

Role of Transportation Management Centers in Emergency Operations

Guidebook



Notice

This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The U.S. Government assumes no liability for the use of the information contained in this document. This report does not constitute a standard, specification, or regulation. The U.S. Government does not endorse products of manufacturers. Trademarks or manufacturers' names appear in this report only because they are considered essential to the objective of the document.

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 for continuous quality improvement.

Cover Image Sources: Top Left - Car in water: iStockphoto®/License agreement.
Middle Left - Merge right sign: Cambridge Systematics, Inc.
Bottom Left - Traffic: Comstock Images/License agreement.
Bottom Right - Tow Truck: Cambridge Systematics, Inc.
Right - Monitoring Traffic: Cambridge Systematics, Inc.

Technical Report Documentation Page

1. Report No. FHWA-HOP-12-050	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Role of Transportation Management Centers in Emergency Operations Guidebook		5. Report Date October 2012	
		6. Performing Organization Code	
7. Author(s) Daniel Krechmer, Albert Samano III, Pamela Beer, Nicholas Boyd, Brenda Boyce		8. Performing Organization Report No.	
9. Performing Organization Name And Address Cambridge Systematics, Inc. 4800 Hampden Lane, Suite 800 Bethesda, MD 20814 Fortress, Inc. 1118 Hidden Glen Drive Round Rock, TX 78681 Mixon-Hill 12980 Metcalf Avenue #470 Overland Park, KS 66213		10. Work Unit No. (TRAIS)	
		11. Contract or Grant No. DTFH61-06-D-00004	
12. Sponsoring Agency Name and Address U.S Department of Transportation Federal Highway Administration Office of Operations 1200 New Jersey Ave, SE Washington, DC 20590		13. Type of Report and Period Covered Final Report	
		14. Sponsoring Agency Code HOTM, FHWA	
15. Supplementary Notes Jimmy Chu, FHWA Office of Transportation Management, Government Task Manager (GTM)			
16. Abstract The purpose of this guidebook is to increase communication, collaboration, and cooperation among Transportation Management Centers (TMC) and emergency response agencies so they can effectively respond to a variety of situations ranging from a localized traffic incident to major regional events such as hurricane evacuations. The key is to remove the technical and institutional barriers that prevent TMCs from fully supporting emergency operations. The guidebook addresses those barriers and provides noteworthy practices on how TMCs can effectively implement emergency operations through a mutual understanding with emergency response agencies on the responsibilities, resources, and operational procedures that result in a beneficial relationship for all parties. Throughout the publication are photos showing actual emergency events and the role played by the TMC. The guidebook will increase a TMC's understanding of emergency operations and identify specific activities to enhance coordination and cooperation with emergency response agencies. The guidebook will also allow emergency response agencies to understand the mission, resources, and operational procedures of TMCs. As demonstrated through the guidebook best practices, it is the trust and relationships built up through joint planning and training activities that result in better cooperation. Improved cooperation in turn leads to success in achieving the ultimate goal, which is more rapid and effective response in times of emergency with reduced loss of life and property.			
17. Key Words Transportation Management Centers, Emergency response, Incident management, Incident Command System		18. Distribution Statement No restrictions.	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages J1	22. Price N/A

Preface/Acknowledgments

We would like to thank Jimmy Chu, FHWA Office of Transportation Management, Government Task Manager (GTM), for his continued support and technical guidance during this project. We would also like to acknowledge the contributions of the following Transportation Management Centers Pooled Fund Study (TMC PFS) members:

- Cathy McGhee, Virginia Department of Transportation;
- Robert Koeberlein, Idaho Department of Transportation;
- Paul Keltner, Wisconsin Department of Transportation;
- Laurel Radow, FHWA;
- Tom Martin, I-95 Corridor Coalition; and
- Ming Shiun Lee, URS Corporation.

This report is based upon work supported by the Federal Highway Administration TMC PFS under contract number DTFH61-06-D-00004. Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of the Federal Highway Administration.

Table of Contents

Executive Summary	ES-1
1.0 Introduction and Overview.....	1-1
1.1 The Role of Emergency Operations in the TMC	1-1
1.2 The Role of TMCs in Emergency Operations Checklist	1-3
2.0 TMC Functions and Context for Emergency Operations	2-1
2.1 Relevance of TMC Functions to Emergency Operations Functions	2-1
2.2 TMC Preparedness Activities	2-3
2.3 TMC Preparedness Checklist	2-6
2.4 TMC Support of the Incident Command System.....	2-7
2.5 Support for Incident Command System Checklist	2-10
2.6 TMC Support of Emergency Operations.....	2-10
2.7 Support for Emergency Operations Checklist.....	2-12
2.8 Colocation of TMC and EOC.....	2-12
3.0 Pre-Event Activities – Planning, Training and Exercising, and Best Practices.....	3-1
3.1 Establish an Emergency Preparedness Working Group	3-1
3.2 Emergency Preparedness Working Group Checklist.....	3-2
3.3 Perform a Needs Assessment	3-3
3.4 Needs Assessment Checklist	3-4
3.5 Develop a TMC EOP and SOPs.....	3-4
3.6 Develop an Emergency Operations Plan	3-5
3.7 Emergency Operations Plan Checklist	3-25
3.8 Continuity of Operations Planning	3-26
3.9 COOP Planning Checklist.....	3-36
4.0 Response and Recovery	4-1
4.1 General TMC Roles in Response and Recovery	4-1
4.2 Response and Recovery Checklist	4-3
4.3 Traffic Incidents	4-3
4.4 Traffic and Large-Scale Incidents Checklist.....	4-6
4.5 Large-Scale Emergencies.....	4-6
4.6 Large-Scale Emergency Checklist	4-10
4.7 Large Planned Events and National Special Security Events.....	4-11
4.8 Large Planned Events Checklist.....	4-15

5.0 Postevent Activities	5-1
5.1 Recovery Actions	5-1
5.2 After-Action Assessments and Improvement Plans.....	5-2
5.3 Postevent Checklist.....	5-7
5.4 Maintain TMC Emergency Operations	5-8
5.5 Maintain Emergency Operations Checklist	5-9
A. Glossary	A-1

List of Tables

Table 3.1	Traffic Incident Management Stakeholders and Descriptions.....	3-9
Table 4.1	Operational Responsibilities Assumed by TMCs for Traffic Incidents	4-4

List of Figures

Figure 2.1 Information Exchange between Transportation Centers Emergency Centers and Fusion Centers.....	2-3
Figure 2.2 Highway Incidents Requiring Formal Use of ICS.....	2-9
Figure 2.3 Components of the NIMS Process.....	2-9
Figure 3.1 Concept of Operations Weather Event	3-7
Figure 3.2 DHS National Preparedness System.....	3-23
Figure 3.3 Evacuation Zones Houston-Galveston Area.....	3-26
Figure 3.4 TMC Emergencies Most Likely to Require COOP Activation.....	3-29
Figure 3.5 HSEEP Exercise Program Management Model	3-33
Figure 5.1 Activities in the Preparation, Response, and Recovery Phases.....	5-4
Figure 5.2 Indiana DOT Freeway Service Patrol Performance Measures.....	5-6

Executive Summary

The purpose of this guidebook is to increase communication, collaboration, and cooperation among Transportation Management Centers (TMC) and emergency response agencies so they can effectively respond to a variety of situations ranging from a localized traffic incident to major regional events such as hurricane evacuations. A description of TMC functions and resources relevant to emergency operations is included followed by sections describing the activities that take place during emergency operations, including pre-event, response and recovery, and post event.

The guidebook opens with a description of how TMCs currently support emergency response such as reporting on traffic conditions, and assessing transportation system damage. The TMCs are well suited to this role because they are the “hub of the transportation management system.” The guidebook also describes the various TMC preparedness activities that can help when an emergency occurs including detection and verification of incidents, dissemination of information, assistance with incident response, on-scene management, traffic control, coordination with maintenance activities, mapping and GIS resources, and access to archived historical data.



Source: Cambridge Systematics, Inc.



Source: Digital Stock, a division of Corbis Corp.

During an emergency, it is important to utilize an Incident Command System (ICS), which is a standardized, all-hazards incident management approach that provides the integration of facilities, equipment, personnel, procedures, and communications that operate within a common organizational structure. The guidebook describes how TMCs can benefit from learning and utilizing ICS, and recommends TMCs conduct strategic-level actions on preparedness and resource management (planning, training, personnel, and equipment certification) to improve support to emergency response agencies in a way that is consistent with ICS.

Even though most emergency operations centers (EOC) are temporary, an entity like a TMC that is permanently in place can provide support because they have access to established and widespread cameras, sensors, and communications networks. The guidebook describes how these and other functions can help during small- and large-scale traffic incidents, planned events, and large-scale regional emergencies. For instance, the TMC can detect a traffic event and issue appropriate notifications to the

public. During large-scale emergencies, like a hurricane, the TMC can facilitate evacuations by suspending highway work or projects on evacuation routes and providing equipment and personnel resources to assist in the staffing and implementation of evacuation traffic control points.

In some cases, a TMC and EOC co-locate which provides backup power, communications, and sheltering requirements that allow the TMC to continue operating during adverse conditions. Other EOCs are virtual, and use video/voice conferencing, and file sharing servers as a way to coordinate activities. Both approaches are described in the book.

Because emergencies usually occur with little or no warning, it is important for TMCs to prepare in advance through planning, training, and practice. The guidebook describes these “pre-event” activities including establishing an emergency preparedness working group; performing a needs assessment; and developing a TMC Emergency Operations Plan (EOP) and Standard Operating Procedures (SOP). Other activities include the development of a comprehensive preparedness guide and a Continuity of Operations Plan. The TMC Emergency Operations Plan can be an extensive document and the guidebook walks through each of the recommended elements which include the following:

- Purpose and Scope;
- Situation Overview and Planning Assumptions;
- Concept of Operations (ConOps);
- Organization and Assignment of Responsibilities;
- Direction, Control, and Coordination;
- Interagency Coordination for Planned Special Events;

- Information Collection and Dissemination;
- Communication;
- Administration, Finance, and Logistics;
- Plan Development and Maintenance;
- Authorities and References; and
- Additional Planning and Coordination Functions.

Training for TMC personnel and joint training with emergency responders and others are also helpful. The guidebook describes the various types of training currently available and recommends TMCs develop a training plan to ensure all relevant personnel have the necessary information and skills.

Once the emergency or event occurs, the TMCs can move into the response and recovery phase. The guidebook describes the various relationships and provides descriptions of the TMC role in these activities in three different situations, including traffic incidents (minor and large-scale), large-scale emergencies, and planned special events.

During the response phase, TMCs can implement their operating procedures, which identify the personnel to staff an emergency, and notification procedures. Other response activities in the guidebook include the use of the TMC camera system, and media relations. Because emergencies are not all the same, the guidebook describes the various operational (response and recovery) responsibilities for TMCs during emergency events.

The final chapter of the guidebook describes the various post event activities including recovery, after-action assessments, and how to improve planning functions. An important role for TMCs is to help departments of transportation identify roadway restoration and infrastructure repair. TMCs can also play a critical role in after-action assessments that allow all participants to review what

happened and how operations can be improved in the future.

In addition to a wealth of the information, the guidebook includes practical checklists for each section that allow a TMC to evaluate their current support for support emergency operations and identify areas for improvement.

The checklists provided are intended for use by TMC personnel to self-evaluate:

- The level of cooperation they have achieved with emergency management and response personnel; and
- The level of expertise they have developed to participate in emergency response activities.

Checklists can be used to provide an overall assessment, identify areas in which TMCs want to improve, or identify specific priority actions. The order in which the check boxes are listed in this document does not imply any priority.

1.0 Introduction and Overview

Transportation Management Centers (TMC) monitor roadway conditions, provide support to motorists and field personnel responding to roadway incidents, and actively manage traffic flow. This central role in traffic operations provides an excellent opportunity to enhance the effectiveness of emergency response. New technologies and strategies are enabling transportation and emergency management agencies to work together so they can rapidly respond to emergency events, utilize limited resources in a cost-effective way, and improve safety for the traveling public.



Source: Cambridge Systematics, Inc.

The purpose of this guidebook from the Federal Highway Administration (FHWA) is to increase communication, collaboration, and cooperation among these agencies so they can effectively respond to a variety of situations from a localized traffic incident to major regional events such as hurricane evacuations. The key is to remove the technical and institutional barriers that prevent TMCs from fully supporting emergency operations.

The guidebook addresses those barriers and provides noteworthy practices on how TMCs and emergency operations can achieve a mutual understanding on the responsibilities, resources, and operational procedures that

result in a beneficial relationship for all parties. Throughout the publication are photos showing actual emergency events and the role played by the TMC.

Areas Covered in the Guidebook

- Phases of emergency response planning.
- Where TMCs and emergency operations personnel can work together.
- Description of the National Incident Management System (NIMS) and Incident Command System (ICS).
- Role of TMCs during and after an emergency.
- How to maintain cooperation between transportation and emergency management agencies.
- Recommendations for additional activity.

1.1 The Role of Emergency Operations in the TMC

TMC roles in supporting emergency response can include direct supervision of Freeway (safety) service patrols¹ in local incidents, surveillance of traffic, reporting on traffic conditions during major incidents or planned special events, and deployment of maintenance trucks and other resources. Some emergency response agencies share space with the TMCs or have public safety personnel at the center. Others provide space when needed during emergencies.

A number of TMCs also are upgrading their central software systems to improve the automated linkages with law enforcement and emergency operations agencies. Others offer staff and information resources. The Wisconsin

Department of Transportation (DOT) started a Helper Program (WisHELP) which has at least one DOT employee on-call 24 hours, 7 days to support the emergency management agency. The WisHELPERS represent Statewide Bureaus (structures, traffic, maintenance) that are headquartered near the State Emergency Operations Center. There is also support for the WisHELPERS through the emergency traffic operations positions of the Statewide Bureau Duty Officer. This has led to closer ties between transportation and emergency management agencies.

1.1.1 How TMCs and Emergency Operations Centers Cooperate

An Emergency Operations Center (EOC) is a control facility where emergency operations are directed and coordinated. In an EOC the local and state staff and officials receive information relating to an incident. It also is where decision-makers and support agencies supervise the coordination of response activities to a large incident/emergency such as an evacuation. The main functions of an EOC include providing direction, coordination, and support to emergency operations; carrying out disaster management functions at a strategic level in an emergency; and ensuring the continuity of operation of a company, political subdivision, or other organization. The EOC also collects, gathers, and analyzes data; makes decisions that protect life and property; maintains continuity of the organization, and disseminates those decisions to all concerned agencies and individuals.

Greater emphasis on homeland security and budget constraints make joint use of resources more important and TMC resources can be helpful during emergencies. A number of events have led to greater cooperation between transportation and emergency operations personnel, including the following:

TMC Emergency Support Activities

- Plan for anticipated events (hurricanes, winter storms, etc.).
 - Detect, verify, and monitor roadway conditions.
 - Assess transportation system damage and capacity.
 - Identify and manage public safety lifeline routes.
 - Develop and implement traffic control strategies to support emergency response and evacuation.
 - Manage detours and evacuation routes.
 - Dispatch maintenance and support vehicles.
 - Coordinate with local transportation agencies.
 - Develop event-specific operational strategies to address response phases.
 - Provide public information/traveler alerts.
 - Stabilize traffic demand in the affected area.
 - Postevent debriefings.
- The geographic expansion of the surveillance and detection components of Intelligent Transportation Systems (ITS) systems allows TMCs to cover both urban areas and rural “hotspots.” New data sources such as privately provided “probe” data allow monitoring of speeds on evacuation and detour routes.
 - New traffic management software and supporting communications technologies allow sharing of data and video between transportation, law enforcement, and emergency response agencies.
 - Improvements in the coverage and quality of weather information are available to TMC personnel through expansion of the Road Weather Information Systems (RWIS), and a consolidation of weather information from the National Weather Service and private forecasting services through the *Clarus* initiative.

- TMC historical archived datasets are available for use by emergency personnel in monitoring, planning, and implementing emergency routes and activities.



Photo courtesy of the FHWA Road Weather Management Program.

The implementation of the National Incident Management System (NIMS) has also resulted in closer relationships between TMC and Emergency Response personnel as evidenced by improvements in the following:

- An understanding of responsibilities through training of transportation personnel in emergency situations;
- Communications infrastructure and faster more extensive information sharing;
- Response times and effectiveness during actual events due to joint training and table top exercises; and
- Opportunities to review performance, identify gaps, and develop lessons learned.

1.2 The Role of TMCs in Emergency Operations Checklist

The TMC can use the following checklist to evaluate their current status in support of emergency operations. The TMC conducts the following support activities in conjunction with the EOC (*check all that apply*):

- Plans for anticipated events (hurricanes, winter storms, etc.).
- Detects, verifies, and monitors roadway conditions.
- Assesses transportation system damage and capacity.
- Identifies and manages public safety life-line routes.
- Conducts traffic control strategies to support emergency response and evacuation.
- Manages detours and evacuation routes.
- Dispatches maintenance and support vehicles.
- Coordinates with local transportation agencies.
- Develops event-specific operational strategies to address response phases.
- Provides warnings and public information/ traveler alert requirements.
- Stabilizes traffic demand in the affected area.
- Conducts postevent debriefings.
- Monitors speeds on evacuation and detour routes.
- Shares data and video with transportation, law enforcement, and emergency response agencies.
- Obtains and shares weather information from the Road Weather Information System (RWIS) and *Clarus*.
- Provides historical archived data to emergency personnel for monitoring, planning, and implementing emergency routes and activities.
- Participates in joint training.

¹ Freeway Service Patrols are now referred to as Safety Service Patrols by FHWA's Traffic Incident and Emergency Management team. In this document both terms are included.

2.0 TMC Functions and Context for Emergency Operations

The TMC concept, initially developed for railroads and urban public transportation systems, has been in place for some time mainly because it allowed information on system operations to be in a centralized location; a function that evolved as technology for centralized monitoring and control of traffic signal systems grew.

[The TMC is] “the hub of a transportation management system, where information about the transportation network is collected and combined with other operational and control data to manage the transportation network and to produce traveler information. It is the focal point for communicating transportation-related information to the media and the motoring public, a place where agencies can coordinate their responses to transportation situations and conditions. The TMC also links various elements of Intelligent Transportation Systems such as variable message signs, closed circuit video equipment, roadside count stations, etc., enabling decision-makers to identify and react to an incident in a timely manner based on real-time data.”

*Institute of Transportation Studies
University of California-Berkeley, 2005*

Early TMC deployments focused on urban areas with existing freeway detection systems. The addition of cameras, electronic message signs, and communications networks has enabled TMCs to monitor and respond to incidents and other traffic disruptions.

Some TMCs also manage and dispatch Freeway (safety) service patrols (FSP) or collaborate with law enforcement agencies on FSPs to provide faster response to incidents. Their capabilities range from van services with basic capabilities such as jump-starting and tire changing to full-size wreckers with the ability to tow large commercial vehicles.



Source: Cambridge Systematics, Inc.

One of the most important TMC functions is the dissemination of information through various channels such as the dedicated 511-telephone service, web sites, electronic message signs, and direct links to media and outside private information services.

Over the past several years, private companies developed methods, mainly through feedback from probe vehicles, to estimate speeds and travel times on most of the Interstate system and many other major highways, helping TMCs with situational awareness and providing important information in emergencies.

2.1 Relevance of TMC Functions to Emergency Operations Functions

The day-to-day operations of a TMC assist with several of the Emergency Support

Functions (ESF), which are developed by the Department of Homeland Security and provide the structure for coordinating interagency support in an emergency. ESF 1: Transportation and ESF 3: Public Works, which relates to the deployment of DOT engineering support, reference the capabilities and functions of TMCs. ESF 1 and ESF 3 activate transportation and public works agencies, and call upon them to assist emergency response and recovery efforts coordinated by an EOC. The footnoted link provides access to more detail on ESFs and other incident management practices found in the FHWA document, *Best Practices in Traffic Incident Management*.²

Probe Vehicle Data

The following can be used to collect probe vehicle data:

- Cell phones.
- Electronic toll tags.
- In-vehicle navigation units.
- Automated vehicle location units.

The system tracks vehicles and calculates highway speeds based on their locations at specific times. Because of privacy issues, the technologies assign an encrypted ID to the vehicles to prevent identification and discard data after it is used.

A pre-established framework of coordination and cooperation based on the ESF model is essential to leverage TMC capabilities. Figure 2.1, for instance, shows the diverse potential for information interchange between TMCs, EOCs, and other centers such as Fusion Centers.

Fusion Centers serve as focal points within the state and local environment for the receipt, analysis, gathering, and sharing of threat-related information. In this role, they empower front-line law enforcement, public safety, fire service, emergency response, public health, critical infrastructure protection, and private-sector security personnel to understand local

Emergency Support Function (ESF) 1 – Transportation

ESF 1 provides support to the Department of Homeland Security (DHS) by participating in the following activities:

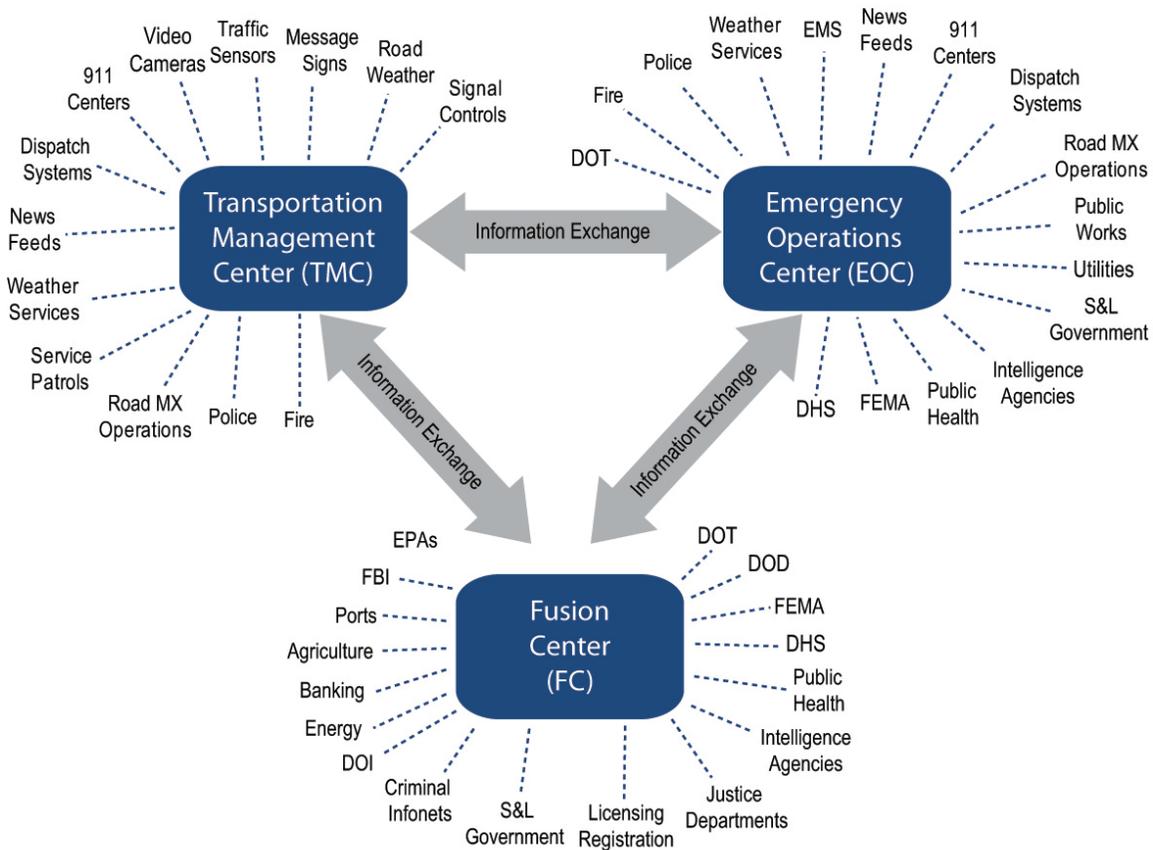
- Monitor and report status of and damage to the transportation system and infrastructure caused by the incident.
- Identify temporary alternative transportation solutions for implementation by others when systems or infrastructure are damaged, unavailable, or overwhelmed.
- Perform activities conducted under the direct authority of DOT elements as these relate to aviation, maritime, surface, railroad, and pipeline transportation.
- Coordinate the restoration and recovery of transportation systems and infrastructure.
- Coordinate and support prevention, preparedness, response, recovery, and mitigation activities among transportation stakeholders within the authorities and resource limitations of ESF 1 agencies.

