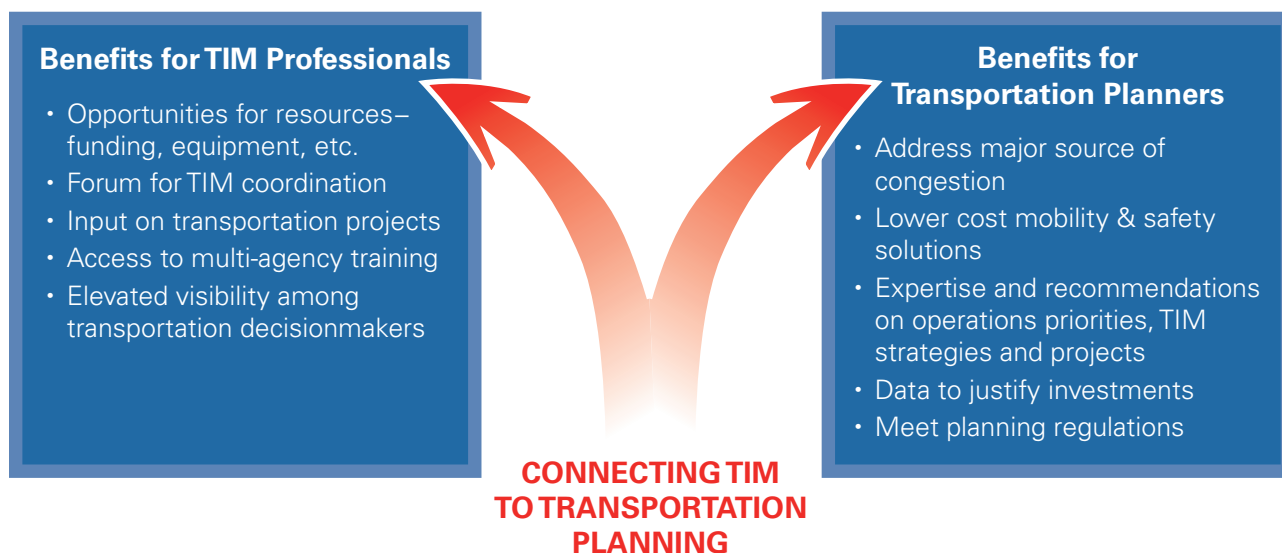


Figure 1. Benefits of connecting TIM to transportation planning for TIM professionals and planners.

What Do Transportation Planners Do?

Transportation planners at metropolitan planning organizations, State departments of transportation, and transit agencies lead a cooperative process designed to foster involvement by all users of the system, such as the business community, community groups, environmental organizations, the traveling public, freight operators, and the general public, through a proactive public participation process. The process facilitated by planners includes:

- “Monitoring existing conditions;
- Forecasting future population and employment growth, including projected land uses and major growth corridors;
- Identifying current and projected future transportation problems and needs and analyzing, through detailed planning studies, various transportation improvement strategies to address those needs;
- Developing long-range plans and short-range programs of alternative capital improvement and operational strategies for moving people and goods;
- Estimating the impact of recommended future improvements to the transportation system on environmental features, including air quality; and
- Developing a financial plan for securing sufficient revenues to cover the costs of implementing strategies.”

Source: FHWA/FTA, The Transportation Planning Process Key Issues, FHWA-HEP-07-039. Available at: <http://www.planning.dot.gov/documents/briefingbook/bbook.htm>.

Expanded Access to Resources

TIM professionals can also benefit from connecting with the planning process by coordinating with other TIM stakeholders to propose and support TIM strategies in the metropolitan transportation plan and the funding of TIM needs. TIM professionals may be able to obtain funding for inter-agency field communications systems, training program development, total incident scene investigation stations, variable message signs and other traveler information devices, emergency signal preemption, and other resources that will advance the safety and effectiveness of incident management professionals’ efforts. TIM projects may be eligible for several Federal funding programs. See the section— “Regional Investment in TIM”— in Chapter 3 for more information.

Another benefit for TIM professionals includes access to MPO mapping services. MPOs may provide maps for emergency detour routing, water access locations for fire, and door locations in noise walls along highways.

Forum for TIM Coordination

TIM professionals can also benefit from using the planning organization’s capability to convene TIM partners from across the region for the purpose of increasing coordination between jurisdictions, modes, and functions in TIM operations. Planning organizations can facilitate a collaborative group for improving TIM that enables TIM professionals to meet the people who they may need to work with in the field and better understand the roles of other responders. Through this collaboration, TIM professionals can also benefit from bringing their staff expertise, data, and other resources together for improved TIM performance.

Input on Transportation Projects

By participating in the transportation planning process, TIM professionals may be able to influence how and where operations devices are deployed and infrastructure is designed so that TIM is facilitated. As one fire chief in Virginia commented, *“It is better to be involved before the project is deployed than to have to live with the results afterward.”* TIM professionals can improve their ability to detect, respond, clear, and manage incidents by assisting transportation engineers, designers, and planners in the placement of signs, signals, cameras, pull-outs, and other operational features of the infrastructure.

For example, in areas near chemical factories or other industrial areas where hazardous materials (HAZMAT) are frequently transported, designing drainage or providing TIM responders with drainage routes and layouts for diking fuels or channeling spills off of the travel lanes can be extremely helpful to responders’ ability to safely clear the spilled substance in a HAZMAT incident. The sooner responders can “get in front of” a spill or toxic release, the less harm to the environment and, potentially, to nearby residents.

Additionally, when a construction project is planned, an engineer, or group of engineers, typically puts together the schedule of closures and any necessary plan for rerouting traffic. Giving the TIM community the opportunity to provide their input on this before

Case Study: Genesee Transportation Council Fosters TIM as a Strategic Priority

The Genesee Transportation Council (GTC), the MPO for the Greater Rochester region of New York, is incorporating TIM into its planning efforts by creating an intelligent transportation systems (ITS) strategic plan that recognizes TIM as a means of combatting the region's congestion challenges. The seeds of coordination and adoption of TIM as a strategic priority were planted when New York State DOT Region 4 Operations, Monroe County DOT, and a New York State Police station were co-located in the Regional Traffic Operations Center (RTOC) in 2002. It did not take long for these responder and traffic operations communities to realize that collaboration would result in a complete detection and response capability for both the daily routine of traffic as well as TIM.

As a result of working together, regional stakeholders have identified ways to expand and improve upon their success with the assistance and support of the MPO, which has identified multi-agency training and education targeted to local first responders as a strategic objective. This training will provide them with better information regarding the RTOC and its capabilities, reinforce the Unified Incident Command structure, help local first responders better understand the downstream impacts and safety risks associated with highway incident management activities, and educate responders on ways to minimize unnecessary disruption to the transportation system without compromising safety.

Operators and responders also quickly realized the value of different kinds of technologies. GTC has identified coordinated traffic signal timing adjustments, the installation of new highway advisory radio beacons, the addition of portable dynamic message signs, and further integration with the proposed statewide 511 system as strategic priorities to increase dissemination of traffic incident information to the general public so that drivers can avoid incident-related congestion.

Source: Genesee Transportation Council, Intelligent Transportation Systems (ITS) Strategic Plan, February 2011. http://www.gtcmmpo.org/Docs/PlansStudies/ITS_StrategicPlanUpdate.pdf. Note that GTC's Long Range Transportation Plan 2035 (<http://www.gtcmmpo.org/docs/LRTP.htm>) is another example of a document that recognize TIM as a means to reduce congestion.

the project begins can significantly improve response times in construction zones and allow responders to mitigate the scene faster.

Access to Multi-Agency Training

Metropolitan planning organizations, such as the Genesee Transportation Council (GTC), have helped provide multi-agency, multi-disciplinary TIM groups with national training courses and workshops that promote safe and coordinated incident response. Similarly, the North Florida Transportation Planning Organization (NFTPO) spearheaded an effort to create a multi-disciplinary training program for first responders that has been accessed by more than 30,000 responders in Florida (see case study on page 18).

Elevated Visibility Among Transportation Decisionmakers

By participating as a stakeholder group in the planning process and providing input on regional priorities and cost-effective solutions, TIM professionals and their interests gain greater visibility among the transportation decisionmakers who approve the regional transportation plan and make investment decisions.

Benefits for Regional Planners

Address Major Source of Congestion

TIM enables planners to deal with a significant cause of congestion, and incident management can be an important strategy in a region's congestion management process. Planning organizations benefit when TIM professionals know about and actively support

Planning Basics: What Is an MPO?

Each urbanized area in the United States with a population of 50,000 or more is required by Federal statute to have a metropolitan planning organization (MPO), a transportation policy-making body made up of representatives from local government and transportation agencies with authority and responsibility in metropolitan planning areas. MPOs are required to have a continuing, cooperative, and comprehensive transportation planning process, and Federal funding for transportation projects and programs is channeled through this planning process. As a result, MPOs provide a forum for decisionmaking on regional transportation issues. As of 2010, there were 384 MPOs in the United States.

MPOs develop transportation plans and programs for the urbanized area. This cooperative transportation decisionmaking process provides a forum for members to discuss regional transportation issues and plan transportation improvements for the region. The MPO process also provides an open forum for transportation system stakeholders, including first responders, to work together to ensure their needs are addressed – and sometimes funded – through regional transportation plans.

To find the MPO in your region, visit the US Department of Transportation MPO Database at www.planning.dot.gov/mpo.asp.

all of the region's transportation goals. For example, in circumstances where responder and driver safety will not be compromised, TIM responders may be able to help reduce congestion by closing fewer lanes at an incident scene. Regional benefits also extend to reduced emissions (from less congestion/vehicle idling) and improved safety (from reduced opportunities for secondary incidents, i.e., incidents caused by a previous incident). In addition, as TIM responders learn about the goals for the transportation system, they may become more aware of the impacts that an incident has on areas outside their immediate responsibility.

Lower Cost Mobility and Safety Solutions

TIM strategies such as incident response patrols have tremendous benefit-cost ratios. When funds are scarce, safety/service patrols provide an excellent, high-profile way to improve mobility and safety for motorists and responders. For example, a multi-jurisdictional arterial incident management patrol in the Phoenix metropolitan area provides services to six cities with a benefit-cost ratio of 6.4:1, offering the added benefits of increasing responder safety by securing incident scenes and reducing the number of law enforcement officers necessary at each crash scene.³

Expertise and Recommendations on Operations Priorities, TIM Strategies and Projects

In addition to improving regional performance outcomes and planning goals, TIM professionals can help planners and planning boards determine the most effective or needed TIM improvements. TIM professionals can supply expert opinions, field knowledge, and data that can help planning officials make smart decisions when funding TIM-related projects.

Data to Justify Investments

Incident management data collected by TIM partners (DOTs, police, etc.) is highly beneficial to planners in helping to make the case for new TIM investments and justify spending when transportation budget reductions are needed. For example, a 2006 study on the outcomes of the Georgia NaviGator incident management program found that it reduced annual fuel consumption by 6.83 million gallons and significantly contributed to decreased emissions: 2,457 tons less carbon monoxide, 186 tons less hydrocarbons, and 262 tons less nitrous oxides.⁴

³ Battelle Memorial Institute for the Maricopa County Department of Transportation, Regional Emergency Action Coordination Team (REACT) Evaluation, Phoenix, Arizona, 2002.

⁴ URS Corporation for the Georgia DOT, Benefits Analysis for the Georgia Department of Transportation NaviGator Program: Final Report, August 2006. Available at: http://www.ops.fhwa.dot.gov/travelinfo/gdotbenefit/gdotfinalreport_0806.pdf.

Who Are TIM Operators?

TIM Operators come from a variety of responder disciplines, and all of them may provide important input to regional planning. Planners should keep in mind that first responders are accustomed to working in a cooperative, “team” environment with members of other disciplines and agencies, and often across jurisdictional boundaries. This gives them a foundation of working with others to achieve their objectives that can be useful for planners wishing to build relationships with the TIM community. Contacts, and potentially champions, may be found throughout the TIM community, which includes:

- Law enforcement
- Fire and rescue
- Emergency medical services (EMS)
- Towing and recovery
- Hazardous materials response teams/contractors (in some areas, these professionals can be found in the towing and recovery community)
- Medical examiners/coroners
- Emergency dispatchers
- DOT/traffic management center staff

Meet Planning Regulations

Federal planning regulations require that metropolitan transportation plans include management and operations strategies such as TIM. Strategies such as TIM also support congestion mitigation efforts through the congestion management process (CMP), a systematic approach applied in metropolitan regions to identify congestion and its causes, propose mitigation strategies, and evaluate the effectiveness of implemented strategies. The CMP is federally required in metropolitan areas with populations greater than 200,000. For example, the Madison Area Transportation Planning Board’s CMP includes “the development and implementation of an enhanced Regional Incident Management Plan” as one transportation system management strategy recommended to manage congestion in the region.⁵ The Madison CMP also includes arterial and freeway incident management performance measures and targets.⁶

TIM Fundamentals:

Effective TIM reduces the duration and impacts of traffic incidents and improves the safety of motorists, crash victims and emergency responders.

TIM activities are typically categorized into the following five functional areas:

- Detection and verification
- Traveler information
- Response
- Scene management and traffic control
- Quick clearance and recovery

The National Unified Goal (NUG) is a unified national policy developed and ratified by major national organizations as members of the National Traffic Incident Management Coalition (<http://ntimc.transportation.org/Pages/default.aspx>) representing traffic incident responders. It consists of three major goals, listed below, supported by 18 strategies for achieving these goals.

- Responder Safety
- Safe, Quick Clearance
- Prompt, Reliable, Interoperable Communications

The NUG represents essential priorities for TIM responders. MPOs could play a valuable role in implementing the NUG, for example by incorporating the goals and strategies in their plans and programs.

Source: FHWA, Best Practices in Traffic Incident Management, September 2010. Available at: <http://ops.fhwa.dot.gov/publications/fhwahop10050/index.htm>

⁵ Madison Area Transportation Planning Board, 2035 Regional Transportation Plan Update, March 2012. Available at: http://www.madisonareampo.org/planning/documents/TransportationSystemPart4_000.pdf.

⁶ Ibid

Case Study: Benefits Gained from MPO Reaching out to State Police: TIMe4SAFETY Program – North Florida Transportation Planning Organization

TIM is an important component of ITS. With millions of dollars invested in systems and hardware, the procedures and processes used by the responders on the scene can either maximize its value, or derail its promise. With this in mind, the North Florida Transportation Planning Organization (NFTPO) reached out to the Florida Highway Patrol (FHP) in 2003, inviting the agency to participate in the Regional ITS Coalition shortly after it formed in 2003.

It became increasingly clear to the FHP and the NFTPO that first responders needed a single “playbook” that would detail a common operational approach. The NFTPO initiated the development of a concept of operations that resulted in a set of standard operating guidelines. In October 2008, the NFTPO, in association with FHP, hosted a northeast Florida Traffic Incident Management stakeholders’ workshop in Jacksonville, Florida. This workshop attracted multi-disciplinary representatives from law enforcement, fire and rescue, road rangers, towing and recovery, and transportation agencies within northeast Florida. Through discussions and hands-on activities during this four-hour workshop, all attendees were encouraged to comment on the draft guidelines.

Based on comments received during and after the workshop, and after reviewing other nationwide initiatives, the NFTPO, with the full support of the FHP, created the “TIMe4Safety Training Program.” This program includes a Traffic Incident Management Handbook and five video modules featuring actual responders, who not only acted in the video, but also wrote the script, creating a feeling of “ownership” and unity in the operations community.

The training program was designed to make responders more aware of their own safety at the scene of traffic incidents as well as to explain to them the roles and responsibilities of other responder groups, giving them insight into the risks their colleagues face and showing them how to work together to clear incidents in a way that maximizes safety for responders and motorists alike.

Since the Fall 2009 release of this training program, it has been viewed by approximately 30,000 responders in Florida and distributed to responder agencies across the U.S., Canada and Australia. The Traffic Incident Management Handbook and five associated video modules are free for download or viewing at http://www.northfloridatpo.com/its_coalition/traffic_incident_management/.

