TRAFFIC INCIDENT MANAGEMENT HANDBOOK

U.S. Department of Transportation
Federal Highway Administration

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Kimberly C. Vásconez, FHWA Office of Operations, Office of Transportation Operations, Emergency Transportation Operations Team Leader and Contracting Officer's Technical Monitor (COTM)

16. Abstract

The 2010 version of the TIM Handbook includes the latest advances in TIM programs and practices across the country and offers insights into the latest innovations in TIM tools and technologies. The 2010 TIM Handbook also features a parallel, web-based version that may be conveniently bookmarked, browsed, or keyword-searched for quick reference. This version supersedes the Freeway Incident Management Handbook (published by FHWA in 1991) and the TIM Handbook (published by FHWA in 2000). Readers will find the following topic areas in this Handbook:

- **Introduction: This chapter provides an overview of Traffic Incident Management and sets the context for the 2010 TIM Handbook update.**
- **TIM Strategic Program Elements: This chapter details the programmatic structure and institutional coordination necessary for a successful TIM program.**
- **TIM Tactical Program Elements: This chapter describes the full range of on-scene operations.**
- **TIM Support Program Elements: This chapter describes the communications and technical aspects of successful TIM programs.**

A quick resource guide titled, *"Want to Know More,"* follows each chapter and direct readers to supplemental information associated with the specific chapter content.

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AAA	American Automobile Association
AACN	Advanced Automatic Crash Notification
AASHTO	American Association of State Highway Transportation Officials
ACN	Automatic Crash Notification
ANSI	American National Standards Institute
APCO	Association of Public-Safety Communications Officials – International
ARTIMIS	Advanced Regional Traffic Interactive Management and Information System
ATA	American Trucking Associations
ATAF	American Trucking Associations Foundation
ATIS	Automated Traveler Information Systems
ATSSA	American Traffic Safety Services Association
AVL	Automatic Vehicle Location
CAD	Computer-Aided Dispatch
Caltrans	California Department of Transportation
CapWIN	Capital Area Wireless Integrated Network
CCD	Charge-Coupled Device
CCTV	Closed-Circuit Television
CDOT	Colorado Department of Transportation
CFR	Code of Federal Regulations
CHART	Coordinated Highways Action Response Team
CHP	California Highway Patrol
CIR	Critical Incident Review
CO_2	Carbon Dioxide
CVVFA	Cumberland Valley Volunteer Fireman's Association
DHS	U.S. Department of Homeland Security
DMS	Dynamic Message Sign
DOJ	U.S. Department of Justice
DOT	Department of Transportation
DVRPC	Delaware Valley Regional Planning Commission
E911	Emergency 911
EMS	Emergency Medical Services
EPA	U.S. Environmental Protection Agency
ERSI	Emergency Response Safety Institute
ERU	Emergency Response Unit
ESF	Emergency Support Function
ETA	Emergency Traffic Accommodation
ETO	Emergency Transportation Operations

FCC	Federal Communications Commission
FDOT	Florida Department of Transportation
FFSP	Full Function Service Patrol
FHP	Florida Highway Patrol
FHWA	Federal Highway Administration
FITM	Freeway Incident Traffic Management
GPS	Global Positioning System
HAR	Highway Advisory Radio
Hazmat or HM	Hazardous Materials
HEROS	Highway Emergency Response Operators
IACP	International Association of Chiefs of Police
IAFC	International Association of Fire Chiefs
IAFF	International Association of Fire Fighters
IAP	Incident Action Plan
IC	Incident Command (function)
ICS	Incident Command System
IEEE	Institute of Electrical and Electronics Engineers
IEN	Information Exchange Network Clearinghouse
IFSTA	International Fire Service Training Association
IIMS	Integrated Incident Management System
IJIS	Integrated Justice Information Systems
IM	Incident Management
IMTF	Incident Management Task Forces
INDOT	Indiana Department of Transportation
IR	Incident Response
ISEA	International Safety Equipment Association
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation Systems
ITS/PS	Intelligent Transportation Systems and Public Safety
iVEDDS	Interagency Video Event Data Distribution System
JOPS	Joint Operations Policy Statement
LESS	Law Enforcement Stops & Safety Subcommittee
LLIS	Lessons Learned Information Sharing
MOU	Memoranda or Memorandum of Understanding
mph	miles per hour
MUTCD	Manual of Uniform Traffic Control Devices
NASEMSO	National Association of State EMS Officials
NCHRP	National Cooperative Highway Research Program
NENA	National Emergency Number Association
NFPA	National Fire Protection Association

NG	Next-Generation
NGA	National Governors Association
NHI	National Highway Institute
NIEM	National Information Exchange Model
NIFG	National Interoperability Frequency Guide
NIFOG	National Interoperability Field Operations Guide
NIMC	National Incident Management Coalition
NIMS	National Incident Management System
NIOSH	National Institute for Occupational Safety and Health
NJDOT	New Jersey Department of Transportation
NJSP	New Jersey State Police
NRT	National Response Team
NTIMC	National Traffic Incident Management Coalition
NUG	National Unified Goal
NVFC	National Volunteer Fire Council
NYDOT	New York Department of Transportation
OSC	On-Scene Coordinator
PDA	Personal Digital Assistant
PennDOT	Pennsylvania Department of Transportation
PIO	Public Information Officer
PM	Performance Measures or Performance Measurement
POC	Point of Contact
PSAP	Public Safety Answering Point
PSP	Pennsylvania State Police
QC	Quick Clearance
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers (International)
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SHRP II	Strategic Highway Research Plan II
SHSP	Strategic Highway Safety Plan
SME	Subject Matter Expert
SO	Safety Officer
SOC	State Operations Center
SOP	Standard Operating Procedure
SOSINK	Southeast Indiana and Northern Kentucky
SQC	Safe, Quick Clearance
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TDOT	Tennessee Department of Transportation
the Handbook	***TIM Handbook***
TIM	Traffic Incident Management

TIMA	Traffic Incident Management Area
TIME	Traffic Incident Management Enhancement
TIM PM FSI	TIM Performance Measures Focus States Initiative
TIMSA	Traffic Incident Management Self-Assessment
TMC	Transportation Management Center
TMT	Transportation Management Team
TOC	Traffic Operations Center
TRAA	Towing and Recovery Association of America
TTC	Temporary Traffic Control
TTI	Texas Transportation Institute
UASI	Urban Area Security Initiative
UC	Unified Command
UDOT	Utah Department of Transportation
UMTRI	University of Michigan Transportation Research Institute
U.S.	United States
USDOT	U.S. Department of Transportation
USFA	U.S. Fire Administration
VMS	Variable Message Sign
WFC	Washington Fire Chiefs
WisDOT	Wisconsin Department of Transportation
WSAFC	Washington State Association of Fire Chiefs
WSDOT	Washington State Department of Transportation
WSP	Wisconsin State Patrol or Washington State Patrol

1 Introduction to Traffic Incident Management

1.1 Introduction

For more than 20 years, transportation, public safety and private sector professionals have worked cooperatively in traffic incident management (TIM) programs to safely and efficiently clear traffic incidents and incident-related debris. As TIM programs have matured, program managers and field-level practitioners alike have benefited from Federal Highway Administration (FHWA) efforts to collect, document, and distribute good practices, lessons learned, and the necessary steps for implementing, improving, and expanding TIM program components.

The 2010 version of the ***Traffic Incident Management Handbook*** (***the Handbook*** or ***TIM Handbook***) includes the latest advances in TIM programs and practices across the country, and offers practitioners insights into the latest innovations in TIM tools and technologies. The ***2010 TIM Handbook*** also features a parallel Web-based version that can be conveniently bookmarked, browsed, or keyword-searched for quick reference. This version supersedes the ***Freeway Incident Management Handbook*** published by FHWA in 1991 and the ***Traffic Incident Management Handbook*** published in 2000.

The Handbook is organized according to the following chapter topic areas:

- **Chapter 1: Introduction:** This chapter provides an overview of Traffic Incident Management and sets the context for the ***2010 TIM Handbook*** update.
- **Chapter 2: TIM Strategic Program Elements:** This chapter details the programmatic structure and institutional coordination necessary for a successful TIM program.
- **Chapter 3: TIM Tactical Program Elements:** This chapter describes the full range of on-scene operations.
- **Chapter 4**: **TIM Program Support – Communications and Information Exchange:** This chapter describes the communications and technical aspects of successful TIM programs.

A quick resource guide titled, "*Want to Know More?*", follows each chapter and directs readers to supplemental information associated with the specific chapter content.