Emergency Support Function (ESF) 3 – Public Works and Engineering

ESF 3 assists the Department of Homeland Security (DHS) by participating in the following activities:

- Pre-incident and postincident assessments of public works and infrastructure.
- Emergency contract support for life-saving and life-sustaining services.
- Technical assistance to include engineering expertise, construction management, and contracting and real estate services.
- Emergency repair of damaged public infrastructure and critical facilities.
- Implementing and managing the DHS/Federal Emergency Management Agency (FEMA) Public Assistance Program and other recovery programs.

Figure 2.1 Information Exchange between Transportation Centers Emergency Centers and Fusion Centers



Source: Federal Highway Administration, *Information-Sharing Guidebook for Transportation Management Centers, Emergency Operations Centers and Fusion Centers*, June 2010, p. 4.

implications of national intelligence. They also provide interdisciplinary expertise and situational awareness to inform decision-making at all levels of government. They conduct analysis and facilitate information sharing while assisting law enforcement and homeland security partners in preventing, protecting against, and responding to crime and terrorism. By utilizing the information provided by Fusion Centers, local officials can better protect their communities.³

2.2 TMC Preparedness Activities

TMCs undertake various preparedness activities, including detection and verification of incidents, dissemination of information, assistance with incident response, on-scene management and traffic control, coordination with maintenance activities, mapping and GIS resources, and providing archived historical data.

2.2.1 Detection and Verification

TMCs monitor, detect, and verify incidents affecting transportation operations and safety, serve as a clearinghouse, and provide information to emergency agencies on the status of the transportation infrastructure (washed-out bridges or roadways, etc.). To obtain this information, TMCs utilize the following methods:

- **ITS Technology** - TMCs utilize ITS technologies such as closed-circuit television (CCTV) cameras and information from computer-aided dispatch (CAD) systems to detect the presence of incidents or emergencies on transportation facilities. The use of this technology confirms the incident occurred, enhances the assessment of incident needs, and helps with the subsequent dispatch of appropriate personnel and resources.
- **Data Sources** - TMCs receive and exchange information on incidents and traffic conditions with on-site responders, law enforcement, and emergency personnel. TMCs may also manage or access cell phone calls to local law enforcement and dispatchers, motorist aid call boxes, and information from automated collision notification systems (ACNS).



Source: Cambridge Systematics, Inc.

2.2.2 Dissemination of Information

TMCs collect and disseminate traveler information to the public, which helps control

and smooth traffic operations and provides information to appropriate personnel for quick and efficient response during incidents and emergencies. TMCs utilize the following to disseminate information:



Source: Cambridge Systematics, Inc.

ETravel Information - TMCs control Dynamic Message Signs (DMS) on major roadways, which are available for use in emergencies. These signs provide motorists with information on detour routes, shelter locations, and evacuation procedures. In non-emergencies, DMS provide information on construction activity, special events, minor delays caused by traffic incidents, or expected travel times. TMCs also have small portable message signs, which mainly support construction activity, but are available during emergencies for information on detour routes or other emergency-related matters.

New technologies such as Connected Vehicle programs will allow TMCs to provide authorized information to drivers in their vehicles. According to the U.S. DOT's Research and Innovative Technology Administration (RITA) the goal of the Connected Vehicle Research Program is to "to achieve a vision of a national, multimodal surface transportation system that features a connected transportation environment among vehicles, the infrastructure and passenger portable devices. This connected environment will leverage technology to maximize safety, mobility, and environmental performance." The footnoted link provides more detail on this research.⁴

Pretrip Information - TMCs provide motorists with information prior to a trip on roadway conditions, infrastructure damage, and evacuation routes through 511 systems and traveler information web sites. TMCs also provide information through Highway Advisory Radio and media partnerships with AM/FM Radio, and televised announcements. Providing pretrip information can reduce traffic demand at the incident scene and direct motorists to alternative routes, emergency shelters, and/or evacuation points.

2.2.3 Incident Response

TMCs use ITS technologies and communication linkages with other agencies and media partnerships to identify, verify, and track incidents and emergency events, which allows for information exchange and coordination among emergency responders, and law enforcement.

Coordinated Response – TMCs, once they detect and verify an incident, can perform a variety of functions during a coordinated response, including the following:

- Play an active role in incident clearance by relaying information to Freeway (Safety) Service patrols, police, responders, and tow and recovery operators.
- Improve the timeliness of response during nontraffic incidents such as industrial accidents, civil disruption, and natural disasters.
- Use improved methods and technologies such as enhanced computer-aided dispatch (E-CAD) and dual or optimized dispatch procedures to direct emergency responders to routes with the least amount of traffic or other disruptions.
- Reduce traffic demand at the incident scene and clear the path for responders, by utilizing traveler information resources to alert motorists to avoid certain routes

and/or destinations and present alternative paths or transportation modes.



Source: Cambridge Systematics, Inc.

Operational and Demand Strategies for Emergency Response – The TMC can also utilize ITS resources to expedite incident and emergency response through the following:

- Coordinate with local agencies or utilizing systems such as responsive signal operations and emergency vehicle signal preemption/priority to optimize emergency responder access to and from the incident scene.
- Update information on message signs and other media (web sites, radio, TV, and 511) to reduce demand at incident scene, clear the path for responders, and divert traffic to alternative routes and/or destinations.
- Coordinate with transit agencies and/or tolling authorities to inform motorists and the public of strategies (free transit services, opening tolling lanes) that divert traffic to alternative routes and modes of transportation. This effort can relieve demand at the incident, help motorists avoid certain facilities during planned events or work zones, and direct travelers to evacuation routes and shelters.

Innovative Strategies for Improved Emergency Response – TMCs may also establish certain procedures or programs that

improve emergency response, including the following:

- Manage instant tow dispatch procedures and towing and recovery zone-based contracts with specific contractors to speed incident response. This expedites dispatch, optimizes response procedures, and reduces travel distances.
- Coordinate equipment staging areas and preposition equipment to enhance the availability of and reduce the wait time for specialty equipment that may be slow to mobilize.
- Provide resources, including trucks and support vehicles by coordinating with agency maintenance.

2.2.4 Coordination with Maintenance Activities

TMC maintenance crews are generally responsible for clearance and repair of transportation infrastructure, which enables the TMC to receive accurate information for better-informed decision-making. Maintenance activities can support coordination through the following:

- Maintain, monitor, and repair vital infrastructure, equipment, and other assets such as cameras, detectors, and message signs that are essential to the TMC for monitoring traffic, detecting and verifying incidents, and responding to various emergencies.
- Aid in the detection and verification of incidents, and response activities.

2.2.5 Mapping and GIS Resources

TMCs and other partner agencies are often responsible for mapping and GIS-related resources. Many TMCs utilize these tools to better manage ITS equipment and service vehicles, track and monitor maintenance

work services, and disseminate important information on incidents, emergencies, and travel conditions to the public, responders, and law enforcement.



Source: Cambridge Systematics, Inc.

2.2.6 Archived Historical Data

Many TMCs are placing greater emphasis on analyzing and archiving data on volumes, speeds, incidents, construction activities, traveler information messages, weather conditions, or special events which can be used for emergency response operations. For instance, data can measure incident clearance or emergency response times or identify strategies or elements of an area's response plans that may need adjustments or improvements. Additionally, archived historical data can be used to improve emergency and disaster preparedness activities by identifying detour routes and evacuation routes and strategies.

2.3 TMC Preparedness Checklist

The TMC can use the following checklist to evaluate their current status in the area of preparedness.

The TMC conducts the following preparedness activities (*check all that apply*):

Incident Response

- Detects and verifies incidents.
- Disseminates information through (*check all that apply*):
 - Dedicated 511 telephone service.
 - Web sites.
 - Electronic message signs.
 - Direct links to the media and outside private information services.
 - Pretrip information.
 - ETravel Information.
- Relays information to Freeway (Safety) Service patrols, police, responders, and tow and recovery operators.
- Improves the timeliness of response.
- Uses improved methods and technologies to direct emergency responders to routes with the least amount of traffic or other disruptions.
- Reduces traffic demand at the incident scene and clears the path for responders.
- Coordinates with local agencies or utilizes equipment and devices to optimize emergency responders' access to and from the incident scene.
- Updates information on message signs and other media (web sites, radio, TV, and 511) to reduce demand at incident scene, clear the path for responders, and divert traffic to alternative routes and/or destinations.
- Coordinates with transit agencies and/or tolling authorities to inform motorists and the public of strategies (free transit services, opening tolling lanes) that divert traffic to alternative routes and modes of transportation.

- Manages instant tow dispatch procedures and towing and recovery zone-based contracts with specific contractors to speed incident response.
- Coordinates equipment staging areas and repositioning of equipment to enhance the availability of and reduce the wait time for specialty equipment.
- Provides resources, including trucks and support vehicles, by coordinating with agency maintenance.

Other Coordination

- Maintains, monitors, and repairs vital infrastructure, equipment, and other assets.
- Aids in the detection and verification of incidents, as well as in response activities.
- Provides mapping and GIS resources.
- Provides archived historical data.

2.4 TMC Support of the Incident Command System

The Incident Command System (ICS), which is part of the broader NIMS, is a standardized, all-hazards incident management approach that provides the following:

- The integration of facilities, equipment, personnel, procedures, and communications that operate within a common organizational structure;
- A coordinated response among various jurisdictions and functional agencies, both public and private; and
- The identification of common processes for planning and managing resources.

ICS is a scalable and modular approach for use during incidents of any type, scope, and complexity. It allows users to adopt an

integrated organizational structure for incident management to match the complexities and demands of single or multiple incidents, and guides the process for planning, building, and adapting that structure. Government at the Federal, state, tribal, and local levels, nongovernmental organizations, and the private sector use ICS. The typical ICS structure facilitates activities in five major functional areas: command, operations, planning, logistics, and finance/administration.

TMCs are an integral part of ICS because they monitor and control traffic flow when a disruption in roadway system operations occurs. FHWA's *Simplified Guide to the Incident Command System for Transportation Professionals* introduces the ICS concept to transportation officials whose expertise, assistance, or material is needed during a highway incident. A growing number of transportation agencies are adopting ICS as evidenced by a 2002 FHWA survey that found 64 percent are using ICS to manage traffic incidents.

While ICS supports incidents of all sizes, a formal activation is not necessary for smaller incidents since a single police car and tow truck can usually handle them. Figure 2.2 illustrates this concept.

TMCs should undertake advance planning and preparation consistent with NIMS and ICS. By utilizing FHWA's *Simplified Guide to the Incident Command System for Transportation Professionals* to lay out activities (Figure 2.3), TMCs can put into place the strategic, tactical, and support levels necessary prior to an incident and ensure adoption and understanding of ICS and successful general TMC planning and coordination practices.

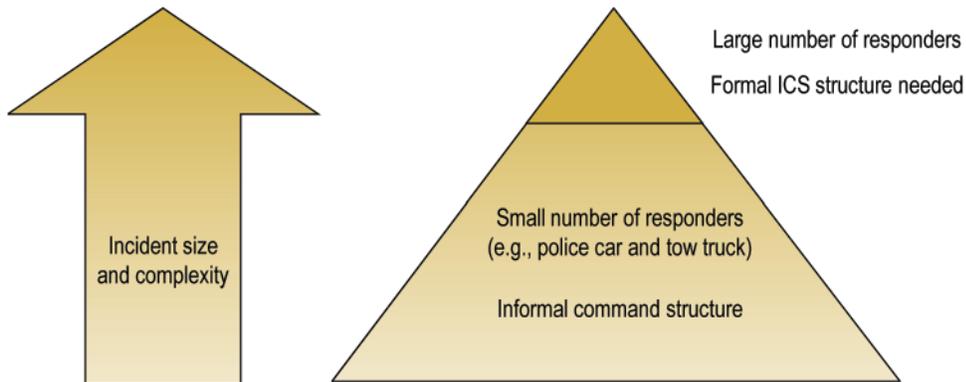
2.4.1 Conduct Strategic-Level Actions on Preparedness and Resource Management

To improve support to emergency response agencies in way that is consistent with

ICS and NIMS, TMCs should conduct strategic-level actions on preparedness and resource management, and provide support for communications and information management. Following is a checklist of the recommended TMC strategic actions:

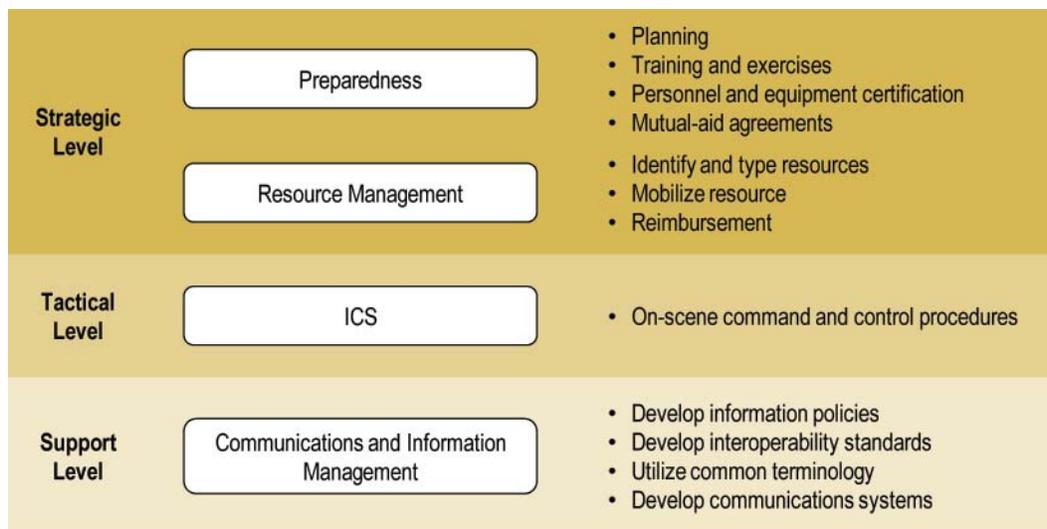
- **Planning** – Develop plans and procedures to support incident response activities, including descriptions of agency relationships, event classification and/or notification practices, and position and equipment checklists.
- **Training and Exercises** – Design, develop, and conduct training and discussion-based exercises such as workshops, seminars, and tabletop exercises for personnel as appropriate to ensure familiarity and understanding with plans and procedures.
- **Personnel and Equipment Certification** – Certify the required personnel and equipment are prepared and in working order.
- **Mutual-Aid Agreements** – Develop mutual-aid agreements with appropriate agencies and jurisdictions to ensure resource sharing and cooperation.
- **Resource Typing and Identification** – Clearly identify and type resources to ensure accurate TMC understanding of the available resources, their locations, and capabilities.
- **Mobilization and Reimbursement** – Develop and promulgate procedures for resource mobilization, demobilization, and reimbursement.
- **Tactical-Level Actions on ICS** – Develop documentation to support tactical-level actions.

Figure 2.2 Highway Incidents Requiring Formal Use of ICS



Source: FHWA *Simplified Guide to the Incident Command System for Transportation Professionals*.

Figure 2.3 Components of the NIMS Process



Source: FHWA *Simplified Guide to the Incident Command System for Transportation Professionals*.

2.4.2 Support-Level Actions for Communications and Information Management

To provide support for communications and information management, TMCs should conduct the following activities:

- **Information Policy** - Develop a policy for the TMC's handling and securing of

information, including any interoperable communication among the TMC, public safety agencies, and any other necessary entities.

- **Common Terminology** - Develop policies and procedures for use of common terminology to ensure understanding between agencies and avoid agency-specific jargon that may impede communications.

- **Communications Systems** – Develop communications systems to support the TMC’s mission and facilitate interoperable communication with other agencies involved in incident response.

Checklist of Recommended TMC Strategic Actions

- Planning.
- Training and Exercises.
- Personnel and Equipment Certification.
- Mutual-Aid Agreements.
- Resource Typing and Identification.
- Mobilization and Reimbursement.
- Tactical-Level Actions on ICS.

2.5 Support for Incident Command System Checklist

The TMC can use the following checklist to evaluate their current status in support in the incident command system by doing the following (*check all that apply*):

Preparedness and Resource Management Checklist

- Uses the NIMS and ICS as a way to plan and manage incidents and emergencies.
- Develops plans and procedures to support incident response activities.
- Designs, develops, and conducts training and discussion-based exercises.
- Certifies that the required personnel and equipment are prepared and in working order.
- Develops mutual-aid agreements with appropriate agencies and jurisdictions to ensure resource sharing and cooperation.

- Identifies and categorizes resources to ensure accurate TMC understanding of the available resources, their locations, and capabilities.
- Develops and promulgates procedures for resource mobilization, demobilization, and reimbursement.
- Develops documentation to support formal activation of ICS for incidents warranting activation and for implementation of the command and control functions.

Communications and Information Management

- Develops a policy for the TMC’s handling and securing of information.
- Develops policies and procedures for use of common terminology.
- Develops communications systems to support the TMC’s mission and facilitate interoperable communication.

2.6 TMC Support of Emergency Operations

The capabilities and functions of a TMC can support to the needs of EOCs because they have access to established and widespread cameras, sensors, and communications networks. The TMC can help the EOC overcome some of the challenges that are inherent in a temporary operation.

TMCs can support small- and large-scale traffic incidents, planned events, and large-scale regional emergencies by developing emergency operations procedures that do the following:

- Detect events and issue notifications to the appropriate public safety entities;
- Monitor and relay TMC camera and sensor information (roadside weather

information, traffic queues, etc.) to first responders as requested;

- Provide communications support using TMC systems and capabilities as requested;
- Provide emergency response resources, including personnel and equipment as requested; and
- Assist with coordination involving specialized agencies (hazardous materials spill, fire evacuations, and transportation closures).

The following are ways TMCs can provide additional support for large-scale planned events and large-scale emergencies (hurricanes, blizzards, earthquakes, terrorist attacks, and industrial accidents):

- Transition from providing support for a planned event to providing response to an unplanned incident occurring at the event;
- Refocus, to the extent possible, camera and sensor information on an event, and monitor and relay to first responders as requested;
- Facilitate evacuations by suspending highway work or projects on evacuation routes and provide equipment and personnel resources to assist in the staffing and implementation of evacuation Traffic Control Points; and
- Provide response resources, including personnel and equipment as requested by the Emergency Operations Center or the incident or the unified commander in the field.



Photo courtesy of Matt Stamey/[The Gainesville Sun](#).

As visibility reaches near zero due to a massive brush fire, a fatal multivehicle accident occurs near Gainesville, Florida. The Florida Highway Patrol and the Florida Department of Transportation, colocated in the Transportation Management Center, work together to close Interstate 75, inform the traveling public, and manage the incident.

2.7 Support for Emergency Operations Checklist

The TMC can use the following checklist to evaluate their current status in support of small- and large-scale events and emergencies by doing the following (*check all that apply*):

- Detects events and issues notifications to the appropriate public safety entities.
- Monitors and relays TMC camera and sensor information (roadside weather information, traffic queues, etc.) to first responders as requested.
- Provides communications support using TMC systems and capabilities as requested.
- Provides emergency response resources, including personnel and equipment as requested.
- Assists with coordination involving specialized agencies (hazardous materials spill, fire evacuations, and transportation closures).
- Transitions from providing support for a planned event to providing response to an unplanned incident occurring at the event.
- Refocuses, to the extent possible, camera and sensor information on an event, and monitors and relays to first responders as requested.
- Facilitates evacuations by suspending highway work or projects on evacuation routes and provides equipment and personnel resources to assist in the staffing and implementation of evacuation Traffic Control Points.

2.8 Colocation of TMC and EOC

Because an emergency incident requires cooperation from a variety of agencies, some TMCs and EOCs colocate to provide greater communication and coordination, and allow for the leveraging of resources. TMCs should explore the feasibility of collocating with the state or region EOC, which may depend on the laws, operational configurations, and available facilities. Some important factors to consider include the following:

- Colocation provides backup power, communications, and sheltering requirements that allow the TMC to continue operations in adverse conditions;
- EOCs are activated only in cases of emergency or during some special events, and even then staffing will vary dramatically according to the nature and severity of the incident;
- An EOC is typically located away from hazards that may impact or preclude its use during an emergency; and
- Existing facilities that can accommodate both the systems and space needs of a TMC and EOC are rarely available, which may require new construction and configuration.



Source: Cambridge Systematics, Inc.

2.8.1 Utilization of Virtual EOCs

Virtual EOCs, which refer to utilization of technologies and procedures between physically separated personnel operating as one entity, enable multiple EOCs to coordinate activities. TMCs should consider utilizing the “virtual EOC” concept to achieve closer integration of the TMC with the EOC. Video conferencing, voice conferencing, and file sharing servers are among the technologies that facilitate a virtual EOC concept. In addition, procedures and documentation must be developed that will support the activation, operation, and demobilization of a virtual EOC.

² <http://ops.fhwa.dot.gov/publications/fhwahop10050/ch1.htm>.

³ Federal Highway Administration, *Information-Sharing Guidebook for Transportation Management Centers, Emergency Operations Centers and Fusion Centers*, June 2010, p. 4.

⁴ http://its.dot.gov/connected_vehicle/connected_vehicle.htm.

3.0 Pre-Event Activities – Planning, Training and Exercising, and Best Practices

Incidents usually occur with little to no warning. That is why TMCs should prepare for incidents through planning, training, and practice prior to an incident in the “pre-event” phase. Incident response lies at the core of a TMC’s mission. Rigorous, sustained, and coordinated pre-incident preparedness ensures an efficient and effective handling of future incidents. The pre-event activities TMCs should undertake include the following:

- Establish an emergency preparedness working group;
- Perform a needs assessment;
- Develop a TMC Emergency Operations Plan (EOP) and Standard Operating Procedures (SOP);
- Develop a comprehensive preparedness guide; and
- Develop a Continuity of Operations Plan.

3.1 Establish an Emergency Preparedness Working Group

TMCs should form an Emergency Preparedness Working Group with agencies that regularly work with the TMC to discuss, develop, and review topics and initiatives related to emergency preparedness. Some of the possible participants include the following:



Source: Digital Stock, a division of Corbis Corp.

- Law enforcement (Federal, state, local);
- Fire departments;
- Emergency medical services;
- Emergency management agencies (Federal, state, local);
- Towing and recovery providers;
- Transportation agencies (Federal, state, local), including nonhighway agencies such as public transit (large metro systems and local bus services), rail, airport, or maritime;
- Private or not-for-profit organizations such as the Red Cross, towing associations and AAA; and
- Other Federal, state, or local agencies such as Department of Homeland Security and state/local environmental agencies.

The group should establish regularly scheduled and published meetings and develop the activities, including the following:

- Conduct a needs assessment and planning activities;
- Perform training and drill exercises;
- Introduce and evaluate new technologies that can benefit both transportation and emergency operations which may offer opportunities to pool funds; tabletop exercises to build trust and good working relationships; and
- Perform formal debriefs or after-action meetings after critical incidents.

A series of guiding principles with regard to interagency cooperation are shown in the side box.

3.2 Emergency Preparedness Working Group Checklist

The TMC can use the following checklist to evaluate their current status in forming an Emergency Preparedness Working Group. The following list includes those parties that should be participating in the group (*check all that apply*):

- Law enforcement (Federal, state, local).
- Fire departments.
- Emergency medical services.
- Emergency management agencies (Federal, state, local).
- Towing and recovery providers.
- Transportation agencies (Federal, state, local), including nonhighway agencies such as public transit (large metro systems and local bus services), rail, airport, or maritime.

- Private or not-for-profit organizations.
- Other Federal, state, or local agencies.

Guiding Principles to Interagency Cooperation in Emergency Planning for TMCs

- Play a support role to the State Emergency Management Agency (SEMA).
- Play an active role in developing and exercising the State EOP.
- Serve as the lead agency for ESF 1 – Transportation and play a significant role in other ESFs.
- Have an agencywide emergency operations plan.
- Ensure plans and procedures complement the State’s overall emergency structure and plan(s).
- Ensure plans adhere to an all-hazards approach.
- Use the Comprehensive Preparedness Guide (CPG) 101 emergency management planning cycle (plan, prepare, respond, recover) and within that framework, prepare for specific response activities.
- Actively participate in the unified command during incidents.
- Recognize the need for transportation agencies to understand the basic concept of the ICS, including Unified Command (UC), as defined in NIMS.

Source: NCHRP Report 525, Volume 16, *Guide to Emergency Response at State Transportation Agencies*, p. 18.