Source: North Florida TPO website, and ITS Master Plan Update For North Florida Regional ITS Master Plan - http://www.northfloridatpo.com/images/uploads/general/ITS-Master-Plan-2010Update_finalreport.pdf; email communication with FHP Chief Grady Carrick (ret.), January 2, 2013



3. Opportunities to Advance TIM in Transportation Planning and Investments

Getting Together: Connecting TIM Professionals and Transportation Planners

Opportunities abound for connecting these two groups that are so vital to the safe and efficient operation of the transportation system. Each group has a number of regular activities to which the other could be invited, as a guest, presenter, or a regular participant. The cycle of plan updates that are required of transportation planners provides opportunities to engage TIM professionals at the visionary, strategic, and/or tactical levels. Additionally, meetings of elected officials, some of whom may have responsibility for professionals in each group, provide a forum for guiding and promoting collaboration among transportation planners and TIM professionals.

Despite the opportunities to come together to advance TIM, planners and TIM professionals encounter challenges in bridging the cultural divide, making that first connection, and sustaining a collaborative relationship. This section provides approaches for MPO planners and TIM professionals to reach out and engage each other. While the role of the transportation planner at an MPO is ideally situated to reach out and invite TIM professionals into the planning process, the TIM community should not wait for an invitation. There are too many benefits to be gained.

Connecting with TIM Professionals as a Metropolitan Planner

The world of TIM is driven by one overriding goal: safety. TIM operators focus on maintaining and improving safety for both incident responders as well

as the motoring public, and planners should recognize that mobility and reliability are often improved by operators' actions. Finding ways to work with TIM teams to maximize operators' ability to do their jobs quickly and safely will help planners reach established mobility and reliability goals.

"Packaging everything in 'safety' is what really gets our attention."

—Chief Stephen P. Kopczynski
York County Department of Fire and Life Safety

Planners should also recognize that TIM operators know they are least safe when they are on the scene of an incident, so they are motivated to clear incidents quickly to get off the road and into a safe environment. Ideally, a relationship between transportation planners and TIM operators will be a means to facilitate incident clearance, which will result in shortened incident timelines, reduced congestion, and improved safety, mobility, and reliability. Therefore, when approaching TIM operators to begin a dialogue, planners should remember that the most effective message they can convey is that working with the MPO can improve responder safety.

Transportation planners and TIM professionals have an extensive network of contacts, and there is a high likelihood that the two networks have some level of overlap. State and local DOT representatives are the most likely groups to be among both networks. Initial meetings with these "interconnected" representatives could be opportunities to discuss the value of

Case Study: San Francisco Metropolitan Transportation Commission – A Forum for TIM Collaboration

The Metropolitan Transportation Commission (MTC), the MPO for the San Francisco Bay Area, works to facilitate and promote interagency coordination among regional TIM and emergency response personnel as part of a comprehensive Incident Management Program. MTC acts as the lead facilitator for the incident response community, coordinating multidisciplinary training and Incident Management Task Force Quarterly Meetings.

The need for greater coordination was originally recognized in 2007, during a Statewide Highway Incident Management Summit. In response to this need, MTC began working to develop a series of regional TIM workshops, which were designed to provide a forum for agency personnel who are directly involved in TIM and response efforts to get to know each other, discuss current regional TIM issues, identify ways to work together safely to reduce the impacts of incidents on the highways, and to improve coordinated action among partnering response agencies in incident management.

After a series of three increasingly popular workshops between 2010 and 2011, the practitioner gatherings transformed into formal Incident Management Task Force Quarterly Meetings beginning in January 2012. While there were only a handful of attendees in the beginning, the workshops – now the Task Force – grew to include representatives of more than 30 agencies, including all first responder disciplines as well as towing. “Word spread, and the more people who heard about it, the more people wanted to attend. It became a challenge to find a space big enough to hold all the participants,” said Sarah Burnworth, who coordinates the MTC’s Incident Management Program. Each quarterly meeting is hosted and chaired by a different discipline, and the agenda addresses current issues involving communication, training, data and performance measures, incident debriefs for major incidents that have occurred, and a unique “tours and demonstrations” feature in which attendees are invited to tour the host’s facilities (for example, the California DOT’s [Caltrans] Transportation Management Center, the California Highway Patrol dispatch center, etc.). There is also an opportunity for attendees to discuss new business and network.

Due to these quarterly TIM meetings, the responder and the planning communities have been able to identify some specific needs among responders, and a new series of targeted workshops is in the making. One need that has been identified is in the dispatcher community. As a result, MTC is working with Caltrans and the California Highway Patrol to coordinate a workshop where dispatchers from each discipline and jurisdiction in the region can meet to better coordinate the way they communicate and interact to respond to incidents. The first workshop for this group occurred in February 2013.

For inquiries related to the MTC Incident Management Program, or to learn more about how to develop a regional TIM forum, contact Sarah Burnworth at sburnworth@mtc.ca.gov.

Source: MTC web site and telephone interview with Sarah Burnworth, Incident Management Program Coordinator, Metropolitan Transportation Commission, December 27, 2012.

TIM collaboration, membership of the TIM Team (if one exists), who the champion(s) is/are within the TIM community, what the major goal is (which is likely to be safety), and what their current issues and needs are (including supplies and training). Information in each of these areas could become the talking points for first contact with TIM professionals. One of the greatest challenges for planners is establishing trust and buy-in from the TIM community. Creating trust takes time, but as an initial step the MPO may

seek out an ally among the TIM community, such as the State DOT, to serve as a champion for connecting TIM professionals and planners.

Planners are encouraged to go out and develop relationships one on one. Introducing oneself to incident responders can be best done over the phone or in person. Email is typically not the most effective way to initiate contact. When inviting TIM professionals to a meeting, let them know “what’s in it for them”

and how they can help you with the issues you are trying to address. Initially, planners should sit down with each agency, find a champion for this effort, and have a dialogue on what is hampering TIM operators' ability to get their jobs done as a way to develop a common understanding of what is important to each partner and how you may be able to advance TIM better together.

The role of metropolitan transportation planners is ideally situated for initiating contact with TIM professionals and involving them in the planning process. The MPO's role as convener, coordinator, and facilitator on any topic related to the transportation system creates a variety of opportunities to engage the TIM community. Topics of particular interest to the TIM community include real-time information on system operations, work zone locations and management, and location and scale of planned special events to name just a few. The objectives of responders are centered around reduced responder exposure time, reduced frequency of secondary incidents, and reduced incident response and clearance times. These are all consistent with transportation planners' and engineers' goals of improved safety and reliability, reduced delay, and reduced emissions. Meeting agendas that address any of these topics, objectives, goals, or outcomes may benefit from involvement of the TIM community.

One approach to reaching out and gaining the participation of local fire and other local TIM professionals is to enlist the help of the local departments of transportation that the MPO is already working with. The Genesee Transportation Council had success in asking the local DOTs that were already involved in the planning process to serve as "ambassadors" to their city and county counterparts at fire/EMS departments.

If a TIM Team is in place, it is because one or more champions have taken on the cause. Most often, the group is motivated by a primary purpose: safety for the responder. Requesting a meeting to discuss how to support improved responder safety would be welcomed by any TIM champion. A great deal of information will be gathered through this type of first contact because the TIM Team has already been organized, they know one another, they have defined a common goal, and they are aware of issues that impact their effectiveness.

Each organization within the TIM community has administrators, managers, and a field work force. Initial outreach by transportation planners to senior management or those responsible for their organization's public affairs would provide the appropriate opportunity to make introductions and discover ways to productively engage the organization. Informal one-on-one meetings with a few representatives from the TIM community should be sufficient to verify the initial network of contacts, a list of key leaders in the TIM community, current methods of interaction and coordination, and the strategic goals of the TIM community. Even these initial meetings provide an opportunity to inquire about existing issues and needs.

Organizations responsible for law enforcement and fire and rescue make particularly effective first contacts due to their on-site responsibilities involving traffic incidents. These organizations maintain relationships with virtually all TIM community members as well as with the State DOT and local transportation agencies. Therefore, initial meetings with a police chief and a fire chief would enable the transportation planner to provide an overview of the MPO's purpose and planning process and the mutual benefit that could be derived from TIM involvement. In return, the transportation planner would receive information on appropriate contacts within the TIM community and early ideas for how to initiate a coordinated engagement with TIM professionals.

Depending on the region, the DOT and law enforcement are normally the biggest players in operating the road. They are always a good place to start.

Time should be devoted to understanding the limitations each of these groups face in accomplishing their TIM mission. This may lead to one-on-one meetings with other professionals in the TIM community, again to understand what they do and what limitations they face. Methods of response sometimes differ and/or conflict among TIM providers, creating other challenges to be aware of. This fact-finding effort serves to educate the transportation planning professional and help them prepare for subsequent group meetings with the TIM community. Planners can also learn more about the issues facing TIM

professionals by co-training with the TIM community. Staff members at the Delaware Valley Regional Planning Commission co-train with TIM professionals in the region to gain a better understanding of TIM needs and to build trust and credibility with the TIM community.

These early contacts could lead to the creation of an informal working group of transportation planners and TIM leaders that recognize the potentially significant benefit derived through collaboration. As early champions, their efforts would be devoted to outreach, education, and promotion of involvement and arranging an engagement process.

Connecting with Metropolitan Transportation Planners as a TIM Professional

When reaching out to transportation planners and the staff of an MPO, it is helpful to know some basic information about the job of a transportation planner and how TIM can support the planning effort. Local, regional, and statewide transportation planners are responsible for preparing and updating near-term and long-range plans to systematically maintain and improve the transportation system. These plans can improve the safety and efficiency of the current system while at the same time providing incremental capacity increases to accommodate anticipated population growth in the planning area.

Every 4 to 5 years, MPOs are responsible for developing or updating the region's transportation plan for the next 20 or more years. The regional investment program—in which funds are allocated to transportation projects—is updated every 1 or 2 years with a 4 to 5 year horizon. For a project to be funded in the regional investment program, it must either be consistent with or included in the long-range plan.

TIM is considered an important strategy to promote safe and efficient transportation systems

management and operations, so one of the best contacts at an MPO for the TIM community would be the **planner in charge of transportation systems management**. Another good contact would be the **planner in charge of intelligent transportation systems (ITS) planning**, since ITS such as closed-circuit television (CCTV) cameras and variable message signs are used to facilitate TIM and are often used by TIM responders.

Alternatively, in regions with a population greater than 200,000, **the staff member responsible for the congestion management process** would be a prime contact for the TIM community because TIM is a significant tool for reducing congestion. For some MPOs, the person in charge of the congestion management process or planning for ITS or operations can be identified from the MPO website. In other regions, those roles may be minor and difficult to determine from the website. In that case, in medium-sized or smaller regions, making initial contact with the **director of transportation planning** or the **MPO director** would be most useful. In smaller MPOs, there may be only one staff person handling Transportation Systems Management and Operations (TSM&O) planning, ITS planning, and the CMP, which may be an advantage as this person can serve as a focal contact and may even become a champion for TIM on the planning side.

At first contact, the TIM professional should be ready to explain his or her interest in working with the MPO to help advance TIM in the region, which will help reach regional goals of safety, air quality improvement, and reliable travel. The TIM professional could request an initial one-on-one meeting or invite the MPO planner(s) to a meeting of TIM operators. During the meeting, one of the TIM champions should provide basic information on TIM priorities and needs and ask the MPO planner to provide some information on the planning process. As an additional step, a TIM champion could make presentations to the MPO board to make the case for funding for specific needs such as interagency training, crash investigation equipment, and other items. Human interaction is critical in making this connection, so it is very important to find a liaison or champion willing to lead the effort who has great inter-personal skills, cares about the effort, has energy, and wants to do it.

Human interaction is critical in making this connection, so it is very important to find a liaison or champion willing to lead the effort who has great inter-personal skills, cares about the effort, has energy, and wants to do it.

Case Study: SEMCOG's Annual TIM Partnering Workshops Promote Regional Transportation Operations in Michigan

The Southeast Michigan Council of Governments (SEMCOG) has been involved with the TIM community since it adopted the Metropolitan Detroit Traffic Incident Management Committee in 2005, when SEMCOG participated in an FHWA-sponsored Regional Concept for Transportation Operations (RCTO) initiative designed to outline broad objectives to improve regional transportation operations. As a result of the RCTO process, the TIM committee merged with SEMCOG's Regional Transportation Operations Coordinating Committee. Since then, the organization has hosted seven annual TIM Partnering Workshops for Regional Transportation Operations.

Participants at these workshops include staff from the Michigan DOT, Michigan State Police, local police and fire departments, County Road Commissions, Metropolitan Planning Organizations, Universities, private engineering consulting companies, and many others. The one-day workshops are designed primarily to enable practitioners and planners alike to improve their understanding and appreciation of the goals and roles of each responder group at an incident scene to facilitate safe, quick clearance. The workshop also serves as a progress report on the region's efforts to respond to traffic incidents in a way that protects the safety of both travelers and responders and reduces travel delay for people and goods. Planners and practitioners are encouraged and expected to continue the collaborative efforts currently underway and to focus on working together more closely in the future.

Source: Southeast Michigan Council of Governments, Regional Operations website.

http://www.semco.org/RegionalOperations_Wkshop13.aspx

Opportunities to Engage the TIM Community

Early engagement of the entire TIM community may best be accomplished through a meeting hosted by the MPO or co-hosted with the TIM Team champion. This first meeting allows participants to introduce themselves and briefly describe their role in TIM. The transportation planner could provide an overview of the purpose of regional planning and emphasize how the planning process provides a resource to help the TIM community improve their performance. Core discussion content could include the identification of current issues and needs that adversely impact each participant's performance.

A desired outcome of this initial TIM community engagement is the identification of individuals who would commit further time to investigating effective ways to achieve sustained involvement of TIM professionals in the transportation planning process. It is useful to remember that like planners, responders are used to working with other agencies and often across jurisdictions during incident response. This commonality will help facilitate any working group's efforts to determine effective ways to involve TIM in

the transportation planning process and identify key individuals who might best be suited to the particular forms of involvement.

An optional approach to early engagement could be to select a particular situation, such as an upcoming special event or major construction project, to convene a meeting that includes TIM representatives alongside those responsible for planning and implementing the event/project. Provisions for emergency response, rapid ingress/egress, design for vehicle accommodation and staging, and command locations and coordination are all topics of concern to TIM representatives, and their input would benefit those responsible for the event/project. This type of first-hand experience of collaboration and coordination would serve as the foundation for promoting regular interaction and involvement.

"When you get there, explain the process of planning, explain that you're there to help. Ask where are responders having issues, where do they have needs, and what can we do to help you with that. The key is to come in as a resource."

—Gary Milsaps, former director of Georgia DOT's Highway Emergency Response Operators Program

Involving the TIM Community in Planning

Regional and statewide transportation planners must operate in a fairly structured cycle of planning activities in order to meet certain State and/or Federal requirements. The “planning process” creates various committees that would benefit from occasional or regular participation by TIM professionals, such as:

- **Standing Committees** – Many planning agencies have standing committees that provide technical or policy guidance in the development, implementation, and monitoring of the long-range transportation plan. Since these meetings are open to the public, TIM professionals would be welcome at any time. However, inviting TIM representatives at the beginning of the new planning cycle (as a means of introducing them to the entire process) or during plan implementation/monitoring (as a means of highlighting the value of coordination) may prove particularly productive.
- **Special Committees** – A growing number of MPOs and State DOTs have or are establishing committees (or subcommittees) with a particular focus on improving transportation system safety and efficiency through more effective management and operation. Such a committee would immediately benefit from direct involvement of TIM professionals, to the point where standing membership would be practical. Agendas for these committees are such that TIM professionals could be easily integrated at virtually any time.
- **Task Forces** – Some plan updates produce strategic initiatives that rely on a task force to investigate and make recommendations. Initiatives that involve such things as safety, reliability, emissions, delay, and/or system management and operations would likely benefit from including TIM professionals as members.

Some MPOs find it useful to host an ongoing group or team devoted to advancing TIM. For example, Delaware Valley Regional Planning Commission (DVRPC) manages several TIM task forces for its region, each focused around a different corridor. A planner from DVRPC noted that keys to the success of these teams were to allow the TIM community to take ownership of the group and elect a chair or co-chairs from two different disciplines. The groups rotate meeting locations so that each organization has the opportunity to introduce the team to their facilities and equipment.