1.2 What's at Stake

In 2006, the U.S. Department of Transportation (USDOT) announced the "National Strategy to Reduce Congestion on America's Transportation Network". In this strategy-defining document, USDOT defined congestion as "one of the single largest threats" to the Nation's economic prosperity and way of life. The USDOT's Fiscal Year 2006 to 2011 Strategic Plan[1] identified reducing congestion as one of the Department's key strategic goals.

[1] Department of Transportation: *Strategic Plan Fiscal Years 2006-2011*, available online: http://www.dot.gov/stratplan2011/index.htm#overview.

The impact of congestion on the Nation's highways is well documented. In the *2009 Urban Mobility Report* published by the Texas Transportation Institute (TTI), data calculated in 2007 reported that based on wasted time—4.2 billion hours—and fuel—2.8 billion wasted gallons, congestion cost about $87.2 billion combined in the top 439 urban areas in the United States.[2]

Traffic incidents have been identified as a major contributor to increased congestion. The National Traffic Incident Management Coalition (NTIMC) estimates that traffic incidents are the cause of about one-quarter of the congestion on US roadways, and that for every minute a freeway lane is blocked due to a incident, this results in 4 minutes of travel delay time.[3]

Improving traffic incident management is one key to reducing congestion. In the 2009 Urban Mobility study, TTI calculated that in 2007, where improved incident management procedures were implemented in 272 of the 439 urban areas, the resulting reduction in incident-related congestion saved 143.3 million hours and $3.06 million.[4]

Improved TIM has been shown to reduce both overall incident duration as well as secondary crashes. In the annual evaluation of its Coordinated Highways Action Response Team (CHART) program, the State of Maryland estimated that the CHART-directed incident management resulted in average incident duration of 22 minutes, as compared to 29 minutes for other agencies, and that this reduction in incident duration resulted in 290 fewer secondary incidents in 2005.[5] The impact of this reduction incident duration is demonstrated by a study published in the *ITS Journal* that estimated that the likelihood of a secondary crash increases by 2.8 percent for every minute that the primary incident remains a hazard.[6]

In addition to the economic and safety impacts, congestion levies a very real human toll. According to the NTIMC, traffic crashes and struck-by incidents are leading causes of on-duty injuries and deaths for law enforcement, firefighters, and towing and recovery personnel.[7] As a result, increased responder safety is one of the three core objectives of the NTIMC's National Unified Goal (NUG) for traffic incident management.

An additional significant benefit of improved TIM and reduced congestion that is not often considered is the environmental benefit realized by reducing wasted fuel consumption. The U.S. Environmental Protection Agency (EPA) estimates that every gallon of gasoline burned emits 19.4 pounds of carbon dioxide (CO_2). For diesel fuel, the average is 22.2 pounds of CO_2 per gallon of diesel fuel.[8] Given that approximately 2.8 .billion gallons of fuel were wasted due to congestion in 2007, the environmental impact of reducing congestion and improving TIM is significant. For example, in Maryland, the reduction in incident duration for the CHART program of 7 minutes when compared to other agencies would result in a reduction of 135.8 pounds of CO_2 for gasoline and 155.4 pounds of CO_2 for diesel. Given that CHART reported 20,515 incidents that involved the blockage of one or more freeway lanes in 2005, the per-incident savings multiplied by the number of incidents in Maryland alone demonstrates the potential impact in emissions reduction from improved traffic incident management.

[2] TTI: *2009 Urban Mobility Report*, July 2009, p. 14, available online: http://tti.tamu.edu/documents/mobility_report_2009.pdf.

[3] NTIMC: *Benefits of Traffic Incident Management*, available online: http://www.transportation.org/sites/ntimc/docs/Benefits11-07-06.pdf.

[4] TTI: *2009 Urban Mobility Report*, July 2009, p. 14.

[5] Chang, Rochon: *Performance Evaluation and Benefit Analysis for CHART—Coordinated Highways Action Response Team—in Year 2005 Final Report,* University of Maryland, College Park, MD, May 2006.

[6] Karlaftis, Latoski and Sinha Richards. "ITS Impacts on Safety and Traffic Management: An Investigation of Secondary Crash Causes," *ITS Journal*, 1999, Vol. 5, pp.39-52.

[7] "Responder Safety," National Traffic Incident Management Coalition, November 2006.

[8] EPA: Overview: Pollutants and Programs, "Emission Facts: Average Carbon Dioxide Emissions Resulting from Gasoline and Diesel Fuel," available online: http://www.epa.gov/oms/climate/420f05001.htm.

1.3 Traffic Incident Management: A Timeline for Progress

TIM program progress has evolved over two decades and has benefited from a series of national initiatives described in sections 1.3.1 through 1.3.6.

1.3.1 National Incident Management Coalition

As one of the earliest formal TIM initiatives, the National Incident Management Coalition's (NIMC) work has been the genesis for a number of TIM programs across the country. In 1990, the American Trucking Associations Foundation (ATAF) and its Trucking Research Institute published *Incident Management*,[9] which was among the first documents to propose a link between the effective management of traffic incidents and the country's economic competitiveness. Concurrent with the publication of *Incident Management*, the ATAF collaborated with FHWA to create and manage the NIMC, an ad hoc coalition of national organizations dedicated to advancing the cause of coordinated management of traffic incidents as a discipline.

The NIMC's work focused on outreach and education, introducing the concept of coordinated incident response. Through a series of 20 outreach conferences held around the country from 1991 to 1994, the NIMC brought together the diverse range of TIM stakeholders to make the case and build consensus for multi-agency cooperation and coordination involved in clearing traffic incidents. In 1996 and 2001, the NIMC convened TIM expert focus groups to document current TIM state-of-the-practice and future recommendations.

1.3.2 National Highway Institute Training

Initiated in 1998 and ongoing currently, the National Highway Institute's (NHI) *Managing Traffic Incidents and Roadway Emergencies* training course is among the longest running TIM-related training courses ever offered. Designed for mid- to upper-level managers from TIM responder agencies, the curriculum focuses on institutional and technical aspects of multi-agency incident clearance.[10] Since its initial offering, the course has been taught more than 90 times, reaching some 2,800 TIM practitioners.

1.3.3 National Conference on Traffic Incident Management

In 2002, several key NIMC organizations convened the National Conference on Traffic Incident Management with goals to develop and promote an agenda for improved TIM at the national level. More than 150 TIM stakeholders identified seven Action Items essential for guiding a national agenda for traffic incident management:[11]

- Professionalize incident management.
- Develop national program models and guidelines.
- Create standards and guidelines for performance data.
- Recognize regional focus in developing/operating/funding TIM technologies.
- Develop regional/cross-agency systems architectures, based on standards.

[9] *Incident Management*, ATAF Trucking Research Institute, Alexandria, VA: 1990.

[10] NHI Courses 133048 and 1330488A: *Managing Traffic Incident and Roadway Emergencies* (1- and 2-day courses); available online: http://www.nhi.fhwa.dot.gov/home.aspx.

[11] *Proceedings of the National Conference on Traffic Incident Management: A Roadmap to the Future*, June 2002, available online: http://onlinepubs.trb.org/onlinepubs/archive/conferences/TIM/TIMProceedings.pdf.

- Establish a clearinghouse for incident management data.
- Integrate TIM needs into highway planning and design.

Participants refined the identified Action Items by introducing several key components, including the need to form a national-level TIM framework or coalition for advancing a national TIM strategy. Where the earlier NIMC focused solely on education and outreach, the results of the 2002 National Conference suggested the need for a more active national coalition with a broader focus and the ability to complete the Action Items.

1.3.4 National Traffic Incident Management Coalition

A direct outcome of the 2002 National Conference, the American Association of State Highway Transportation Officials (AASHTO) formed and led an ad hoc steering charged to explore creating and sustaining a national TIM organization. That activity resulted in 2004 with the launch of the NTIMC, whose membership comprises representatives from more than 20 national organizations representing transportation, public safety, and the private sector.

The NTIMC's mission is to improve incident management policies, procedures, and practices through the creation of a national-level multidisciplinary coalition. To fulfill its mission, and lay a foundation for future work, the NTIMC crafted, and its member organizations ratified, a National Unified Goal (NUG) for Traffic Incident Management. This milestone is significant as it represents the first time such a multidisciplinary group of stakeholders has formally agreed to pursue a set of shared objectives in support of a national goal. The NUG contains three overall objectives: responder safety; safe, quick clearance; and prompt, reliable interoperable communications. To achieve its objectives, the NUG outlines the following 18 strategies as presented in Table 1.