Link to full documentation: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_525v16.pdf.

3.3 Perform a Needs Assessment

Transportation agencies conduct needs assessments on operations and maintenance, mobility, safety, or staffing. Needs assessments for emergency operations follow similar procedures and require the same basic elements, including the following:

Sample Emergency Operations Goals

- Minimize the impact of disaster on people, property, environment, and the economy.
 - Assure mobility of the public and emergency response personnel.
 - Assure agency continuity.
 - Protect agency facilities and resources.
- Goals and objectives indicating what the TMC wants to accomplish in the area of emergency operations (see sample in the box above). Performance measures should determine whether the plan met its goals and objectives (see Wisconsin example).
 - Measurable targets supported by available data that tie back to the goals and objectives, e.g., response times during events.
 - Gaps and deficiencies such as inadequate staffing or geographic coverage, training, lack of communications capability, or slow response times.
 - A summary of needs for the Emergency Transportation Operations plan, including task-specific needs, which relate to the ability to carry out specific functions, and crosscutting needs, which include support functions for a variety of tasks.

A **task-specific needs assessment** might include the following:

- Deployment of additional detection equipment and/or cameras to cover specific locations;
- Assignment of staff to emergency response planning activities;
- Development of response scenarios for specific events such as hazardous material spills, special events, or winter storms; and
- Evaluation and selection of detour routes.

A **crosscutting needs assessment** might include the following:

- Development of interagency training programs and exercises;
- Implementation of real-time communications/ software links between the TMC and EOC; and
- Joint development of detour routes for major emergencies and identification of needed infrastructure.

Wisconsin DOT Emergency Operations Plan Areas for Performance Measurement

- ETO Positional Roles/Staffing.
- Training.
- Incident Action Plans (Communication/Coordination).
- Regional Incident Management Coordinator Response.
- WisHELP Response.
- Timely Notification.
- Emergency Contact List Maintenance.

Source: Wisconsin DOT, Emergency Transportation Operations Program Update: Winter Weather Webinar, November 2010.

3.4 Needs Assessment Checklist

The TMC can use the following checklist to evaluate their current status in support of a needs assessment (*check all that apply*):

- Develops goals and objectives.
- Identifies measurable targets.
- Identifies gaps and deficiencies.

The TMC develops an Emergency Transportation Operations plan that includes the following (*check all that apply*):

- Deploys additional detection equipment and/or cameras.
- Assigns staff to emergency response planning activities.
- Develops response scenarios for specific events.
- Evaluates and selects detour routes.
- Develops interagency training programs and exercises.
- Implements real-time communications/software links between the TMC and EOC.
- Participates in joint development of detour routes for major emergencies.

3.5 Develop a TMC EOP and SOPs

An Emergency Operations Plan (EOP) is a coordinating document outlining an organization's concept of operations during an emergency. It provides information on potential situations and planning assumptions, roles and responsibilities, administration, and maintenance. Effectively developed, an EOP provides a concise overview of an organization's emergency preparedness,

response capabilities, and policies. It ties together threat and vulnerability assessments, mitigation planning, procedures, training, and drills and exercises in the form of a central high-level document that guides and advances the organization's emergency preparedness program.



Source: Cambridge Systematics, Inc.

A TMC Emergency Preparedness Working Group should coordinate and drive the EOP. Although guidance does not currently exist for transportation EOPs, the Department of Homeland Security (DHS), and the Federal Emergency Management Administration (FEMA) Comprehensive Preparedness Guide (CPG) 101 is a standard guideline for a range of emergency operations needs. The footnoted link provides access to full documentation of CPG-101.⁵ It also provides a framework for transportation agencies identifying the process for monitoring and reporting the status of, and damage to, the transportation system and infrastructure resulting from an incident. Other items that are part of ESF 1 are available alternative transportation solutions, and methods of restoring the transportation systems and infrastructure. The guidebook also discusses the tasks that are part of ESF 3, Public Works.

Specific guidance is available in the NCHRP Report 525 – Volume 16 *Surface Transportation Security – A Guide to Emergency Response*

Planning at State Transportation Agencies, which utilized the CPG-101 as guidance for transportation EOP. Whenever possible, the TMC should use Federal standards and guidelines in the planning process. NIMS is a comprehensive, nationwide, systematic approach to incident management and includes a set of preparedness concepts and principles for all hazards, as well as essential principles for a common operating picture and interoperability of communications and information management. NIMS consists of standardized resource management procedures that enable coordination among different jurisdictions or organizations. It is a scalable and dynamic system promoting ongoing management and maintenance. The footnoted link provides access to full documentation of NIMS.⁶

Achieving NIMS compliance requires state transportation agencies to become familiar with and understand the NIMS/ICS and National Response Framework (NRF) structure and their roles and responsibilities. The NIMS/ICS structure provides a systematic, shared tool to command, control, and coordinate emergency response activities consistently across all response agencies.

3.6 Develop an Emergency Operations Plan

Although formats vary, many state transportation agencies choose to follow the State EOP format for their agency plans. This makes the plans more consistent and, when put to use, makes it easier for outside parties to be involved. At a minimum, CPG 101 states the EOP should include the following sections:

- Purpose and Scope;
- Situation Overview and Planning Assumptions;

- Concept of Operation (ConOps);
- Organization and Assignment of Responsibilities;
- Direction, Control, and Coordination;
- Interagency Coordination for Planned Special Events;
- Information Collection and Dissemination;
- Communication;
- Administration, Finance, and Logistics;
- Plan Development and Maintenance;
- Authorities and References; and
- Additional Planning and Coordination Functions.

Following is a description of each of those sections.

3.6.1 Purpose and Scope

The purpose section sets the tone of the EOP, and describes the shared commitment to improve responder and motorist safety and expedite incident clearance. The purpose should also reflect the basic guiding principles from NIMS as well as the NCHRP Guide to Emergency Response at State Transportation Agencies. The scope identifies the jurisdictional, geographic, and functional boundaries applicable to the EOP.

3.6.2 Situation Overview and Planning Assumptions

This section characterizes the planning environment and explains the need for the EOP. It should summarize the hazards faced by the TMC and discuss how the TMC expects to receive (or provide) assistance within its regional response structures. The situation section covers the following:



Source: Digital Stock, a division of Corbis Corp.

As scientists try to determine not if, but when a major earthquake will occur along the New Madrid fault line, the Missouri Department of Transportation (MoDOT) is planning for the possibility. MoDOT has a disaster plan and conducts earthquake emergency exercises with the State Emergency Management Agency and other public safety agencies. During the scenarios, the participants deal with fallen bridges, trapped motorists, crumbled roadways, and essential employees who were injured or incapacitated. Another benefit of the exercise demonstrates how MoDOT TMCs will disseminate messages to the traveling public and the media.

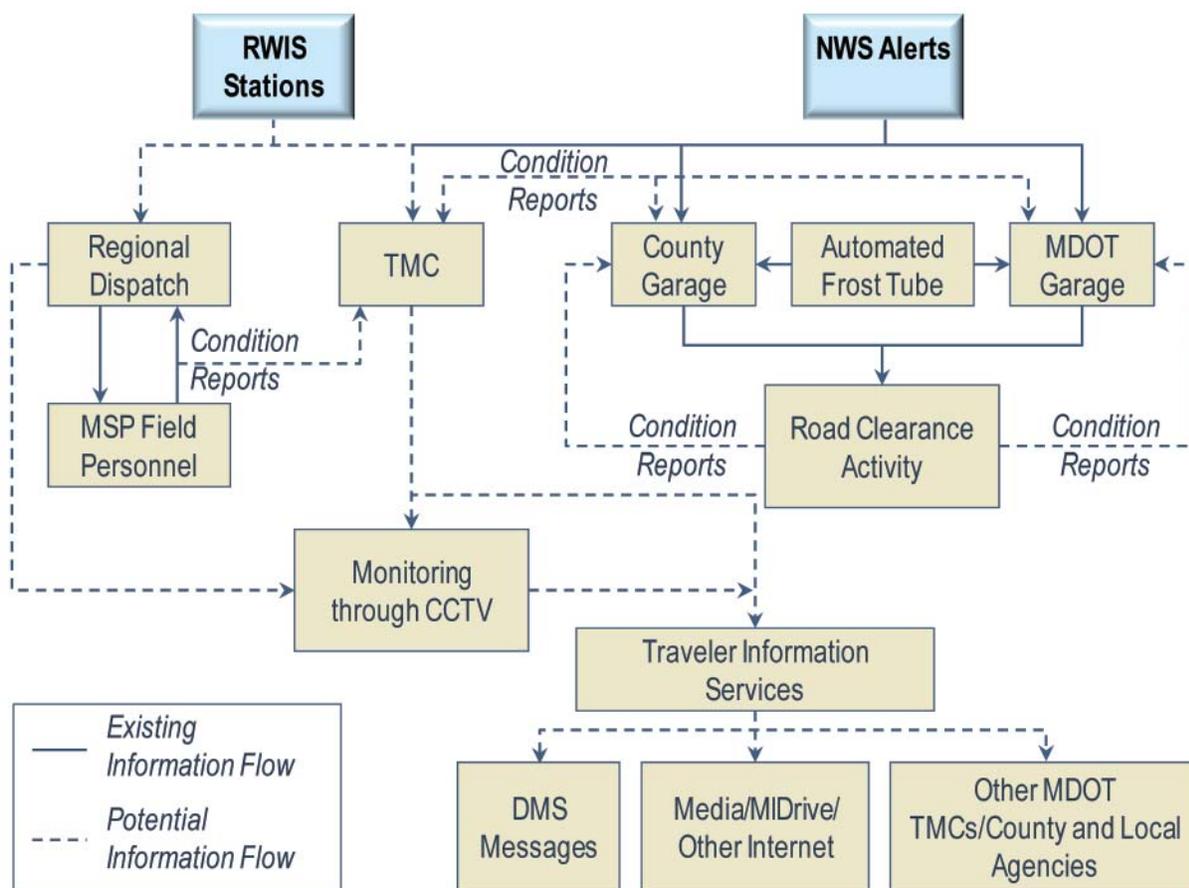
- Relative probability and impact of the hazards;
- Geographic areas likely to be affected by particular hazards;
- Vulnerable critical facilities (e.g., nursing homes, schools, hospitals, infrastructure);
- Population distribution and locations, including any concentrated populations of individuals with disabilities, others with access and functional needs, or individuals with limited English proficiency, as well as unaccompanied minors and children in daycare and school settings;
- Dependencies on other jurisdictions for critical resources;
- The process used by the TMC to determine its capabilities and limits to prepare for and respond to the defined hazards;
- The actions taken in advance to minimize an incident's impacts, including short- and long-term strategies; and
- How to identify areas where plan adjustments may be needed once more information is available.

3.6.3 Concept of Operations

This ConOps section of the EOP explains TMC management's intent on operations and through the documentation of specific operating concepts fosters understanding between transportation and emergency response agencies. The ConOps should make clear whether the TMC and EOC would collocate, the utilization of virtual EOCs, and

how the TMC will leverage Traffic Incident Management (TIM) practices. Concepts of Operations are often scenario-based such as the description of the weather event shown in Figure 3.1. Scenarios can vary from relatively simple high-level concepts, as shown below, to very detailed flowcharts. This chart shows the concept for DOT monitoring of a weather event, and communications with the Michigan State Police (MSP).

Figure 3.1 Concept of Operations Weather Event



Source: Michigan Department of Transportation *North Region Traffic Management Center Concept of Operations*, prepared for MDOT by Kimley-Horn and Associates, Inc., Cambridge Systematics, Inc., HNTB, and Richard Foltman, 2008.

3.6.4 Organization and Assignment of Responsibilities

This section establishes the organization that will respond to emergencies, including the types of tasks by position and organization. It can build upon the existing TIM programs, which typically include coordination of incident response efforts by traditional responders (law enforcement, transportation, fire and rescue, and EMS). This initial coordination forms the basis for a multiagency team, a cornerstone of any TIM program, including:

- The responsibilities for various emergency preparedness and response activities in the EOP, including internal position responsibilities, and the responsibilities of external agencies, such as public safety agencies; and
- A framework for developing and achieving multiagency coordination (detailed in NIMS and ICS). Table 3.1 shows a description of the various roles and responsibilities. More information on roles and responsibilities is included in the Traffic Incident Management Handbook. The Handbook offers insights into the latest innovations in TIM tools and technologies and includes a web-based version that users can easily access. Some of the topics covered include the necessary programmatic structure and institutional cooperation, what constitutes the full range of on-scene operations, and the communications and technical aspects of a successful program. The footnoted link provides access to full documentation.⁷

3.6.5 Direction, Control, and Coordination

This section describes the framework for all direction, command and control, and coordination activities, and identifies who has strategic, tactical (as applicable), and operational command and control of response assets and services. Strengthening interagency coordination during emergency planning activities will encourage ongoing dialogue among TIM responders. It will also increase awareness of priorities and roles, as well as joint agency/jurisdictional protocols. It gives TMCs and EMCs an opportunity to formalize agency relations and respective roles in TIM and demonstrate commitment through common resource/facility investments. The footnoted link provides access to additional detail on coordination strategies found in the FHWA *Traffic Incident Management Handbook*, which is described earlier.⁸

Utilizing the Emergency Preparedness Working Group as a vehicle, TMCs should lead or participate in interagency coordination and communication efforts related to emergency preparedness. TMCs are hubs for information gathering and sharing as well as communications and notifications, and should bring these capabilities and functions to broader, statewide emergency preparedness planning efforts. Whether led by state DOTs, state Emergency Management Agencies (EMA), or DHS, incorporation of TMC resources and capabilities is rarely turned away. The discussion of direction, control, and coordination will have a direct effect on the following:

- Identifying and encouraging participation by the full range of stakeholders, as shown in Table 3.1;
- Participation by nontraditional stakeholders such as trucking companies and AAA through relationships with their trade organizations;
- Utilization of state or regional responder organizations such as Sheriff's or Fire Departments to reach out to representatives from smaller communities; and
- Familiarizing team members with each other's roles and responsibilities at initial meetings and repeating as needed given the high turnover rates among participants.

Table 3.1 Traffic Incident Management Stakeholders and Descriptions

Traditional Responders	Special/Extreme Circumstance Responders	Incident Information Providers	Transportation System Providers and Users
Public Safety Communications Law Enforcement Fire and Rescue Emergency Medical Services (EMS) Towing and Recovery Transportation Agencies	Hazardous Materials Contractors Coroners and Medical Examiners Emergency Management Agencies Environmental/Natural Resources Departments of Public Health	Traveler Information Services Traffic Media Transportation Agencies	Traveling Public Trucking Industry Insurance Industry Public Transportation Providers Motorist Organizations

Source: 2010 Traffic Incident Management Handbook, FHWA-HOP-10-013.



Source: iStockphoto®.

Three tractor-trailers have crashed releasing Thioglycol, a Class 6 HAZMAT material, and trapping one of the drivers inside the cab. While emergency responders worked to extricate the driver, a HAZMAT team contained the chemical. Behind the scenes, the Virginia Department of Transportation (VDOT) published 511 messages (voice and web site), and through its regional TMCs established detours, and posted information on message boards until the highway was open in both directions and returned to normal traffic patterns.



Photo courtesy of the North Carolina Department of Transportation.

The North Carolina Department of Transportation (NCDOT) played a primary role in communicating information to residents and tourists before, during, and after Hurricane Irene. NCDOT's TMC provided real-time travel information on their 511 system, web site, changeable message signs, through Twitter, and on mobile devices. The TMC also managed traffic and monitored for incidents.

3.6.6 Interagency Coordination for Planned Special Events

This section describes the expertise and resources on traffic flow that TMCs bring to an event planning team. While planned special events are not the focus of this guidebook, they are discussed here for two important reasons:

- Planned special events provide an opportunity to test emergency response systems, equipment and training, including ICS, in a non-emergency situation. Lessons can be drawn which will help improve emergency response.
- Due to the large number of people concentrated in limited space, planned special events represent a high risk for terrorist acts. Unanticipated weather events, particularly thunderstorms or high winds, can also result in an emergency situation.

Depending on the type of event, the venue, or even the location, the event planning team could include the following:

- State and local police/law enforcement;
- State and local traffic management agencies;
- Emergency management services/response (Fire/EMS);
- Tow truck operators;
- Transit operators and event shuttle operators;
- Parking lot operators;
- Venue operators; and
- Event promoters and the media.



Source: Cambridge Systematics, Inc.

The FHWA *Freeway Management and Operations Handbook*, Chapter 11, provides a detailed summary of TMC planning and management roles related to special events, which will vary depending on event characteristics. Some of the topics discussed include a detailed description of all phases of managing travel from preplanning to postevent, a framework for stakeholder coordination, and innovative techniques for enhancing efficiency. The footnoted link provides access to full documentation.⁹ Another valuable source of information is the FHWA document *National Special Security Events: Transportation Planning for Planned Special Events*, FHWA-HOP-11-012, which provides a transportation guide to National Special Security Events (NSSEs).

Some of the planning and resources from the TMC, law enforcement, and emergency response can improve operational efficiency around planned special events.

For instance, when the Dallas Cowboys Stadium opened in 2009, there were 200 officers in the field supporting traffic and event management; today that number is closer to 90, which shows a significant resource and cost savings as a result of technology, operational strategies, and coordination with the TMC.

3.6.7 Information Collection and Dissemination

This section describes the essential information common to all emergencies identified during the planning process, including coordination with state and regional Fusion Centers.

TMC Resources and Services for Planned Special Events

- Monitor traffic conditions on key roadways through detection and CCTV equipment.
- Share CCTV feeds with law enforcement, event managers, and others.
- Implement strategies to guide traffic in and out of the event, including reviewing historical traffic conditions to determine where congestion can be expected, using of Dynamic Message Signs (DMS) to provide advance notice, and deploy portable message signs to help guide event traffic advise drivers of potential delays.
- Provide the public with advanced notice of the event, detours, and closed roads via web sites, 511 phone systems, media, and private traffic information services.
- Coordinate with other transportation departments to supply additional trucks or equipment to support a potential emergency.
- Participate in drills and exercises with emergency responders to plan for emergency access/egress or evacuations.
- Coordinate with local jurisdictions to modify signal timing on arterial roadways during pre-event and postevent periods.
- Coordinate with transit operations centers, both public and private, to help manage bus staging areas and access/egress routes for transit vehicles.

ITS and Traveler Information

In many regions, the DOT's ITS is an important source of real-time information about the transportation system, which is often communicated by the TMC to law enforcement.

TMC/EOC Data Exchange

TMCs should explore avenues to enhance connectivity and interoperability between TMCs, EOCs, and Fusion Centers. The range of connectivity and data exchange between the TMC and EOC includes shared local area data and video networks; shared private area networks using Ethernet technology and video encoding; and commercial data access from publicly available providers such as the Internet and telephone service providers. In addition, the TMC should incorporate ITS into their emergency operations procedures to provide situational awareness to the EOC and Fusion Center including traffic volumes and queuing. ITS information may also help inform evacuation decisions and routing.

3.6.8 Communication

This section of the EOP describes the response communication protocols and coordination procedures for use during emergencies and disasters. The TMCs' 24/7 operational profile and advanced incident detection and information gathering capabilities place them at the forefront of highway incident response. TMCs can only be effective in this role if there are appropriate communications and notification policies and procedures. The box shows a communications policy developed by Florida DOT for use in hurricanes and other emergencies.

If a common interagency communications center is not available, the plan must then cover how to achieve interagency communications, including notifications between TMCs, EOCs, Fusion Centers, and emergency

response agencies. These protocols should apply for regional communications plans and communication between the TMC and other transportation agencies. The Federal Communications Commission (FCC) ruling of July 2011 on Public Safety Broadband, discussed further in the next section, has direct implications for TMC/EOC cooperation.

Microwave System and Communications Through Cellular Telephones and Radios

- Communications protocols are a critical part of the Emergency Operations Plan, including both notification and equipment. Clear direction such as that shown below in the Florida DOT Hurricane Action Response Plan can assure that DOT participants are properly equipped and prepared.
- Districts should continue to use and maintain FDOT-owned 47 MHz maintenance radio system to ensure communication during emergencies.
- Contractors who provide services to FDOT during emergencies should be included in the FDOT communication system.
- Districts should explore use of satellite telephones for redundancy following a hurricane since telephones and radios could be out of service after such an event.

Source: Florida DOT Hurricane Response Action Plan, Version 2, June 2005.

Communications Stakeholders

State DOTs, because of their interest in ITS technology, can work with and support public safety agency partners on advanced technology applications. The FCC's allocation of frequency to public safety functions reinforces this cooperation. An integrated approach to a broader range of hazards requires cooperation among the emergency management community and public safety and transportation entities, more shared real-time

information, rapid access across public data sources and data types, and access to special expertise on an on-call basis. TMCs should also establish a Communications Working Group and include stakeholders involved in communications and notification systems and procedures within and outside the TMC. The communications group would cooperate with the TMC on the development of plans and procedures and include individuals from the following:

- Internal TMC or state DOT Information Technology Division;
- Internal TMC or state DOT Telecommunications Division;
- External Communications Stakeholders:
 - Police Telecommunications;
 - State Emergency Management Telecommunications; and
 - Municipal Public Safety Telecommunications.

Regular discussion and coordination with internal and external stakeholders can enhance communications and notification and identify problem areas such as radio interoperability. Typical telecommunications resources include the common mutual-aid frequencies/channels, alternative communications devices, wireless information networks, and an associated standardized communications terminology/protocol to enhance en-route and on-scene communications among responders from different agencies. Mobile unified communications vehicles can also enhance en-route/on-scene communications among different responders.

TMCs should utilize the Communications Working Group to maximize the utility and interoperability of the many different communications services and systems that interface with the TMC and leverage those systems to expand the communications reach

of the TMC. All of the systems can support emergency operations as long as there are plans and procedures such as standardized terminology and system protocols, and external stakeholders are able to tap into them. Examples of communications commonly used by TMCs include the following:

- Internal radio frequencies/channels;
- Mutual-aid frequencies/channels;
- Wireless information networks;
- Landline voice and data networks; and
- Cellular voice and data networks.

3.6.9 Administration, Finance, and Logistics

This section of the EOP addresses the general support requirements and the availability of services for all types of emergencies, including mutual-aid agreements; authorities for and policies on reassigning public employees and soliciting and managing volunteers; and general policies for maintaining financial records, reporting and tracking resource needs. Of particular importance are potential sources of funding for the TMC's Emergency Preparedness and Security Program.

Transportation Emergency Preparedness/Security Funding

TMCs should utilize the Emergency Preparedness Working Group members to research and leverage transportation emergency preparedness and security funding. This funding comes from multiple sources, depending on the specifics of the project and the current funding environment. Primary sources include general state and Federal funds and specific grant funds. Transportation projects can sometimes take advantage of emergency preparedness or infrastructure security-oriented funding. The following are current grant programs to support emergency preparedness:

- United States Department of Transportation/Federal Transit Administration:
 - Metropolitan and Statewide Planning;
 - State-of-Good-Repair Bus and Bus Facilities Initiative;
 - Transit Asset Management (TAM) Pilot Program; and
 - Urbanized Area Formula Program.
- Pipeline and Hazardous Material Safety Administration:
 - Hazardous Materials Emergency Preparedness (HMEP) Grant Program: Hazardous Materials Public Sector – Training and Planning Grants for States and Territories.
- United States Department of Homeland Security/Federal Emergency Management Agency:
 - Buffer Zone Protection Program (BZPP);
 - Driver’s License Security Grant Program (DLSGP);
 - Emergency Management Performance Grants (EMPG);
 - Homeland Security Preparedness Technical Assistance Program – National Governors Association;
 - Intercity Bus Security Grant Program;
 - Port Security Grant Program (PSGP);
 - Regional Catastrophic Preparedness Grant Program (RCPGP);
 - Technical Assistance Program – National Governors Association (NGA);
 - Transit Security Grant Program (TSGP); and
 - Urban Areas Security Initiative (UASI).

3.6.10 Plan Development and Maintenance

This section describes the planning process, participants, and how EOP revisions are coordinated during the preparedness phase. It also includes guidance on how to provide a regular cycle of testing, reviewing, and updating the EOP. Recommended processes for post-incident review and EOP adjustment are also included.

Steps in the Planning Process

This section presents a planning process that is flexible and allows TMCs to adapt it to varying characteristics and situations. If time is a constraint, steps can be minimized or skipped in order to accelerate the process. Small TMCs can follow just the steps that are appropriate to their size, known risks, and available planning resources. At each step in the planning process, TMCs should consider the impact of the decisions made on training, exercises, equipment, and other requirements.