Sustaining the interest and involvement of TIM responders beyond the State highway patrol/police and the DOTs involves capitalizing on early, quick wins to demonstrate that the MPO and the State DOT want to be involved in and promote TIM. DVRPC has successfully supported multiple TIM teams in its region since 1999, and their staff report that one of the first activities of the TIM teams was to ask the members about their needs and issues. DVRPC learned that ramp signing at interchanges was a major issue for a few of the groups. It was a relatively low-cost need that would have significant benefits for the responders in locating and responding to incidents. DVRPC worked with the New Jersey DOT and Pennsylvania DOT to create enhanced ramp designation signs and plan their placement at interchanges.

Recognizing and learning from the unique and valuable expertise that each TIM partner contributes to the success of safe, quick incident clearance is another method to engage and keep a variety of TIM partners at the planning table. For example, in Atlanta, Georgia, the Traffic Incident Management Enhancement (TIME) Task Force leaders capitalized on the specialized expertise that regional towing professionals have in crucial clearance activities such as heavy equipment removal; now, towers provide training on this to other task force members.

In many cases, initial involvement of TIM representatives from the DOT, law enforcement, and/or fire and rescue will immediately activate the biggest players in TIM operations and management. They are likely to be in positions to attract the involvement of others in the TIM community and have ideas of when and how to achieve that involvement.

A challenge faced by planners in engaging the TIM community in planning is a high turnover rate of first responders and especially state police representatives. Establishing and maintaining an ongoing TIM committee allows the new members to be more easily brought in. In addition, a one-on-one meeting with the new member and the leader of the TIM committee can be an effective way to introduce him or her to the collaborative effort.

What Can Be Accomplished?

Direct involvement of TIM professionals in the overall metropolitan transportation planning process will lead to accomplishments at many levels.

MPO Board Members, Elected Officials, & Community Leaders – These groups will understand more fully and more clearly (1) how TIM professionals support the safe, efficient, and reliable operation of the transportation system and (2) how the investment decisions they make can cost-effectively improve the safety and effectiveness of TIM professionals for the benefit of all users and the environment.

Partnering Agencies and Other Providers – Members of technical committees and/or subcommittees will establish or reinforce direct relationships with TIM representatives and determine more effective ways to communicate and coordinate. Their technical work in identifying existing and future transportation needs (e.g. safety, connectivity, reliability, redundancy, predictability, capacity) will broaden to include TIM perspectives on system management and operations. The integration of TIM-related elements into planned projects and programs will lead to greater returns on the investments being made. Opportunities to enhance user and responder safety, decrease non-recurring delay, and improve air quality will expand, as will the ability to monitor and measure progress toward performance goals and objectives associated with these benefits.

Stakeholders and the General Public – These groups will achieve a heightened sense of awareness of the risks faced, services provided, and benefits derived from TIM responders. As an informed electorate, they will have a deeper understanding of the value derived from investments made to provide, train, equip, and coordinate TIM functions. By extension, they will be the direct benefactors of these investments, particularly the economic and societal benefits associated with faster emergency response times, decreased delay, lower fuel consumption, and reduced emissions.

The TIM Community – Their participation will lead to more effective communication and coordination among themselves and with partnering agencies, other providers, and elected officials. A greater sense of interdependence will evolve among these partners. Their needs will be better understood and attract funding and political and community support for effective solutions. The safety of first responders will be improved as a result of reduced clearance times, which will decrease the exposure of on-scene personnel to the dangers of the roadway, such as being struck or injured in secondary incidents.

The Transportation System and the Environment – Transportation planning organizations are operating in an era of significant financial constraint, even as issues of increasing congestion and worsening air quality continue in our urban areas. Congestion produced by non-recurring delay is a significant societal challenge in our metropolitan areas. Investments in TIM strategies have proven to be highly effective in reducing non-recurring delay, crash frequency and severity, and first responder exposure. Many of these investments are low-cost and produce high rates of return.

Integrating TIM into Transportation Planning

Integrating TIM in the Development of the Metropolitan Transportation Plan

Metropolitan transportation planning is a vision and goal-driven process. Elected leaders, major providers of transportation facilities and services, and key user groups gather together and, with public input, go on to shape a vision of the future and establish goals that help describe that vision.

The entire planning process is meant to frame how an area will grow (or change) and how agencies will meet the resulting near-term and long-range transportation demands. The development of the metropolitan transportation plan generally follows the five-step process defined in the diagram below.



Figure 2. Five-step process generally followed in developing a metropolitan transportation plan.

There are opportunities for TIM professionals to influence and provide input at each of these steps. Even before this process begins, TIM professionals should be involved at the committee or task force level of the MPO to provide input on TIM priorities, needs, and possible strategies that could be funded through the planning and investment decisionmaking process at the MPO.

One of the most effective ways for the TIM community to have input ready for the development of the metropolitan transportation plan is to coordinate with the MPO to develop an operations or TIM-focused strategic plan that presents a comprehensive vision for TIM (or overall operations) in the region and measurable objectives, performance measures, and action items/strategies for reaching those objectives. Then, when it is time to develop or update the metropolitan transportation plan, the TIM community has documented and collaborative input that can be woven into the planning process to support regional mobility, safety, and environmental goals.

Guidance

Visioning – Elected officials and community leaders are often called upon to provide a vision for the future of the region. High-level officials from within the TIM profession could serve an advisory role and provide key insights to this visioning process. A respected TIM official from within the community can readily serve as a TIM champion to virtually any MPO Board or other leadership group responsible for developing the vision.

Setting Goals and Objectives – Setting meaningful goals and objectives that tie directly to the vision and lead to desirable plan solutions is always a challenge. Crafting goals that are specific and developing supporting objectives that are measurable can also be difficult. Senior managers from within the TIM community (TIM Leaders) would be very effective contributors to this effort. TIM professionals are mission-driven and experienced drafters of goals and objectives that support more effective transportation system management and operations. TIM Leaders working alongside other local, regional, and State leaders will establish a mutually agreeable set of goals that define what the Plan is to accomplish. TIM Leaders can be expected to show strong support for goals focused on transportation system safety and efficiency.

Advocating for measurable TIM-related objectives requires linking regional goals in areas such as mobility, safety, and the environment to TIM priorities (responder/traveler safety and minimal incident clearance times). These priorities easily translate into strategic, measurable objectives and targeted performance measures that are mutually agreed to by those responsible for developing the Plan and their partnering agencies.

Current and Future Issues

Identifying Existing Needs – TIM professionals have a unique and valuable perspective on the transportation system; they see how and why it works and why it fails. They often see needs (physical and operational) that planners and engineers may not be aware of. As a group, they also have their own needs (e.g., better awareness, communications, and coordination) that would improve their safety and performance, which (in turn) would benefit virtually all users, providers, and the system as a whole.

Mid-level TIM managers and field supervisors would find involvement in such activities to be very productive and potentially fruitful in getting TIM needs met.

Potential and Preferred Solutions

Solving Near-Term and Long-Term Transportation Issues – TIM professionals can bring a variety of techniques (or strategies) to bear that will support and help accomplish the objectives set forth by the MPO. Issues of non-recurring delay, system reliability, traveler safety, worker and responder safety, energy efficiency, and emissions can all be addressed with great effectiveness using TIM techniques.

Oftentimes, from the planners' perspective, existing problems may appear to be difficult to solve with low-cost (affordable) solutions that can be rapidly deployed. However, within the TIM community, low-cost solutions have often come about due in part to limited resources. Field-tested TIM managers are trained problem-solvers; they focus on increasing responder and victim safety, reducing clearance times and exposure to secondary incidents, and minimizing delay and emissions. They make for great collaborators in developing effective solutions that produce triple bottom line benefits.⁷

⁷ A "triple bottom line" expands the traditional performance reporting framework to take into account not just financial performance but also social and environmental performance as well.

Case Study: DVRPC Surveys TIM Practitioners to Identify Regional Priorities

DVRPC's TIM Program is integrated into the MPO's planning processes through the long-range plan, the congestion management process, and the Transportation Operations Master Plan. The Transportation Operations Master Plan is a component of DVRPC's adopted 2035 long-range plan and was developed in cooperation with DVRPC's Transportation Operations Task Force, which is composed of traffic, transit, and emergency responders in the region.

As part of the Transportation Operations Master Plan planning process, DVRPC surveyed not just county planners and transportation operations center staff, but also county 9-1-1 center personnel, State police officers, local emergency responders, and others for their inputs on regional transportation priorities. Because members of all the region's incident management task forces were surveyed, emergency response personnel represent the largest number of the respondents, and their interests greatly influenced the Master Plan. These survey results became a central factor in the Plan's goals and objectives as well as its projects and programs. An interesting, high-priority program that was recommended in this plan is DVRPC's "Incident Management Grant Initiative." The intent of the initiative would be to issue small-scale grants, \$70,000 per year in total, to local responders and county 9-1-1 centers to purchase equipment for highway incident management. Eligible projects could include traffic control equipment, detour route and reference location sign implementation, communications equipment for interagency operability, traffic signal power interrupt devices, and training courses. This is envisioned to be a competitive program that would be structured in a way to foster greater interagency cooperation. The initiative is gaining support, but is currently not funded.

Source: DVRPC, Transportation Operations Master Plan, July 2009,
<http://www.dvrpc.org/reports/09049.pdf>

Cost Feasible Plan

TIM officials and managers can provide important input on the cost over time for TIM improvements as well as provide input on the priorities of TIM-related projects and programs that will help achieve TIM objectives.

Implementation and Monitoring

TIM professionals are implementers, paying close attention to performance and striving for improvement because their lives depend on it. They collect data and generate performance reports to support performance evaluations and target areas for continued improvement. Because of this, the TIM community can be very supportive in implementing and monitoring solutions, often collecting data that may support the monitoring process. Collaborating with the TIM community during preliminary and final plan design provides opportunities for project refinements that meet the needs of responders at little or no additional cost. Coordinating with them in advance of construction projects can improve work zone safety, expedite construction, and reduce delay and emissions. Again, the TIM Professionals can readily support the collaboration and coordination, while TIM Managers can be sources of valuable data for monitoring progress toward mutually beneficial goals and objectives.

Regional TIM Priorities and Performance Measures

Establishing specific objectives for TIM and related performance measures within the context of the metropolitan transportation plan is an important step in advancing TIM needs and strategies in the plan. The objectives and performance measures selected for the plan will help guide the selection of projects and programs to be funded for years into the future. Depending on the region, the metropolitan transportation plan may include objectives related to higher level outcomes, such as reliability and non-recurring congestion, and then reference an operations or TIM-focused plan for more objectives and performance measures that directly support the higher level outcomes.

As mentioned earlier, some regions go into more detail on operations strategies, such as TIM, for a separate operations or ITS plan that feeds into the overarching metropolitan transportation plan. For examples of this, see Portland Metro's Transportation Systems Management and Operations Plan and DVRPC's Transportation Operations Master Plan. Supporting objectives and performance measures in the metropolitan transportation plan that are directly impacted by TIM strategies such as reliability and non-recurring delay/congestion will help to advance TIM as a solution in the overall planning process.

Case Study: Portland Focuses on Performance Measurements to Gauge Investments

The Portland Metro's 2035 Regional Transportation Plan (RTP) outlines the use of a performance measurement system that evaluates investments in the transportation system to determine whether they have achieved the desired outcomes and provided the best returns. The evaluation element of the RTP performance measurement system comes into play every 4 years, during the periodic plan update cycle. During these updates, the region revisits its goals and objectives for the transportation system and develops and refines an investment strategy. In previous RTPs, the success of the investment strategy was measured narrowly, considering whether the plan met vehicle level of service standards and mode share targets for walking, bicycling, transit use and shared ride. The performance measurement system introduced with the 2035 RTP update adopts an outcomes-based performance evaluation and substantially broadens the performance measures applied to track how well the investment strategy addresses the full set of goals for public investments, including incident-related delay. One of the plan's stated performance measures is "average incident duration on the throughway system."

Source: Portland Metro, 2035 Regional Transportation Plan,
<http://www.oregonmetro.gov/index.cfm/go/by.web/id=25036>

The Regional TIM Planning Sheets in Appendix A of this primer provide a large sample of TIM objectives, performance measures, and data needs that can be consulted when selecting TIM objectives for the reader's region. In addition, there are TIM goals, objectives, and performance measures that have been proposed at the national level that may provide a starting point for regions just beginning to define specific TIM objectives.

For example, the National Unified Goal contains three objectives that could be transformed into specific, measurable statements and included as objectives in a transportation plan. The objectives of the National Unified Goal are:

- Responder safety;
- Safe, quick clearance; and
- Prompt, reliable, interoperable communications.

Responder safety is readily supported by all organizations involved with planning and providing transportation facilities and services. It directly links to any goal related to transportation system safety. Rapid, safe clearance of incidents is an objective that directly supports the goals of transportation system efficiency and regional air quality. A central function of every MPO is to foster and support interagency cooperation, coordination, and communication. Similarly, the success of TIM professionals depends on effective communication. An objective regarding prompt, reliable, and interoperable communications could lead to the

identification of several communications infrastructure improvements with multiple benefits that extend to other transportation providers and operators as well as the traveling public.

As part of a Federal Highway Administration (FHWA) initiative, 11 States reached consensus on three objectives and related performance measures for their TIM teams (Table 1). These objectives could be easily converted into targeted, time-bound objectives and used in a metropolitan transportation plan or related operations plan.

In June of 2008, a TIM working group in Hampton Roads, Virginia, hosted by the Hampton Roads Transportation Planning Organization and the Virginia DOT, formalized the Hampton Roads Regional Concept for Transportation Operations – Traffic Incident Management (RCTO-TIM). The RCTO-TIM, developed by a multi-agency, multi-disciplinary group of transportation planners, operators, and public safety professionals, established a mutual set of objectives, performance measures, and actions to advance TIM in the region. Since the development of the RCTO-TIM, TIM performance measures have been tracked by the Virginia DOT, and funding has been provided through the MPO's transportation improvement program for the purchase of TIM-related equipment. The following diagram shows the TIM objectives and performance measures in the Hampton Roads' RCTO-TIM.

Table 1. TIM program objectives and performance measures developed through the FHWA Focus States Initiative.⁸

Consensus-based, Program-level TIM Performance Measures Developed by Focus States	
TIM Program Objectives	Related Performance Measures
Reduce "Roadway" Clearance Time	Time between first recordable awareness of incident by a responsible agency and first confirmation that all lanes are available for traffic flow.
Reduce "Incident" Clearance Time	Time between first recordable awareness of incident by a responsible agency and time at which the last responder has left the scene.
Reduce the Number of Secondary Crashes	Number of unplanned crashes beginning with the time of detection of the primary incident where a collision occurs either a) within the incident scene or b) within the queue, including the opposite direction, resulting from the original incident.

Examples of How TIM has been Integrated into the Transportation Plan

Although there typically is no "chapter" on TIM in a metropolitan transportation plan, there should be evidence of TIM-related considerations in any plan prepared by an organization that has been deliberate about including TIM professionals and incorporating TIM needs into the planning process. Plans that address TIM needs could include:

- Goals that address the management and operation of the transportation system, travel time reliability, non-recurring congestion, air quality, and safety.
- Objectives and performance measures that focus on non-recurring delay/congestion, reliability, secondary incidents, responder safety, or incident clearance time.