Table 1. NTIMC NUG Strategies

Strategies	Description
TIM Partnerships and Programs	Encourages NTIMC members to participate in TIM programs at the State, multi-state, regional, and local levels.
Multidisciplinary NIMS and TIM Training	Ensures that incident responders are cross-trained on scene roles and responsibilities and have a thorough understanding of the Incident Command System (ICS) as required in the National Incident Management System (NIMS).
Goals for Performance and Progress	Develops a systematic approach for measuring TIM program performance at the national, State, and local levels.
TIM Technology	Promotes the deployment of affordable and useful TIM technologies.
Effective TIM Policies	Advocate for policies and legislation that support NUG goals of responder safety; safe, quick clearance; and interoperable communications.
Awareness and Education Partnerships	Cultivates broad partnerships to educate motorists on the shared responsibilities in the safe, quick clearance of incidents.
Recommended Practices for Responder Safety	Develops consensus-driven practices to protect responders on scene.
Move Over/Slow Down Laws	Ensures that motorists provide a safety buffer for responders when possible.
Driver Training and Awareness	Teaches drivers how to prevent secondary incidents.
Multidisciplinary TIM Procedures	Encourages widespread adoption of procedures for quickly clearing incident-involved vehicles, cargo, and debris.
Response and Clearance Time Goals	Sets forth mutually agreed upon time goals for incident response and clearance.
24/7 Availability	Encourages 24 hours a day, 7-day per week availability of traffic incident responders and equipment.
Multidisciplinary Communications Practices and Procedures	Develops guidelines for standardized communications practices and procedures.
Prompt, Reliable Responder Notification	Develops systems and procedures to ensure prompt and reliable notification of incident information to incident responders.
Interoperable Voice and Data Networks	Creates linkages between incident responder information and communications systems.
Broadband Emergency Communications Systems	Promotes integrated broadband networks linking emergency service providers.
Prompt, Reliable Traveler Information Systems	Encourages the development and deployment of traveler information systems to deliver real-time traveler information.
Partnerships with News Media and Information Providers	Develops recommended practices for working with news media and information service providers to deliver timely and reliable traveler information.

1.3.5 Traffic Incident Management Self-Assessment

In 2002, FHWA developed of a method to measure TIM program performance and identify potential program gaps at the national level. The Traffic Incident Management Self-Assessment (TIMSA) provides State and local TIM program managers with a tool and process for periodically measuring achievement of a multi-agency program to manage traffic incidents.

The TIMSA consists of various questions, grouped by TIM program functional area, that query respondents on the level of progress in each area. Since its initial launch in 2003, FHWA has conducted the TIMSA annually and publishes the aggregated national results in the annual TIMSA Analysis report.

Table 2 provides an example of questions from the on-scene operations/tactical section of the current TIMSA. The sample questions are extracted from TIMSA Section 4.3.2, Response and Clearance Policies and Procedures.

Table 2. Traffic Incident Management Self-Assessment Sample Questions

Section 4.2.3 Response and Clearance Policies and Procedures	Does the TIM Program…?
4.2.3.1.	Utilize the Incident Command System?
4.2.3.2.	Have specific policies and procedures for fatal accident investigation that also address maintenance of traffic flow?
4.2.3.3.	Have specific policies and procedures for hazardous materials response that also address maintenance of traffic flow?
4.2.3.4.	Have quick clearance policies for major and minor incidents?
4.2.3.5.	Have a pre-qualified list of available and contracted towing and recovery operators (to include operators' capabilities)?
4.2.3.6.	Use motorist assist service patrols?

Year to year, the tactical on-scene operations questions receive the highest scores (indicating high levels of success/progress), while the questions focused on TIM strategic program and institutional issues routinely receive the lowest scores. On-scene operations are the primary focus of new and emerging TIM programs, as well the cornerstone of more mature programs. Therefore, the higher scores are a logical outcome of the attention paid to on-scene operations.

Chapter 2 of ***the Handbook*** provides detail and guidance on many of the specific issues for which TIM program progress has scored low in previous TIMSA responses. Similarly, the tactical program elements leading to higher scores on the TIMSA are detailed in chapter 3 for the benefit of new and emerging TIM programs.

1.3.6 Traffic Incident Management Performance Measures Focus States Initiative

In 2005, FHWA identified 11 States to participate in an initiative to develop and test TIM program-level performance measures. The TIM Performance Measures Focus States Initiative (TIM PM FSI) participants, representing transportation and law enforcement agencies, worked together through a series of workshops to reach consensus on three TIM performance measures for collection and analysis:

- **Roadway Clearance Time:** This interval is defined as the time between the first recordable awareness of an incident (detection, notification, or verification) by a responding agency and first confirmation that all lanes are available for traffic flow.
- **Incident Clearance Time:** This interval is defined as the time between the first recordable awareness of the incident and the time at which the last responder has left the scene.
- **Secondary Incidents:** These incidents are identified as the number of unplanned incidents beginning with the time of detection of the primary incident where a collision occurs either a) within the incident scene or b) within the queue, including the opposite direction, resulting from the original incident.

Focus State participants then implemented State Action Plans to collect and analyze the requisite data for tracking performance. FHWA published the results in the TIM PM FSI Final Report that available through various FHWA-sponsored and other Web sites,[12] as well as a TIM Knowledge Management System that FHWA is developing to transfer the knowledge from this initiative to interested practitioners around the country.

1.4 Traffic Incident Management Redefined

The ***2000 TIM Handbook*** defined an "incident" as

> ...any non-recurring event that causes a reduction of roadway capacity or an abnormal increase in demand. Such events include traffic crashes, disabled vehicles, spilled cargo, highway maintenance and reconstruction projects, and special non-emergency events.

However, the events of September 11, 2001, and the widespread impacts of major weather events like Hurricane Katrina in 2005, caused the alignment and redefinition of TIM within a national blueprint for incident response, highlighting the critical role of TIM in national preparedness. As a result, transportation agencies are recognizing that TIM is more than just a tool for increasing mobility and reducing congestion. Public safety agencies also are acknowledging their roles in responder and motorist safety and secondary incident prevention.

In 2003, the President of the United States charged the U.S. Department of Homeland Security (DHS) to develop and administer the National Incident Management System (NIMS). NIMS provides a framework for incident planning and response, at all levels, regardless of cause, size, or complexity. The broad scope of NIMS includes ensuring U.S. roadways are available for incident response and has an enormous impact on emerging as well as established TIM programs. As traditional lines of incident scene responsibility become blurred, it is incumbent on all incident responders to be aware of and understand each other's role, regardless of incident size or scope.

[12] See FHWA and DHS Web sites: http://ops.fhwa.dot.gov/; http://ops.fhwa.dot.gov/eto_tim_pse/index.htm; and https://www.llis.dhs.gov/index.do.

NIMS compliance applies to every discipline, including transportation. As such, emergency transportation operations documentation will use standard terminology promoted through NIMS. The NIMS framework calls for aligning TIM program components in three broad areas, which mirror the NIMS concepts of Preparedness, Resource Management, and Communications/ Information Management:

- **Strategic:** How to plan, prepare for, and measure performance.
- **Tactical:** How to execute the plan and manage resources.
- **Support:** How to incorporate the tools and technologies to manage and communicate information.

This evolution in TIM program components to mirror NIMS also will be seen in the TIMSA, which is under revision to reflect the role of TIM in the broader area of emergency preparedness. Starting in 2009, TIMSA questions will measure TIM program performance across the emergency operations continuum.

Though the definition of TIM has expanded, the opportunities for addressing core transportation issues remain:

- Incidents are estimated to cause more than 50 percent of total delay experienced by motorists in all urban areas.[13] Of this, 25 percent is caused by traffic incidents such as crashes, stalled vehicles, roadway debris, and spilled cargo.[14]
- Secondary crashes are estimated to cause 18 percent of all fatalities on freeways.[15]
- In 2002, approximately 50 percent of all police, Emergency Medical Services (EMS) personnel, and firefighter fatalities occurred as a result of transportation incidents (either accidental or "struck-by" incidents or crashes in pursuit or other line-of-duty activities).[16]
- Between 1997 and 2006, 17 percent of the *accidental* law enforcement deaths were the result of "struck-by" motor vehicle incidents occurring during activities such as traffic stops, roadblocks, directing traffic and assisting motorists.[17]

[13] *Urban Mobility Report 2003*, Texas Transportation Institute, September 2003.

[14] National Traffic Incident Management Coalition National Unified Goal, available online: http://timcoalition.org/?siteid=41&pageid=1973.

[15] *Improving Traffic Incident Management Together*, NTIMC, December 2004.

[16] Ibid.

[17] *Law Enforcement Officers Killed and Assaulted, 2006*, U.S. Department of Justice, Federal Bureau of Investigation, Washington, DC: 2006.