Step 1 – Form a Collaborative Planning Team

Experience and lessons learned have demonstrated that operational planning is best performed by a team. A team approach enables organizations to define the role they will play during an operation. The common threads found in successful operations are that participating organizations understand and accept their roles and that members of the planning team understand and accept the roles of other departments and agencies. A key goal of any TMC planning team is to build and expand relationships that help bring creativity and innovation to emergency planning. A TMC benefits from the active participation of all stakeholders. Tips for gathering the team together are listed below:

- Give the planning team plenty of notice about where and when the planning meeting will be held.
- Provide information about team expectations. Explain why participating on the planning team is important to the participants' agencies and show the participants how their contributions will lead to more effective operations.
- Ask the senior appointed official or designee to sign the meeting announcement, since a directive from the executive office carries authority and sends a clear signal that operational planning is important to the community.
- Allow flexibility in scheduling after the first meeting as not all team members will need to attend all meetings. Determine where possible task forces or subcommittees should complete the work.

In most TMCs, the TMC manager is the senior official's policy advisor for response and mitigation strategies, as well as overall preparedness. TMC managers are often responsible for coordinating and developing an EOP, filling the role of lead planner. This means that the TMC manager provides oversight to a TMC's planning team.

Step 2 – Understand the Situation

Effective risk management requires a consistent comparison of the hazards a particular TMC faces. TMCs should collect information about threats and hazards and assign values to risk for the purposes of determining priorities, developing or comparing courses of action, and informing decision-making. The TMC could conduct an in-depth process – cataloging everything from specific asset vulnerabilities to emergency personnel staffing levels. Due to resource limitations, however, this level of analysis may not be possible or practical. In such cases, TMCs should conduct a risk assessment of achievable and appropriate scale and scope.

Identify Threats and Hazards. As the first step, TMCs should gather information about the potential risks, resource base and geographic characteristics that could affect emergency operations. In addition, TMCs' hazard mitigation plans are an excellent resource for this step, as they are required to identify, catalog, and analyze all natural hazards that have the ability to impact the TMC and its operations. TMCs should take additional steps to include human-caused and technological hazards. Planning teams should use state and local fusion centers to provide analytical products, such as risk and trend analyses, that are derived from the systematic collection and evaluation of threat information. Fusion centers also provide access to national-level intelligence and can serve as a mechanism to “deconflict” information.

Assess Risk. The risk assessment is the basis for EOP development and helps a planning team decide what hazards or threats merit special attention, what actions to plan for, and what resources are likely to be needed. In this step, planners inventory, evaluate, and provide loss estimates for assets deemed critical during the response and recovery phases of an incident. Planners can also obtain the Hazards U.S. Multi-Hazard (HAZUS-MH) model from FEMA. HAZUS-MH is a nationally applicable and standardized methodology that estimates potential losses from earthquakes, floods, and hurricane winds.

Step 3 – Determine Goals and Objectives

Determine Operational Priorities. TMCs set operational priorities by using information from the risk profile. The planning team engages the senior official to establish how the hazard or threat would evolve, survivors, and the community. Starting with a given intensity for the hazard or threat, the team imagines an incident's development using the following sequence:

- Prevention and protection efforts;
- Initial warning (if available);
- Impact (as identified through analysis); and
- Generation of specific consequences (e.g., collapsed buildings, loss of critical services or infrastructure, death, injury, displacement).

Planners may use the incidents that have the greatest impact on the TMC (worst-case), those that are most likely to occur, or an incident constructed from the impacts of a variety of risks. During this process of building an incident scenario, the planning team identifies the requirements that determine actions and resources. Planners identify requirements generated by the hazard or threat, the response, and by constraints/restraints.

Planners develop requirements based on the nature of the hazard or threat. Response requirements are developed based on actions taken in response to an agent-generated problem. These tend to be common to all operations.

A constraint is something that must be done (“must do”), while a restraint is something that prohibits action (“must not do”). These may be defined in law, regulation, or management directive; by physical characteristics (e.g., terrain and road networks that make east-west evacuations impossible); or by resource limitations.

Set Goals and Objectives. Planners should carefully craft goals and objectives to ensure they support the plan mission and operational priorities. They must also clearly indicate the desired result or end state. Goals and objectives facilitate unity of effort and consistency of purpose among the multiple groups and activities involved in plan execution.

Planners correctly identify an operational task when they can answer the following questions about it:

- What is the action?
- Who is responsible for the action?
- When should the action take place?
- How long should the action take and how much time is actually available?
- What has to happen before?
- What happens after?
- What resources does the person/entity need to perform the action?

Step 4 – Plan Development

Develop and Analyze Courses of Action. This step is a process of generating, comparing, and selecting methods of achieving the goals and objectives identified in Step 3. When developing courses of action, planners depict how an operation unfolds by building a portrait of the incident’s actions, decision points, and participant activities. Planners identify tasks that occur immediately at incident initiation, tasks that are carried out through the duration of the incident, and tasks that affect long-term operations. Specific activities include:

- Establish the timeline. Planners should cover all mission areas in the timeline and use the speed of incident onset to establish the timeline. For example, a hurricane’s speed of onset is typically days, while a major HAZMAT incident’s speed of onset is minutes.
- Depict the scenario. Planners use the scenario information developed in Step 3, place the incident information on the timeline and identify and depict decision points. Decision points indicate the place in time, as incidents unfold, when leaders anticipate making decisions about a course of action.

- Identify and depict operational tasks. For each operational task depicted, some basic information is needed. Developing this information helps planners incorporate the task into the plan when they are writing it.
- Select courses of action. Once the above analysis is complete, planners must compare the costs and benefits of each proposed course of action against the mission, goals, and objectives. Based on this comparison, planners then select the preferred courses of action to move forward in the planning process.

Identify Resources. Once courses of action are selected, the planning team identifies resources needed to accomplish tasks without regard to resource availability. The object is to identify the resources needed to make the operation work. Once the planning team identifies all the requirements, they begin matching available resources to requirements. The resource base should also include a list of facilities vital to emergency operations, and the list should indicate how individual hazards might affect the facilities. Whenever possible, planners should match resources with other geographical/regional needs so that multiple demands for the same or similar resources can be identified and conflicts resolved. This step provides planners an opportunity to identify resource shortfalls and prepare pre-scripted resource requests, as appropriate. The EOP should account for unresolved resource shortfalls so they are not just “assumed away.” The capability estimate process, a planner’s assessment of a TMC’s ability to take a course of action, is critical to this effort. Planners should use capability estimates for both future and current operational planning.

Step 5 – Plan Preparation, Review, and Approval

Write the Plan. This step turns the results of course of action development into an EOP. The planning team develops a rough draft of the basic plan, functional annexes, hazard-specific annexes, or other parts of the plan as appropriate. The TMC and partners on the planning team record results from Step 4 and provide an outline for the rough draft. As the planning team works through successive drafts, the members add necessary tables, charts, and other graphics. The planning team prepares and circulates a final draft to obtain the comments of organizations that have responsibilities for implementing the plan. Following these simple rules for writing plans and procedures will help ensure that readers and users understand their content:

- Keep the language simple and clear by writing in plain English and avoid using jargon and minimize the use of acronyms.
- Use short sentences and the active voice. Qualifiers and vague wording only add to confusion.
- Provide enough detail to convey an easily understood plan that is actionable. The amount of detail a plan should provide depends on the target audience and the amount of certainty about the situation.
- Format the plan and present its contents so that its readers can quickly find solutions and options. Focus on providing mission guidance and not on discussing policy and regulations.
- Ensure accessibility by developing tools and documents (e.g., print, electronic, video) so plans can be easily converted to alternate formats.

Criteria for Plan Assessment

- *Adequacy.* Do the scope and concept of planned operations identify and address critical tasks effectively? Can the plan accomplish the assigned mission while complying with guidance? Are the plan's assumptions valid, reasonable, and comply with guidance?
- *Feasibility.* Can the organization accomplish the assigned mission and critical tasks by using available resources within the time contemplated by the plan?
- *Acceptability.* Does the plan meet the requirements driven by a threat or incident? Can the plan be justified in terms of the cost of resources? Is its scale proportional to mission requirements? Planners use both acceptability and feasibility tests to ensure that the mission can be accomplished with available resources, without incurring excessive risk regarding personnel, equipment, material, or time.
- *Completeness.* A plan is complete if it:
 - Incorporates all tasks to be accomplished;
 - Includes all required capabilities;
 - Provides a complete picture of the sequence and scope of the planned response operation;
 - Provides a timeline for implementation; and
 - Identifies success criteria and a desired end-state.
- *Compliance.* The plan should comply with guidance and doctrine to the maximum extent possible, because these provide a baseline that facilitates both planning and execution.

Review the Plan. Planners should check the written plan for its conformity to applicable regulatory requirements and the standards of Federal or state agencies, as appropriate, and for its usefulness in practice. Planners should consult the next level of government about its plan review cycle. Commonly used criteria help decision-makers determine the effectiveness and efficiency of plans. These measures include adequacy, feasibility,

acceptability, completeness and compliance. Decision-makers directly involved in planning can employ these criteria, along with their understanding of plan requirements, to determine a plan's effectiveness and efficiency and to assess risks and define costs.

When using these five criteria, planners should ask the following questions:

Did an action, a process, a decision, or the operational timing identified in the plan make the situation worse or better?

- Were new alternate courses of action identified?
- What aspects of the action, process, decision, or operational timing make it something to keep in the plan?
- What aspects of the action, process, decision, or operational timing make it something to avoid or remove from the plan?
- What specific changes to plans and procedures, personnel, organizational structures, leadership or management processes, facilities, or equipment can improve operational performance?

Approve and Disseminate the Plan. Once the plan has been validated, the planner should present the plan to the appropriate DOT officials and obtain official promulgation of the plan. The promulgation process should be based in a specific statute, law, or ordinance. A formal promulgation documentation process is implemented to obtain senior official's approval and to gain the widest acceptance possible for the plan. The authority required for changes and modifications to the plan must be established. Once the senior official grants approval, the plan must be distributed and a record of the people and organizations that received a copy (or copies) of the plan must be maintained. "Sunshine" laws may require that a copy of the plan be posted on the TMC's web site or be placed in some other public accessible location.

Step 6 – Plan Implementation and Maintenance

Training. After developing a plan, it must be disseminated and managers must train their personnel so they have the knowledge, skills, and abilities needed to perform the tasks identified in the plan. Personnel should also be trained on the organization-specific procedures necessary to support those plan tasks.

Exercise the Plan. The planning team must conduct training events, exercises, and real-world incidents to determine whether the goals, objectives, decisions, actions, and timing outlined in the plan leads to a successful response. In this way, homeland security and other emergency preparedness exercise programs become an integral part of the planning process. Similarly, planners need to be aware of lessons and practices from other communities. A remedial action process will help a planning team identify, illuminate, and correct problems with the TMC’s EOP. This process captures information from exercises, post-disaster critiques, self-assessments, audits, administrative reviews, or lessons-learned processes that may indicate that deficiencies exist. Members of the planning team should reconvene to discuss the problem and to consider and assign responsibility for generating remedies across all mission areas. Remedial actions may involve revising planning assumptions and operational concepts, changing organizational tasks, or modifying organizational implementing instructions (i.e., the SOPs/SOGs). Remedial actions may also involve providing refresher training for an organization’s personnel.

Review, Revise, and Maintain the Plan. This step closes the loop in the planning process as it focuses on adding the information gained by exercising the plan to the research collected in Step 2 and starting the planning cycle over again. Planning teams should establish a process for reviewing and revising the plan on a regular basis. Some TMCs have found it

useful to review and revise portions of their EOPs every month. Many accomplish their reviews on an annual basis. In no case should any part of the plan go for more than two years without being reviewed and revised. Teams should also review and update the plan after the following events:

- A major incident;
- A change in operational resources (e.g., policy, personnel, organizational structures, management processes, facilities, equipment);
- A formal update of planning guidance or standards;
- Major exercises;
- A change in the TMC’s hazard or threat profile;
- A change in the acceptability of various risks; and
- The enactment of new or amended laws or ordinances.

3.6.11 Authorities and References

This section provides the legal basis for emergency operations and activities. The authorities and references should include the following:

- A list of laws, statutes, ordinances, executive orders, mutual-aid, and other agreements, etc.;
- The extent and limits of the emergency authorities granted to the state transportation agency; and
- Emergency authorities and provisions for continuity of operations.

The emergency operations activities of the TMC generally fall within the legislative mandate that established the agency and defined its responsibilities. Recent legislative

initiatives related to emergency operations and roadway safety include Quick Clearance laws, and Move Over Slow Down laws for emergency vehicles. Implementation of NIMS has helped define the roles of transportation and emergency response agencies during emergencies.

Memoranda of Understanding or Agreements (MOU/A) or Emergency Management Assistance Compacts (EMAC) are two methods to ensure formal procedures are in place for mutual assistance and support. These agreements form the basis of training and planning activities, and are generally most effective when covering specific topics. NIMS and the NRF provide a basis for these agreements, and the duties in the State EOP. While implementation of agreements may occur at a higher level in the transportation agency, the TMC should have a seat at the table in both the development and the execution of MOU/As and EMACs. TMC personnel can provide inventories of equipment, current operating procedures, and provide recommendations on items to include in the plan. The text box provides language for an agreement. Successful implementation of an agreement requires research upfront by all parties during the preparation phase and most importantly, efforts to build relationships between agency personnel.

An example of a noteworthy practice is the consolidation of transportation and emergency response functions into Houston's TranStar Transportation Center through an interlocal agreement that focuses heavily on funding, project development, and operating responsibilities. Four entities, including the Texas DOT, Houston Metro (transit operator), Harris County, and the City of Houston agreed to participate in the development and operation of the Center. TranStar operates freeway and traffic signal management and emergency management activities for both Harris County and the City of Houston. The operating agreement of the Center determines

the procedures affecting transportation and emergency response personnel. The footnoted link provides access to full documentation of the interlocal agreement.¹⁰

Agreement Language

Agreement language should include the following information:

- An inventory of the available assets for use during exercises and actual events;
- The chain of command;
- Definitions of key terms and participating agency jurisdictional boundaries;
- Procedures for requesting and providing assistance;
- Procedures, authorities, and rules for payment, reimbursement, and reallocation of cost;
- Notification procedures;
- Protocols for interoperable communications;
- Relationships to other agreements between jurisdictions;
- Treatment of liability, immunity, and workers' compensation;
- Recognition of qualifications and certifications;
- Future evaluation and modification of procedures and protocols;
- Training and joint exercise responsibilities; and
- Sharing agreements.

Source: NCHRP Report 525 Volume 16, A Guide to Emergency Response Planning at State Transportation Agencies, pp. 48-49.

An example of a broader agreement is the Joint Operations Policy Statement between the Washington State DOT, State Patrol, and Association of Fire Chiefs for Disaster Response. This goes beyond an incident management agreement to address working relationships for disaster response, work zone safety, winter operations, smart highways, commercial vehicle operations, facilities management (rest areas), wireless

Agreement

Background: The Washington State Comprehensive Emergency Management Plan (CEMP) establishes the policy under which all state agencies will respond to emergencies and disasters.

Objective: Improve coordination of joint Washington State Police (WSP), Washington State Department of Transportation (WSDOT) emergency operations.

Policy: The WSP and WSDOT agree to enhance existing procedures to provide additional protection measures for the traveling public and the transportation system.

Roles and Responsibilities:

WSDOT Responsibilities: Headquarters (HQ) Emergency Operations Center (EOC) will be equipped for WSP Data communication capabilities. WSDOT Lead: Emergency Operations and Safety Program Manager.

WSP Responsibilities: Staff the WSDOT's HQ and Regional EOCs as appropriate during emergencies. WSP Lead: Incident Management Team Coordinator.

Washington Fire Chiefs (WFC): Work collaboratively with WSP and WSDOT partners to identify joint interests and best practices for disaster response. WFC Lead: Deputy Chief, Bellevue Fire Department.

Action: To increase effectiveness, WSDOT's HQ EOC Team will meet at least annually to discuss opportunities for improvement in disaster response. The Team will also work to establish cooperative partnerships with other emergency response agencies. Each WSP District Commander (DC) and WSDOT Region Administrator (RA) will work to exchange knowledge of all applicable WSP and WSDOT disaster response plans. WFC will continue to promote training and coordination to support disaster response preparedness and response.

Measures of Performance/Reporting: Disaster response drills should be conducted on an annual basis and should include WSP, WSDOT, and all local stakeholders. At each annual JOPS meeting, each DC/RA will report on new or revised plans for their area.

Time Line: This policy will be in place when JOPS receives final approval by both agencies.

Source: JOPS, A Joint Operations Policy Statement, prepared and agreed by the Washington Department of Transportation, the Washington State Patrol, and the Washington Fire Chiefs, 2010, p. 15.

management (rest areas), wireless communications, system security, and ferry operations. For each area, the policy statement includes a brief background statement, a simply stated objective, and policy guidance (which may reference other documents) along with roles and responsibilities, ongoing actions, measures of performance, and a timeline for implementation.

Incident Clearance Agreements

Interagency agreements for incident clearance may address duties and responsibilities of response agencies, jurisdictional authority, and resource sharing among agencies. MOUs or cooperative agreements between emergency operations agencies and transportation agencies can focus exclusively or primarily on the handling of incidents, which is an effective way to reduce tension around the tradeoffs

Tennessee Interagency Memorandum of Understanding (MOU)

TDOT, DOS, local responders, and other agencies as needed, will conduct an after-action review within 10 working days, unless unusual circumstances require more than 10 days, following any incident that requires complete closure of an Interstate highway (in one or both directions of travel) for more than two hours and following any incident that requires closure of one or more lanes for more than five hours.

The purpose of the meeting will not be to find fault or to assign blame but to identify opportunities for improvements in agency procedures, training, or allocation of resources. The after-action review will not substitute for critical incident stress debriefings (CISD) and will not address issues that are more appropriate for CISD.

A one-page report will be prepared jointly by the representatives of DOS and TDOT and forwarded through the chain-of-command to the Commissioners of DOS and TDOT within one month of the date of the incident, unless unusual circumstances require more than one month. Regardless of the duration, extent, or location of closure, either agency may request an after-action meeting following any highway incident, and that meeting will be held and a report prepared as described above.

DOS and TDOT will meet periodically to discuss experiences with incident management and to work toward improvements. In addition to the after-action reviews described above, periodic working sessions will be held in each of TDOT Region Offices with DOS, TDOT, and other state and local agencies to discuss overall incident management and related issues.

Source: Interagency Memorandum of Understanding between the Tennessee Office of Safety and the Tennessee Department of Transportation Relative to Urgent Clearance of Highway 2004.

Link to full documentation: <http://tdot.state.tn.us/news/2004/pdfs/MOU%20TDOT-DOS%20October2004.pdf>.

between public safety and mobility. Incident commanders at the scene have safety as a first priority and are generally cautious in allowing traffic to move through or around an incident. Transportation agencies meanwhile are concerned about traffic impacts and both parties are concerned about the potential for secondary crashes when there are stops in the traffic flow. A sample memorandum between the Tennessee DOT and the Tennessee Department of Safety (DOS) defines the responsibilities and policies for each agency, and those which are joint activities. Two of the paragraphs in the text box illustrate how such an agreement can define specific responsibilities during and after an incident through ongoing working relationships.

Use of TMC Resources for Nontransportation Events

Interagency agreements can be important in defining the parameters of TMC participation in nontransportation events. This issue comes up frequently in relation to the role of law enforcement during homeland security activities. Law enforcement/security agencies, for example, may request CCTV access to track suspects. TMCs are hard-pressed to turn down these requests even though it may contradict TMC policies or agreements and most TMCs do not record CCTV feeds except for incidents. As TMCs work with law enforcement on incident management, event management, or evacuations; relationships can develop along with guidelines for this activity. While there will be limitations in what law enforcement

agencies can divulge about their activities, the discussions should be adequate to develop broad guidelines and policies. To develop such guidelines, TMCs should implement the following steps:

- Meet with State Police and local law enforcement agencies to discuss needs on nontransportation use of TMC facilities;
- Explain current TMC policies toward recording of nontransportation events;
- Document draft set of conditions for a written agreement;
- Confer with U.S. DOT and state representatives to obtain guidance on Federal policies and Federal security officials to contact;
- Contact Federal agencies that may have an interest in using TMC resources, including the FBI and key subagencies of DHS;
- Develop draft guidelines for law enforcement use of TMC resources (primarily CCTV), including personnel responsibilities and documentation; and
- Submit guidelines for review by law enforcement agencies and incorporate into both TMC and joint training activities.

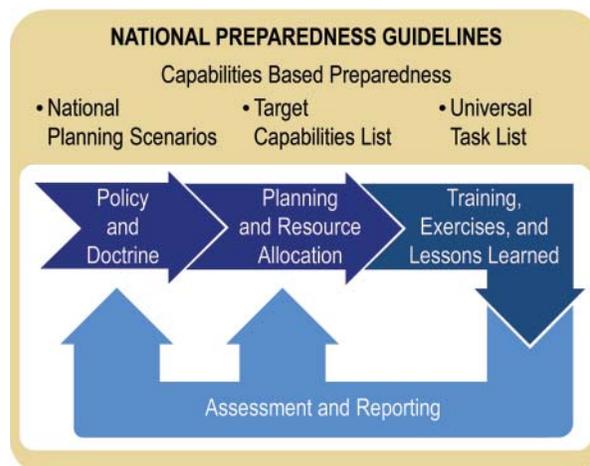
In preparing to develop these guidelines there are several key documents TMC personnel should review to gain a better understanding of security concerns that may trigger use of TMC resources by law enforcement or homeland security agencies. The footnoted links provide access to full documentation of the DHS *National Infrastructure Protection Plan (NIPP)* and the *National Preparedness Guidelines* (Figure 3.2).¹¹ The NIPP integrates existing and future critical infrastructure and key resources (CIKR) protection efforts and strategies into a single national program. The NIPP framework provides recommendations on how to mitigate risk by lessening vulnerabilities, deterring threats, and minimizing the consequences

of terrorist attacks and other manmade and natural disasters.

Participation in Cost-Recovery Agreements

DOTs transport equipment in emergencies, and support activities such as utility restoration, which may be reimbursable from emergency funding sources. MOUs or interagency agreements can be helpful in defining these responsibilities and in setting up payment systems. TMCs can also have an important role in documenting conditions that enable states to collect emergency repair funds after infrastructure losses. The footnoted link provides full documentation of guidelines for collecting these funds, included in the document *Recovering from Disasters: The National Transportation Recovery Strategy*.¹² One of the suggestions in the strategy, for instance, recommends communities bring together individuals responsible for overseeing the recovery of various infrastructure networks to plan for the overall process.

Figure 3.2 DHS National Preparedness System



Source: *National Preparedness Guidelines*, Department of Homeland Security, September 2007, p. 22.

3.6.12 Additional Planning and Coordination Activities

This section details additional planning and coordination functions that may be included in the EOP, including the planning and development of preplanned detours, and emergency evacuation plans.

Planning and Development of Preplanned Detours

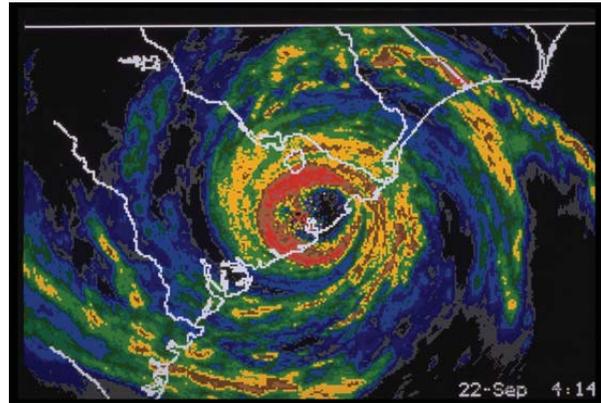
Some states identify preplanned detour routes for their entire Interstate Highway System, a process in which DOT staff often coordinates with evacuation planning. This makes it easier to implement the detours in the event of an incident or other emergency. Several state and local DOTs also have standard detour routes for use during construction or incident-related rerouting. Utilizing their familiarity with local road and highway evacuation/detour routes, the TMC should develop preplanned detours for the major arterials in their area so they can support emergency response by providing information on routes.