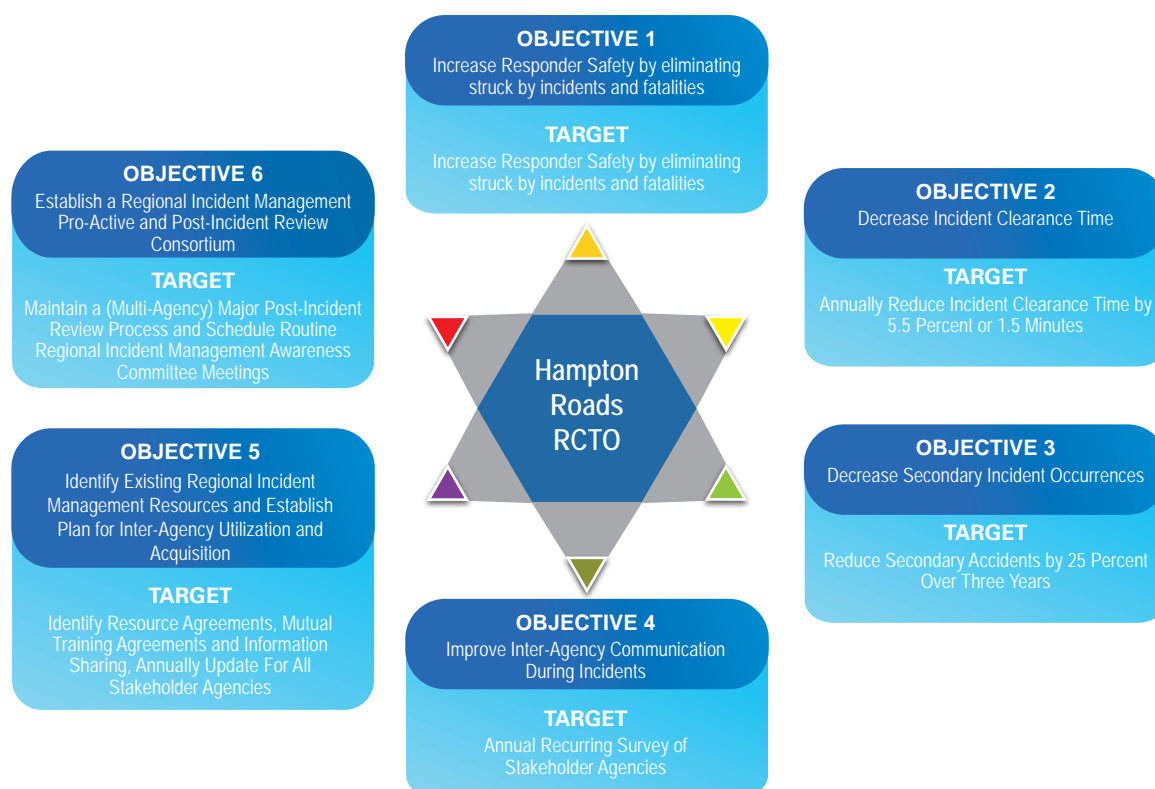


Figure 3. Hampton Roads' objectives and performance targets for the region's regional concept for transportation operations (RCTO). Source: Hampton Roads Transportation Planning Organization.⁹

⁸ Federal Highway Administration, Focus States Initiative: Traffic Incident Management Performance Measures Final Report, December 2009, Publication Number: FHWA-HOP-10-010. Available at: <http://www.ops.fhwa.dot.gov/publications/fhwahop10010>.

⁹ 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 July 22, 2013.

- *Strategies* that employ TIM capabilities to meet a regional need as an alternative to other approaches or in concert with complementary efforts.
- *Programs/Projects/Actions* that serve as evidence of a commitment to support and advance TIM.

Evidence that TIM is incorporated in the planning process may include:

- *Leadership* in the form of a TIM representative as an advisor or ex-officio member of the policy committee or regional planning board.
- *Collaboration* through on-going involvement of TIM professionals in committees, subcommittees, or task forces devoted to improving the management and operation of the transportation system.
- *Coordination* through the involvement of TIM professionals in monitoring, data sharing, reporting, and debriefing.

At the strategic level, TIM may have its most logical connection to the efforts each region devotes to efficient transportation system management and operation. Groups that are dedicated to this aspect of transportation system performance share a great deal in common with TIM professionals. Some regions have advanced TSM&O to a stage where it warrants its own planning document and committed level of funding.

Other groups, with a focus on congestion management and/or on transportation safety, would benefit from regular engagement with TIM professionals. Again, some regions may make such groups responsible for a Congestion Management Plan or a Regional Safety Plan. Either or both of these types of plans may have dedicated funding that establishes them as a program, with the committee producing the annual list of investments to make.

Examples of components from metropolitan transportation plans that demonstrate the incorporation of TIM are given below for each type of “evidence” that may be included.

Regional Goals that can be Directly Effected by TIM

The 2040 Regional Transportation Plan for the Pima Association of Governments, which includes Tucson, Arizona, includes eight goals, one of which is directly supported through TIM: “System Performance: Unobstructed mobility through efficient system

management, preservation and operations.” To support this goal, TIM is one of the areas emphasized in the plan’s congestion management process.

The Denver Regional Council of Governments 2035 Metro Vision Regional Transportation Plan also includes TIM improvements and contains an air quality goal that can be directly supported by TIM, “Reduce the annual per capita greenhouse gas emissions from the transportation sector by 60 percent by 2035.” The plan includes a policy that is also supportive of TIM and other operations strategies: “Policy #4. Management and Operations. Make the best use of existing and future transportation facilities by implementing measures that actively manage and integrate systems to optimize system performance and safety, provide accurate real-time information, reduce the demand for single-occupant motor vehicle travel, and reduce per capita Vehicle Miles Traveled.”

TIM-related Objectives and Performance Measures

Objectives and performance measures relevant to TIM can be found integrated into the overall objectives and performance measures of the metropolitan transportation plan or specifically included in operations or ITS strategic plans that are linked to the metropolitan transportation plan. TIM objectives and measures may also be included in the congestion management process component of the metropolitan transportation plan. Below are three examples that illustrate each case.

The 2035 Regional Transportation Plan Update developed by the Madison, Wisconsin, metropolitan planning organization and its planning partners includes several TIM-specific performance measures and objectives in the form of performance targets in the congestion management process portion of the plan. These objectives lead to the recommendation of TIM strategies and projects in the plan.

The performance measures, threshold goals, and monitoring schedule from the Madison plan are shown in table 2.

The Southwestern Pennsylvania Commission (SPC) included objectives and performance measures explicitly for TIM in its 2011 Regional Operations Plan. A specific TIM objective contained in the Regional Operations Plan 2011 is: “Manage and coordinate incident and emergency response activities.” Performance measures relevant for TIM include:

Table 2. Performance measures and targets from the Madison, Wisconsin area’s metropolitan transportation plan.

Performance Measure	Threshold Goals	Monitoring Schedule
Freeway Non-Recurring Congestion	70% of non-recurring congestion should not last longer than 30 minutes	Selected corridors beginning in 2013
Freeway Incident Index	Total lane-hours of closure/average weekday < 2.0	Requires data tabulation beginning in 2012
Urban Arterial Street Travel Time Index	1.75 (traffic speeds on 30-40 mph roadways should not experience incident-related speed reductions of more than 30 percent)	Selected corridors beginning in 2013
Urban Arterial Street Non-Recurring Delay	Incident clearance average < 1 hour	Requires data tabulation beginning in 2012
	Special Event traffic management plans in place for all events	Currently Implemented

“Percent of traffic signals equipped with emergency vehicle preemption” and “Mean & median incident clearance times.”

In the Genesee Transportation Council’s metropolitan transportation plan, a performance measure for TIM is integrated into the set of performance measures used to address all aspects of transportation system performance. This plan is used as a sample plan incorporating TIM in the next chapter.

DVRPC is gathering operations data to compare incident duration times along corridors where TIM teams currently exist. Preliminary results suggest that the

longer TIM teams have been meeting, the shorter the average incident duration times in those corridors compared to corridors where TIM teams have more recently formed.

TIM Strategies

The examples below illustrate the inclusion of TIM strategies into metropolitan transportation plans.

The Pima Association of Governments 2040 RTP includes a significant discussion of TIM and a recommendation for a formal TIM team as one of its plan implementation strategies:

Case Study: PAG Aims to Increase Safety through TIM

Safety was identified as a top concern by the public during planning for the 2040 RTP, and more than 10 implementation strategies are dedicated to the topic, including TIM. Traffic incidents, such as crashes, stalled vehicles, traffic stops, roadway debris, weather events, construction and special events, are estimated to cause nearly 60 percent of the total delay experienced by motorists in the United States. Traffic congestion caused by these incidents affects the safety and mobility of all travelers.

TIM is an effective transportation improvement program that works to reduce the effects of incident-related congestion. Incident management detects incidents when they occur, reducing the time for responding vehicles to arrive and the time required for traffic to return to normal conditions. Many public sector and private sector partners are involved in traffic incident management, but it is not a core function of any agency. The 2040 RTP Implementation Strategies encourage the jurisdictions and private sector partners to establish a formal traffic incident management program in order to better coordinate the operations and responses of the many entities involved, including first responders and police.

Source: Pima Association of Governments, 2040 Regional Transportation Plan, <http://www.pagnet.org/programs/transportationplanning/2040regionaltransportationplan/tabid/809/default.aspx>

The 2040 Regional Transportation Plan for the Ohio-Kentucky-Indiana Regional Council of Governments includes TIM strategies in both the congestion management process and ITS components. The plan recommends “Implementation of the State’s Transportation Operations Infrastructure Plan” and the “Development and implementation of an enhanced Regional Incident Management Plan.”

TIM Programs/Projects/Actions

The 2040 RTP for the Ohio-Kentucky-Indiana Regional Council of Governments also includes specific TIM projects with estimated costs as part of the cost feasible portion of the plan. These projects are taken from the ITS architecture and strategic plan for the region and incorporated into the plan. Below is a table from the RTP highlighting several TIM-related projects, such as emergency vehicle signal priority, increase service patrols, and additional freeway message signs.

Regional Investment in TIM

When TIM is understood as a core element of providing a safe, efficient, and more sustainable transportation system and included in the metropolitan transportation plan, elected officials, regional leaders, and citizens respond with support for TIM investments. TIM investments may come from a variety of sources, such as operating agency budgets, but all TIM investments for the region that receive Federal funds must be included in the MPO’s transportation improvement program (TIP). The MPO updates the TIP at

least every 4 years to identify those projects or strategies from the metropolitan transportation plan that it plans to undertake in the next 4 years. TIM projects may be eligible for Federal funding through several different funding programs described in the table at the end of this section.

Regional investments that can benefit TIM vary widely. Some investments may meet a specific TIM need (e.g., TIM training, specialized first responder equipment) that is only of direct benefit to TIM professionals. Other investments may, in fact, be motivated by a need that is seemingly unrelated to TIM, but still provides direct benefit to the TIM community.

Listed below are some examples of regional investments that benefit TIM:

- **Towing Recovery Incentive Program** – Paying an incentive to towing companies when an incident is cleared within an established timeframe (e.g., 90 minutes). Such a program could be implemented as a pilot to prove its effectiveness, possibly for the more complex incidents (e.g. crashes involving trucks, heavy vehicles, hazardous materials, etc.).
- **Training, Materials, and Supplies** – Establishing or expanding a “joint response” training program, keeping it updated, and delivering it frequently enough to keep field personnel current in established response methods.
- **ITS** – Investments in technology to detect, measure, and visually monitor incidents and to improve the speed, accuracy, and reliability of communication.

Table 3. TIM-related projects listed in the Ohio-Kentucky-Indiana Regional Council of Governments’ regional transportation plan.

Project	Cost
Traveler information on Cincinnati parking facilities – Variable Message Sign, mobile or on-board notifications	\$1,250,000
Transit Automated Vehicle Locator system	\$450,000
Work zone safety improvements	\$75,000
I-75 and I-471 ramp metering	\$6,000,000
Bus signal priority along key transit corridors	\$800,000
Emergency vehicle signal priority	\$800,000
Increase service patrols	\$1,600,000
Transit vehicle updates including electronic fare boxes and real-time passenger count	\$3,000,000
Additional ARTIMIS message signs (I-74, I-275 and SR 32)	\$1,650,000
Total	\$15,625,000

Source: Ohio-Kentucky-Indiana Regional Council of Governments, 2040 Regional Transportation Plan, June 2012.¹⁰

¹⁰ Available at: <http://www.oki.org/departments/transportation/2040.html>.

tions for a particular component of the transportation system (e.g., freeways, arterials, transit-ways) may be a sought-after investment by a local or State DOT. Such information and technology would be of significant benefit to TIM professionals.

- **Incident Management Equipment** – Equipment needs can range from traffic cones and flares to specialized towing and recovery vehicles to protective gear for first responders. Each type of investment contributes to responder or traveler safety, improved clearance time, system reliability, and reduced delay and emissions.
- **Collaboration and Coordination** – Staff time devoted to supporting not only the planning process, but the ongoing efforts to coordinate communications, actions, and follow-up improves the efficiency of each organization involved with the transportation system and its performance.
- **Highway/Freeway Vehicle Pullouts and Turn-arounds** – These facilities may be called for as a part of improvement projects to support improved maintenance and/or policing. Such facilities can also be of significant value to TIM professionals, if properly located to support rapid response for road assistance programs and/or towing assistance to incidents.

- **Highway Service Patrols** – Assist with incident scene management and quick clearance activities and deal with minor incidents (e.g., flat tires, vehicles out of gas, etc.) to help free up State DOT, law enforcement and emergency services resources and to reduce delay associated with minor incidents. Highway Service Patrols are cost-effective because they can leverage private resources through sponsors such as insurance companies.

Obtaining and maintaining funding for TIM is a significant challenge. This may be addressed through marketing the benefits of the existing TIM investments or efforts, such as documenting the benefits of using a TIM-related monitoring system at a high-profile event. Regions frequently have difficulty successfully competing smaller-scale TIM projects with other larger projects. Some MPOs, such as DVRPC, use their planning funds to support TIM with short-term mapping projects, conference hosting, and TIM training.

Table 4. Description of Federal funding programs that may support TIM-related activities.

Federal Funding Program	Purpose	Sample of Eligible Activities Related to TIM
Congestion Mitigation and Air Quality Improvement Program (CMAQ)	Provides a flexible funding source to State and local governments for transportation projects and programs to help meet the requirements of the Clean Air Act. Funding is available to reduce congestion and improve air quality for areas that do not meet the National Ambient Air Quality Standards for ozone, carbon monoxide, or particulate matter (nonattainment areas) as well as former nonattainment areas that are now in compliance (maintenance areas). ¹¹	<ul style="list-style-type: none"> • Projects that improve traffic flow, including projects to improve signalization, construct HOV lanes, improve intersections, add turning lanes, improve transportation systems management and operations that mitigate congestion and improve air quality, and implement ITS and other CMAQ-eligible projects, including projects to improve incident and emergency response or improve mobility, such as real-time traffic, transit, and multimodal traveler information. • Purchase of integrated, interoperable emergency communications equipment.¹²

¹¹ FHWA, MAP-21 Fact Sheets – Congestion Mitigation and Air Quality Improvement Program. Available at: <http://www.fhwa.dot.gov/map21/cmaq.cfm>.

¹² Ibid.

Federal Funding Program	Purpose	Sample of Eligible Activities Related to TIM
Highway Safety Improvement Program (HSIP)	To achieve a significant reduction in traffic fatalities and serious injuries on all public roads, including non-State-owned public roads and roads on tribal lands. A highway safety improvement project is any strategy, activity or project on a public road that is consistent with the data-driven State Strategic Highway Safety Plan (SHSP) and corrects or improves a hazardous road location or feature or addresses a highway safety problem. ¹³	<ul style="list-style-type: none"> • Installation of a priority control system for emergency vehicles at signalized intersections. • Collection, analysis, and improvement of safety data. • Planning integrated interoperable emergency communications equipment, operational activities, or traffic enforcement activities (including police assistance) relating to work zone safety.¹⁴
National Highway Performance Program (NHPP)	To support the condition and performance of the National Highway System (NHS), for the construction of new facilities on the NHS, and to ensure that investments of Federal-aid funds in highway construction are directed to support progress toward the achievement of performance targets established in an asset management plan of a State for the NHS. ¹⁵	<ul style="list-style-type: none"> • Operational improvements of NHS segments, which include capital improvements for installation of traffic surveillance and control equipment, computerized signal systems, motorist information systems, integrated traffic control systems, incident management programs, and transportation demand management facilities, strategies, and programs.¹⁶ • Capital and operating costs for traffic and traveler information, monitoring, management, and control facilities and programs. • Infrastructure-based ITS capital improvements.¹⁷
Surface Transportation Program (STP)	Provides flexible funding that may be used by States and localities for projects to preserve and improve the conditions and performance on any Federal-aid highway, bridge and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects, including intercity bus terminals. ¹⁸	<ul style="list-style-type: none"> • Operational improvements for highways. • Capital and operating costs for traffic monitoring, management and control facilities and programs, including advanced truck stop electrification. • Infrastructure-based ITS capital improvements.¹⁹
Metropolitan Planning	Establishes a cooperative, continuous, and comprehensive framework for making transportation investment decisions in metropolitan areas. ²⁰	Planning funds may provide for MPO staff support for TIM training, coordination, regional TIM guideline development, minor studies, and other staff activities to support regional TIM programs.