1.5 Traffic Incident Management Stakeholders

As the definition and scope of TIM has evolved, so too has the list of key TIM stakeholders. Table 3 defines the current TIM stakeholders involved in traditional response, special circumstances, information dissemination, and transportation system providers and users.

Table 3. TIM Stakeholders Roles and Descriptions

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

1.6 A Handbook for Today's Traffic Incident Management

Much has changed for TIM practitioners over the last 15 years:

- A number of national initiatives have advanced TIM state-of-the-practice.
- The NTIMC has coalesced multidiscipline national organizations in support of its National Unified Goal.
- Events of national significance have redefined and expanded the role of TIM through the NIMS.
- The list of stakeholders with a role in TIM continues to grow as congestion impacts our Nation's safety and economic prosperity.

These national initiatives, and others that are detailed in subsequent chapters of ***the Handbook,*** have facilitated TIM program advancement to a level that now necessitates the updating of the previously published ***TIM Handbooks*** (1991 and 2000) to reflect the current state-of the-practice. While new levels of program maturity provide the rationale for this ***TIM Handbook*** update, the intervening 9 years since the publishing of the last ***TIM Handbook*** have witnessed other events that are reshaping TIM.

In recognition of these changes, the updated ***2010 TIM Handbook*** is designed for TIM stakeholders across the experience continuum. Professionals new to TIM will find the necessary elements for starting and maintaining a successful TIM program. Experienced career professionals will gain insight into the latest practices, tools, and technologies for capitalizing on their earlier successes.

Similarly, the ***2010 TIM Handbook*** relates to stakeholders, regardless of their roles in TIM. While each stakeholder group performs individual roles and responsibilities in incident response and clearance, a shared understanding and appreciation of each group's roles is crucial to improving the individual responder's effectiveness, and the effectiveness of the response overall.

In today's economy, all TIM stakeholders must maximize resources and minimize cost effects. The ***2010 TIM Handbook*** documents how TIM program success can be achieved, and provides valuable information on capitalizing on available resources to minimize the budgetary impacts of TIM program components. In addition, recommendations for resource management and resource sharing may be found throughout ***the Handbook***. ***The Handbook*** provides a clear rationale and the tools necessary for calculating the value of TIM resource commitments where additional resources are necessary for program success.

1.7 What to Expect

With a focus on preparing the next generation of TIM professionals, the ***2010 TIM Handbook*** is intended as a training tool. Each subsequent chapter 2 through 4 provides sufficient detail on TIM Strategic Program Elements, TIM Tactical Program Elements, and TIM Program Support – Communications and Information Exchange to train new entrants to the field of TIM in critical program success factors.

For those interested in learning more, each chapter concludes with a brief reference guide titled, "*Want to Know More?*" where additional resources will be listed by subject, title, and where applicable, an associated link or URL.

1.8 Want to Know More?

For additional resources and information, please view the items listed in the following resource guide.

Want to Know More?

TIM Resources:

- **FHWA-sponsored Web sites with TIM-specific Content:** About Emergency Transportation Operations: http://ops.fhwa.dot.gov/eto_tim_pse/about/index.htm; Traffic Incident Management: http://ops.fhwa.dot.gov/eto_tim_pse/about/tim.htm; Performance Measures: http://ops.fhwa.dot.gov/eto_tim_pse/preparedness/tim/pm.htm; and Publications: http://www.ops.fhwa.dot.gov/publications/publications.htm#tim.
- **National Highway Institute (NHI) Courses:** Managing Traffic Incidents and Roadway Emergencies: Learn more about NHI Courses 133048 and 133048A, available online: http://www.nhi.fhwa.dot.gov/home.aspx.
- **National Traffic Incident Management Coalition (NTIMC) Web site,** available online: http://timcoalition.org/?siteid=41.
- **Research and Innovative Technology Administration (RITA):** Best of Public Safety and Emergency Transportation Operations available online: http://www.its.dot.gov/its_publicsafety/index.htm.
- **Traffic Incident Management:** The TIM Program of the Federal Highway Administration is part of a larger all-hazards program, Emergency Transportation Operations (ETO). For more information, contact **Paul Jodoin,** TIM Program Manager, at FHWA at **202-366-5465** or paul.jodoin@dot.gov.
- **Traffic Incident Management as part of the Congestion Initiative,** available online: http://www.oti.dot.gov/tim/index.htm.
- **Traffic Incident Management Self-Assessment (TIMSA):** The TIMSA Guide, accompanying scoring template, and National Analysis Reports are available from 2003 through 2008, available online: http://ops.fhwa.dot.gov/eto_tim_pse/preparedness/tim/self.htm. For more information, contact **Kimberly Vásconez,** FHWA Office of Operations, Office of Transportation Operations, Emergency Operations Team Leader, at **202-366-1559** or kimberly.vasconez@dot.gov.
- **U.S. Department of Homeland Security Lessons Learned Information Sharing Web site:** Lessons learned and best practices from emergency responders from across the country, available online: https://www.llis.dhs.gov/index.do.
- **U.S. Department of Homeland Security publication, National Incident Management System, March 1, 2004,** available online: http://www.fema.gov/pdf/nims/nims_doc_full.pdf.
- **U.S. Department of Homeland Security National Incident Management System (December 2008):** Available online: http://www.fema.gov/pdf/emergency/nims/NIMS_core.pdf.
- **U.S. Department of Transportation Secretary's Congestion Initiative:** *National Strategy to Reduce Congestion on America's Transportation Network,* U.S. Department of Transportation, May 2006, available online: http://isddc.dot.gov/OLPFiles/OST/012988.pdf.

2 TIM Strategic Program Elements

2.1 Introduction

The Traffic Incident Management (TIM) Strategic Program Elements are those that form a framework for TIM activities. This chapter introduces the concept of formalized TIM programs and provides specific guidance on what are the key program elements. This chapter presents examples of States' best practices for establishing TIM programs, and provides guidance on multi-agency TIM teams. Additionally, this chapter provides guidance on the importance of TIM performance measurement and presents examples of States that have implemented or are implementing TIM performance measures.

2.2 Formalized TIM Programs

The need for formalized TIM programs has been building steadily in recent years. Early TIM efforts, including the ***2000 TIM Handbook***, focused on the basic elements involved in instituting a TIM program where none previously existed. As such, the former handbook quantified primary categories of people, practices, and infrastructure, and laid out strategies for involving all stakeholders, overcoming institutional issues, and defining TIM goals and objectives.

The early approach was to provide a "how-to" guide for the incident management community to coordinate activities in a more organized fashion. The key item that this process did not incorporate was that of sustainability, and maintaining a dedicated and active TIM program as opposed to coordinating multiple TIM activities across multiple organizations. The planning for and coordination of TIM activities by partner agencies within a formalized programmatic structure allows for development of policies and procedures, resource sharing and program evaluation.

responder safety is one of the three core objectives of the NTIMC's National Unified Goal (NUG) for traffic incident management.

2.2.1 Evolution through NIMS

The National Incident Management System (NIMS)[18] requirements clearly articulate a need for a formalized structure for incident management. Under the banner of "Preparedness," NIMS outlines key activities, which if employed in advance of potential incidents, lead to effective incident management, regardless of incident size and scope. Table 4 presents a crosswalk between TIM program areas and NIMS concepts, with the respective TIM program components listed for each.[19]

[18] *National Incident Management System*, U.S. Department of Homeland Security, Washington, DC: March 1, 2004.

[19] *Simplified Guide to the Incident Command System for Transportation Professionals*, Federal Highway Administration, Washington, DC: February 2006, available online: http://www.ops.fhwa.dot.gov/publications/ics_guide/ics_guide.pdf.

Table 4. TIM-NIMS Crosswalk

TIM Program Areas	NIMS Concepts	TIM Program Components
Strategic	Preparedness	Planning Training and exercises Ensure readiness of personnel and equipment Mutual-aid agreements Multi-agency operations agreements TIM Task Forces and/or Teams
	Resource Management	Identify and type resources Identify location of resources Mobilize resources Reimbursement
	ICS	On-scene command and control procedures
Tactical	Communications and Information Management	Develop information policies Develop interoperability standards Utilize common terminology Develop communication system
Support		

With the backing of a Presidential Directive (HSPD-5), the Department of Homeland Security's NIMS provides transportation and public safety stakeholders a common framework for developing and sustaining a formal Traffic Incident Management Program. NIMS also provides Federal resources for achievement of key program components such as responder training. TIM programs at all stages of development can and should tap into NIMS resources to achieve "Preparedness." For more information on available NIMS resources, see the "*Want to Know More?*" reference at the end of this chapter.