Planning and Development of Emergency Evacuation Plans

Regions which have developed emergency evacuation plans for their central business districts, provide information on specific roles for each agency, including which police or DOT unit is responsible for securing each highway access point. Interagency collaboration is important to developing the plans, which also include involvement from transit agencies and MPOs.

Utilizing their own familiarity with existing emergency evacuation planning, the TMC should develop emergency evacuation routes for the major arterials in their area. TMCs have often played a central role in the development of emergency evacuation plans and procedures for urban areas. TMCs

should also be involved in these efforts since the plans often delegate responsibility for specific traffic control points to varying agencies based on geographic jurisdiction (or other factors). TMCs can thus serve as a resource during implementation.



Hurricane – Carolina Coast

Source: Digital Stock, a division of Corbis Corp.

Some noteworthy developments in transportation planning have improved the link between planning and operations in disaster response. The increase in the programming and funding of ITS technologies with disaster response as location criteria, the leveraging of transit/multimodal resources during a disaster, and the movement from “table-top” exercises to field exercises have helped. The footnoted link provides access to full documentation.¹³

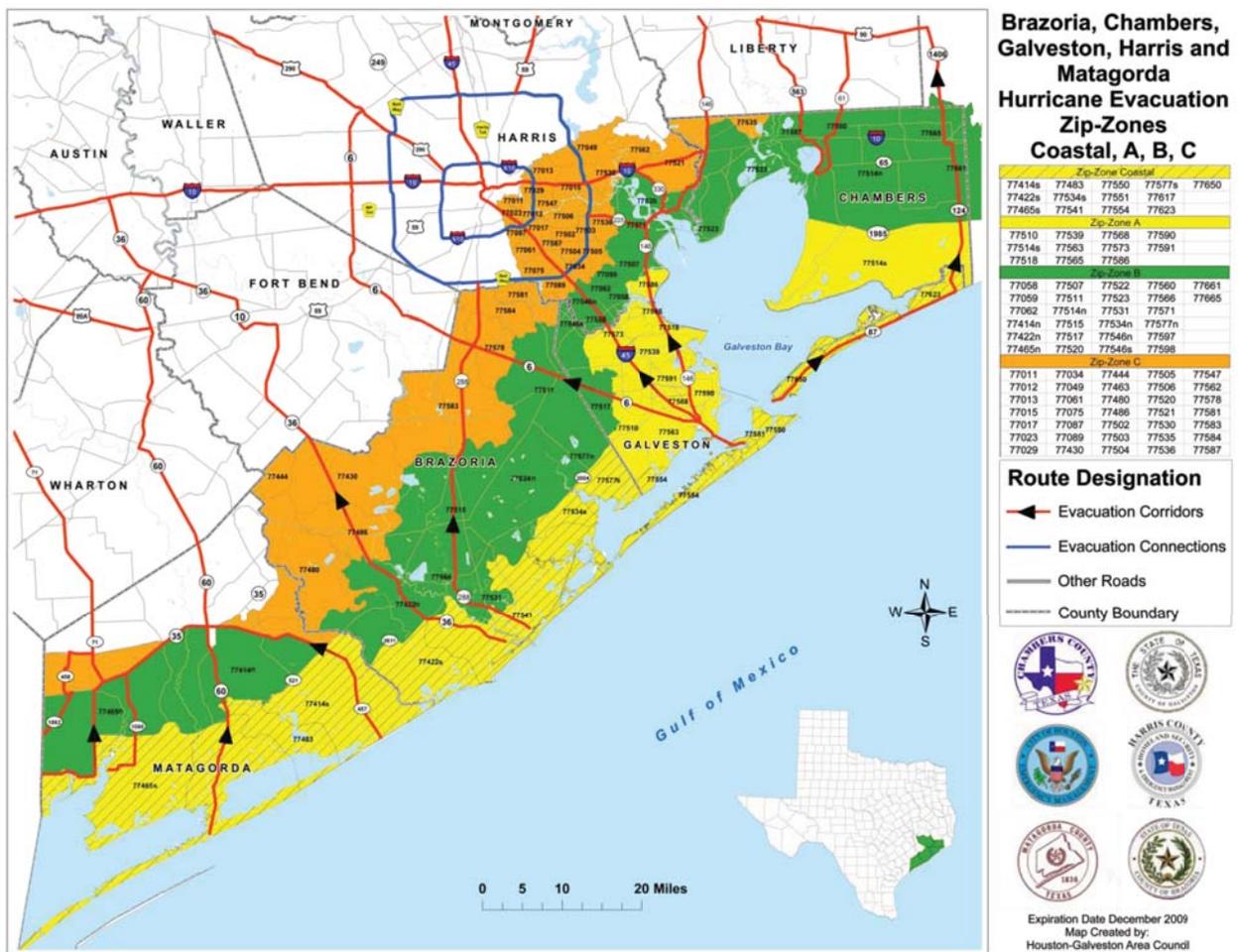
An important activity for transportation agencies is identification of improvements to alleviate the impact of future disasters. Both New Orleans and the Houston-Galveston area demonstrated best practices by refining their evacuation plans and routes and assessing what physical and operational infrastructure is required to improve safety and mobility in future emergencies. Figure 3.3, which shows evacuation zones developed by the Houston-Galveston Area Council using their transportation model, can serve as a guide to the TMC and other emergency agencies in the future.

3.7 Emergency Operations Plan Checklist

The TMC can use the following checklist to evaluate their progress and completion status in the development of the EOP. The TMC should incorporate the following elements into the EOP (*check all that apply and are included*):

- Includes purpose and scope.
- Includes situation overview and planning assumptions, i.e., geographic areas likely to be affected, vulnerable critical facilities, population distribution, and location of individuals with access functional needs, etc.
- Includes a concept of operations, including whether the TMC and EOC will collocate or whether the TMC will use a virtual EOC concept, the organization and assignment of responsibilities, and the framework for all direction, command and control, and coordination activities.
- Documents interagency coordination procedures among enforcement, emergency management agencies, transit, tow truck operators, and venue operators for Planned Special Events.
- Documents information collection and dissemination procedures, including the use of ITS and traveler information, and exchange of data between the TMC and EOC.
- Documents communication protocols and coordination procedures.
- Identifies the communications stakeholders who will be involved and the membership and responsibilities of a Communications Working Group. Includes information on administration, finance, and logistics, including the identification of potential funding sources, how the plan will be developed and maintained, and the legal basis for emergency operations and activities.
- Documents incident clearance agreements addressing the duties and responsibilities of response agencies, jurisdictional authority, and resource sharing.
- Documents how the TMC will recover costs through participation in cost-recovery agreements.
- Includes information on additional planning and coordination activities, including the planning and development of pre-planned detours, and emergency evacuation plans.
- Includes a capabilities survey.
- Identifies of essential functions, including the following (*check all that apply*):
 - Areas of responsibility.
 - Organizational functions.
 - Criteria for selecting essential functions.
 - Essential functions and supporting processes and systems.
 - Key management, technical, and supporting personnel.
 - The development, review, and approval of the plan.
- Documents the development of supporting procedures.
- Documents personnel training plan and the process for testing/update of the plan.
- Documents the implementation of drills and exercises, including the description of the following activities (*check all that apply*):
 - Seminar.
 - Workshop.
 - Tabletop Exercise (TTX).
 - Games.
 - Operations-Based Exercises (drill, functional exercise, full-scale exercises).

Figure 3.3 Evacuation Zones Houston-Galveston Area



Source: Hurricane Evacuation Planning Presentation, Harris County Amateur Radio Emergency Service (ARES), June 2008.

3.8 Continuity of Operations Planning

Continuity of Operations (COOP) planning is a way transportation agencies define required activities when an emergency results in no access to essential operating and maintenance facilities, vehicle fleets, systems, and senior management and technical personnel. Under certain disruptive conditions, the transportation agency cannot perform its normal business activities. COOP planning should involve all-hazards, including natural, human-caused, and technological incidents.

It is a multistep process, which must be periodically tested and maintained.

While many TMCs have plans, policies, procedures, checklists, and job aids to direct immediate response to various emergencies, there is often a need for dedicated continuity and recovery planning. Without a management framework that clearly identifies essential functions and establishes operational procedures to sustain them when there is a disruption of normal operations, TMCs remain vulnerable to service interruptions and loss of public confidence.



Photo courtesy of Kent Barnard for the Minnesota DOT.

The Minnesota Department of Transportation (Mn/DOT) joined other state departments, volunteer agencies, and the Minnesota National Guard to start operation of the State Emergency Operations Center in St. Paul within hours of the I-35 bridge collapsing over the Mississippi River. The TMC disseminated messages via 511, message boards, twitter, and the web site to the traveling public. The TMC also coordinated with other agencies, including across state lines, to broadcast alternate route and incident information.

A good guide for developing COOP is the Transportation Research Board's (TRB) TCRP86/NCHRP525 Report on *Continuity of Operations (COOP) Planning Guidelines for Transportation Agencies*; the footnoted link provides access to full documentation.¹⁴ Information in the plan includes a description of COOP, its purpose, and guidelines for use. Typically, the COOP development process follows seven steps, including:

- Initiating the process;
- Conducting a capabilities survey;
- Identifying essential functions;
- Developing, reviewing, and approving the plan;
- Developing supporting procedures;
- Training personnel and test/update the plan; and
- Conducting drills and exercises.

3.8.1 Initiate the COOP Process

The TMC Emergency Preparedness Working Group should serve as the coordination and starting point for the COOP process because it will be easier to secure important buy-in and support from top management and ensure the organization is fully committed to the COOP process. From the Working Group, designate a COOP planning leader to lead the planning team with sufficient personnel and resources to accomplish the effort. Coordination with external agencies, training, and exercise participation may also be necessary. There should be regular dedicated meetings to keep the effort on track and subcommittees for specific COOP planning areas.

3.8.2 Conduct a Capabilities Survey

It is important to assess and understand current capabilities, including current vulnerabilities and incident response practices. A Capabilities Survey may include analyzing capabilities, inventorying resources, examining personnel assignments, determining vulnerabilities, reviewing internal plans and policies, and evaluating lines of coordination.

As a first step, it is essential to establish the existing and anticipated threats to the TMC to construct the foundation of the COOP Plan. This is possible by determining the types of events that are likely to require activation of a COOP Plan, shown in Figure 3.4.

3.8.3 Identify Essential Functions

Next, the TMC should identify and prioritize the essential functions to maintain during emergencies. A common approach uses the following steps:

- Identify areas of responsibility;
- Compile organizational functions;
- Determine criteria for selecting essential functions;
- Identify and prioritize essential functions and supporting processes and systems; and
- Identify key management, technical, and supporting personnel.

3.8.4 Develop, Review, Approve COOP Plan

The TMC should undertake the development, review, and approval of the COOP Plan utilizing the following process:

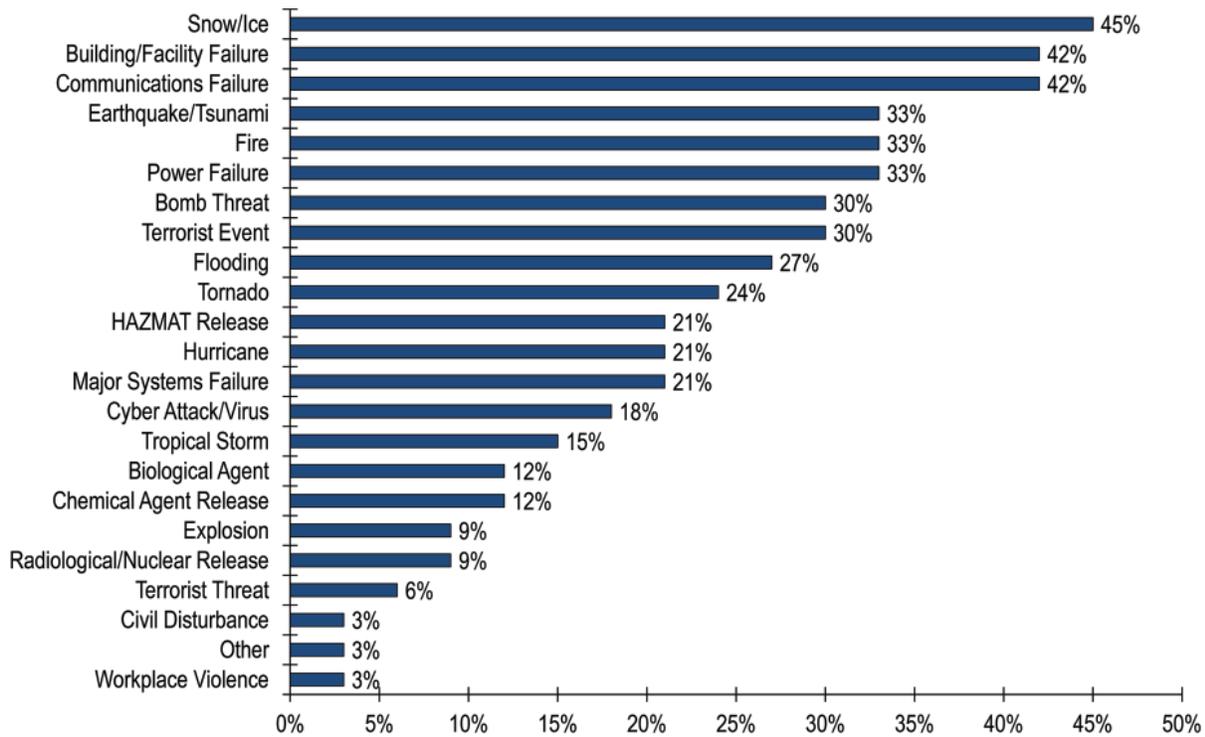
- Prepare the first draft;
- Coordinate review of the first draft by each organizational unit, incorporate changes, and develop a second draft;

- Seek external review of the second draft by expert(s) and partners in local/regional/state emergency response and management;
- Incorporate changes and develop the final draft;
- Present the final draft to the appropriate senior leadership for approval and signature;
- Finalize and distribute the plan; and
- Review and update the plan annually or as major changes occur.

The TMC's COOP Plan should include and describe the following elements:

- Leadership succession and assignment of authority;
- Assignment of essential functions to specific teams;
- Identification and preparation of alternate facilities;
- Protection of vital records, databases, and communication systems;
- Maintenance of the plan through training and testing, followed by evaluation and improvement planning;
- The conditions necessitating the activation of the COOP plan;
- TMC hours of operation;
- Identification of alternate work sites where COOP functions can be performed if the primary facilities are destroyed or disrupted;
- Creation of COOP teams; and
- Delegation of emergency authorities and orders of succession.

Figure 3.4 TMC Emergencies Most Likely to Require COOP Activation



Source: TRB TCRP86/NCHRP525 Report on Continuity of Operations (COOP) Planning Guidelines for Transportation Agencies.

3.8.5 Develop Supporting Procedures

Supporting procedures will ensure effective implementation of the COOP Plan. Just as an EOP or EMP serves as the foundation for emergency response procedures, the COOP Plan should be the foundation for continuity of operations and recovery procedures. COOP procedures should focus on the following areas:

- Key Position SOPs;
- COOP Activation SOPs;
- Evacuation;
- Vital Records;
- Communications;
- Notification; and
- Order of Succession.

3.8.6 Train Personnel and Test/Update the Plan

Effective implementation also depends on training personnel on its use, which requires the development of a regular and documented training program so new and existing employees receive consistent and recurring COOP training.

Regular testing of the COOP Plan is required periodically through drills and exercises that examine its functionality and implementation. COOP Plan updates, coordinated by the Emergency Preparedness Working Group, should address any deficiencies.

Training ensures personnel are familiar with and understand plans, policies, and procedures. It allows the effective transmission of the elements of an emergency preparedness program into and throughout the TMC

organization. Training also ensures TMC personnel understand and effectively execute plan policies and the SOPs.

For a TMC, which utilizes complex systems and interacts extensively with external agencies, training that includes participation from an array of stakeholders is particularly important. The TMC can initiate the training or a partner agency can initiate it externally. Training in joint environments will ensure consistency and strengthen interagency relationships, both of which are crucial when an incident occurs and a response is required.



Source: Cambridge Systematics, Inc.

The TMC Emergency Preparedness Working Group should oversee the development of a training plan that addresses curriculum and audience to serve as a foundation for all TMC training activities.

The training plan should also identify specific training opportunities. The following is a partial list of recommended training topics. Individual TMCs may have particular needs based on their specific structure, assets, or external partners. Four categories of training available are described below:

- National Incident Management System (NIMS) and Incident Command System (ICS) training;
- FHWA Training Courses;

- TMC-Based Emergency Management Training; and
- TMC Emergency Response Standard Operating Procedures (SOP) Training.

National Incident Management System and Incident Command System Training

- *ICS-100 – Introduction to ICS* – This training program introduces the ICS and provides the foundation for higher-level training. It describes the history, features, principles, and organizational structure of the ICS and explains the relationship between ICS and the NIMS. The footnoted link provides access to full documentation.¹⁵
- *ICS-200 – ICS for Single Resources and Initial Action Incidents* – This training program enables personnel to operate efficiently during an incident or event within the ICS, and provides training on and resources for personnel who are likely to assume a supervisory position. The footnoted link provides access to full documentation.¹⁶
- *ICS-700 – NIMS, An Introduction* – This program introduces and provides an overview of NIMS, which is the consistent nationwide template that enables all government, private sector, and nongovernmental organizations to work together during domestic incidents. The footnoted link provides access to full documentation.¹⁷
- *ICS-800 – National Response Framework, An Introduction* – This program introduces participants to the concepts and principles of the National Response Framework. The footnoted link provides access to full documentation.¹⁸
- *ICS-300 – Intermediate ICS for Expanding Incidents for Operational First Responders* – This training describes how the NIMS command and management component support the management of expanding incidents as prescribed by the ICS. It

includes a simulation and Incident Action Plan for the incident management process on a Type 3 incident. The footnoted link provides access to full documentation.¹⁹

- *ICS-400 – Advanced ICS* – This training focuses on how the NIMS command and management component supports the management of expanding incidents by describing the incident/event management process for large-scale organization development; roles and relationships of the primary staff; the planning, operational, and logistical and fiscal considerations related to a complex incident/event management. It covers the implementation of area command and the importance of interagency coordination. The footnoted link provides access to full documentation at the FEMA training web page.²⁰
- *ICS-402 – ICS Summary for Executives* – This program provides a forum to discuss strategic and executive-level preparedness and response issues and challenges related to weapons of mass destruction/terrorism and other incidents of national significance. It also serves as a vehicle to share proven strategies and practices as well as enhanced teamwork and coordination among an agency’s senior officials responsible for emergency response. Conducted as a facilitated workshop, it integrates multimedia scenarios and vignettes that highlight the key issues. The footnoted link provides access to full documentation at the FEMA training web page.²¹

Federal Highway Administration Training

The National Highway Institute (NHI) offers training, both on-line and in classroom, that covers the topics below. The footnoted link provides access to full documentation.²²

- *Principles of Evacuation Planning Tutorial; Course Number: FHWA NHI-133107* – This course provides an introductory overview of evacuation planning topics and

common considerations. It covers the roles and responsibilities of local, regional, and state agencies involved in the evacuation process.²³

- *Design and Traffic Operations* – This course covers topics such as highway capacity and quality of flow, traffic signal design and operation, and freeway management and operations.
- *Highway Safety* – This course focuses on roadside safety design, construction zone safety inspection, road safety audits, low-cost safety improvements, and their related topics.



Source: Cambridge Systematics, Inc.

- *Intelligent Transportation Systems (ITS)* – This training focuses on how to improve highway safety with intelligent transportation systems.
- *Transportation Planning* – This program includes application of the FHWA Traffic Monitoring Guide, statewide transportation planning, and traffic monitoring and pavement design programs.

TMC Emergency Management/Operations Plan Overview Training

TMCs should develop this training for their own use since it is not readily available. Specific topics covered in the program should include the following:

- Pre-impact preparations, including relationships between the type of emergency and necessary preparations, responsibilities of different agencies for preparedness, and location of sites of greatest risk;
- Communications and required interoperability;
- Activation and management of emergency operations centers (EOC), including locations, equipment, operation, staffing, and redundancy; and
- How to maintain public order during emergency operations.

This EOP Training can be conducted jointly with external responding agencies by utilizing the Capabilities Gap Analysis format, which delineates response capabilities and responsibilities between the TMC and external responding agencies. Additional information is available in the EOP section.

TMC Emergency Response Standard Operating Procedures SOP Training

TMCs should develop this type of training for their own use since it is not readily available. Specific topics covered in the training should include the following:

- The actions to support traffic incident detection, management, response, and recovery;
- Operation of warning systems (e.g., types of warnings, how they will be distributed, obligations on receiving warnings);
- Emergency evacuation procedures, including conditions under which evacuation is

authorized; routes to be followed and destinations; how people of age, who are ill, who are institutionalized, or combinations thereof will be accommodated; and locations and facilities for emergency shelters;

- Search and rescue (SAR) needs and required capabilities; and
- Public information requirements during emergencies.

SOP Training can also be conducted jointly with external responding agencies by utilizing the Capabilities Gap Analysis format, which delineates response capabilities and responsibilities between the TMC and external responding agencies. Additional information is available in the EOP section (3.6).

TMCs can learn from successful implementation of these training programs in transportation and TMC settings. While ICS-100 and ICS-200 are basic, easy to complete on-line courses, ICS-300 and ICS-402 represent more investments in training. ICS-300 is a classroom course spanning several days, and the ICS-402 requires time and commitment from senior executives. An advanced TMC training program should include basic courses along with more advanced offerings.

TMCs should take advantage of the applicability of ICS and NIMS to virtually any field, setting, or industry. This added benefit allows organizations and personnel from different fields who adopt ICS to understand and work within another emergency management framework. Different agency personnel, both trained separately in ICS, will immediately enhance their ability to effectively interact and cooperate during an incident. Joint training attended simultaneously by both TMC and public safety personnel offers additional value. Modification of these settings, scenarios, and examples can provide enhanced interagency cooperation and understanding.

3.8.7 Conduct Drills and Exercises

A formal and well-developed drill/exercise program validates the concepts and policies embedded in the EOP and SOPs. The drills/exercises test the organization's capability to execute their actions in an effective and integrated manner. A leading standard for exercise design, development, conduct, evaluation, and improvement planning is FEMA's Homeland Security Exercise Evaluation Program (HSEEP). HSEEP is a capabilities and performance-based exercise program that provides standardized guidance and terminology. A key objective of HSEEP is to promote consistency among exercises across the nation to enhance national preparedness. A key component of HSEEP is fostering self-sustaining exercise programs by providing jurisdictions with consistent doctrine and resources for program management. A Visual illustration of the HSEEP process is provided in Figure 3.5.

Figure 3.5 HSEEP Exercise Program Management Model



Source: HSEEP Exercise Program Management Model, Department of Homeland Security/Federal Emergency Management Agency (DHS/FEMA), February 2007.

Drills and exercises allow TMCs to evaluate and identify improvement for established policies, plans, procedures, and training. Exercises are a particularly valuable method of involving and interacting with external public safety and support agencies. The scope of a TMC's operations can provide a variety of potential scenarios. Reasons to develop and conduct TMC-specific drills and exercises include the following:

- It results in an interagency team with a common understanding of the transportation-specific drills and exercises;
- It tests developed plans to ensure they effectively address the necessary topics; and
- It improves individual and agency performance.

Designate Exercise Planning Team

The TMC Emergency Preparedness Working Group should form an Exercise Planning Team that will be responsible for planning, designing, developing, and conducting multistakeholder exercises. This team should conduct regular planning meetings to ensure coordination and progress from external agencies, including law enforcement, emergency management, fire, and EMS. Once formed, the Exercise Planning Team should develop a schedule outlining drill and exercise activities to conduct over a set timeframe, usually three to five years. This aids coordination with outside agencies and reduces potential for overlap with other exercises or activities that may draw on the same personnel or resources.