¹³ FHWA MAP-21 Fact Sheets – Highway Safety Improvement Program. Available at: <http://www.fhwa.dot.gov/map21/hsip.cfm>.

¹⁴ USC, Title 23 Section 148. Highway safety improvement program. Available at: <http://www.fhwa.dot.gov/map21/legislation.cfm>.

¹⁵ FHWA, MAP-21 Fact Sheets – National Highway Performance Program. Available at: <http://www.fhwa.dot.gov/map21/nhpp.cfm>.

¹⁶ USC, Title 23 Section 101. Definitions and declaration of policy. Available at: <http://www.fhwa.dot.gov/map21/legislation.cfm>.

¹⁷ FHWA, MAP-21 Fact Sheets – National Highway Performance Program. Available at: <http://www.fhwa.dot.gov/map21/nhpp.cfm>.

¹⁸ FHWA, MAP-21 Fact Sheets –Surface Transportation Program. Available at: <http://www.fhwa.dot.gov/map21/stp.cfm>.

¹⁹ Ibid.

²⁰ FHWA, MAP-21 Fact Sheets – Metropolitan Planning. Available at: <http://www.fhwa.dot.gov/map21/mp.cfm>.

Case Study: TIM Plays Leading Role in DVRPC's Data-Driven Future

The Delaware Valley Regional Planning Commission (DVRPC) launched its Traffic Incident Management Program in 1999. Since then, it has administered and supported seven traffic incident management task forces within the region and developed two software programs to improve incident management responses and foster interagency coordination. One of the programs, IDRUM (Interactive Detour Route Mapping), is an internet application used to access official Pennsylvania DOT and New Jersey DOT detour routes covering five Pennsylvania and eight New Jersey counties.

DVRPC, in conjunction with regional transportation agencies, also developed the "Regional Integrated Multi-Modal Information Sharing" (RIMIS) program, a web-based information exchange network with the ability to connect highway operation centers, transit control centers, and 9-1-1 call centers in the Delaware Valley. RIMIS was designed so that agencies can receive real-time messages about incidents, construction and maintenance activity, and special events that impact highways and transit. For a typical incident or event, a traffic operations center operator will input, via pull-down menus, the incident location, type of incident, its impact on traffic, and the anticipated duration of the incident. Another feature of RIMIS is the ability to give local responders access to custom "Video Walls" of DOT CCTVs. For example, several local fire departments purchased large video screens and installed them in their fire engine rooms. Before going out on a call, they can check their RIMIS Video Wall for best access to a scene or to ensure that they are bringing the correct equipment with them.

In addition to providing situational awareness and up-to-date information accessible to all responders, the RIMIS system also functions as a data collection mechanism, amassing a wealth of data about both the incidents that occur throughout the region as well as the response to them. This data can be used as a basis for identifying needs and creating long-term performance measures, which are an increasingly important factor in funding allocation decisions, as well as validating the need for ongoing program funding during periods of budget reduction.

At present, personnel from nearly 60 entities are using the system and DVRPC will continue to roll out the RIMIS program in areas of the region not currently being served. Entities using the system at present include:

- Toll road authorities
- Pennsylvania and New Jersey DOTs
- Regional/County 9-1-1 Centers
- Office of Emergency Management Centers
- County Traffic Operation Centers
- Local fire, police, EMS
- Bridge authorities
- Department of Environmental Protection
- Public Works Departments

For more information, contact Laurie Matkowski, Manager, Office of Transportation Operations Management, at 215-238-2853 or lmatkowski@dvrpc.org; or visit www.dvrpc.org/Operations/RIMIS.htm

Sources: Laurie Matkowski, "Incident Management in the DVRPC Region," presentation, The State of the Practice: Putting Information into the Hands of the Practitioners, Friday, June 15, 2012. Also, DVRPC Web site, Regional Integrated Multi-Modal Information Sharing Project web page. <http://www.dvrpc.org/Operations/RIMIS.htm>.

There are several knowledge resources available that can help transportation planners gain a better understanding of TIM needs, priorities, and partners. There are also resources that can be used by planners to support inter-agency TIM program development through a standard assessment, toolbox, sample agreements, and TIM plans. This section provides a guide to resources that will provide planners with more detail on TIM and will provide additional ideas on how to take the next steps.



4. Information Resources for Planners on TIM

Federal Highway Administration Traffic Incident Management Website

(http://ops.fhwa.dot.gov/eto_tim_pse/about/tim.htm)

This is a helpful initial resource to browse for basic as well as more in-depth information on TIM from a transportation point of view. It provides fundamental information on what is TIM and who is involved in TIM. It also contains links to several general, easy-to-understand handbooks on TIM from FHWA:

2010 Traffic Incident Management Handbook Update

(http://ops.fhwa.dot.gov/eto_tim_pse/publications/tim-handbook/index.htm)

This includes the latest advances in TIM programs and practices across the country and offers insights into innovations in TIM tools and technologies. It also contains links to interagency agreements for TIM. The handbook includes these sections:

- Introduction: Overview of Traffic Incident Management
- TIM Strategic Program Elements: Programmatic structure and institutional coordination necessary for a successful TIM program.
- TIM Tactical Program Elements: Full range of on-scene operations.
- TIM Support Program Elements: Communications and technical aspects of successful TIM programs.
- A quick resource guide titled, “Want to Know More,” follows each chapter and directs readers to supplemental information associated with the specific chapter content.

Best Practices in Traffic Incident Management

(<http://ops.fhwa.dot.gov/publications/fhwahop10050/index.htm>)

This report will give planners a good understanding of the challenges encountered by TIM professionals and practices for overcoming them. It describes task-specific and cross-cutting challenges commonly encountered by TIM responders and novel and effective strategies for overcoming these issues and challenges (i.e., best practices). Cross-cutting challenges of interest to planners include interagency coordination and communication, technology procurement and deployment, and performance measurement.

Analysis, Modeling, and Simulation for Traffic Incident Management Applications

(<http://ops.fhwa.dot.gov/publications/fhwahop12045/index.htm>)

This publication provides more advanced material for planners looking to predict what the impacts of TIM strategies will be at the planning stage of project development and to monitor the effects of TIM programs. It provides a synthesis of analysis, modeling, and simulation methods for incident impacts. The focus is on the effects of incidents on congestion and reliability as well as secondary incidents, for the purpose of estimating TIM benefits and evaluating programs and proposed strategies.

National Unified Goal (NUG) from the National Traffic Incident Management Coalition

(<http://ntimc.transportation.org/Pages/NationalUnifiedGoal%28NUG%29.aspx>)

The National Unified Goal (NUG) consists of the following three major goals, which are supported by 18 strategies:

- Responder safety
- Safe, quick clearance, and
- Prompt, reliable, interoperable communications.

The NUG was developed through a consensus process by representatives of the major national organizations representing the many disciplines that respond to traffic incidents and is being implemented through State, regional and local traffic incident management partnerships. The website listed above provides information and outreach materials on the NUG.

Traffic Incident Management Self Assessment

(http://ops.fhwa.dot.gov/eto_tim_pse/preparedness/tim/self.htm)

The purpose of the Traffic Incident Management Self Assessment is to provide a formal process for State and local transportation, public safety, and private sector partners to collaboratively assess their traffic incident management programs and identify opportunities for improvement. The assessment provides a tool that MPOs can use to bring together TIM partners in the region to evaluate the current components of a coordinated TIM program in the area and identify areas for additional effort.

The I-95 Corridor Coalition Quick Clearance Document Library

(<http://www.i95coalition.org/i95/Training/QuickClearanceWorkshop/tabid/188/Default.aspx>)

The I-95 Corridor Coalition's website contains many TIM resources, but one of the most relevant resources for transportation planners is the selection of Quick Clearance Documents available from the web address above. It contains a collection of interagency agreements, plans, and policy documents contributed by State and local agencies. Also available from that page is the Quick Clearance Toolkit that offers policy-makers and practitioners a roadmap for developing a TIM program.

The TIM Network

(<http://timnetwork.org/>)

The TIM Network is a professional network of individuals from across the country who are interested in connecting with other TIM professionals from multiple disciplines and staying up-to-date with efforts to advance TIM.



Appendix A. Regional TIM Planning Sheets

This section of the primer provides one- to two-page information sheets that group together similar TIM objectives under major categories of outcomes related to system performance or operations activities. The purpose of these sheets is to give planners and TIM professionals tangible examples of TIM objectives that can be drawn from, in whole or in part, to develop metropolitan transportation plans or related operations or TIM-focused plans. The sheets contain sample TIM objectives, performance measures, data required, and sample TIM strategies that may be considered to meet the objectives. In addition, any known safety impacts that may be realized through the use of the sample TIM strategies are noted.

Responder and Motorist Safety	
General Description	The focus of these objectives is on improving the safety of traffic incident responders at the scene and in transit to and from the scene and of motorists involved in the incident.
Operations Objectives	<ul style="list-style-type: none"> • Reduce responder stuck-by incidents by X percent from this year's level by 2015. • Decrease responder traffic incidents going to or from incident scenes by X percent from this year's level by 2015. • Reduce the total number of responder fatalities for the next 5 years by X percent of the previous 5-year total. • Increase the percentage of accident victims who survive traffic incidents.
Performance Measures	<ul style="list-style-type: none"> • Number of traffic incident responder struck-by incidents per year. • Number of responder incidents occurring while in transit to and from incident scenes per year. • Number of responder fatalities during incident response over 5 years. • Percent of accident victim survival.
Anticipated Data Needs	<ul style="list-style-type: none"> • Responder safety incident records including stuck-by incidents, responder traffic incidents, and responder fatalities. Accident victim survival rates.
Data Resources and Partners	<ul style="list-style-type: none"> • Safety and incident reports from TIM responder agencies and partners including police, fire/EMS, towing, HAZMAT, DOTs, and others. • Survival/fatality reports from hospitals and coroners.
Management and Operations (M&O) Strategies to Consider	<p>The National Unified Goal recommends several strategies to improve responder safety. They include:</p> <ul style="list-style-type: none"> • "Recommended practices for TIM responder safety and for traffic control at incident scenes should be developed and widely published, distributed, and adopted." • "Driver training and awareness programs should teach drivers how to react to emergencies on the roadway in order to prevent secondary incidents, including traffic incident responder injuries and deaths." • "TIM responders should receive multidisciplinary National Incident Management System (NIMS) and Traffic Incident Management training." <p>In addition, improve awareness and compliance with Move Over/Slow Down laws. Each State now has some type of Move Over/Slow Down law that requires drivers to move over or slow down when approaching traffic incident response vehicles and traffic incident responders on the roadway.</p> <p>M&O strategies that support quick incident detection and response by trained medical staff should improve survivability rates for motorists involved in incidents.</p>
Safety-related Impacts	Direct safety impacts not identified within referenced safety documents.

Secondary Incidents	
General Description	<p>The focus of these objectives is on the reduction of secondary incidents, which are incidents that result from an initial incident. Motorists moving through and upstream from a traffic incident site are vulnerable to secondary incidents caused by sudden slowing of traffic, lane changes, and the situation or movement of emergency vehicles. A nationally accepted definition of secondary incidents does not yet exist.</p> <p>An initial definition from the 2009 Federal Highway Administration Focus States Initiative: Traffic Incident Management Performance Measures Final Report is “Unplanned incidents (starting at the time of detection) for which a response or intervention is taken, where a collision occurs either a) within the incident scene or b) within the queue (which could include the opposite direction) resulting from the original incidents.”</p>
Operations Objectives	<ul style="list-style-type: none"> • Reduce the number of secondary incidents occurring each year by X percent over this year. • Reduce the severity of secondary incidents such that the percentage of secondary incidents that are fatal or injury-causing decreases by X percent within X years.
Performance Measures	<ul style="list-style-type: none"> • Beginning with the time of detection of the primary incident, the number of incidents that occur either a) within the primary incident scene or b) within the queue—including a queue in the opposite direction—resulting from the original incident. (FHWA Focus State Initiative)
Anticipated Data Needs	<ul style="list-style-type: none"> • Traffic incident logs, including the location and time reported, the queue length, incident clearance time, and incident normalization information • Police accident database http://www.intrans.iastate.edu/reports/secondary-accidents.pdf
Data Resources and Partners	<ul style="list-style-type: none"> • Traffic management center, State/local DOTs, State and local police.
M&O Strategies to Consider	<ul style="list-style-type: none"> • Safety service patrols (provide traffic control at scene) http://www.safehighways.org/safe-highway-matters/spring-2010-3/secondary-incidents/ • Traveler information on alternate routes • Policies and procedures for HAZMAT and fatal incidents that also include maintenance of traffic flow • Strategies that reduce time to clear incident scene, including the use of CCTV cameras to support incident detection and verification, 511 systems, dynamic message signs, towing and recovery quick clearance incentives, incident command system, and others.
Safety-related Impacts	Direct safety impacts not identified within referenced safety documents.

Incident Detection and Verification	
General Description	This set of objectives focuses on improving the detection and verification of an incident, the first steps in the TIM process. Detection is the determination that an incident of some type has occurred. Incidents may be detected in person by motorists or response personnel or automatically using electronic loop detectors and associated incident detection algorithms. Verification is the determination of the precise location and nature of the incident, which may be performed by on-site response personnel or CCTVs.
Operations Objectives	<ul style="list-style-type: none"> • Reduce mean incident notification time (defined as the time between the first agency's awareness of an incident and the time to notify all needed response agencies) by X percent over Y years. • Decrease the average time for incident verification by X percent by year Y. • Reduce the number of times that inaccurate incident location and type information are provided to response personnel during notification to X inaccurate notifications per month.
Performance Measures	<ul style="list-style-type: none"> • Average incident notification time of necessary response agencies. • Average time for incident verification (defined as the time between the first agency's awareness of an incident and the determination of the precise location and nature of the incident). • Number of inaccurate notifications to response agencies per month regarding incident location and type.
Anticipated Data Needs	<ul style="list-style-type: none"> • Time of awareness of incident by first agency. • Time of notification to all necessary response agencies. • Time of incident verification. • Accuracy of incident notifications.
Data Resources and Partners	<ul style="list-style-type: none"> • Data would need to be tracked by the incident responders or operators at a traffic management center or emergency operations center with access to video of the scene. The partners needed for these measures would be all incident responders willing to support the objectives.
M&O Strategies to Consider	M&O strategies to consider in improving detection and verification of incidents include enhancing inter-agency voice and data communications systems, expanding the use of roving patrols, and CCTV cameras. Accuracy of incident notifications can be improved through 1/10 or 2/10 mile markers and motorist call boxes in rural areas.
Safety-related Impacts	Direct safety impacts not identified within referenced safety documents.