2.2.2 State Strategic Highway Safety Plans

With the enactment of the 2005 Surface Transportation reauthorization—Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)—States were required to develop and implement a State Strategic Highway Safety Plan (SHSP). The objective of the SHSP is to identify safety needs in order to achieve reductions in highway fatalities and injuries. The SHSP requirements, like NIMS, provide TIM stakeholders with the necessary rationale and guidance for developing a formalized TIM program.

FHWA lists suggested activities to be undertaken in development and achievement of SHSP objectives in its guidance document, *Strategic Highway Safety Plans: A Champion's Guide to Saving Lives*.[20] Among the activities listed are ones very similar to those followed by the more developed TIM programs:

- Gain leadership support.
- Identify a champion.
- Bring safety partners together.
- Adopt a strategic goal.
- Identify key emphasis areas.
- Identify performance goals.

Many States have identified TIM as a key emphasis area as part of the State SHSP. The *California Strategic Highway Safety Plan* acknowledges the complex nature of highway incidents, and refers to the four "E's" of highway safety: engineering, enforcement, emergency services, and education, as shown in figure 1 at right.[21]

The *Indiana Strategic Highway Safety Plan* identifies a Highway Incident Management Coordination Plan as a strategy for reducing incident-induced congestion and secondary crashes. In defining its Incident Management Coordination Plan, the Indiana SHSP notes that, "the four "Es" all play a role in ensuring that incidents are quickly detected, responded, and cleared with minimum disruption to traffic flow. All of this is done giving first priority to the safety of the on-scene responders and the motoring public".[22]

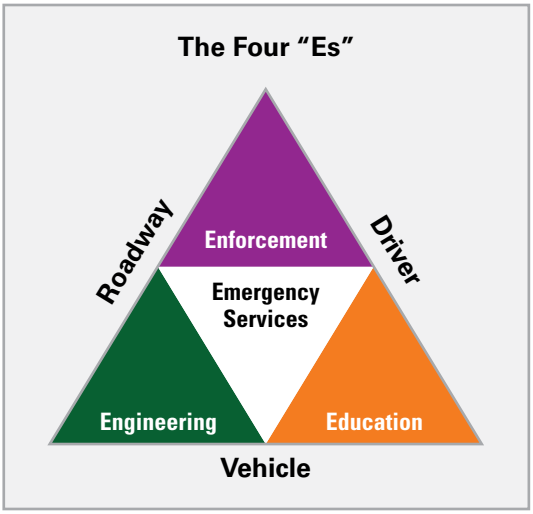

Figure 1. The Four "Es" of Highway Safety.

2.2.3 NTIMC TIM Program Guidance

Strategy #1 of the National Traffic Incident Management Coalition's (NTIMC) National Unified Goal (NUG) is to promote, develop, and sustain effective TIM programs. The NTIMC stresses the importance of formal TIM programs differentiated from TIM activities by the immunity from a re-shifting or re-focusing of agency personnel and budget resources.

While most States have increasing levels of coordinated multi-agency, multidisciplinary TIM activities, few if any States, regions, or localities have all of the key elements which, when

[20] *Strategic Highway Safety Plans: A Champion's Guide to Saving Lives*, Federal Highway Administration, April 5, 2006, available online: http://safety.fhwa.dot.gov/safetealu/guides/guideshsp040506/.

[21] *California Strategic Highway Safety Plan*, California Department of Transportation (Caltrans), September 2006, p. 5; document now superseded, available online: http://www.dot.ca.gov/hq/traffops/survey/SHSP/SHSP-Booklet-version2_%20PRINT.pdf.

[22] *Indiana Strategic Highway Safety Plan*, Indiana Department of Transportation (INDOT), September 2006, p. 27, available online: http://in.gov/indot/files/shsp.pdf.

combined, would meet the definition of a formal TIM program. Table 5 presents the key TIM program elements and their respective purposes as defined by the NTIMC.[23]

Table 5. TIM Program Key Elements

Element	Purpose
Legislative or Administrative Authorization	Provides top-down authorization for resource sharing and joint operations.
Strategic Mission and Accompanying Goals	Sets direction and establishes accountability for program performance.
Written Operational Policies	Provides unambiguous guidance for on-scene operations.
Dedicated Staff	Establishes TIM as core job function rather than secondary or tertiary activity.
Ongoing Training	Keeps responder skills current based on most recent state-of-practice.
Well-Defined Responsibilities	Solidifies relationships across disparate agencies and mitigates "turf battles" among responders.
Clear Reporting Channels	Establishes chain of command and ensures accountability.
Dedicated Funding	Lessens impact of budgetary fluctuations.

Creating a formalized TIM program is an evolutionary process and it should not be presumed that success in each of the elements will be easily achieved. Many well established TIM programs, with 10 to 15 years' experience, are still working to resolve key issues in attainment of the elements of a formal program.

The Traffic Incident Management Self-Assessment (TIMSA) documents these challenges. The first subsection of questions in the TIMSA is on Formal TIM Programs, specifically querying respondents on the presence of:

- Multi-agency, multi-year strategic plans.
- Formal interagency agreements on operational and administrative policies and procedures.

The TIMSA asks respondents to rank success in each TIM program area using a scale of 0 to 4. The questions on "Formal TIM Programs" have yet to achieve an aggregated score of 3 or higher since the TIMSA was started in 2003.

One of the key pitfalls in achievement of TIM program success is the lack or loss of a champion. For emerging programs, this may be a small group of individuals committed to advancing TIM through coordinated activities and regular meetings. As activities increase and TIM benefits are realized, the champion may be resident with one or two agencies (typically State Departments of Transportation [DOT] and law enforcement). Ideally, these champions will be at the highest level of those agencies. However, experience shows that more often than not, the champions reside at mid-management level with individuals successful in communicating program needs and benefits in a way that continues resource allocation from the highest levels.

[23] *Example Strategies for Building Stronger State Traffic Incident Management Programs*, National Traffic Incident Management Coalition National Unified Goal for Traffic Incident Management, November 2006, p. 1, available online: http://www.transportation.org/sites/ntimc/docs/Institutional%20Models.pdf.

The NTIMC addresses some of the barriers that caused the demise or decline of early TIM programs. In addition to the lack or loss of the early program champion, other early obstacles include: divergent stakeholder goals; personnel for whom TIM is not a core job function; lack of a process for evaluating performance; and therefore, the inability to document benefits, which leads to a lack of sustained funding.

Through its NUG and other publications, the NTIMC focuses on overcoming these obstacles so that formal TIM programs become the rule rather than the exception. In the NTIMC technical brief *Example Strategies for Building Stronger State Traffic Incident Management Programs*, published in 2006, key best practices from States across the country are documented as they relate to the six key areas of:

- Incident Management Plans and Policies.
- Interagency and Interdisciplinary Relationships.
- Organizational Structures for TIM programs.
- TIM Programs.
- Staffing, Chain of Command and Reporting Channels.
- Performance Goals.

This index of activities reflects a varied approach to TIM in States, regions, and localities. The white paper recognizes that very few formal statewide or regional TIM programs exist. Where States and regions do have TIM programs they are often oriented towards freeway service patrols as opposed to broader tactical and operational applications.

The NTIMC 2006 technical brief also cited several State and regional programs containing the key areas listed above; notably, only three States had implemented measures to address all six areas. Based on the information in the NTIMC 2006 technical brief, Table 6 summarizes how Utah, Washington, and Wisconsin have addressed these areas.

Table 6. Summary of State Best Practices

NTIMC TIM Area	Utah	Washington	Wisconsin
Incident Management (IM) Plans and Policies	• Operations Manual.	• Washington State DOT (WSDOT) and Washington State Patrol (WSP) have joint strategic plan for TIM. • Joint Operations Policy Statement (JOPS) (annual updates). • Policy to increase tow-away zones to deal with abandoned vehicles.	• TIME (Traffic Incident Management Enhancement) Program Blueprint (started in southeast Wisconsin, expanded to statewide in 2006). • Alternate route plans. • Move over laws. • Quick clearance/hold harmless laws. • Evacuation plans. • Emergency traffic control and scene management guidelines. • Outreach plans and initiatives. • Special event plans.