Adopt FHWA and HSEEP Exercise Guidelines

TMCs should adopt the FHWA and HSEEP guidelines for exercises, which support discussion and operations-based exercises of various types and sizes. The following types are predefined and available for consideration by the Exercise Planning Team:

- **Discussion-Based Exercises** familiarize participants with current plans, policies, agreements, and procedures, or can develop new plans, policies, agreements, and procedures. Types of discussion-based exercises include:
 - **Seminar** - A seminar is an informal discussion, designed to orient participants to new or updated plans, policies, or procedures (e.g., a seminar to review a new Evacuation Standard Operating Procedure).
 - **Workshop** - A workshop resembles a seminar but builds specific products, such as a draft plan or policy (e.g., a Training and Exercise Plan Workshop is used to develop a Multiyear Training and Exercise Plan).
 - **Tabletop Exercise (TTX)** - A tabletop exercise involves key personnel discussing simulated scenarios in an informal setting. TTXs can assess plans, policies, and procedures.
 - **Games** - A game simulates operations involving two or more teams, usually in a competitive environment, using rules, data, and procedures to depict an actual or assumed real-life situation.
- **Operations-Based Exercises** validate plans, policies, agreements, and procedures; clarify roles and responsibilities; and identify resource gaps in an operational environment. Types of operations-based exercises include:

- **Drill** - A drill is a coordinated, supervised activity usually employed to test a single specific operation or function within a single entity (e.g., a fire drill).
- **Functional Exercise (FE)** - A functional exercise examines and/or validates the coordination, command, and control between various multiagency coordination centers (e.g., emergency operation center, joint field office, etc.). A functional exercise does not involve any “boots on the ground” (i.e., first responders or emergency officials responding to an incident in real time).
- **Full-Scale Exercises (FSE)** - A full-scale exercise is a multiagency, multijurisdictional, multidiscipline exercise involving functional (e.g., joint field office, emergency operation centers, etc.) and “boots on the ground” response (e.g., firefighters decontaminating mock victims).

Utilize the DHS/FEMA Homeland Security Exercise Evaluation Program Guidance

The TMC Exercise Planning Team should utilize the standardized approach in HSEEP as planning guidance for developing discussion and performance-based exercises. The following are key activities identified within the HSEEP guidance for the design, development, and evaluation of exercises:

- Schedule an exercise planning conference such as the following:
 - Concepts and Objectives Conference;
 - Initial Planning Conference;
 - Midterm/Master Events Scenario List Planning Conference; and
 - Final Planning Conference.
- Identify exercise stakeholders and participants;

- Develop an exercise scenario;
- Develop exercise documentation as shown in the text box on the next page;
- Determine exercise venue and logistics associated with the conduct of the exercises;
- Identify and train exercise staff (controllers and evaluators);
- Develop and provide briefings to exercise (participants and staff);
- Conduct and evaluate the exercise;
- Schedule and conduct an after-action conference to discuss and present exercise findings; and
- Develop an After-Action Report/Improvement Plan (AAR/IP).

The AAR/IP has two components: An AAR captures observations and recommendations based on the exercise objectives and an IP identifies specific corrective actions, assigns them to responsible parties, and establishes targets for their completion. The lead evaluator and the exercise planning team draft the AAR and submit it to conference participants prior to an After-Action Conference. Conference participants receive the AAR for review no more than 30 days after the completion of the exercise.

Consider Adapting Previous Exercise Formats

TMCs should consider adapting previously utilized exercise formats and designs to their own needs. Exercises can be designed for transportation and accommodate a variety of participating agencies and jurisdictions. A selection of examples previously employed in transportation settings follows:

- **First Responder Workshop** – Operations-level public safety agency representatives and TMC and transportation agency representatives jointly design and attend a workshop to discuss key emergency preparedness issues, such as ICS, NIMS, emergency operations centers, and training. The objective is to achieve a consensus among attendees to advance preferred solutions for consideration by senior personnel.
- **Senior Leadership Seminar** – Senior public safety and transportation executives jointly attend a seminar to learn about relevant key emergency preparedness issues. The objective is to obtain buy-in from senior executives on pre-identified issues and solutions. These seminars are usually short in order to accommodate senior leader schedules. Issues must be fully developed and understood before presenting them for senior leader review and consideration.
- **Transportation Functional Exercise** – Representatives from public safety, TMC, and transportation jointly attend an exercise featuring a scenario that draws on all of their respective capabilities and responsibilities. There is no deployment to the field, but there is a utilization of multiple discussion locations along with a realistic communications component to simulate real interaction between response partners and locations.
- **Interoperable Communications Equipment Test** – Communications representatives from public safety, TMC, and transportation agencies jointly design and attend a drill designed to test interoperable communications capabilities (usually radio) between the agencies. Such a drill is useful in advance of a larger exercise that may rely on interoperable communications.

Exercise Documentation

Exercise documentation should include the following:

- An Exercise Plan (ExPlan), typically used for operations-based exercises, provides a synopsis of the exercise and is published and distributed to players and observers prior to the start of the exercise. The ExPlan includes the exercise objectives and scope, safety procedures, and logistical considerations such as an exercise schedule.
- The Controller and Evaluator (C/E) Handbook supplements the ExPlan for operations-based exercises and contains more detailed information about the exercise scenario. It describes exercise controllers' and evaluators' roles and responsibilities. Because the C/E Handbook contains information on the scenario and exercise administration, it is distributed only to those individuals specifically designated as controllers or evaluators.
- The Master Scenario Events List (MSEL) is a chronological timeline of expected actions and scripted events (i.e., injects) to be inserted into operations-based exercise play by controllers to generate or prompt player activity.
- A Player Handout is a one to two page document usually handed out the morning of an exercise, which provides a quick reference for exercise players on safety procedures, logistical considerations, exercise schedule, and other key factors and information.
- Exercise Evaluation Guides (EEG) help evaluators collect and interpret relevant exercise observations. EEGs provide evaluators with information on what tasks they should expect to see accomplished during an exercise, space to record observations, and questions to address after the exercise as a first step in the analysis process. To assist entities in exercise evaluation, there are standardized EEGs reflecting capabilities-based planning tools, such as the Target Capabilities List (TCL) and the Universal Task List (UTL). The EEGs are not report cards. Rather, they guide an evaluator's observations so the evaluator focuses on capabilities and tasks relevant to exercise objectives that support development of the After-Action Report/Improvement Plan (AAR/IP).

3.9 COOP Planning Checklist

The TMC can use the following checklist to evaluate their current status in support of a Continuity of Operations Plan. The TMC has developed a COOP Plan that includes the following (*check all that apply*):

- Documents leadership succession and assignment of authority.
- Assigns essential functions to specific teams.
- Documents identification and preparation of alternate facilities.
- Documents procedures for protection of vital records, databases, and communication systems.
- Documents procedures for maintenance of the plan.
- Identifies conditions necessitating the activation of the plan.
- Documents TMC hours of operation.
- Identifies of alternate work sites.
- Documents COOP teams.
- Delegates emergency authorities and orders of succession.

- ⁵ http://fema.gov/pdf/about/divisions/npd/CPG_101_V2.pdf.
- ⁶ http://fema.gov/pdf/emergency/nims/NIMS_core.pdf.
- ⁷ http://ops.fhwa.dot.gov/eto_tim_pse/publications/timhandbook/tim_handbook.pdf.
- ⁸ <http://ops.fhwa.dot.gov/publications/fhwahop10050/ch1.htm>.
- ⁹ http://ops.fhwa.dot.gov/freewaymgmt/publications/frwy_mgmt_handbook/fmoh_complete_all.pdf.
- ¹⁰ http://houstontranstar.org/about_transtar/docs/TranStar_Interlocal_Agreement.pdf.
- ¹¹ http://dhs.gov/xlibrary/assets/NIPP_Plan.pdf; http://dhs.gov/xlibrary/assets/National_Preparedness_Guidelines.pdf.
- ¹² http://dot.gov/disaster_recovery/resources/DOT_NTRS.pdf.
- ¹³ [http://onlinepubs.trb.org/onlinepubs/archive/NotesDocs/NCHRP08-36\(69\)03_FR.pdf](http://onlinepubs.trb.org/onlinepubs/archive/NotesDocs/NCHRP08-36(69)03_FR.pdf).
- ¹⁴ which is available on-line at http://bussafety.fta.dot.gov/uploads/resource/2987_filename.
- ¹⁵ Material is available at <http://training.fema.gov/EMIWeb/IS/is100b.asp>.
- ¹⁶ <http://training.fema.gov/EMIWeb/IS/is200b.asp>.
- ¹⁷ <http://emilms.fema.gov/IS700aNEW/index.htm>.
- ¹⁸ Material is available at <http://training.fema.gov/EMIWeb/IS/IS800b.asp>.
- ¹⁹ Material is available at http://flsart.org/training_usda/USDA%20NIMS-NRP%20CD%20Contents/USDA_IC300/index.htm.
- ²⁰ <http://fema.gov/emergency/nims/NIMSTrainingCourses.shtm>.
- ²¹ <http://fema.gov/emergency/nims/NIMSTrainingCourses.shtm>.
- ²² <http://nhi.fhwa.dot.gov/default.aspx>.
- ²³ http://www.nhi.fhwa.dot.gov/training/course_detail.aspx?num=FHWA-NHI-133107&cat=&key=evacuation&num=&loc=&sta=%25&typ=&ava=&str=&end=&tit=&lev=&drl=

4.0 Response and Recovery

This section provides guidance on Transportation Management Centers (TMC) roles in the response and recovery phases of emergency events. The planning activities described in Section 3.0 determine the level of success achieved in response and recovery. TMC participation in the NRF and NIMS frameworks are key to effective working relationships during recovery. This section includes a summary of response and recovery relationships and then descriptions of the TMC role in response activities in three different situations, including traffic incidents (minor and large-scale), large-scale emergencies, and planned special events.

4.1 General TMC Roles in Response and Recovery

During an emergency or event, the TMC serves as a Transportation Department Operations Center (TOC). It can be colocated with a state or county EOC, which allows for close coordination between the DOT and their counterparts in emergency response. It also allows the quick deployment of TMC resources for emergency response activities. The quote from NCHRP Synthesis 318 shown below summarizes the role TMCs can play during the response and recovery phase of an emergency or event.

Section 2.0 discussed the key resources and services provided by TMCs in emergency operations. The footnoted link provides access to additional detail on best practices in using TMC resources in emergency response found in the FHWA document *Best Practices in Emergency Transportation Operations Preparedness and Response*.²⁴ One of the best practices is deployment of Mobile Emergency Response Operations/Command

Centers, which can be quickly deployed to emergency sites. These trailers support various radio frequencies, including those for state DOT, state patrol, and most local police and fire departments. The report divides the best practices into interagency communication and cooperation; emergency operations; equipment; ITS; mutual aid; threat notification, awareness, and information sharing; and policy.

“Considered a key component in facilitating efficient incident detection, verification, and response, the use of a traffic management center (TMC) as a communications hub during incident removal operations provides numerous benefits. TMC personnel can assist in sizing up and classifying an incident, dispatch state DOT incident response or maintenance crews, contact private towing and recovery companies, relay agency communications across jurisdictions and disseminate accurate incident characteristics and predicted duration to travelers and the media.”

NCHRP Synthesis 318: Safe and Quick Clearance of Traffic Incidents, 2003, p. 52.

Following are some of the key roles in the response phase.

- **Implementation of Operating Procedures –** Most TMCs maintain an operating procedures manual identifying TMC personnel to staff an emergency, and the key notifications to be made under different circumstances. These procedures often include flow charts incorporating both required operator actions and notifications. TMCs should review these as part of the emergency operations planning process and should have procedures in place to make sure changes in agency partner personnel are up-to-date.

- **Implementation of Operating Procedures** – Most TMCs maintain an operating procedures manual identifying TMC personnel to staff an emergency, and the key notifications to be made under different circumstances. These procedures often include flow charts incorporating both required operator actions and notifications. TMCs should review these as part of the emergency operations planning process and should have procedures in place to make sure changes in agency partner personnel are up-to-date.
 - **Infrastructure Surveillance** – Many regions with traffic cameras are now using them for surveillance of critical infrastructure during periods of heightened alert, and TMCs are developing policies and training personnel for this purpose. When emergencies threaten the viability of critical infrastructure, TMCs should coordinate with emergency operations to focus on facilities under threat or those that are key to maintaining emergency access or evacuation routes. TMCs should also coordinate with their engineering and maintenance staffs to obtain information on infrastructure conditions. In some situations, there may be a need for engineers and inspectors to assess infrastructure condition. TMC personnel can then communicate these conditions to emergency operations personnel.
 - **CCTV to Support Security** – TMC camera operators are trained to look for suspicious activity. In some regions, public safety agencies have access to traffic cameras, either by their presence in TMCs or by external camera feeds and control mechanisms. Guidelines for use and/or control of CCTV by outside parties, as discussed in Section 3.0, should be in place to expedite exchange of video information.
 - **Media Relations** – The TMC can provide a conduit for traffic and transportation information to emergency public information personnel and/or the media. During incidents, TMCs should be aware and adhere to the protocols as laid out under NIMS and ICS. These protocols recognize the role of the Public Information Officer (PIO) who is tasked with the following functions:
 - Gather data and attend staff briefings;
 - Monitor news coverage and analyze public information needs;
 - Handle media interviews and arrange for safe escort of reporters to restricted areas;
 - Write and distribute media advisories, news releases and situation reports;
 - Organize news conferences;
 - Prepare radio actualities/audio messages for telephone hotlines;
 - Write information to be posted to the Web;
 - Provide community or legislative outreach as assigned; and
 - Prepare internal or staff information materials as assigned.²⁵
- In some cases, PIOs are supplied by the transportation agency, or transportation agencies may provide a deputy PIO to communicate information. TMCs should make sure staff with the right PIO skills are available for emergency duty. NIMS/ICS training and communications skills/experience are important for this position.



Photo courtesy of the Washington State DOT.

The Washington State Department of Transportation's TMC continually monitors inclement weather and road conditions for reporting to the traveling public. An ice storm created havoc on the roads with icy roads, fallen trees, and numerous vehicle incidents. The TMC kept the traveling public informed via 511, Twitter, web site, and message boards. They also worked with law enforcement to manage traffic.

4.2 Response and Recovery Checklist

The TMC can use the following checklist to evaluate their current status related to participation in response and recovery activities (*check all that apply*):

- The TMC maintains an Operating Procedures Manual which TMC personnel use to staff an emergency, and which includes the key notifications to be made under different circumstances.
- The TMC conducts infrastructure surveillance and coordinates with emergency operations to focus on facilities under threat or those that are key to maintaining emergency access or evacuation routes, and with DOT engineering and maintenance staff to determine infrastructure conditions.
- The TMC has guidelines that support the use of CCTV during an emergency.
- The TMC coordinates with the DOT PIO during emergencies or large events.

4.3 Traffic Incidents

Most TMCs currently have well-established procedures defining coordination activities with emergency operations during small-scale incidents. This section will identify methods, through best practice examples, to improve response through coordination. Most TMCs also have procedures for emergency operations during large-scale incidents. Established procedures for response to small-scale emergencies can be a building block to improve coordination for larger events. Table 4.1 summarizes response activities identified in the TIM Resource Guide,²⁶ and includes how they relate to both small-scale and large-scale traffic incidents.

Table 4.1 Operational Responsibilities Assumed by TMCs for Traffic Incidents

Resources and Services	General Practice	Best Practices
Assist in incident detection and verification	<ul style="list-style-type: none"> Most incidents are now reported through emergency cell phone calls to Public Safety Answering Points (PSAP). In areas covered by TMC detection and surveillance, TMC operators may identify incidents simultaneously. In some cases, incident data are passed from PSAP's to TMCs through an intermediate database or by phone. 	<ul style="list-style-type: none"> TMCs share their space with emergency operations personnel. TMC's have direct links to law enforcement Computer Aided Dispatch (CAD) systems, and are able to obtain dispatch reports in near real time.
Initiate Traffic Management Strategies on Impacted Facilities	<ul style="list-style-type: none"> TMCs use available ITS system components such as message signs and traveler information to keep traffic out of the impacted area (L). 	<ul style="list-style-type: none"> TMCs use a variety of operational systems, including ramp meters and coordination with arterial signal operations personnel to implement preplanned strategies for managing traffic in and around the incident (L).
Establish and Operate Alternate Routes	<ul style="list-style-type: none"> TMCs use available ITS system components such as message signs and traveler information services to reinforce Quick Clearance, Move Over, and/or Slow Down laws (S). 	<ul style="list-style-type: none"> TMCs have access to the location of all DOT resources, including maintenance vehicles, and coordinate with the incident scene commander and other DOT departments to deploy these resources as needed. TMCs have preplanned detours routes incorporated into their freeway management system, which provides automated guidance on traveler information messages, signal/ramp meter timing, and preferred detour routes. Operators use this information to keep the incident scene commander informed on best option (L).
Protect the Incident Scene and Provide Traffic Control	<ul style="list-style-type: none"> TMCs help protect the incident scene by using Dynamic Message Signs and other traveler information services to warn motorists of the incident location. 	<ul style="list-style-type: none"> TMCs can provide information on the location of the incident quickly to the public through multiple communications channels. TMCs have the ability to automatically locate and dispatch support vehicles where needed at the request of the scene commander.
Provide Special Equipment Clearing for Incident Scenes	<ul style="list-style-type: none"> TMCs field requests from the incident scene commander to coordinate with DOT maintenance departments to dispatch required traffic control equipment to the scene (L). 	<ul style="list-style-type: none"> TMCs have traffic control plans for specific types of roadway segments in their system management software and can provide advice to the incident scene commander based on these plans (L).
Determine Incident Clearance and Roadway Repair Needs	<ul style="list-style-type: none"> TMCs field requests from the incident scene commander to coordinate with DOT maintenance departments and relevant environmental agencies regarding minor clean up of fuel and antifreeze spills (S). 	<ul style="list-style-type: none"> TMCs have direct link to key environmental agency personnel for use in providing support to incident scene commander and marshalling any DOT resources required for cleanup (L).
Coordinate Clearance and Repair Resources	<ul style="list-style-type: none"> TMCs contact engineering personnel to assess road and bridge condition after major incident and help determine whether restrictions/detours need to be implemented (L). 	<ul style="list-style-type: none"> TMCs have access to real-time bridge and/or pavement sensor data enabling them to monitor conditions if damage from incidents or natural disaster has occurred (L).
Repair Transportation Infrastructure		

Resources and Services	General Practice	Best Practices
Initiate medical assistance until help arrives	<ul style="list-style-type: none"> • Freeway (safety) service patrols arriving at the scene can report their observations on medical conditions to TMC who can pass these along to incident responders traveling to the scene. 	<ul style="list-style-type: none"> • Patrols have personnel with EMT training who can initiate medical response prior to arrival of scene commander and other responders. • Patrols have capability to transmit photos from the scene to incident response personnel on the way to the scene and medical facilities preparing to receive the injured (L).
Assist motorists with disabled vehicles	<ul style="list-style-type: none"> • Some freeway service patrols provide only basic services such as jump-starting and tire changing while others agencies can provide tow services directly (S). • TMCs or law enforcement may dispatch private towing services to take disabled vehicles off the road. 	<ul style="list-style-type: none"> • TMCs provide tow vehicles on call for multiple types of vehicles, including large trucks. The stationing of large wreckers on freeway segments with heavy commercial vehicle traffic is a best practice conducted by the Los Angeles Metropolitan Transportation Authority's LA SAFE program.^a
Provide motorist information	<ul style="list-style-type: none"> • TMCs generally have multiple options for communicating with the public about traffic incidents, including Dynamic Message Signs, Highway Advisory Radio, web sites, and 511 telephone services. 	<ul style="list-style-type: none"> • Best practices are represented by TMCs who have multiple options for communicating with the public, including relationships with media and private web sites, as well developing communications through social media. • For major incidents, TMCs can provide up-to-date real-time information on detours being implemented and traffic conditions along those routes (L).

Source: Traffic Incident Management Resource Guide, FHWA, June 2009, p. 708.

Key: L = Large Incidents only; S = Small Incidents only; No Designation = covers both.

^a Link to full documentation: <http://lasafe.net/freeway-service-patrol/fsp-big-rig/>.

4.4 Traffic and Large-Scale Incidents Checklist

The TMC can use the following checklist to evaluate their current status in regard to participation in traffic and large-scale incidents (*check all that apply*):

Traffic Incidents

- Shares space with emergency operations personnel.
- Maintains direct links to law enforcement Computer Aided Dispatch (CAD) systems, and obtain dispatch reports in near real time.
- Has access to the location of all DOT resources, including maintenance vehicles, and coordinate with the incident scene commander and other DOT departments to deploy these resources as needed.
- Provides information on the location of the incident quickly to the public through multiple communications channels.
- Has the ability to automatically locate and dispatch support vehicles where needed at the request of the scene commander.
- Has Freeway (safety) service patrols with EMT-trained personnel who can initiate medical response prior to arrival of scene commander and other responders.
- Has multiple options for communicating with the public, including relationships with media and private web sites, as well as developing communications through social media.
- Provides tow vehicles on call for multiple types of vehicles, including large trucks.

Large-Scale Incidents

- Uses a variety of operational systems, including ramp meters and coordination with arterial signal operations personnel to implement preplanned strategies for managing traffic in and around the incident.
- Identifies preplanned detours routes that are incorporated into the freeway management system.
- Provides automated guidance on traveler information messages, signal/ramp meter timing, and preferred detour routes.
- Has traffic control plans for specific types of roadway segments in the system management software.
- Maintains a direct link to key environmental agency personnel for use in providing support to incident scene commander and marshalling any DOT resources required for cleanup.
- Has access to real-time bridge and/or pavement sensor data which allows for monitoring of damage from incidents or natural disasters.
- Has Freeway (safety) service patrols with capability to transmit photos from the scene to incident response personnel on the way to the scene and medical facilities preparing to receive the injured.
- Provides up-to-date real-time information on detours and traffic conditions along those routes.

4.5 Large-Scale Emergencies

TMC personnel and technical resources (traffic data, cameras, and road weather) can provide important support during large-scale emergencies, which likely involve disruption to the transportation system and the need for evacuation of homes and businesses.

Generally, small incidents occur more frequently with less impact, which means organizations are usually well equipped and practiced to handle these incidents, sometimes without external coordination or assistance of any kind.

TMCs often deal with the impacts of small incidents such as motor vehicle crashes, localized inclement weather, and road construction. As a result, TMCs are usually well prepared to deal with these small incidents internally, with minimal or only basic support from public safety and other outside agencies.



Source: Digital Stock, a division of Corbis Corp.

Large-scale incidents are by definition more complex and may require coordination and resource assistance from outside agencies, especially if the incident spans multiple jurisdictions or agencies. A hurricane, for example, would affect most agencies and jurisdictions located in the impact area. The impact and scope of large incidents requires special planning to ensure incidents which extend beyond a single agency or jurisdiction can be effectively managed and resolved.

A large-scale incident may require the TMC to play a support role for a broader emergency where it is only one of many responding agencies. TMCs are part of ESF 1: Transportation, which means they provide transportation resources and services in response to an emergency. TMCs may

need to interact and coordinate extensively with outside agencies and jurisdictions, perhaps even some located out-of-state. In addition, the impacts of a larger incident may affect the communications or transportation infrastructure in ways that inhibit the response. That is why it is important for a TMC to plan for its role in supporting a large-scale emergency in the context of ESF 1.

4.5.1 Initial Recovery Phase Activities

Following are some examples of best practice emergency operations activities performed by the TMC during the initial and sustained response to a large-scale emergency:

- Mobilize TMC representative to the appropriate state or agency EOC or Unified Command Center (UCC) as requested;
- Configure communications to maximize interoperability with other agencies;
- Focus information gathering resources on the incident area (cameras, traffic monitoring services, personnel on-scene) and relay information as needed;
- Respond in a prioritized manner in accordance with decisions made either internally or externally from the EOC or UCC;
- Fulfill resource requests as possible, while filtering requests to ensure the request is appropriate in both timing (avoiding requests for future needs) and purpose (avoiding mission/equipment mismatches); and
- Provide public information in the form of dynamic message signs (DMS), 511 updates, and TMC social media.



Photo courtesy of the Iowa DOT.

Historic flooding along the Missouri river's 384.6-mile course along eastern Nebraska and parts of South Dakota, Iowa, and Missouri washed out hundreds of thousands of acres of farmland, swamping rural homes, overflowing highways, and threatening cities, railroads, power plants, and airports. Since the flooding event did have some advance warning, the Iowa DOT began preparations long before the water topped the banks of the Missouri River from Sioux City south into Missouri. In early June, the Iowa DOT began preparing for what has become the worst Missouri River flooding in recorded history. Equipment and supplies were moved to higher ground, and the Onawa rest areas were closed to serve as a materials storage area for flood mitigation efforts along I-29 near Blencoe and U.S. 30 near Missouri Valley. DOT emergency managers held daily strategy sessions to set the course for the long flood event. The statewide TMC disseminated information via 511, web site, and message boards, and coordinated with other local and state agencies since the road was closed for many months.

4.5.2 Continuing Recovery Phase Activities

Following are best practice emergency operations typically performed by the TMC after the event and the recovery phase has commenced.