Incident Response	
General Description	This set of objectives focuses on improving incident response: “the activation of a ‘planned’ strategy for the safe and rapid deployment of the most appropriate personnel and resources to the incident scene.” ²¹
Operations Objectives	<ul style="list-style-type: none"> • Reduce mean time for needed responders to arrive on-scene after notification by X percent over Y years. • For X percent of all HAZMAT incidents, the necessary HAZMAT equipment and personnel arrive on scene within X minutes of notification. • For X percent of all incidents requiring tow trucks, the appropriate tow truck equipment arrives on scene within X minutes of request.
Performance Measures	<ul style="list-style-type: none"> • Mean time for needed responders to arrive on-scene after notification. • Time for necessary HAZMAT equipment and personnel to arrive on-scene following notification of a HAZMAT incident. • Time between request for tow trucks and the arrival of appropriate tow trucks on scene.
Anticipated Data Needs	<ul style="list-style-type: none"> • For each incident of interest in the region, incident notification time and on-scene arrival time. • For all HAZMAT incidents, the time of notification to HAZMAT staff/agencies and the arrival time of necessary HAZMAT equipment and personnel. • For incidents requiring tow trucks, the time of tow truck request and the time all appropriate tow truck(s) arrive on-scene.
Data Resources and Partners	<ul style="list-style-type: none"> • Data would need to be tracked by 9-1-1 dispatchers, incident responders on scene, or operators at a traffic management center or emergency operations center with access to video of the scene.
M&O Strategies to Consider	M&O strategies to consider in improving the timely and optimum response of personnel and equipment to incident scenes include enhancing inter-agency voice and data communications systems, CCTV cameras, pre-positioned tow trucks, towing and recovery zone-based contracts, enhanced computer-aided dispatch that uses automated vehicle location systems, and emergency vehicle preemption at traffic signals.
Safety-related Impacts	<p>Select examples of associated M&O strategies and their safety impacts include:</p> <ul style="list-style-type: none"> • Employ emergency vehicle preemption: The safety impact is the potential for decreasing response times. Reviews of systems in several cities show a decrease in response times ranging from 14 to 50 percent. Source: NCHRP 500 Volume 12 (effectiveness categorized as “proven”). • Install emergency vehicle preemption systems: The crash modification factor (CMF) for this treatment is 0.30 for all crashes. Source: FHWA Desktop Reference for Crash Reduction Factors, 2008. <p>Note: The existing number of crashes is multiplied by the CMF to determine the number of crashes that may be anticipated following implementation of a treatment.</p>

²¹ Federal Highway Administration, Best Practices in Traffic Incident Management, “Chapter 2. Task-Specific Challenges and Strategies,” FHWA-HOP-10-050 (Washington, DC: 2010).
Available at: <http://ops.fhwa.dot.gov/publications/fhwahop10050/ch2.htm#s3>

Incident Scene Management and Traffic Control	
General Description	This set of objectives focuses on the coordination and management of resources and activities at or near the incident scene, including personnel, equipment, and communication links. It also features safe and efficient management of traffic approaching the scene. This phase of TIM occurs once incident response agencies have arrived on the scene.
Operations Objectives	<ul style="list-style-type: none"> • A <i>Manual on Uniform Traffic Control Devices (MUTCD)</i>-compliant Traffic Incident Management Area will be established at all traffic incidents requiring the closure of at least one travel lane by year Y. • Response vehicle placement and on-scene emergency lighting procedures will be developed and used for all traffic incidents in the region by year Y. • The Incident Command System, a well-established, standardized on-scene process for managing incident response activities, is understood by all incident response personnel prior to performing incident response functions and is used at all incident scenes by year Y. • The region develops and uses specific, mutually agreed upon policies and procedures for HAZMAT and fatal accident response that also address maintaining traffic flow around the incident by year Y. • By year Y, alternate route plans have been established and used by all appropriate agencies in the region for all routes with average daily volumes exceeding X.
Performance Measures	<ul style="list-style-type: none"> • Rate of use of MUTCD-compliant Traffic Incident Management Areas. • Rate of use of response vehicle placement and on-scene emergency lighting procedures. • Percent of incident response personnel demonstrating proficiency in Incident Command System concepts and process. • Rate of use of the Incident Command System. • Usage rate of policies and procedures for HAZMAT and fatal accident response. • Percentage of routes in region with average daily volumes over X with alternate route plans. • Rate of use of alternate route plans.
Anticipated Data Needs	<ul style="list-style-type: none"> • Usage rates for the procedures and policies listed in the performance measures.
Data Resources and Partners	<ul style="list-style-type: none"> • Data would need to be tracked by the incident responders or operators at a traffic management center or emergency operations center with access to video of the scene. The partners needed for these measures would be all incident responders willing to support the objectives.
M&O Strategies to Consider	M&O strategies that support this set of objectives include multi-agency training and regional TIM programs. Other M&O strategies are inherent in the operations objectives.
Safety-related Impacts	Direct safety impacts not identified within referenced safety documents.

Incident Clearance and Recovery	
General Description	This set of objectives focuses on the final steps of the TIM process: incident clearance and the recovery of the roadway. ²² Clearance refers to the safe and timely removal of any wreckage, debris, or spilled material from the roadway. Recovery refers to the restoration of the roadway to its full capacity. ²² This set also includes objectives that account for the entire duration of the incident.
Operations Objectives	<ul style="list-style-type: none"> • Reduce mean incident clearance time per incident by X percent over Y years. (Defined as the time between awareness of an incident and the time the last responder has left the scene.) • Reduce mean roadway clearance time per incident by X percent over Y years. (Defined as the time between awareness of an incident and restoration of lanes to full operational status.) • Reduce mean time of incident duration (from awareness of incident to resumed traffic flow) on transit services and arterial and expressway facilities by X percent in Y years. <p>Each objective can be qualified for the level of traffic incident (major, intermediate, and minor) as defined in MUTCD, Chapter 6I, Control of Traffic through Traffic Incident Management Areas. Major traffic incidents are those that typically require closing all or part of the roadway for a period exceeding 2 hours. Intermediate traffic incidents are those that typically affect travel lanes for a period of 30 minutes to 2 hours. A minor incident typically lasts no more than 30 minutes and does not require lane closures or extensive traffic control.²³</p>
Performance Measures	<ul style="list-style-type: none"> • Mean incident clearance time per incident. • Mean roadway clearance time per incident. • Mean time of incident duration.
Anticipated Data Needs	<ul style="list-style-type: none"> • Data needed for these measures include the time of the awareness of an incident and one or more of the following pieces of data: the time the last responder left the scene, the time when all lanes were re-opened, the time when traffic returned to full operational status.
Data Resources and Partners	<ul style="list-style-type: none"> • Data would need to be tracked by the incident responders or operators at a traffic management center or emergency operations center with access to video of the scene. The partners needed for these measures would be all incident responders willing to support the objectives.
M&O Strategies to Consider	M&O strategies to consider in improving incident clearance and recovery include all of the strategies suggested for the areas of detection and verification, incident response, and incident scene management and traffic control. Policies and laws to consider for improved incident clearance include abandoned vehicle legislation/policy, safe, quick clearance laws— <i>driver removal and authority removal</i> , quick clearance/open roads policy, fatality certification/removal policy, and non-cargo vehicle fluid discharge policy. ²⁴ Expedited crash investigation methods such as photogrammetry.

²² Federal Highway Administration, *Best Practices in Traffic Incident Management* (2010).

²³ Federal Highway Administration, *2010 Traffic Incident Management Handbook Update*, "Chapter 3. TIM Tactical Program Elements," FHWA-HOP-10-013 (Washington, DC: 2010). Available at: http://ops.fhwa.dot.gov/eto_tim_pse/publications/timhandbook/chap3.htm#sec3-2

²⁴ For more information, see FHWA, *Best Practices in Traffic Incident Management*, (2010).

Safety-related Impacts	<p>Select examples of associated M&O strategies and their safety impacts include:</p> <ul style="list-style-type: none"> • Employ emergency vehicle preemption: The safety impact is the potential for decreasing response times. Reviews of systems in several cities show a decrease in response times ranging from 14 to 50 percent. Source: NCHRP 500 Volume 12 (effectiveness categorized as “proven”). • Install emergency vehicle preemption systems: The CMF for this treatment is 0.30 for all crashes. Source: FHWA Desktop Reference for Crash Reduction Factors, 2008. <p>Note: The existing number of crashes is multiplied by the CMF to determine the number of crashes that may be anticipated following implementation of a treatment.</p>
-------------------------------	--

Person and Freight Hours of Delay	
General Description	The objective(s) below focus on delay for people and goods due to traffic incidents.
Operations Objectives	<ul style="list-style-type: none"> • Reduce the person hours (or vehicle hours) of total delay associated with traffic incidents by X percent over Y years. • Reduce freight (in tons) hours of total delay associated with traffic incidents by X percent over Y years. • Reduce commercial vehicle hours of total delay associated with traffic incidents by X percent over Y years.
Performance Measures	<ul style="list-style-type: none"> • Person hours (or vehicle hours) of delay associated with traffic incidents. • Freight (in tons) hours of delay associated with traffic incidents. • Commercial vehicle hours of delay associated with traffic incidents.
Anticipated Data Needs	<ul style="list-style-type: none"> • Total travel time in person hours (or vehicle hours) of travel impacted by incidents. • Total travel time in person hours (or vehicle hours) of travel during free flow conditions. • Total travel time in freight ton hours of travel impacted by incidents. • Total travel time in freight ton hours of travel during free flow conditions. • Total travel time in commercial vehicles hours of travel during free flow conditions. • Total travel time in commercial vehicles hours of travel during free flow conditions.
Data Resources and Partners	<ul style="list-style-type: none"> • Due to the unpredictable nature of traffic incidents, travel time may need to be collected, stored, and then analyzed after incident times and locations are obtained. Partners needed include public safety agencies and departments of transportation.
M&O Strategies to Consider	Regions can reduce travel time delay due to incidents by shortening incident clearance time and providing travelers with information to avoid the incident area.
Safety-related Impacts	<p>Select examples of associated M&O strategies and their safety impacts include:</p> <ul style="list-style-type: none"> • Install changeable “Accident Ahead” warning signs: The CMF for this treatment is 0.56 with a standard error of 0.2. Therefore the range of the CMF is 0.96 to 0.16. Source: HSM, First Edition. • Install changeable “Queue Ahead” warning signs: The CMF for this treatment is 0.84 with a standard error of 0.1 for rear-end injury crashes. Therefore, the range of the CMF is 1.04 to 0.64. For rear-end non-injury crashes, the CMF is 0.84 with a standard error of 0.2. Therefore, the range of the CMF is 1.24 to 0.44. Source: HSM, First Edition. <p>Note: The existing number of crashes is multiplied by the CMF to determine the number of crashes that may be anticipated following implementation of a treatment.</p>

Traveler Information	
General Description	This section contains objectives that focus on providing travelers with accurate, timely, and actionable information about incidents and emergencies.
Operations Objectives	<ul style="list-style-type: none"> • Reduce time between incident/emergency verification and posting a traveler alert to traveler information outlets (e.g., variable message signs, agency website, 511 system, media alerts) by X minutes in Y years. • Increase number of repeat visitors to traveler information website (or 511 system) by X percent in Y years. • Reduce the time between recovery from incident and removal of traveler alerts for that incident. • Achieve by year Y and maintain an accuracy rate of X percent of the traveler information provided on incidents and emergencies by government agencies. • Provide alternate route information to travelers for at least X percent of intermediate and major incidents (as defined by the MUTCD) by year Y. • Expand the percentage of impacted or potentially impacted travelers who receive incident and emergency traveler information to X percent of the (potentially) impacted traveler population by year Y.
Performance Measures	<ul style="list-style-type: none"> • Time to alert motorists of an incident/emergency. • Number of repeat visitors to traveler information website (or 511 system). • Time between recovery from incident and removal of traveler alerts. • Rate of accuracy of traveler information messages provided by government agencies. • Percent of intermediate and major incidents for which alternate route information was provided for travelers. • Percent of impacted/potentially impacted travelers receiving traveler information on incidents and emergencies.
Anticipated Data Needs	<ul style="list-style-type: none"> • Data needed for these measures include the time of incident verification and variable message sign (VMS) posting, 511 entry, traveler information website log of the number of visitors, and the time of transportation system recovery and travel alert removal. • Traveler information accuracy rates for 511, VMS postings, websites, and other public agency traveler information outlets. • Number of intermediate and major incidents for which alternate route information was supplied to travelers. • Traveler information distribution/access rates.
Data Resources and Partners	<ul style="list-style-type: none"> • Data on the time of incident recovery could be collected by transportation management center operators with video of incident scenes or through continuous collection of traffic speeds. Partners would need to include agencies that manage traveler information websites, VMS, and emergency operations centers. Public safety partners may be needed for information on incident verification time. Surveys will be needed to measures exposure to traveler information for incidents and emergencies.
M&O Strategies to Consider	M&O strategies to consider include training on disseminating incident-related traveler information as well as deploying and managing VMS and websites. Accuracy and distribution of traveler information can be improved through regionally accepted standards and protocols and increased communication and coordination with public information officers, with private media providers, and between jurisdictions.

Safety-related Impacts	<p>Select examples of associated M&O strategies and their safety impacts include:</p> <ul style="list-style-type: none"> • Install changeable “Accident Ahead” warning signs: The CMF for this treatment is 0.56 with a standard error of 0.2. Therefore, the range of the CMF is 0.96 to 0.16. Source: <i>HSM, First Edition</i>. • Install changeable “Queue Ahead” warning signs: The CMF for this treatment is 0.84 with a standard error of 0.1 for rear-end injury crashes. Therefore, the range of the CMF is 1.04 to 0.64. For rear-end non-injury crashes, the CMF is 0.84 with a standard error of 0.2. Therefore, the range of the CMF is 1.24 to 0.44. Source: <i>HSM, First Edition</i>. <p>Note: The existing number of crashes is multiplied by the CMF to determine the number of crashes that may be anticipated following implementation of a treatment.</p>
-------------------------------	---

Inter-Agency Coordination	
General Description	This section contains objectives that focus on increasing coordination and communication between agencies with responsibilities for traffic incident management.
Operations Objectives	<ul style="list-style-type: none"> • Increase percentage of incident management agencies in the region that (participate in a multi-modal information exchange network, use interoperable voice communications, participate in a regional coordinated incident response team, etc.) by X percent in Y years. • Increase the number of corridors in the region covered by regional coordinated incident response teams by X percent in Y years. • Hold at least X multi-agency after-action review meetings each year with attendance from at least Y percent of the agencies involved in the incident's response. • Increase the percentage of TIM-related agencies in the region that participate in a resource/equipment sharing agreement to support TIM activities to X percent by year Y. • Standard definitions of TIM objectives and performance measures are adopted and tracked by X percent of TIM-related agencies in the region by year Y. • X percent of TIM-related agencies in the region agree to use a standard terminology for TIM by year Y.
Performance Measures	<ul style="list-style-type: none"> • Percentage of incident management agencies in region participating in multi-modal information exchange network. • Number of agencies in the region with interoperable voice communications. • Number of participating agencies in a regionally coordinated incident response team. • Number of TIM corridors in the region covered by regionally coordinated incident response teams. • Number of multi-agency after-action reviews per year. • Percentage of responding agencies participating in after-action reviews. • Percentage of TIM-related agencies in the region that participate in a resource/equipment sharing agreement to support TIM activities. • Percentage of TIM-related agencies in the region that have adopted and track standard TIM objectives and performance measures. • Percentage of TIM-related agencies in the region that have agreed to use standard terminology for TIM.
Anticipated Data Needs	<ul style="list-style-type: none"> • Data needed for these measures include the number of agencies participating in a regional incident management program or activity, the number of corridors covered by a regional incident management team, and the number of after-action reviews held. • Data needs also include number of TIM-related agencies participating in a resource sharing agreement that have adopted standard TIM objectives and performance measures and have agreed to use standard terminology.
Data Resources and Partners	<ul style="list-style-type: none"> • This data can be collected by observation of emergency/incident management programs or asking TIM and other emergency management agencies to self-report.
M&O Strategies to Consider	Developing a regional operations plan or regional concept for transportation operations (RCTO) supports the inter-agency coordination objectives in this set. Other M&O strategies to consider are inherent in these objectives.
Safety-related Impacts	Direct safety impacts not identified within referenced safety documents.