NTIMC TIM Area	Utah	Washington	Wisconsin
Interagency Relationships	• Partnership between DOT and Highway Patrol. • Traffic Operations Center (TOC) co-located with patrol dispatchers.	• TIM Coalition between WSDOT and WSP. • TIM training provides outreach to fire and Emergency Medical Services (EMS). • WSDOT working to develop additional agreements with coroners/medical examiners. • Collaboration with tow industry: pilot test instant dispatch, implementation of tow incentive program.	• TIME program partnering agreement (includes Federal, State, and local government, plus private industry). • Regular regional and subregional meetings. • Strong relationship with Wisconsin Department of Transportation (WisDOT) and Wisconsin State Patrol (WSP), law enforcement and public safety agencies.
Organizational Structure	• Day-to-day oversight provided by Region Traffic Engineer. • Programmatic oversight provided by Utah Department of Transportation (UDOT) Traffic Management Division.	• WSDOT headquarters TIM program manager provides functional and administrative support and oversight. • Field operations are managed by Regional Offices in partnership with local responding agencies.	• WisDOT acts as TIM champion. • TIME program includes Steering Committee, Freeway Incident Management Team, and other committees and task forces.
TIM Programs	• Freeway service patrol program in Salt Lake metro area.	• TIM program concentrated on I-5 corridor in Puget Sound Region. • Satellite programs in mountain passes, Spokane, Vancouver. • 55 dedicated IM vehicles.	• Statewide program (TIME). • Freeway service patrols.
Staffing; Chain of Command; Reporting Channels	• 12 full-time incident responders (daytime hours, plus on call after hours). • Clearance times reported as a performance metric in evaluating State-strategic goals.	• Roving service patrol and major incident response teams staffed by WSDOT personnel. • Contract with WSP or additional patrols. • Contract with tow vendor for roving tow service patrols. • Contract with local radio station for mobile assistance van. • WSDOT Incident Tracking System and WSP Computer-Aided Dispatch (CAD) data are used in performance reports to Governor, legislature, transportation commission, media, and public.	• WisDOT Regional Incident Management Coordinators. • Report information through statewide TOCs.
Performance Goals	• 30-, 60-, and 90-minute clearance times based on severity (fender bender, injury, fatality).	• 90-minute clearance goal for major incidents. • Governor receives quarterly reports on clearance time goal achievement from WSDOT and WSP. • Incidents exceeding 90-minute clearance time examined more closely for lessons learned.	• Under development through statewide TIM initiatives.

2.2.4 Starting Small

Many States find success by initially implementing a TIM program from a local or regional perspective as opposed to a statewide perspective. This concept involves starting small, perhaps in one or two cities or counties within the State. This is beneficial for a number of reasons:

1. Allows program stakeholders to demonstrate success early and leverage that success to expand the program to additional cities, counties, or regions.
2. Allows stakeholders to build relationships and lines of communications over time rather than overwhelming any one individual or group of individuals at once;
3. Allows program administrators to evaluate the program early on and make course corrections based on lessons learned.

The *Strategic Plan for Highway Incident Management in Tennessee*[24] provides an example of the chronology of events in the evolution from localized TIM efforts to a statewide program. An abridged version of the chronology is presented below and highlights several common steps in the development of a formal TIM program:

- Start locally in one area of the State.
- Leverage ITS plans and programs for TIM.
- Utilize TIM service patrols to build support for the program.
- Obtain necessary legislation and authority for TIM responders.

Table 7 provides an overview as to the evolution of the statewide TIM Plan in Tennessee.[25]

Table 7. Evolution of Statewide TIM Plan in Tennessee

Action	Year Accomplished
• Regional Incident Management Plan for the Nashville area completed.	1996
• Tennessee Department of Transportation (TDOT) Statewide Intelligent Transportation Systems (ITS) Strategic Plan completed with recommendations for freeway service patrols and incident management.	1998
• TDOT's internal Freeway Service Patrol Task Force established.	1998
• HELP Patrols started in Knoxville and Nashville.	1999
• "Quick Clearance" legislation enacted by the General Assembly.	2000
• HELP Patrols started in Chattanooga and Memphis.	2000
• Office of Incident Management established within TDOT.	2000
• Incident Management Memoranda of Understanding signed between the Tennessee Department of Safety and TDOT.	2001
• Statewide Policy Committee and Steering Committee established for incident management.	2001
• Statewide Traffic Incident Management Plan, 2003-2008.	2003
• Strategic Highway Safety Plan.	2004

[24] *Strategic Plan for Highway Incident Management in Tennessee*, Tennessee Department of Transportation (TDOT) and Vanderbilt Center for Transportation Research, August 2003, available online: http://www.tdot.state.tn.us/incident/CompleteIMPlan.pdf.

[25] Ibid, p. 20.

Other examples include Wisconsin's TIME program, which began in southeastern Wisconsin in 1995 and operated as a regional TIM program until 2006, when it was expanded to the entire State. Likewise, Washington State began its incident response program in the Seattle region with satellite programs in just two areas. Washington's program has since grown to become a statewide program, with six regional programs residing under the State umbrella. Building programs across State DOT regions allows program stakeholders to identify and overcome the challenges of working across jurisdictional boundaries, which is especially important when developing a statewide program.

Like Tennessee, the Maryland Coordinated Highways Action Response Team (CHART)[26] program is an example of starting locally and leveraging the ITS program to expand statewide. CHART got its start in the mid-1980s as an outreach campaign entitled "Reach the Beach." Its goal was to improve travel to and from Maryland's eastern shore through traveler information and expedited incident detection and response. CHART is now a full-scale ITS system managed through a Statewide Operations Center (SOC) functioning 24/7 and satellite TOCs around the State. The incident management components in CHART include:

- Emergency Traffic Patrols (ETP) to assist stranded motorists and remove disabled vehicles.
- Emergency Response Units (ERU) to establish traffic control at the incident scene.
- Freeway Incident Traffic Management (FITM) Trailers pre-stocked to provide readily available traffic control devices.
- Quick clearance legislation to provide responder authority to remove vehicles and cargo from incident scenes.
- An Information Exchange Network (IEN) Clearinghouse, provided by an I-95 Corridor Coalition workstation at the SOC, shares incident and traveler information to member agencies along the Corridor.

Emerging TIM programs are encouraged to model program components after readily available examples across the country rather than reinventing the wheel each time. For example, throughout the *Metro Atlanta Traffic Incident Management Enhancement (TIME) Task Force Strategic Vision*[27] document are numerous references to what has worked in other States in terms of open roads policies; towing and recovery incentive programs; training and certification of tow operators; and memoranda of understanding with medical examiners and coroners (information presented in chapter 3 of ***the Handbook***).

2.3 Multi-Agency TIM Teams/Task Forces

With few exceptions, TIM programs start with the coordinating of incident response efforts by traditional responders (law enforcement, transportation, fire and rescue, and EMS). This initial coordination forms the basis for a multi-agency team, a cornerstone of any TIM program. For both emerging and established TIM programs, multi-agency TIM teams,(also known as task forces,[28] share several common elements:

[26] *Welcome to CHART on the Web*, Maryland Department of Transportation, available online: http://www.chart.state.md.us/default.asp.

[27] *Metro Atlanta Traffic Incident Management Strategic Vision*, Georgia Department of Transportation Metro Atlanta TIME Task Force, May 2, 2006, available online: http://timetaskforce.com/documents/final%20strategic%20vision.pdf.

[28] For the purpose of this document, the term "TIM teams" is used for consistency.

- Representation from traditional responder groups—law enforcement, fire and rescue, EMS, towing and recovery, and transportation agencies.
- A shared commitment to improve responder and motorist safety and expedite incident clearance.
- Regular collaboration through team meetings.

2.3.1 Team Membership

While TIM team members generally represent traditional responder groups, the more successful TIM teams include representation from the larger community of TIM stakeholders (see chapter 1, table 1-3). Regular TIM team participation of non-responder stakeholders (e.g. trucking industry) may not always occur. Continuous efforts to reach out to those groups builds awareness of the TIM team's efforts, and can provide a conduit for more open discussion of incident response roles and responsibilities among stakeholder groups.

Table 8 identifies the NTIMC member organizations that represent the broad array of TIM stakeholders and provide a useful source for potential State/regional/local TIM team members.