- Continue focusing information gathering resources on the incident area (cameras, traffic monitoring services, personnel on-scene) and relay information as needed;
- Continue fulfilling resource requests as possible, while filtering requests to ensure the request is appropriate in both timing (avoiding requests for future needs) and purpose (avoiding mission/equipment mismatches);
- Provide guidance and resources to local communities and agencies as appropriate on recovery activities, including debris management; and
- Continue providing public information in the form of DMS and sharing of appropriate information with the media.



Photo courtesy of the Kansas DOT.

An F-5 tornado ripped through the town of Greensburg and in minutes left an unimaginable path of destruction. The long road to recovery started immediately and from the beginning, the Kansas Department of Transportation (KDOT) was there to provide a helping hand. KDOT's efforts included search and rescue, debris removal and cleaning of roadways, and clearing property easements for restoration of utilities. KDOT deployed mobile Communications on Wheels to assist law enforcement and the National Guard. KDOT assisted with traffic control through barricades and the TMC provided message boards operations and 511 updates.

4.5.3 Implement Restoration Phase Activities

Following are best practice emergency operations activities typically performed by the TMC after the recovery phase has been concluded and the restoration phase is underway.

- Return communications to pre-event configuration;
- Return information gathering resources to pre-event configuration (cameras, traffic monitoring services, personnel);
- Demobilize TMC liaison to external EOC or UCC; and
- Retain all incident documentation and begin After Event Action Review process.

4.5.4 Integrate with State EOC Capabilities

During large-scale events, the TMC should integrate with the State EOC, which has the ability to communicate directly with local emergency management offices, state police troops or districts, and Federal agencies. Some states also have regional EOCs that coordinate disaster/emergency response with multiple communities in a geographic region. The TMC can integrate with the State EOC by sending a liaison, which aids communication, coordination, and resource request and fulfillment between the agencies. In addition, TMCs often have access to valuable camera and sensor networks that provide the State EOC and decision-makers with real-time information from the incident scene.

4.5.5 Plan for Specific Large-Scale Emergencies

Large-scale emergencies may have a long recovery phase which overlaps into the postevent phase. Activities may include reestablishing the TMC and supporting infrastructure. For large emergencies, certain hazards may also require specific additional considerations. These hazards include the following:

Terrorist Events - Public safety and transportation agencies recognize the importance of managing surface transportation during and after a terrorist incident. The same types of homeland defense information exchanged between transportation and public safety agencies can be applied to the less serious (but more common) incidents of crime and traffic law enforcement. Regular use of information between transportation and public service agencies will heighten awareness of the information's value and increase the skills for using the information. Such an improvement will serve the public well should another terrorist event occur. To prepare for a this type of event, TMCs should do the following:

- Anticipate the event may produce large volumes of self-evacuees who utilize the highway system. The TMC will use its traffic monitoring and management capabilities as well as maintain communication and coordination with the EOC and public safety agencies that are responding and working in the field. Monitor camera networks and access control systems for situation developments, and relay observations to EOC and/or public safety agencies as appropriate.
- **Chemical, Biological, and Radiological Threats** - The transportation system has particular vulnerabilities with respect to chemical, biological, and radiological threats. Regardless of the cause, the primary considerations for response

management are the type and toxicity, quantity and persistence, exposure route, dispersion, and population density in the area at risk. During these incidents, TMCs should do the following:

- Maintain contacts and relationships with agencies equipped to handle specialized incidents, including those that are chemical, biological, and radiological in nature. Rapid assessment of impacts will aid the speed, effectiveness, and safety of the response. Relay initial scene/site assessment information available to the TMC to the EOC and responding public safety agencies.
- Help secure the affected area and activate appropriate alternate routes when the affected area will be inaccessible and unusable.

4.6 Large-Scale Emergency Checklist

The TMC can use the following checklist to evaluate their current status in regard to emergency operations activities typically performed by the TMC during the initial and sustained response, during and after the recovery phase of a large-scale emergency (*check all that apply*):

Initial Response

- Mobilizes TMC representative to the appropriate state or agency EOC or Unified Command Center (UCC) as requested.
- Configures communications to maximize interoperability with other agencies.
- Focuses information gathering resources on the incident area (cameras, traffic monitoring services, personnel on-scene) and relays information as needed.

- ❑ Responds in a prioritized manner in accordance with decisions made internally or externally from the EOC or UCC.
- ❑ Fulfills resource requests as possible, while filtering requests to ensure the request is appropriate in both timing and purpose.
- ❑ Provides public information in the form of dynamic message signs (DMS), 511 updates, and TMC social media.

Initial Recovery

- ❑ Continues focusing information gathering resources on the incident area (cameras, traffic monitoring services, personnel on-scene) and relays information as needed.
- ❑ Continues fulfilling resource requests as possible, while filtering requests to ensure the request is appropriate in both timing (avoiding requests for future needs) and purpose (avoiding mission/equipment mismatches).
- ❑ Provides guidance and resources to local communities and agencies as appropriate on recovery activities, including debris management.
- ❑ Continues providing public information in the form of DMS and sharing of appropriate information with the media.

After Recovery

- ❑ Returns communications to pre-event configuration.
- ❑ Returns information gathering resources to pre-event configuration (cameras, traffic monitoring services, personnel).
- ❑ Demobilizes TMC liaison to external EOC or UCC.
- ❑ Retains all incident documentation and begins After Event Action Review process.

- ❑ Integrates with the State EOC by sending a liaison, and provides real-time information from the incident scene.
- ❑ Develops a plan for large-scale emergencies that (*check all that apply*):
 - ❑ Offers traffic monitoring and management capabilities, and communication and coordination functions (camera networks and access control systems) for use in handling large volumes of self-evacuees.
 - ❑ Maintains contacts and relationships with agencies equipped to handle specialized incidents, including those that are chemical, biological, and radiological.
 - ❑ Helps to secure the affected area and activate appropriate alternate routes when the affected area will be inaccessible and unusable.

4.7 Large Planned Events and National Special Security Events

This section describes TMC supporting activities immediately prior to, during, and after large planned special events such as National Special Security Events (NSSE).

In 1998, President Clinton issued Presidential Decision Directive 62 (PDD-62) for the purpose of formalizing and delineating the roles and responsibilities of Federal agencies in the development of security plans for major events. This Presidential Directive focused on the role of each agency and eliminated the duplication of effort and resources. The Presidential Protection Act of 2000 became public law and included in the bill, was an amendment to Title 18, USC §3056, which codified PDD-62. With the support of Federal law, the Secret Service is authorized

to participate “in the planning, coordination and implementation of security operations at special events of national significance.”

The Department of Homeland Security is the lead agency for the design and implementation of an operational security plan when the Secretary of the agency designates it as a NSSE. The Secret Service has developed a core strategy to carry out its security operations, which relies heavily on its established partnerships with law enforcement and public safety officials at the local, state, and Federal levels. The goal is to provide a safe and secure environment for the individuals the Secret Service is protecting, other dignitaries, the event participants, and the public. There is a tremendous amount of advance planning and coordination prior to the event, particularly at the venue and along the motorcade route, in communications, credentialing, and training. An example of an NSSE was the 2008 Democratic National Convention in Denver, Colorado in August 2008. The acceptance speech by nominee Barack Obama at INVESCO field before a record-setting crowd of 84,000 people was designated an NSSE.

While these preplanned and large-scale special events are not emergencies, some of the resources and actions could apply to an emergency. Specific coordination activities between the TMC and emergency operations may include monitoring and traffic control prior to the event, and monitoring of routes during the event in case of emergency or in preparation for the end of the event. TMCs also can provide support to management of exiting traffic.

4.7.1 Pre-Event Phase

During the pre-event phase, the key components of a traffic management plan include plans for site access and parking, pedestrian access, traffic flow, traffic control, en-route traveler information, traffic surveillance, traffic incident management, and safety. A planned special event increases or disrupts the normal flow of traffic and places a premium on the optimal use of existing facilities. A traffic incident and safety plan specifies crash prevention tactics and traffic incident quick clearance initiatives, some for enactment on the day of the event. During this phase, TMCs can conduct the following activities:

- Freeway Traffic Control:
 - Ramp closures;
 - Elimination of weaving areas;
 - Alternate routes; and
 - Ramp metering adjustments.
- Street Traffic Control:
 - Lane Control;
 - Alternative Lane Operations;
 - Trailblazer signing; and
 - Parking management.
- Intersection Traffic Control:
 - Access Restriction;
 - Advance Signing; and
 - Traffic Signal Timing and Coordination.
- Traffic Incident Management:
 - Service Patrols;
 - Tow Truck Staging;
 - Quick Clearance; and
 - Advance Warning Signs.



Source: Comstock Images.

- Traffic Surveillance:
 - CCTV;
 - Media Reports; and
 - Temporary ITS for detection and surveillance.
- En-Route Traveler Information:
 - Dynamic Message Signs;
 - Highway Advisory Radio;
 - 511 Phone Systems;
 - Media; and
 - Smart Phone Apps/In-vehicle devices.
- Pre-Trip Traveler Information:
 - Internet;
 - 511 Phone Systems;
 - Pre-event public relations campaign;
 - Media; and
 - Roadside Traveler Information Systems.

If the planned event warrants preparation of a formal traffic management plan, it will define how the TMC conducts certain functions and roles. These may be primary roles (surveillance, detection, message sign operation, ramp meter control), support roles (public relations campaign, tow truck staging), or coordinating roles (signal systems operation, service patrols).

The TMC may also conduct crash prevention tactics that focus on improving driver awareness of surroundings and driver behavior during planned special events, including portable lighting, congestion warning signs, public information safety campaigns, and enforcement.

4.7.2 Response and Recovery Phases

On the day of the planned event, team organization includes agency representatives stationed at a central command post, at secondary command posts, at a permanent TMC, and at strategic locations in the field for traffic control and observation. The traffic management team generally functions under the ICS to ensure successful deployment of the traffic management plan and minimal impact to transportation system users. Unified command functions coordinate interjurisdictional and multidisciplinary stakeholders among the traffic management team so there is no sacrifice of agency authority, responsibility, or accountability. An advantage of using the ICS during a planned special event is that it clarifies how decisions are made if the traffic management plan requires adjustment.



Source: Cambridge Systematics, Inc.

A number of factors affect traffic conditions either shortly before, or during the event. For events such as the Super Bowl and the NCAA Final Four, for instance, the participating teams are not known until shortly before the

event (two weeks for the Super Bowl, one for the Final Four). Depending on the proximity of the participants, the mix of people driving or flying into the host city can vary greatly, with significant impacts on local traffic. Attendance at major festivals can also vary and a sudden outbreak of bad weather during an outdoor event can change the anticipated timing and patterns of traffic. As a result, plans need to be adjusted in the period immediately prior to the event or in some cases during the event. As an organization with the ability to monitor conditions over a wide area, the TMC may take on a greater role to address immediate changes. For the TMC, specific day-of-event activities involve the following:

- Support the implementation and operation of the traffic management plan by coordinating with field personnel to make sure temporary traffic modifications are in place. The TMC will activate DMS and other traveler information services to remind the public of the event and inform them of traffic changes.²⁷
- Monitor a potential fluid situation and provide inputs on how the plan is working and what adjustments may be required in real time.²⁸ Traffic monitoring represents an important day-of-event activity, serving to provide traffic and incident management support in addition to performance evaluation data. A traffic engineer should be available to the TMC to review historical data on traffic volumes and speeds as well as any projections made for the event. If projections are not accurate, the TMC can coordinate changes in the original plan and implement those elements residing in the TMC. Timely deployment of such contingency plans developed during the operations planning phase can depend on the TMC's accurate collection and communication of real-time traffic data between traffic management team members.

- Monitor traffic conditions; provide traveler information services; coordinate with DOT maintenance and field crews to provide additional resources where needed; coordinate with local agencies that control signals and local streets, ramp meter operation; and support quick clearance and incident management activities.



Source: Digital Stock, a division of Corbis Corp.

4.7.3 Postevent Phase

The postevent phase for preplanned and large-scale special events is similar to other major events. Key events to conduct after special events with TMC participation include the following:

- A debriefing with all stakeholders to review the original plan and compare it to the actual events to see what aspects of the plan worked and which need improvement. The TMC, which usually has resources to display data and graphics, could serve as host.
- A postevent report documenting the event and making recommendations for improvements in the process. The TMC should play a key role in the transportation section of the report, including documentation of traffic volumes, speeds, and times required to clear parking areas and key intersections. Timelines and documentation on implementation of specific strategies (changes in signal timing/operation, opening and

closing of ramps and streets, etc.) should also be included.

- Documentation of any exceptional costs incurred in transportation activities, which is helpful if there are cost-recovery agreements with venue owners, event sponsors, or other agencies. It can also be used for the planning and development of future agreements.
- Archiving data and event documentation for use in future planning efforts.

4.8 Large Planned Events Checklist

The TMC can use the following checklist to evaluate their current status in regard to participation in large planned events (*check all that apply*):

Pre-Event Phase

- Conducts Freeway Traffic Control through ramp closures, elimination of weaving areas, identification of alternate routes, and ramp metering adjustments.
- Maintains street traffic control through lane control, alternative lane operations, trail-blazer signing, and parking management.
- Maintains intersection traffic control by access restriction, advance signing, and traffic signal timing and coordination.
- Conducts traffic incident management through service patrols, two truck staging, quick clearance, and advance warning signs.
- Conducts traffic surveillance through CCTV, media reports, and temporary ITS detection and surveillance.
- Provides en-route traveler information via DMS, Highway Advisory Radio, 511 systems, media, and smart phone apps/in-vehicle decisions.

- Provides pretrip traveler information through the Internet, 511 systems, pre-event public relations campaign, media, and roadside traveler information systems.
- Conducts crash prevention tactics, including portable lighting, congestion warning signs, public information safety campaign, and enforcement.

Response and Recovery Phases

- Coordinates with field personnel to make sure temporary traffic modifications are in place, i.e., DMS and other traveler information services.
- Monitors traffic conditions; provide traveler information services; coordinate with DOT maintenance and field crews to provide additional resources where needed.
- Coordinates with local agencies that control signals and local streets, ramp meter operation.
- Supports quick clearance and incident management activities.

Postevent Phase

- Participates in a debriefing with all stakeholders to review the original plan and compare it to the actual events to see what aspects of the plan worked and which need improvement.
- Assists with the transportation section of a postevent report documenting the event and making recommendations for improvements in the process.
- Documents any exceptional costs incurred in transportation activities.
- Archives data and event documentation for use in future planning efforts.

- ²⁴ http://ops.fhwa.dot.gov/publications/etopr/best_practices/etopr_best_practices.pdf.
- ²⁵ *Wisconsin DOT Emergency Operations Plan*, Rev. 1, June 2010, 40.
- ²⁶ *Traffic Incident Management Resource Guide*, FHWA, June 2009, 708.
- ²⁷ *Freeway Management and Operations Handbook*, FHWA, 2003, Updated 2006, 11-16.
- ²⁸ *Freeway Management and Operations Handbook*, FHWA, 2003, Updated 2006, 11-16.

5.0 Postevent Activities

The TMC roles in emergency operations following emergencies and related events are the focus for this section. Also included are descriptions of postevent emergency activities, including recovery activities, after-action assessments, and improvement planning.

5.1 Recovery Actions

Large-scale events often create a need for immediate follow up to address any resulting damage and mitigate continuing threats to the public. Effective coordination and resource sharing facilitate this type of response. TMCs play a central role in coordinating traffic recovery, but their capabilities may also lend themselves to supporting and/or coordinating a large nontraffic incident recovery. To support an EOC, or first responders, there are a number of planning and preparedness actions TMCs should undertake during the recovery phase, as described in the following sections:

5.1.1 Roadway Restoration

Currently DOTs often coordinate infrastructure repair independent of TMC support. However, TMC surveillance (video and traffic detection) and public information (media contacts, web sites, variable message signs, highway advisory radio) capabilities lend themselves to expansion on a temporary and rapid basis. There are two ways TMCs can support roadway restoration:

- **Surveillance Capabilities** - TMCs can utilize camera networks and traffic sensor/detection systems to provide enhanced real-time, incident location-specific situational awareness. Temporary reconfiguration of these resources may be necessary.

- **Public Information Capabilities** - TMCs have access to media contacts, social networks, web sites, variable message signage, and highway advisory radio. All of these can be utilized to ensure public information efforts are supporting, rather than ignoring or undermining recovery activities.



Photo courtesy of the FHWA Road Weather Management Program.

5.1.2 Infrastructure (Power, Water, and Public Facilities) Restoration

TMCs can help support restoration activities by public works departments and utilities by providing information on access routes and detours, gathering and disseminating information on road conditions, and helping avoid disruption of the system by having too much work in the same area. By serving as a coordination point for cross-utility restoration, recovery efforts can be monitored and spread over multiple areas, reducing congestion, and enhancing progress.



Photo courtesy of the Texas DOT.

When devastating wildfires ripped through West Texas, the Texas Department of Transportation (TxDOT) crews helped the Texas Forest Service and area fire departments battle the blazes that blackened about 120,000 acres, forced evacuations, and destroyed dozens of homes from the Panhandle to the southern plains. The TMC was responsible for notifying the traveling public of the unsafe conditions and assisting with managing traffic.

5.2 After-Action Assessments and Improvement Plans

After-action assessments of specific events and the development of improvement plans provide a good opportunity for TMCs and Emergency Operations agencies to build relationships and coordinate their activities outside of the pressure of the event itself. The process is essential because it identifies and documents lessons learned and then applies improvements to address them, which benefits future incidents and responses. Following are the steps and actions involved in conducting an after-action assessment and developing an improvement plan.

5.2.1 Convene and Set Up an After-Action Conference

Some of activities associated with an After-Action Conference include identifying the appropriate participants, setting up the agenda, and communicating to the attendees what is to be expected. The conference should take place within a reasonable time following the incident to ensure memories are fresh and other priorities do not arise, and include individuals involved in the incident. Some other conference considerations include the following:

- Designate an experienced facilitator to lead the After-Action Conference and ensure discussions are focused and constructive.
- Develop and present a beginning-to-end timeline of the event and the response to help jog memories and provide a consistent basis for discussions.
- Allow for informal discussion and issue exploration so attendees feel comfortable and able to participate.
- Develop a feedback form and distribute to attendees to capture additional observations or comments not covered during the conference. The form should also allow attendees to evaluate the usefulness and quality of the conference.

5.2.2 Develop the After-Action Report and Improvement Plan

TMCs should use the DHS/FEMA Homeland Security Evaluation Program, which includes a template for after-action reports, and utilize a consistent approach when identifying issues and recommendations. A preferred approach, called OAR, identifies the **observation** (what happened), provides an **analysis** of the observation (why did this happen), and **recommends** ways to address the observation (how to fix what happened). Each observation should include a specific improvement action along with a table or matrix summarizing recommendations and assigning responsibility for implementation. The final report should be reviewed and distributed to stakeholders and a process established to evaluate it periodically to ensure the implementation of recommendations. Following in Section 5.2.3 are the steps TMCs should use to develop the After-Action Report and Improvement Plan:

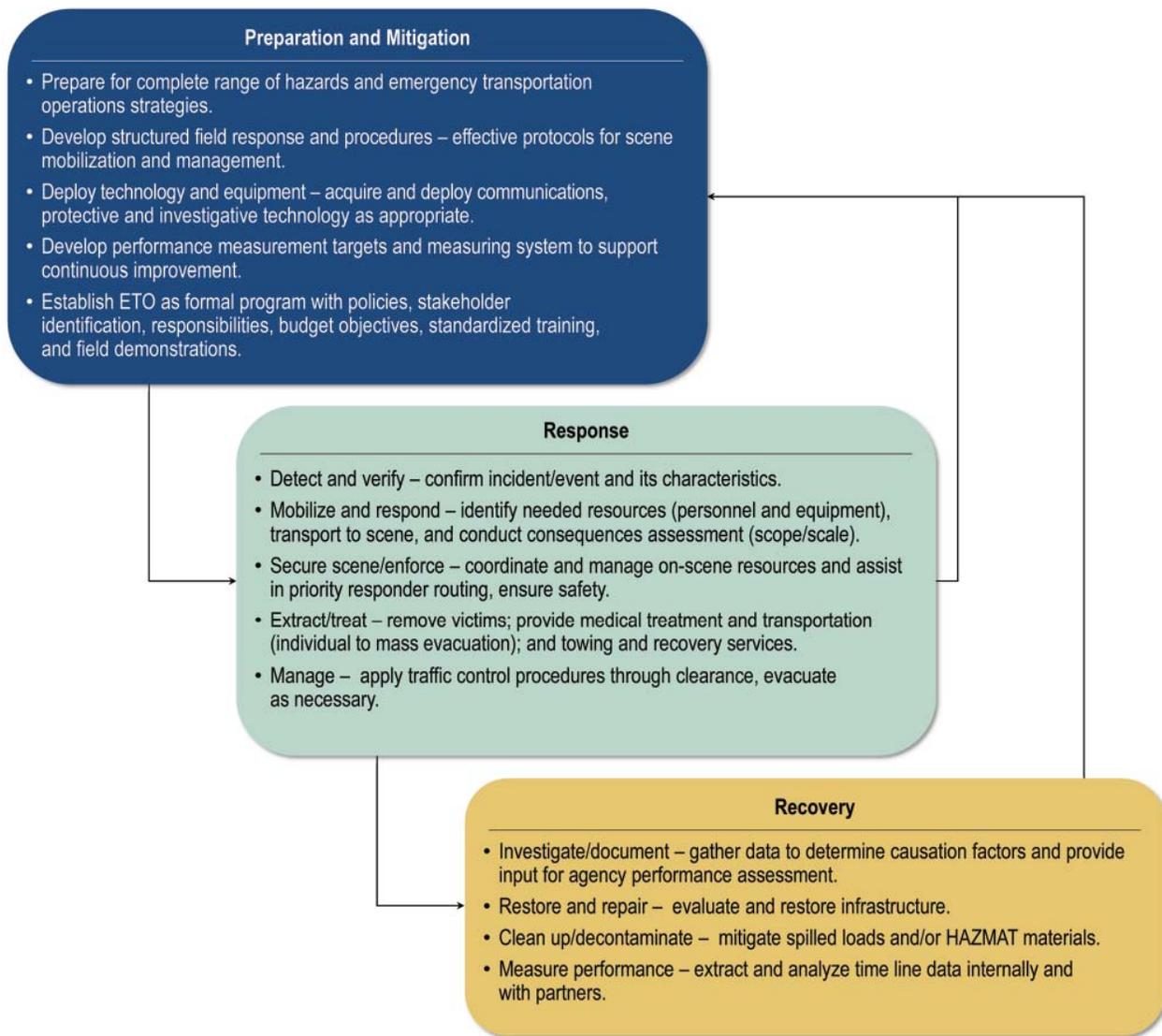
5.2.3 Determine Program Needs and Requirements

A discussion of the TMC role in the emergency or event during the postevent assessment may raise sensitive issues related to funding and jurisdictional oversight. A discussion of prior experiences can help build relationships and improve coordination for future events. Figure 5.1 shows a general picture of how after-action incidents feed back into the development of program needs and requirements.

TMCs have a role in three preparation activities, including the development of field response and procedures, deployment of technologies, and development of performance measure targets and measuring systems. The information for the EOP should focus on the several basic questions to ask after each incident, including the following:²⁹

- Did an action, a process, a decision, or the response timing identified in the plan make the situation worse or better?
- Were new alternate courses of action identified?
- What aspects of the action, process, decision, or response timing make it something to keep in the plan?
- What aspects of the action, process, decision, or response timing make it something to avoid?
- What should be removed from the plan?
- What specific changes to plans and procedures, personnel, organizational structures, leadership or management processes, facilities, or equipment can improve response performance?

Figure 5.1 Activities in the Preparation, Response, and Recovery Phases



Source: NCHRP Report 525, Vol. 6, *Surface Transportation Security Guide for Emergency Transportation Operations*, p. 13.

Identify Performance Measures

Performance measures are important to this process because what cannot be measured cannot be managed. FHWA and National Traffic Incident Management Coalition (NTIMC) are collaborating on the creation of national metrics to help responders develop their own programmatic and incident response goals and commit to them in written agreements. Institutional issues revolve around gaining acceptance for performance measurement from both executive decision-makers and other agencies involved with TIM responsibilities. While most TMCs and emergency responders are familiar with basic transportation-oriented performance measures, appropriate measures will vary depending on the type of event.