Training	
General Description	This section contains objectives that focus on training incident management staff.
Operations Objectives	<ul style="list-style-type: none"> • Conduct X joint training exercises among operators and emergency responders in the region by year Y. • By year Y, X percent of staff in region with incident management responsibilities will have completed the National Incident Management System (NIMS) Training and at least X percent of transportation responders in the region will be familiar with the incident command structure (ICS). • By year Y, X percent of staff in region with incident management responsibilities will have completed the multi-disciplinary Strategic Highway Research Program 2 (SHRP 2) National TIM Responder Training Course offered by FHWA.
Performance Measures	<ul style="list-style-type: none"> • Number of joint training exercises conducted among operators and emergency responders. • Percentage of staff having completed NIMS training and percent of transportation responders familiar with ICS. • Percentage of staff having completed SHRP 2 National TIM Responder Training Course.
Anticipated Data Needs	<ul style="list-style-type: none"> • The number of joint training exercises conducted in the region among operators and emergency responders • The number of staff within each agency in the region that have incident management responsibilities as well as the number of staff that have completed the NIMS training. • The number of transportation responder staff in the region familiar with ICS. • The number of staff within each agency in the region that have completed the SHRP 2 National TIM Responder Training Course by FHWA.
Data Resources and Partners	<ul style="list-style-type: none"> • A simple count of incident management staff and those that completed NIMS training and the SHRP 2 course would need to be collected from each TIM agency in the region. A survey or self-assessment could be used on a regional level for ICS familiarity.
M&O Strategies to Consider	M&O strategies to consider would include making the NIMS training and the SHRP 2 National TIM Responder Training Course widely available to all relevant staff in the region. TIM leaders in the region could take the SHRP 2 Train-the-Trainer course to become a trainer of the SHRP 2 National TIM Responder Training Course.
Safety-related Impacts	Direct safety impacts not identified within referenced safety documents.

Technology	
General Description	This section contains objectives that focus on deploying technology needed to support traffic incident management.
Operations Objectives	<ul style="list-style-type: none"> • Increase the number of ITS-related assets (e.g., roadside cameras, vehicle speed detectors) in use for incident detection by X in Y years. • Increase the number of ITS-related assets (e.g., roadside cameras) in use for incident verification by X in Y years. • Increase the number of regional road miles covered by ITS-related assets (e.g., roadside cameras, dynamic message signs, vehicle speed detectors) in use for incident detection and/or verification by X percent in Y years. • Increase the number of traffic signals equipped with emergency vehicle preemption by X percent in Y years. • Increase the number of total station survey equipment or photogrammetry systems for expedited crash investigation by X in Y years. • Maintain the “health” of the ITS assets (e.g., roadside cameras, dynamic message signs, vehicle speed detectors) so that all assets are functioning as intended at least X percent of the time.
Performance Measures	<ul style="list-style-type: none"> • Number of ITS-related assets in use for incident detection/verification. • Number of regional roadway miles covered by ITS-related assets in use for incident detection. • Number of traffic signals equipped with emergency vehicle preemption. • Number of total station surveying equipment and/or photogrammetry systems. • Amount of time ITS assets are in proper functioning condition.
Anticipated Data Needs	<ul style="list-style-type: none"> • The data needed for technology deployment objectives is simply a count of the assets deployed for TIM. • Rate of failure or decreased functionality of ITS assets.
Data Resources and Partners	<ul style="list-style-type: none"> • Data needed is a count of technology(ies) deployed and condition of assets. Asset condition/maintenance information will need to be supplied by the assets’ owning/operating agencies.
M&O Strategies to Consider	The M&O strategies to consider are inherent in the objectives.
Safety-related Impacts	Direct safety impacts not identified within referenced safety documents.

Environment	
General Description	One of the impacts of traffic congestion caused by traffic incidents is reduced air quality. Other environmental impacts of traffic incidents occur when the incident causes hazardous materials to be spilled onto the roadway. This section contains objectives that focus on reducing the impacts of traffic incidents on the natural environment.
Operations Objectives	<ul style="list-style-type: none"> • Reduce the pounds of carbon dioxide emitted per year in the region as a result of incident-related congestion by X percent in Y years. • Reduce the gallons of fuel wasted per year in the region as a result of incident-related congestion by X percent in Y years. • Decrease the amount (unit of measurement will depend on material spilled) of hazardous materials released into the environment (soil, waterway, air) through spills caused by traffic incidents by X percent in Y years.
Performance Measures	<ul style="list-style-type: none"> • Pounds of carbon dioxide emitted per year in the region as a result of incident-related congestion. • Gallons of fuel wasted per year in the region as a result of incident-related congestion. • Amount of hazardous materials entering the environment as a result of a HAZMAT-related traffic incidents.
Anticipated Data Needs	<ul style="list-style-type: none"> • Hours of travel time delay per year caused by traffic incidents. • Estimate of carbon dioxide emitted and gallons of fuel burned per hour of delay. • Amount of hazardous materials spilled and not recovered during incidents.
Data Resources and Partners	<ul style="list-style-type: none"> • Data on HAZMAT spills may be available from the Environmental/Natural Resources/ Departments of Health. Estimates on CO2 emissions and gallons wasted per hour of delay may be available from the U.S. Environmental Protection Agency. Departments of transportation and public safety agencies are among the partners needed to obtain data on delay time caused by incidents.
M&O Strategies to Consider	The M&O strategies to consider include TIM strategies to reduce the duration of an incident/reduce clearance time. Strategies also include strong coordination with local/State environmental agencies and HAZMAT contractors, training on HAZMAT incidents, and availability of necessary HAZMAT equipment and personnel.
Safety-related Impacts	Direct safety impacts not identified within referenced safety documents.

Appendix B. Case Study: A Metropolitan Transportation Plan and an Operations Plan Incorporating TIM

The purpose of this section is to illustrate how TIM can be integrated into a metropolitan transportation plan and its supporting planning documents by leading the reader through excerpts of a sample metropolitan transportation plan and a sample Intelligent Transportation Systems (ITS) Strategic Plan. The primary audience for this section is the planner who is interested in gathering tangible ideas for the structure and development of the plan in his or her region. The sample demonstrates one approach for making traffic incident management a priority for the region. While there are many options for where and how TIM can be integrated into a plan, the use of an objectives-driven, performance-based approach relies on specific, measureable objectives for TIM, TIM-related performance measures, and TIM strategies to meet those objectives. Because metropolitan transportation plans cover a broad range of areas, such as public transportation, freight, safety, security, environment, land use, and social equity, the plan may not provide a detailed treatment of TIM. As shown in the example below, this region decided to use a supporting document, an ITS strategic plan, to capture multiple TIM objectives and performance measures and to describe the roles, responsibilities, and needs specific to TIM initiatives or programs. TIM may also be included in plans as part of an objectives-driven, performance-based congestion management process (CMP). Since incidents account for approximately 25 percent of congestion, it is appropriate for TIM to have a role in the CMP. Another common location for TIM strategies to appear in the plan is in a section dedicated to management and operations.

While many regions are quickly advancing toward a fully objectives-driven, performance-based approach to planning, the example below does not include performance targets for the TIM-related objectives and performance measures. This is an institutional and technical challenge that regions are working to address through the development of consistent definitions for performance measures, standard data collection procedures, and data sharing and integration. Annotations among the examples in this section offer options of targeted operations objectives to show how the integration of TIM in the plan could be taken to the next level.

Example: Genesee Transportation Council

The Genesee Transportation Council (GTC) is the MPO for the Genesee-Finger Lakes Region including the City of Rochester, New York. The region contains approximately 840,000 people over 4,700 square miles. Since 2006, the MPO has facilitated a Transportation Management Committee that includes law enforcement, and it is working to bring in all public safety disciplines. In 2011, the region adopted an Intelligent Transportation Systems Strategic Plan for Greater Rochester²⁵ and the 2035 Long Range Transportation Plan for the Genesee-Finger Lakes Region.²⁶ While the long range plan includes TIM, the ITS strategic plan provides much greater depth on TIM.

The pages that follow contain annotated excerpts from the long range plan that illustrate the incorporation of TIM.

²⁵ Genesee Transportation Council, Intelligent Transportation Systems Strategic Plan for Greater Rochester, 2011. Available at: <http://www.gtcmppo.org/Resources/Topics/TSMO.htm>.

²⁶ Genesee Transportation Council, 2035 Long Range Transportation Plan for the Genesee-Finger Lakes Region, June 2011. Available at: <http://www.gtcmppo.org/Docs/LRTP.htm>.

The following excerpt shows the table of contents with annotations that highlight areas relevant for TIM.

TABLE OF CONTENTS	
CHAPTER 1 - INTRODUCTION	1
Introduction	1
CHAPTER 2 - THE PLAN	5
L RTP 2035 Development	5
The Genesee Transportation Council	5
Responsibilities	5
Goals and Objectives	8
Organizational Structure	10
Guiding Principles	12
Development Phases	13
Stakeholder Participation	14
CHAPTER 3 - THE REGION	19
People	19
Businesses	22
Recreational and Cultural Resources	24
Places	26
Emerging Opportunities and Issues	31
The Region in 2035	36
CHAPTER 4 - TRANSPORTATION SYSTEM	39
Highways and Bridges	39
Public Transportation	44
Bicycle and Pedestrian	47
Freight	53
Interregional Travel	57
Travel Characteristics	60
Congestion Management Process	62
Safety	68
CHAPTER 5 - FINANCIAL PLAN	75
Transportation Needs	70
Costs	75
Revenues	77
CHAPTER 6 - RECOMMENDATIONS	85
Preservation & Maintenance	87
Systems Management & Operations	92
Expansion	101
Illustrative Projects	106
CHAPTER 7 - PERFORMANCE MEASURES	109
LIST OF EXHIBITS	
Exhibit 1 GTC Goals & Objectives	8
Exhibit 2 GTC Board Members	10
Exhibit 3 Population Change in the Genesee-Finger Lakes Region, 1960-2040	19
Exhibit 4 Population in the Genesee-Finger Lakes Region by County, 2010 & 2035	20
Exhibit 5 Percent Change in Population of the Genesee-Finger Lakes Region by Age Cohort, 2010-2035	21
Exhibit 6 Groups Traditionally Under-Represented in the Transportation Planning Process by Percent of Total Population in the Genesee-Finger Lakes Region, 2000	21
Exhibit 7 Employment in the Genesee-Finger Lakes Region by County, 2009 & 2035	22
Exhibit 8 Employment by Sector in the Genesee-Finger Lakes Region, 2000 & 2009	23
Exhibit 9 Percent of Total Employment in Manufacturing in the Largest Upstate New York Regions and New York State, 2009	24

Needs include improved mobility through operations

Recommends TIM strategies

Includes "incident clearance time"

CMP addresses "non-recurring incident related delay" through TIM strategies

Includes efficient system management and operations goals and guiding principle

Chapter 4: Transportation System

Congestion Management Process

The ability of the highway and bridge network to carry traffic efficiently and minimize delay to the traveling public and freight carriers is important to economic and social productivity as well as environmental quality. Time lost in traffic and increases in emissions of pollutants due to congestion are detrimental to quality of life and economic development. Even though the Genesee-Finger Lakes Region consistently ranks low in terms of congestion compared to similar sized areas in the nation, the U.S. Department of Transportation requires that Transportation Management Areas maintain a Congestion Management Process to:

- monitor and evaluate transportation system performance;
- identify alternative congestion mitigation actions;
- assess and implement cost-effective congestion mitigation actions; and
- evaluate the effectiveness of the implemented actions.

The objective of the GTC Congestion Management Process is to provide practical tools to identify and implement strategies that improve the mobility of people and freight, emphasizing coordinated corridor-level and region-wide solutions that mitigate existing sources and avoid the creation of future sources of congestion that result in excess delay.

Congestion that results in delay along the highway and bridge network of the region has been categorized into three types:

1. Recurring Capacity Related Delay – results in trips taking longer during peak hours than during off-peak hours...
2. Planned Event Related Delay – occurs as a result of a planned special event such as a concert, sports game or match, or scheduled road work...
3. Non-Recurring Incident Related Delay – happens as a result of unplanned incidents such as an automobile crash or a severe weather event. This type of delay can occur anywhere on the transportation system, but is most likely to happen when an incident occurs on an already busy highway. According to the Texas Transportation Institute, incidents are estimated to cause between 52 and 58 percent of delay in all urban areas. Non-Recurring Incident Related Delay can be reduced through improved incident management such as quicker detection, response, and clearance times, as well as by using traveler information systems to help drivers avoid the incident scene altogether.

Locations that experience the greatest amount of Non-Recurring Incident Related Delay are those where volumes relative to the capacity of the roadway is nearing Recurring Capacity Related Delay and are more likely than other locations to experience crashes or other types of incidents that reduce the capacity of the roadway. The only location that is likely to be subject to Non-Recurring Incident Related Delay in the region outside of the Rochester TMA is located in the City of Batavia

where NYS Routes 5, 33, 63, and 98 are in close proximity to each other in the heart of the City's central business district.

The GTC Congestion Mitigation Toolbox, ranging from constructing new highways to building and operating commuter rail, has been updated as part of the LRTP 2035. An evaluation of the benefits and costs of the strategies included in it relative to the guiding principles (discussed later) and the transportation needs of the region through 2035 (discussed previously) was conducted. Based on this evaluation, those mitigation strategies that are considered reasonable in the Genesee-Finger Lakes Region for each type of congestion are presented in Exhibit 18.

TRANSPORTATION SYSTEM

Exhibit 18

Congestion Mitigation Strategies

Recurring Capacity Related	Planned Event Related	Non-Recurring Incident Related
Supply-Driven Strategies		
Intersection/Interchange Improvements	Parking Management	Incident Management
Traffic Signal Improvements	Traffic Signal Improvements	Traffic Signal Improvements
Multi-Modal Traveler Information Systems	Multi-Modal Traveler Information Systems	Multi-Modal Traveler Information Systems
Roadway Monitoring and Management	Roadway Monitoring and Management	Roadway Surveillance and Management
Parking Management	Traffic Enforcement	Traffic Enforcement
Access Management	Reversible Traffic Lanes	Work Zone Management
Expanded Bicycle and Pedestrian Networks	Temporary Turn Prohibitions	Temporary Turn Prohibitions
Expanded Public Transportation Services	Work Zone Management	Safety Awareness Programs
Demand-Driven Strategies		
Promotion of public transportation/bicycling/walking	Promotion of public transportation/bicycling/walking	
Transit-Supportive Development		
Alternative Hours to Travel		
Alternative Workplace Locations		



Chapter 6: Recommendations

Systems Management and Operations

Transportation system management and operations (TSMO) recommendations provide the best opportunity to maximize the effectiveness of the current transportation system at the lowest cost. There are three primary initiatives that serve as the basis for the TSMO recommendations in the L RTP 2035: Technology, Coordination, and Demand. These initiatives are not mutually exclusive (e.g., there are Technology elements that are critical to and included in Coordination and Demand and the same is true for Coordination and Demand as they relate to Technology and each other).

The majority of delay in the region is non-recurring and is the result of crashes, weather, and other irregular events. TSMO programs and projects can effectively address non-recurring delay through improved incident response, more efficient deployment of resources to clear snow and ice, and timelier information to travelers. Even in cases where the delay is recurring due to peak demand and fixed capacity, TSMO programs and projects that inform travelers of less costly options that could be more convenient have the potential to reduce demand on the system when use is at its highest level.

TSMO programs and projects can increase safety by providing timely and accurate information to make travelers aware of hazards such as adverse weather conditions, work zones, crashes, and other incidents. By improving incident response and management, TSMO programs and projects can also shorten clearance times for crashes which reduce the likelihood of secondary crashes. This improves safety, reduces resulting delay and decreases emissions. The technologies used to monitor transportation system performance can also be used for homeland security purposes to prevent or respond to a terrorist attack, natural disaster, or other large-scale emergency.

Coordination

TSMO programs and projects also include the coordination of transportation infrastructure and services and the associated organizational relationships among all transportation agencies, including but not limited to NYSDOT, NYSTA, counties, the City of Rochester, and other municipalities. Like the design of infrastructure and services, the relationships between transportation agencies can also appreciably improve the safety, efficiency, and reliability of the transportation system.

How transportation agencies coordinate their respective activities can maximize the investment of public resources and the delivery of services that clear crashes, address weather-related consequences, and provide connections between public transportation services operated by public and not-for-profit providers. The structure of interagency collaboration between transportation, emergency management, and law enforcement entities is critical to efficient management and operation of the transportation system.