Table 8. NTIMC Membership by TIM Stakeholder Group

TIM Stakeholder	NTIMC Member Organizations
Traditional Responders	• American Association of State Highway and Transportation Officials (AASHTO): http://www.transportation.org/. • Cumberland Valley Volunteer Fireman's Association (CVVFA): http://www.cvvfa.org/. • Federal Highway Administration (FHWA): http://www.fhwa.dot.gov/. • I-95 Corridor Coalition: http://www.i95coalition.org/i95/Default.aspx. • International Association of Chiefs of Police (IACP): http://www.theiacp.org/. • International Association of Fire Chiefs (IAFC): http://www.iafc.org/. • International Association of Fire Fighters (IAFF): http://www.iaff.org/#. • International Fire Service Training Association (IFSTA): http://imis-ext.osufpp.org/iMISpublic/Home/AM/ContentManagerNet/HomePages/OSUFPP_1501_20080104T093011HomePage.aspx?Section=Home. • National Association of State EMS Officials (NASEMSO): http://www.nasemso.org/. • National Fire Protection Association (NFPA): http://www.nfpa.org/index.asp?cookie%5Ftest=1. • National Volunteer Fire Council (NVFC): http://www.nvfc.org/. • Towing and Recovery Association of America (TRAA): http://www.towserver.net/. • U.S. Fire Administration (USFA): http://www.usfa.dhs.gov/.
Incident Information Providers	• American Traffic Safety Services Association (ATSSA): http://www.atssa.com/. • Association of Public-Safety Communications Officials – International (APCO): http://www.apcointl.org/. • Institute of Transportation Engineers (ITE): http://www.ite.org/. • International Municipal Signal Association (IMSA): http://www.imsasafety.org/. • ITS America (ITSA): http://www.itsa.org/. • National Emergency Number Association (NENA): http://www.nena.org/.
Transportation System Providers and Users	• American Automobile Association (AAA): http://www.aaa.com/aaa/sem/sem.htm?redirectto=http://www.aaa.com/?area=JoinSEM&skin=JoinSEM&gcid=S15141x073&keyword=broad_american%20automobile%20club. • American Public Transportation Association (APTA): http://www.apta.com/Pages/default.aspx. • American Trucking Associations (ATA): http://www.truckline.com/Pages/Home.aspx.

2.3.2 TIM Team/Task Force Activities

When TIM teams first convene, the initial meetings often are used to familiarize team members with each other's incident response roles and responsibilities. These meetings provide an opportunity to identify potentially conflicting procedures and come to consensus on response protocol. The discussions eventually can lead to formalized TIM policies and procedures, and the desired action to draft memoranda of understanding (MOU) among responder agencies.

Training is another key activity of multi-agency TIM teams. Tabletop exercises are an effective tool for training incident responders to visualize how their specific actions impact other responders and the incident scene as a whole. Tabletop exercises also provide a low-stress, low-cost way to visualize and plan for contingencies, since traffic incidents rarely follow a set plan. FHWA provides guidance on tabletop exercises through its publication, *Tabletop Exercise Guidelines for Planned Events and Unplanned Incidents/Emergencies*.[29]

TIM teams also use regularly scheduled meetings to conduct incident debriefs on major incidents. These after-action discussions provide an opportunity for responders to identify what worked and what could be improved in future incidents. Florida's Department of Transportation (FDOT), District 1, published guidelines for incident debriefs in its Technical Memorandum, "Critical Incident Reviews,"[30] which includes the following recommendations to maximize the value of the critical incident review (CIR):

- Hold the CIR soon after the major incident so that critical information is retained.
- Conduct the CIR in a blame-free environment where no one agency feels as though its actions will be singled out for criticism.
- Ensure the discussion includes what was done well at the incident scene.
- Ensure the CIR discussions are well documented so that lessons learned can be utilized at future incidents.

Examples of incident debrief and after-action reports are available on the Department of Homeland Security Lessons Learned Information Sharing (LLIS) Web site.[31] Regardless of the topics covered at the TIM team meeting, the following actions yield successful meetings:

- Invite participants from a diverse group of TIM stakeholders to ensure multidiscipline, multi-agency input.
- Publish an agenda letting team members know what to expect from the meeting.
- Provide well-documented meeting minutes to ensure follow up on action items.
- Offer varied agenda topics (e.g. training, resource allocation, incident debriefs, policies and procedures) to keep participants interested and engaged.

Sample TIM team meeting agenda and minutes are available in the *"Want to Know More?"* section at the end of this chapter.

[29] *Tabletop Exercise Guidelines for Planned Events and Unplanned Incidents/Emergencies*, FHWA, November 2007, FHWA-HOP-08-005, available online: http://www.ops.fhwa.dot.gov/publications/tabletopexercpe/tabletopexererc_pse.pdf.

[30] PB Farradyne: *Critical Incident Reviews Technical Memorandum*, June 2005, prepared for Florida Department of Transportation, District 1, available online: http://www.i95coalition.net/i95/Portals/0/Public_Files/uploaded/Incident-toolkit/documents/Guide/Guide_CIR_FL_D1.pdf.

[31] DHS and Federal Emergency Management Agency (FEMA) Federal Lessons Learned Information Sharing Home page: https://www.llis.dhs.gov/index.do.

2.4 TIM Performance Measurement

Performance measurement is essential to leverage limited resources. To determine the program's value, it is necessary to measure TIM program performance, identify areas for improvement, and justify program continuation and expansion. TIM program administrators need to understand that there are challenges involved in measuring TIM program performance. A true TIM program is the result of the efforts of many agencies and the data necessary to evaluate program performance often resides across agencies and jurisdictions.

Despite the challenges, performance measurement is a key aspect of a long-term, sustainable formal TIM program and must be addressed at some point in the program's evolution.

Successful TIM programs address mobility through the adoption of performance measurements. Recognizing that you can't manage what you can't measure, FHWA and NTIMC are collaborating to create national metrics that will help responders develop their own programmatic and incident response goals and commit to them in written agreements.[32]

2.4.1 TIM PM FSI – Measures to Track

FHWA recognizes both the crucial role of and challenges presented by TIM performance measurement. To provide clear guidance and develop best practices, FHWA initiated the TIM PM FSI in 2005. The FSI identified 11 States recognized as leaders in TIM and from those States convened TIM program managers from transportation and law enforcement.

California
Connecticut
Florida
Georgia
Maryland
New York
North Carolina
Texas
Utah
Washington
Wisconsin

Through a series of workshops, the TIM PM FSI participants identified 29 TIM-specific performance measures (Table 2-6) and worked to create standard definitions of core incident management terms.

The development of the TIM performance measures utilized a three-phase process:

- Phase I focused on bringing the 11 States together to identify the candidate performance measures, to select measures for testing, and develop an Action Plan for conducting the test.
- Phase II involved an 18-month test during which each State implemented its Action Plan.
- Phase III involved a final workshop at which States discussed implementation results and identified next steps to continue the development of TIM performance measures. Emphasis was placed on identifying opportunities for which FHWA would continue to provide support for TIM performance measurement.[33]

[32] Corbin, John, Kimberly Vásconez, and David Helman. "Unifying Incident Response," *Public Roads*, (September/October 2007), available online: http://www.tfhrc.gov/pubrds/07sep/04.htm.

[33] Science Applications International Corporation (SAIC): *Draft Focus State Initiative Traffic Incident Management Performance Measures Final Task Report*, FHWA, July 2008, p. 4.

Figure 2 graphically presents the process that was followed, as depicted in the draft final report.[34]

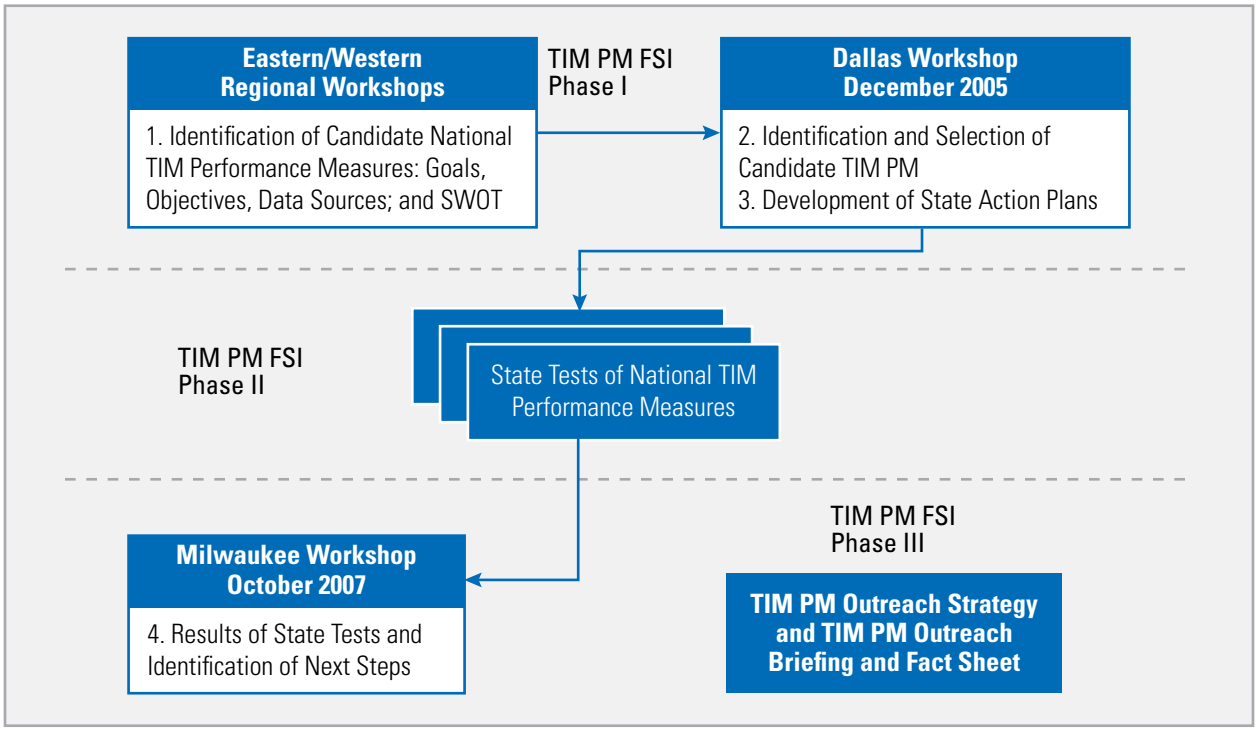

Figure 2. High-Level Process Overview of Focus States Initiative for TIM Performance Measures.