There are two types of performance measures – those that are measured directly and those that are modeled or calculated. Following are examples of direct measures.

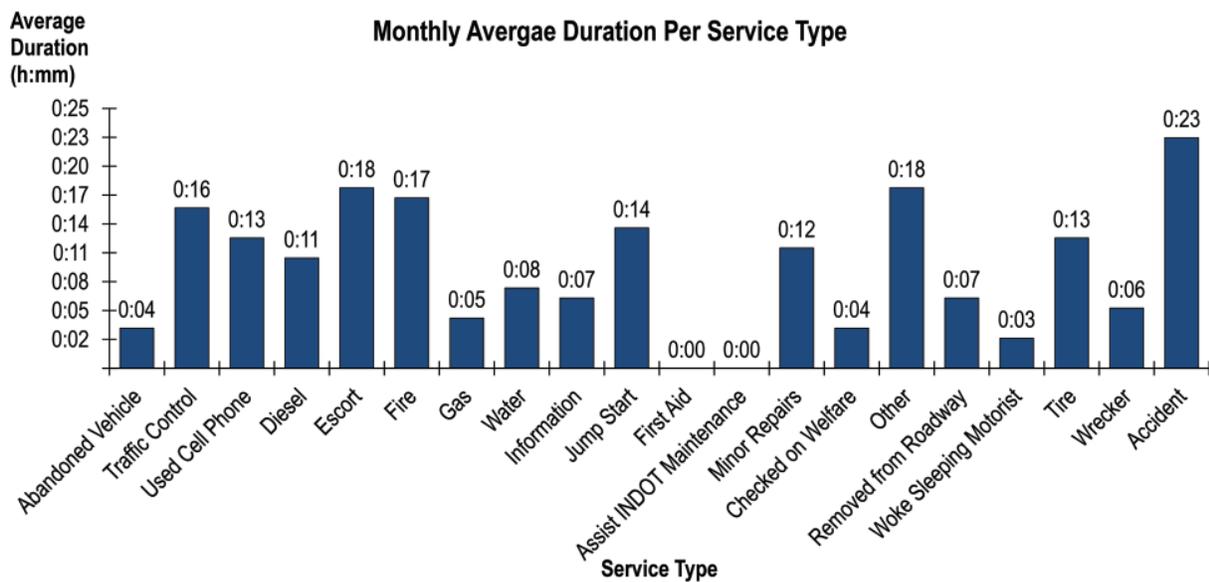
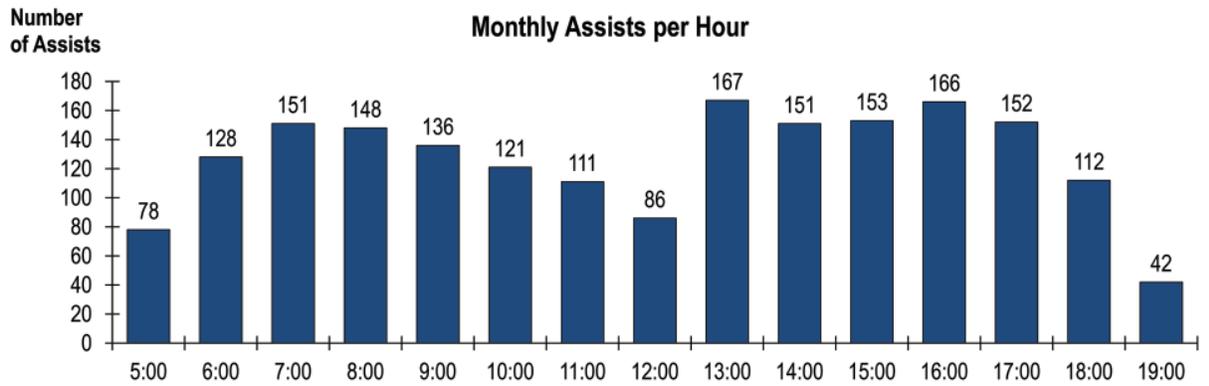
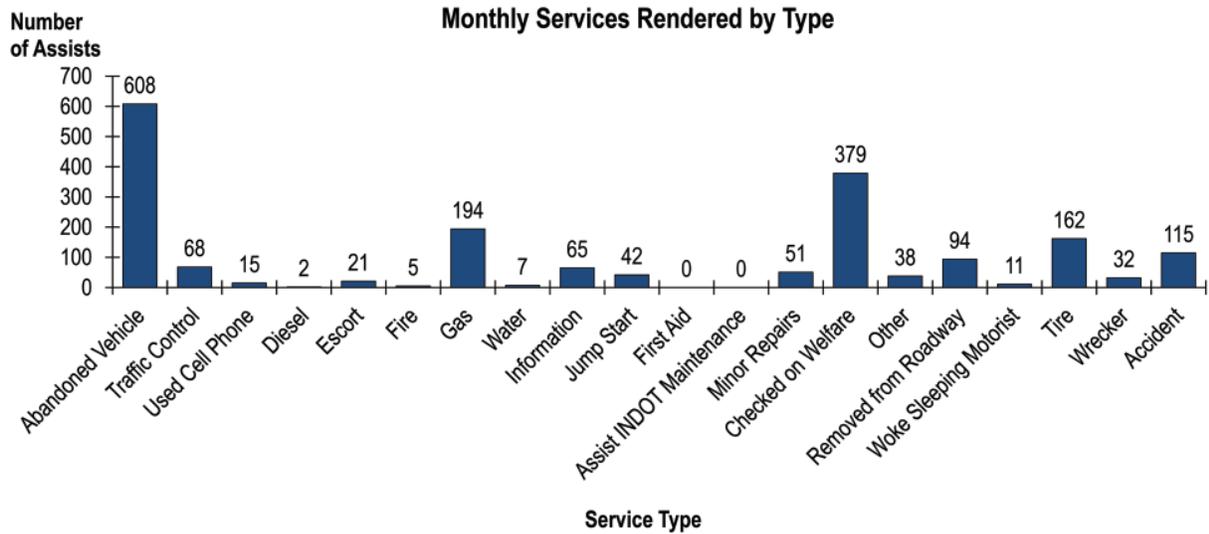
- Number and type of incidents serviced by agency service patrols or privately contracted services;
- Specific support activities conducted;
- The time it takes to detect and verify incident;
- Response and clearance time for the incident;
- Cost of services – total and per incident serviced; and
- Customer satisfaction (measured by surveys or web feedback).

Most agencies keep relatively detailed statistics on these performance measures, as illustrated by the summary of Indiana's Hoosier Helper Program, shown in Figure 5.2.

These measures help track cost-effectiveness, and compare performance with other agencies, different regions, or private contractors. In some areas, law enforcement may compile and manage incident management data, but in general, this function is within the scope of the TMC. These reports help allocate incident management resources, improve the efficiency of operations, and justify capital and operating budgets to decision-makers and the public.

A second set of performance measures look at the system impact of incident management activities and include measures such as crash reduction, travel time saved, reduced fuel costs for the public and operating agencies, and improved air quality. There are a number of ways to identify these measures, including The Urban Mobility Report developed by the Texas Transportation Institute, which estimates the costs of these factors as they relate to congestion. FHWA also has figures on the cost of crashes and there are modeling tools such as the ITS Deployment Analysis System to estimate them. The footnoted link provides access to additional information.³⁰ Agency traffic and planning personnel can develop these estimates and the TMC can contribute with data on incident management and traffic speed and volume. Performance measurement of major incidents and disasters is a more difficult process. Since the first priority is the safety and security of life and property, all transportation system performance must support this goal. Measures usually focus on the ability of emergency vehicles to access the scene and the efficiency of evacuations plans and procedures. Another impediment in measuring performance is the unique nature of each event which makes comparisons difficult.

Figure 5.2 Indiana DOT Freeway Service Patrol Performance Measures



Source: Indiana DOT.

Conduct Benefit/Cost Analysis

A postevent benefit/cost analysis can help an agency determine where to invest new resources and provide a justification for funding and support of those resources. The quantitative benefits include increased survival rate of crash victims; reduced delay; improved response time; improved air quality; reduced occurrence of secondary incidents; improved safety of responders, crash victims and other motorists; and reduced recovery time. Qualitative benefits include enhanced traveler information services, increased driver warning capabilities, improved coordination and cooperation of response agencies, improved public perception of agency operations, and reduced driver frustration.

Other Considerations

Budget and funding topics may be examined and include a review of dedicated funding, ongoing funding, and guidelines for Federal/state funding sources, metropolitan planning organization partnerships, and an associated TIM strategic plan to ensure access to program resources. Some items to measure include whether TIM resources were managed effectively and efficiently; the number and type of executive outreach materials/events to ensure the effectiveness of TIM programs is adequately demonstrated to decision-makers; and whether TIM programs are considered during the prioritization of funding projects.

Postevent reviews and after-action meetings may also identify needed changes in training or operating procedures, existing MOUs, or legal agreements between agencies.

5.3 Postevent Checklist

The TMC can use the following checklist to evaluate their current status in regard to post-event activities (*check all that apply*):

- The TMC convenes an after-action conference.
- The TMC develops an after-action report and improvement plan that includes the following (*check all that apply*):
 - Determines program needs and requirements by asking the following questions (*check all that apply*):
 - Did an action, a process, a decision, or the response timing make the situation worse or better?
 - Were new alternate courses of action identified?
 - What aspects of the action, process, decision, or response timing make it something to keep in the plan?
 - What aspects of the action, process, decision, or response timing make it something to avoid?
 - What should be removed from the plan?
 - What specific changes to plans and procedures, personnel, organizational structures, leadership, or management processes, facilities, or equipment can improve response performance?
 - Identifies performance measures, including the following (*check all that apply*):
 - Number and type of incidents serviced by agency service patrols privately contracted services.
 - Specific support activities conducted.
 - The time it takes to detect and verify incident.

- Response and clearance time for the incident.
- Cost of services – total and per incident serviced.
- Customer satisfaction.
- Crash reduction.
- Travel time saved.
- Reduced fuel costs for the public and operating agencies.
- Improved air quality.
- The ability of emergency vehicles to access the scene.
- Efficiency of evacuation plans and procedures.
- Conducts benefit/cost analysis on the following (*check all that apply*):
 - Increased survival rate of crash victims.
 - Reduced delay.
 - Improved response time.
 - Improved air quality.
 - Reduced occurrence of secondary incidents.
 - Improved safety of responders, crash victims and other motorists.
 - Reduced recovery time.
 - Enhanced traveler information services.
 - Increased driver warning capabilities.
 - Improved coordination and cooperation of response agencies.
 - Improved public perception of agency operations.
 - Reduced driver frustration.
 - Efficiency of budget expenditures.
 - Changes in training or operating procedures.
 - Changes in MOUs or legal agreements between agencies.

5.4 Maintain TMC Emergency Operations

Relationships, policies, plans, and procedures must be maintained to ensure they remain relevant and effective, which is especially important in complex environments involving multiple jurisdictions and stakeholders.

For coordination elements to be up-to-date and aligned, TMCs must ensure a regular process of review and revision. During an emergency is a poor time to discover changed contact information, radio frequencies, organizational structures, and roles and responsibilities. Smooth response depends on pre-event knowledge, both internally and jointly with external response partners. Following are the steps to maintain TMC emergency operations.

5.4.1 Designate Ownership and Management of the Emergency Operations Elements

The policies, plans, and procedures developed by TMCs to address emergency preparedness and response will incorporate assumptions about and actions expected from external agencies. Where TMC efforts overlap or strengthen external actions, there is potential for utilization and ownership conflict. TMC documents and planning must clearly delineate ownership and responsibility. Cooperative meetings with external agencies should establish configurations for ownership and management of emergency operations elements.

One successful model involves TMCs and external public safety agencies maintaining responsibility for developing appropriate emergency operations elements for their own internal use, while developing joint use elements where appropriate and productive. Extensive coordination takes place along with

channeling of funding and resources between the organizations to maximize mutual benefit.

5.4.2 Update Emergency Operations Program Elements on a Periodic Basis

The Emergency Preparedness Working Group should designate and adhere to a documented program review and update process. The inclusion of external agencies will make sure revisions do not cause inconsistency or misalignment with other plans or procedures maintained by these partners. The Working Group should also designate a single, central point of contact for the review and revisions, and ensure there is a record of revisions at the beginning of each program document.

At minimum, review and revision should take place on an annual basis. However, in certain cases, more frequent review and revision may be warranted. For example, After-Action Reports and Improvement Plans that result from exercises should immediately inform revisions to emergency preparedness program elements.

TMCs should develop a work plan that captures all emergency preparedness program conduct, revision, and maintenance activities and include them in a schedule.

5.5 Maintain Emergency Operations Checklist

The TMC can use the following checklist to evaluate their current status in regard to maintenance of emergency operations (relationships, policies, plans, and procedures) (*check all that apply*):

- Designates ownership and management of emergency operations elements.
- Updates EOP elements on a periodic basis.

²⁹ NCHRP Report 525, Vol. 16, *Surface Transportation Security, A Guide to Emergency Response Planning at State Agencies*, 104.

³⁰ <http://idas.camsys.com/>.

A. Glossary

AAR/IP After Action Report/Implementation Plan - The main product of the Evaluation and Improvement Planning process is the AAR/IP. The AAR/IP has two components: an AAR, which captures observations of an exercise and makes recommendations for post-exercise improvements; and an IP, which identifies specific corrective actions, assigns them to responsible parties, and establishes targets for their completion. The lead evaluator and the exercise planning team draft the AAR and submit it to conference participants prior to the After Action Conference. The draft AAR is completed first and distributed to conference participants for review no more than 30 days after exercise conduct. The final AAR/IP is an outcome of the After Action Conference and should be disseminated to participants no more than 60 days after exercise conduct. Even though the AAR and IP are developed through different processes and perform distinct functions, the final AAR and IP should always be printed and distributed jointly as a single AAR/IP following an exercise.

Controller - In an **operations-based exercise**, **controllers** plan and manage exercise play, set up and operate the exercise incident site, and possibly take the roles of individuals and agencies not actually participating in the exercise (i.e., in the **Simulation Cell [SimCell]**). Controllers direct the pace of exercise play and routinely include members from the **exercise planning team**, provide key data to players, and may prompt or initiate certain player actions and injects to the players as described in the **Master Scenario Event List (MSEL)** to ensure exercise continuity. The individual **controllers** issue exercise materials to **players** as required, monitor the exercise timeline, and monitor the safety of all exercise **participants**. Controllers are the only participants who should provide information or direction to players. All controllers should be accountable to one senior controller. (Note: If conducting an exercise requires more controllers or evaluators than are available, a controller may serve as an **evaluator**; however, this typically is discouraged.)

Comprehensive Preparedness Guide 101 - A guide designed to assist jurisdictions with developing operations plans. It promotes a common understanding of the fundamentals of planning and decision-making to help emergency planners examine a hazard and produce integrated, coordinated, and synchronized plans.

Continuity of Government - A coordinated effort within the Federal Government's executive branch to ensure that National Essential Functions continue to be performed during a catastrophic emergency (as defined in National Security Presidential Directive 51/Homeland Security Presidential Directive 20).

Continuity of Operations - An effort within individual organizations to ensure that Primary Mission Essential Functions continue to be performed during a wide range of emergencies.

Discussion-Based Exercises - Discussion-based exercises are normally used as a starting point in the building-block approach to the cycle, mix, and range of exercises. Discussion-based exercises include seminars, workshops, TTXs, and games. These types of exercises typically highlight existing plans, policies, mutual aid agreements (MAAs), and procedures, and are exceptional tools to familiarize agencies and personnel with current or expected jurisdictional capabilities. Discussion-based exercises typically focus on strategic, policy-oriented issues, whereas operations-based exercises tend to focus more on tactical, response-related issues. Facilitators and/or presenters usually lead the discussion and keep participants on track to meet exercise objectives.

EEG **Exercise Evaluation Guide** - EEGs are HSEEP documents that support the exercise evaluation process by providing evaluators with consistent standards for observation, analysis, and AAR development. Each EEG is linked to a target capability and provides standard activities, performance measures, and tasks to be evaluated based on the exercise objectives. Additionally, an EEG contains a Capability Narrative section, in which evaluators provide a general chronological narrative of exercise events associated with the capability; and an Evaluator Observations section in which evaluators provide specific strengths and areas of improvement linked to the capability.

The consistent guidelines provided in EEGs facilitate creation of AAR/IPs resulting in an actionable IPs that target specific personnel, planning, organization, equipment, and training needs within capabilities.

Emergency - Any incident, whether natural or manmade, that requires responsive action to protect life or property. Under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, an emergency means any occasion or instance for which, in the determination of the President, Federal assistance is needed to supplement state and local efforts and capabilities to save lives and to protect property and public health and safety, or to lessen or avert the threat of a catastrophe in any part of the United States.

EMAC **Emergency Management Assistance Compact** - A congressionally ratified organization that provides form and structure to interstate mutual aid. Through EMAC, a disaster-affected state can request and receive assistance from other member states quickly and efficiently, resolving two key issues up front: liability and reimbursement.

EMPG **Emergency Management Performance Grants** - The EMPG program provides resources to assist state and local governments to sustain and enhance all-hazards emergency management capabilities. States have the opportunity to use EMPG funds to further strengthen their ability to support emergency management activities while simultaneously addressing issues of national concern as identified in the National Priorities of the National Preparedness Guidelines. EMPG has a 50 percent Federal and 50 percent state cost-share cash or in-kind match requirement.

EOC **Emergency Operations Center** - The physical location at which the coordination of information and resources to support incident management (on-scene operations) activities normally takes place. An EOC may be a temporary facility or may be located in a more central or permanently established facility, perhaps at a higher level of organization within a jurisdiction. EOCs may be organized by major functional disciplines (e.g., fire, law enforcement, medical services), by jurisdiction (e.g., Federal, state, regional, tribal, city, county), or by some combination thereof.

EOP **Emergency Operations Plan** - An ongoing plan for responding to a wide variety of potential hazards.

Exercise - An exercise is an instrument to train for, assess, practice, and improve performance in prevention, protection, response, and recovery capabilities in a risk-free environment. Exercises can be used for: testing and validating policies, plans, procedures, training, equipment, and interagency agreements; clarifying and training personnel in roles and responsibilities; improving interagency coordination and communications; identifying gaps in resources; improving individual performance; and identifying opportunities for improvement. (Note: an exercises is also an excellent way to demonstrate community resolve to prepare for disastrous events).

Evaluator - Evaluators, selected from participating agencies, are chosen based on their expertise in the functional areas they will observe. Evaluators use EEGs to measure and assess performance, capture unresolved issues, and analyze exercise results. Evaluators passively assess and document participants' performance against established emergency plans and exercise evaluation criteria, in accordance with HSEEP standards. Evaluators have a passive role in the exercise and only note the actions/decisions of players without interfering with exercise flow.

- ExPlan** **Exercise Plan** – ExPlans are general information documents that help operations-based exercises run smoothly. They are published and distributed prior to the start of exercise and provide a synopsis of the exercise. In addition to addressing exercise objectives and scope, ExPlans assign activities and responsibilities for successful exercise execution. They enable participants to understand their roles and responsibilities in exercise planning, execution, and *evaluation*. The ExPlan is intended for use by exercise players and observers; therefore, it does not contain detailed scenario information that may reduce the realism of the tasks to be performed. Players and observers should review all elements of the ExPlan prior to exercise participation.
- FE** **Functional Exercise** – An FE is a single or multi-agency activity designed to evaluate capabilities and multiple functions using a simulated response. An FE is typically used to: evaluate the management of Emergency Operations Centers (EOCs), command posts, and headquarters; and assess the adequacy of response plans and resources. Characteristics of an FE include simulated deployment of resources and personnel, rapid problem solving, and a highly stressful environment.
- FSE** **Full-Scale Exercise** – An FSE is a multi-agency, multijurisdictional activity involving actual deployment of resources in a coordinated response as if a real incident had occurred. An FSE tests many components of one or more capabilities within emergency response and recovery, and is typically used to assess plans and procedures under crisis conditions, and assess coordinated response under crisis conditions. Characteristics of a FSE include mobilized units, personnel, and equipment; stressful, a realistic environment, and scripted exercise scenarios.
- HSEEP** **Homeland Security Exercise Evaluation Program** – HSEEP is a capabilities- and performance-based exercise program that provides standardized policy, doctrine, and terminology for the design, development, conduct, and evaluation of homeland security exercises. HSEEP also provides tools and resources to facilitate the management of self-sustaining homeland security exercise programs.
- ICS** **Incident Command System** – The Incident Command System organizational element responsible for overall management of the incident and consisting of the Incident Commander (either single or unified command structure) and any assigned supporting staff.
- Master Scenario Event List** – The MSEL is a chronological timeline of expected actions and scripted events to be injected into exercise play by controllers to generate or prompt player activity. It ensures necessary events happen so that all objectives are met. Larger, more complex exercises may also employ a Procedural Flow (ProFlow), which differs from the MSEL in that it only contains expected player actions or events. The MSEL links simulation to action, enhances exercise experience for players, and reflects an incident or activity meant to prompt players to action. Each MSEL record contains a designated scenario time, an event synopsis, the name of the controller responsible for delivering the inject; and, if applicable, special delivery instructions, the task and objective to be demonstrated, the expected action, the intended player, and a note-taking section.
- NIMS** **National Incident Management System** – A set of principles that provides a systematic, proactive approach guiding government agencies at all levels, nongovernmental organizations, and the private sector to work seamlessly to prevent, protect against, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity, in order to reduce the loss of life or property and harm to the environment.

- NRP** **National Response Plan** - Establishes a comprehensive all-hazards approach to enhance the ability of the United States to manage domestic incidents. The plan incorporates best practices and procedures from incident management disciplines - homeland security, emergency management, law enforcement, firefighting, public works, public health, responder and recovery worker health and safety, emergency medical services, and the private sector - and integrates them into a unified structure. It forms the basis of how the Federal government coordinates with state, local, and tribal governments and the private sector during incidents.
- NSSE** **National Special Security Events** - Events of national significance which by virtue of their political, economic, social, or religious significance may be targets of terrorism or other criminal activity. Events include presidential inaugurations, major international summits held in the United States, major sporting events, and presidential nominating conventions.
- Operations-Based Exercise** - Operations-based exercises are a category of exercises characterized by actual response, mobilization of apparatus and resources, and commitment of personnel, usually held over an extended period of time. Operations-based exercises can be used to validate plans, policies, agreements, and procedures. They include drills, FEs, and FSEs. They can clarify roles and responsibilities, identify gaps in resources needed to implement plans and procedures, and improve individual and team performance. (Note: These exercises often follow after, and validate, the lessons learned from discussion-based exercises.)
- SHSP** **State Homeland Security Program** - SHSP supports the implementation of State Homeland Security Strategies to address the identified planning, organization, equipment, training, and exercise needs to prevent, protect against, mitigate, respond to, and recover from acts of terrorism and other catastrophic events. SHSP also provides funding to implement initiatives in the State Preparedness Report.
- Standard Operating Guidelines** - A set of instructions having the force of a directive, covering those features of operations which lend themselves to a definite or standardized procedure without loss of effectiveness.
- Standard Operating Procedure** - A complete reference document or an operations manual that provides the purpose, authorities, duration, and details for the preferred method of performing a single function or a number of interrelated functions in a uniform manner.
- TTX** **Tabletop Exercise** - TTXs are intended to stimulate discussion of various issues regarding a hypothetical situation. They can be used to assess plans, policies, and procedures or to assess types of systems needed to guide the prevention of, response to, or recovery from a defined incident. During a TTX, senior staff, elected or appointed officials, or other key personnel meet in an informal setting to discuss simulated situations. TTXs are typically aimed at facilitating understanding of concepts, identifying strengths and shortfalls, and/or achieving a change in attitude. Participants are encouraged to discuss issues in depth and develop decisions through slow-paced problem-solving rather than the rapid, spontaneous decision-making that occurs under actual or simulated emergency conditions. TTXs can be breakout (i.e., groups split into functional areas) or plenary (i.e., one large group).
- UC** **Unified Command** - An Incident Command System application used when more than one agency has incident jurisdiction or when incidents cross political jurisdictions. Agencies work together through the designated members of the UC, often the senior persons from agencies and/or disciplines participating in the UC, to establish a common set of objectives and strategies and a single Incident Action Plan.



U.S. Department of Transportation
Federal Highway Administration

U.S. Department of Transportation
Federal Highway Administration
Office of Operations
1200 New Jersey Ave, SE
Washington, DC 20590

FHWA-HOP-12-050

October 2012