Formal protocols (including via Regional Concepts of Transportation Operations) to coordinate information sharing, incident response, and timing of construction projects based on a cooperatively-developed vision can improve efficiency and effectiveness.

Recommendations

- Continue federal funding for Regional Traffic Operations Center (RTOC) staffing, including continued 24-hour operations and cross-training of NYSDOT and Monroe County staff – Ongoing (Near-Term for cross-training)...
- Continue Federal funding for the NYSDOT Highway Emergency Local Patrol (HELP) Program to decrease delay and increase safety on major highways by providing emergency roadside service to disabled vehicles – Ongoing

The HELP Program is an important initiative in minimizing Non-Recurring Incident Related Delay. The program provides assistance to motorists that have experienced issues on major roadways that without quick action will limit capacity and cause congestion with the potential for secondary incidents as a result. The NYSDOT-Region 4 Advanced Transportation Management System Local Evaluation Report found that the HELP Program had one of the highest cost/benefit ratios of any initiative assessed. Like RTOC staffing, funding for the HELP Program has been and continues to be provided in the TIP and these financial resources will continue to be made available.

- Conduct relevant training opportunities between transportation, law enforcement, fire and medical, and other agencies to improve incident response, management, and clearance – Ongoing

Clearing crashes as quickly as possible while providing for the safety of emergency responders and law enforcement agents requires significant coordination. The National Highway Institute Coordinated Incident Management (Quick Clearance) Workshop, developed by the I- 95 Corridor Coalition, was conducted in October for regional local law enforcement, first responder, and transportation system management agencies, as well as representatives from the local towing industry. This workshop or a similar training opportunity should be offered in the region on a regular basis.

In Chapter 7, Performance Measures, GTC selected “median incident clearance time” as one of 15 performance measures that the region will use to monitor transportation system performance to support accountability and identify changes in key areas of the transportation system. A benchmark or current level is provided along with expected and desired directional changes.

Chapter 7: Performance Measures

Using quantitative metrics to measure the performance of the transportation system over time is important to being accountable to taxpayers, given the large amount of public funds used for its construction, maintenance, and operation. There is no current Federal or State requirement that system performance be monitored and reported but there are increasing discussions at the national level on this issue. Performance measures are included in the LRTP 2035 in order to monitor changes in key areas that matter to users of the transportation system.

GTC sought to ensure that the selected performance measures would be both meaningful (having significance) and understandable (capable of being comprehended) to users and policymakers, providing a common basis to discuss changes in how the transportation system is meeting or not meeting regional needs.

The current value for each performance measure is provided as a benchmark along with the desired direction consistent with the GTC Goals and Objectives and the likely direction based on what can realistically be accomplished within the reasonably expected revenues.

Though less important than meaningfulness and understandability, another consideration in the selection of the performance measures was the availability of quality data for the region (or Rochester TMA) and the likelihood that it will continue to be collected. As a result, all of the data is collected either by a GTC member agency, GTC staff, or a New York State government agency that is not a GTC member agency. Exhibit 26 presents the LRTP 2035 Performance Measures with each discussed below.

Median incident clearance time on major roadways was calculated by GTC for calendar year 2010 based on when notifications of incidents and their corresponding clearances were provided by e-mail through NY-Alert and the NYSTA TRANSalert.

Median incident clearance time on major roadways was calculated by GTC for calendar year 2010 based on when notifications of incidents and their corresponding clearances were provided by e-mail through NY-Alert and the NYSTA TRANSAAlert.

PERFORMANCE MEASURES

Exhibit 26

L RTP 2035 Performance Measures

Performance Measure	What it Evaluates	Benchmark	Desired Change	Likely Change
Number of Fatalities	Safety	100	Decrease	Slight Decrease
Federal-Aid Highway with Pavement Fair or Better	System Preservation	90.3 percent	Increase	Slight Decrease
Non-Deficient Bridges	System Preservation	64.8 percent	Increase	Slight Decrease
Average Age of Transit Buses	System Preservation	7.65 years	Decrease	Slight Decrease
Travel Time Index on Major Roadways	Mobility	1.10	Decrease	Slight Increase
Transit On-Time Performance	Mobility	84 percent	Increase	Slight Increase
Passenger Rail On-Time Performance	Mobility	70 percent	Increase	Slight Decrease
Median Incident Clearance Time on Major Roadways	Mobility	52 minutes	Decrease	Slight Decrease
Median Transit Load Factor	Accessibility	0.93	Slight Increase	Slight Increase
Gaps in Core Multi-Use Trails Network	Accessibility	36 miles	Decrease	Slight Decrease
Federal-Aid Highways in TMA with Complete Sidewalks	Accessibility	19.6 percent	Increase	Slight Increase
Emissions of Nitrogen Oxides	Environment	18,914.8 Kg/day	Decrease	Decrease
Emissions of Volatile Organic Compounds	Environment	13,537.8 Kg/day	Decrease	Decrease
Emission of Carbon Dioxide Equivalent	Environment	11,385 tons/day	Decrease	Slight Decrease
Direct Energy Usage	Environment	146.2 billion BTUs/day	Decrease	Slight Decrease

Advancement could include specific target such as "decrease to X minutes"

needs and other expenses make this difficult for any public transportation operator to achieve. In addition, proper preventive maintenance of vehicles can make it possible for buses to remain in service longer while providing levels of reliability similar to newer models.

As discussed previously, the Travel Time Index is a ratio of the time it takes to make a trip during the peak period compared to making the same trip at free-flow speeds (mid-day period). Data is currently collected by GTC using GPS-equipped vehicles. A

Travel Time Index of 1.3 on a single segment indicates that the trip takes one-third longer in the peak period than in the midday period (i.e., a 20-minute free-flow trip requires 26 minutes in the peak period).

The historical transit on-time performance was provided by RGRTA for RTS with on-time defined as between three minutes early and 6 minutes late. Passenger rail on-time performance was obtained from Amtrak for their Empire Corridor New York City to Niagara Falls routes in December 2010 (the last monthly



During the development of the region's long range transportation plan, GTC and its stakeholder agencies, including public safety, created the Intelligent Transportation Systems (ITS) Strategic Plan for Greater Rochester. This served as a detailed plan for management and operations with a 10-year deployment strategy. The ITS strategic plan, guided by the regional vision and goals of the regional transportation plan, enabled transportation operators/public safety to provide crucial input on specific objectives, needs, and strategies for TIM. These needs and strategies were then used to build recommendations for TIM in the long range plan. The relationship between the regional transportation plan and the regional ITS strategic plan is diagramed in the figure below from the GTC ITS Strategic Plan.

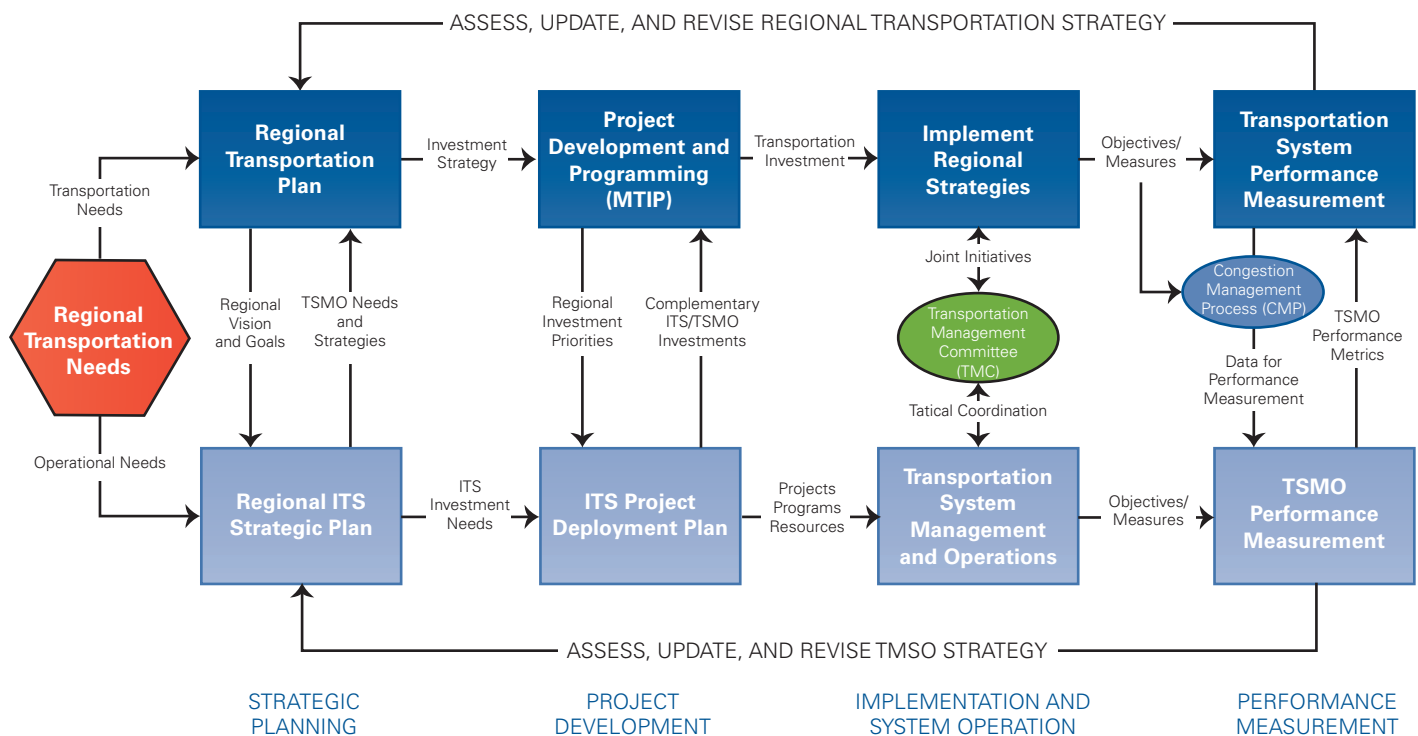


Figure 4. Diagram depicting the relationship between regional transportation planning and planning for operations/ITS at the Genesee Transportation Council. Source: Genesee Transportation Council, Intelligent Transportation Systems Strategic Plan for Greater Rochester, 2011. Available at: <http://www.gtcmpr.org/Resources/Topics/TSMO.htm>.

Below is an excerpt from the GTC ITS Strategic Plan of the incident and emergency management initiatives defined for the region. The objectives are activity or action-oriented and support the desired decrease in incident clearance time as identified in the long range plan.

Incident and Emergency Management

Description: Detection, verification, response, management, and recovery of incidents and emergency situations in the Greater Rochester area.

Goal: Provide for prompt, safe response to traffic incidents and emergency management scenarios to increase safety and minimize congestion, disruptions, and loss of capacity associated with traffic incidents.

Objectives:

- Formalize existing incident management procedures and protocols through a Regional Concept for Transportation Operations that documents institutional roles and responsibilities using a scenario-based approach.
- Increase involvement and participation of emergency response agencies in incident management, including knowledge of best practices for traffic management and awareness/access to ITS tools.
- Improve cross-training of operations staff to enable MCDOT and NYSDOT staff to cooperatively manage incidents and operate ITS system on the other agency's systems during incident situations.
- Improve public access to traveler information about incident situations through a variety of traveler information media
- Develop a regional, multiagency system for incident and event reporting that is consistent with federal guidelines (SAFETEA-LU Sec 1201).
- Plan for future integration of regional ITS infrastructure with NYSDOT statewide Advanced Traffic Management System (ATMS) and incident reporting tools.
- Fill in gaps or "blind spots" in existing instrumented corridors to improve incident detection, verification, and response capabilities.
- Provide for phased expansion of traffic management infrastructure on additional expressway and arterial corridors based on prioritized operational needs.
- Increase the level of NYSDOT and MCDOT central signal system control along critical corridors throughout the urbanized and rural portions of the region to improve the ability to implement alternative signal plans in response to incidents and real-time conditions.

Relevant Regional Needs:

- Detection of incidents and disruptions through video or field reports.
- Dissemination of incident information to general public through media, HAR, and DMS signs.
- Coordinated response to incidents and emergency situations with NY State Police (colocated at RTOC).

Key Opportunities and Challenges:

- Expansion of regional traffic data collection devices and cameras
- Increased participation of local first responders (police, fire, EMS) in regional response plans and utilization of ITS technology
- Multi-agency training to improve awareness of RTOC capabilities
- Additional scenario-based incident response and diversion planning
- Provision of incident information to the public via 511 integration, DMS, and HAR
- Use of data to support performance measurement of system management programs

In the following table, lead and participating agencies include:

- GTC – Genesee Transportation Council
- MCDOT – Monroe County Department of Transportation
- NYSDOT – New York State Department of Transportation
- NYSTA – New York State Thruway Authority

Genesee Transportation Council
INTELLIGENT TRANSPORTATION SYSTEMS (ITS) STRATEGIC PLAN
FINAL REPORT

IBI Group
February 2011


Incident and Emergency Management Initiatives					
Ref. #	Description	Time-frame	Lead Agency	Participating Agencies	Progress Milestones
IE1 EM1 AM2 IC2 WM1	Develop a Regional Concept for Transportation Operations for Incident Management using a corridor-based approach.	Near	MCDOT NYSDOT NYSTA	GTC Law Enforcement/ Emergency Management	<ul style="list-style-type: none"> Development of an RCTO and execution of related agreements
IE2 EM2 TI1	Identify and instrument gaps in regional traffic and incident management ITS infrastructure based on operations needs.	Medium	NYSDOT MCDOT	NYSTA GTC	<ul style="list-style-type: none"> Infill instrumentation deployment
IE3 EM3 TI2	Phased expansion of ITS infrastructure to additional regional corridors based on prioritized need.	Medium-Long	NYSDOT MCDOT	NYSTA GTC	<ul style="list-style-type: none"> Instrumentation of additional corridors based upon operational priorities
IE4 CI2	Expand communications and provide system integration to support increased NYSDOT and MCDOT centralized signal control capabilities.	Medium	NYSDOT MCDOT	Other comm. asset owning agencies	<ul style="list-style-type: none"> Integration of additional signalized intersections into the NYSDOT central system
IE5 EM4	Improve integration and joint operations management of the NY Thruway corridor with expressways managed by NYSDOT and MCDOT, including incident response, and traveler information, and infrastructure sharing.	Near	NYSDOT NYSTA	Law Enforcement/ Emergency Management	<ul style="list-style-type: none"> Development of a scenariobased joint operating concept Execution of interagency agreements Integration of ITS systems and operations
IE6 EM5	Increase availability of incident and traffic information through traveler information media – 511, HAR, DMS, third-party services, etc., including comparative travel time information.	Medium	NYSDOT	Third-party information providers	<ul style="list-style-type: none"> New or enhanced traveler information reporting of real-time expressway and incident conditions, including travel time reporting
IE7	Provide education and outreach to local law enforcement agencies on traffic and incident management best practices and coordinated regional plans and ITS infrastructure.	Near	NYSDOT MCDOT	Law Enforcement/ Emergency Management	<ul style="list-style-type: none"> Conduct agency outreach and training Increase local agency involvement in incident response

67

Genesee Transportation Council
INTELLIGENT TRANSPORTATION SYSTEMS (ITS) STRATEGIC PLAN
FINAL REPORT

IBI Group
February 2011

IE8	Facilitate cross-training of MCDOT and NYSDOT staff to allow for greater flexibility to respond to incident and emergency situations on the network using RTOC staff.	Near	NYSDOT MCDOT		<ul style="list-style-type: none"> Cross-training and certification of staff on both MCDOT and NYSDOT systems Execution of related interagency agreements
IE9 EM7 AM8	Identify the most suitable diversion routes for major roadways in the region to minimize delay and improve safety for the travelling public when road or bridge closures occur.	Near	GTC	MCDOT NYSDOT NYSTA Law Enforcement agencies	<ul style="list-style-type: none"> Diversion route plans for Principal Arterials for production and distribution to relevant agencies
IE10	Evaluate system redundancy, and off-site backup for the RTOC to ensure resiliency in emergency situations.	Near	NYSDOT MCDOT	NYSP	<ul style="list-style-type: none"> Needs assessment/feasibility study for RTOC enhancements and backup



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