Also derived from the draft final report, Table 9 presents the candidate program-level TIM objectives and performance measures.[35]

[34] SAIC: *Draft Focus State Initiative Traffic Incident Management Performance Measures Final Task Report,* FHWA, p. 4.

[35] Ibid., p. 5.

Table 9. Candidate Program-Level TIM Objectives and Performance Measures

Candidate Objective	Proposed Performance Measure(s)
1. **Reduce incident notification time** (defined as the time between the first agency's awareness of an incident, and the time to notify needed response agencies).	a. The time between the first agency's awareness of an incident, and the time to notify needed response agencies.
2. **Reduce roadway clearance time** (defined as the time between awareness of an incident and restoration of lanes to full operational status.	a. Time between first recordable awareness (detection/ notification/ verification) of incident by a responsible agency and first confirmation that all lanes are available for traffic flow.
3. **Reduce incident clearance time** (defined as the time between awareness of an incident and removal of all evidence of the incident, including debris or remaining assets, from shoulders).	a. Time between first recordable awareness (detection/ notification/verification) of incident by a responsible agency and time at which all evidence of incident is removed (including debris cleared from the shoulder). b. Time between first recordable awareness and time at which the last responder has left the scene.
4. **Reduce "recovery" time** (defined as between awareness of an incident and restoration of impacted roadway/ roadways to "normal" conditions).	b. Time between awareness of an incident and restoration of impacted roadway/ roadways to "normal" conditions. (NOTE: Participants noted that "normal" conditions could be difficult to define.)
5. **Reduce time for needed responders to arrive on-scene after notification.**	a. Time between notification and arrival of first qualified response person to arrive on incident scene.
6. **Reduce number of secondary incidents and severity of primary and secondary incidents.**	a. # of total incidents (regardless of primary or secondary) and severity of primary incidents (National Highway Transportation Safety Administration [NHTSA] classification). b. # of secondary of incidents and severity (NHTSA classification). c. # fatalities.
7. **Develop and ensure familiarity with regional, multi-disciplinary TIM goals and objectives and supporting procedures by all stakeholders.**	a. Existence/availability of program-level plan for implementing traffic control devices and/or procedures. b. Existence of/participation in multi-agency/jurisdictional training programs on the effective use of traffic control/staging devices and procedures. c. % of workforce trained on National Incident Management System as well as local/ regional/ "program-level" procedures. d. % of agencies with active, up-to-date Memoranda of Understanding (MOUs) for program-level TIM. e. # of certified courses taken. f. # of attendees at various courses.
8. **Improve communication between responders and managers regarding the status of an incident throughout the incident.**	a. # or % of agencies with a need to communicate, who are able to communicate (sharing information or communications systems) within an incident.

Candidate Objective	Proposed Performance Measure(s)
9. Provide timely, accurate, and useful traveler information to the motoring public on regular basis during incident.	a. Comparison of information provided at any given time to what information could have been provided. b. Customer perceptions on usefulness of information provided. c. Time of updates to various sources. d. # of minutes it takes to disseminate informational updates to the public (after something changes regarding incident status). e. # of sources of information to the public. f. # of system miles that are covered/density of coverage by traveler information systems (seek to increase these).
10. Regularly evaluate and use customer (road user) feedback to improve TIM program assets and practices.	a. % incidents managed in accordance with program-level procedures. b. % of incidents for which multi-agency reviews occur. c. Perceived effectiveness (by involved stakeholders) of use of traffic control devices to achieve incident management goals developed for each incident. d. Correlation of use of program-level traffic control devices by incident type. e. # of instances of sending the needed equipment (presumes that needed quantities and types of equipment are defined) for the incident. f. Frequency of dissemination of multi-agency/program-level and customer feedback back to partners. g. Measures of customer feedback: • # Web site feedback. • # of surveys conducted/focus groups. • # of complaint logs. • # of service patrol comment cards. • # of 1-800 feedback system calls. • # of sources of information to the public (# of media/government outlets providing information). • # of 511 calls.

Over the course of the workshops held in 2005 and 2006, participants worked from this list to come to consensus on program-level performance measures that their State would be willing to implement. This process yielded two performance measures (and related objectives) that all 11 States agreed to implement in common. Program-level measures are those that cross agencies rather than focusing on the performance of just one responding agency.

Workshop participants defined State Action Plans to guide implementation of these measures. Following the 2006 workshop, two program-level performance measures had been identified (#1 and #2 on Table 10). At the final workshop held in 2007, participants were tasked with defining "secondary incidents" from which a third program-level objective was added on reducing secondary incidents (item 3 on Table 10).

Table 10. TIM PM FSI Program-Level Performance Measures

TIM Program Objective	Related Performance Measure
1. **Reduce "roadway clearance" time** (defined as the time between awareness of an incident and restoration of lanes to full operational status).	Time between first recordable awareness of incident by a responsible agency and first confirmation that all lanes are available for traffic flow.
2. **Reduce "incident clearance" time** (defined as the time between awareness of an incident and removal of all evidence of the incident, including debris or remaining assets, from shoulders).	Time between first recordable awareness of incident by a responsible agency and time at which the last responder has left the scene.
3. **Reduce the number of secondary crashes,** specifically unplanned incidents for which a response or intervention is taken, where a collision occurs either a) within the incident scene or b) within the queue (which could include opposite direction) resulting from the original incident.	Number of unplanned incidents beginning with the time of detection of the primary incident where a collision occurs either a) within the incident scene or b) within the queue, including the opposite direction, resulting from the original incident.

2.4.2 TIM Performance Measures Focus States Initiative - Results of State Action Plans

Through participation in the TIM PM FSI, all 11 States made progress towards improving TIM performance measurement. In terms of implementing the performance measures, there were varying levels of success. The first two objectives on Table 9 were field tested for a period of 18 months, and five States (Florida, Georgia, Maryland, Washington, and West Virginia) successfully identified, collected, and analyzed data to support performance measurement activities.

Other States laid the groundwork for TIM performance measurement by establishing interagency agreements by identifying data requirements and data sources, and developing data exchange interfaces as shown in Table 11.[36]

Table 11. TIM PM FSI Implementation Summary

State	Developing Interagency TIM Program	Interagency Data Exchange (CAD TMC)	Reduce Roadway Clearance Time	Reduce Incident Clearance Time	Results Used to Improve TIM Operations
California	Y	Under Development	In Progress	In Progress	Planned
Connecticut	Y	Under Development	In Progress	In Progress	Planned
Florida	Y	Y	Y	Y	In Progress
Georgia	Y	N	Y	Y	Y[37]
Maryland	Y	N	Y	Y	Y[38]
New York	Y	Under Development	In Progress	In Progress	Planned
North Carolina	Y	Under Development	In Progress	In Progress	Planned
Texas	Y (Local Events)	N	N	N	N
Utah	Y	Limited	N	N	N
Washington	Y	Limited	Y	Y	In Progress for incidents involving joint response with WSDOT and WSP
Wisconsin	Y	Y	Y	N	In Progress

An important outcome of the TIM PM FSI process was the consensus on key lessons learned. The TIM PM FSI Final Report documented successful strategies and solutions for resolving institutional and technical integration and data exchange issues used by the States during the testing phase of the initiative. The institutional and technical integration and data exchange lessons learned are summarized below.

Institutional

The institutional issues revolved around gaining acceptance to implement performance measurement "from both executive decision makers and other agencies involved with TIM responsibilities."[39] Therefore, most of the lessons learned in this area focused on building cooperative working relationships among the various TIM stakeholders to:[40]

[36] SAIC: *Draft Focus State Initiative Traffic Incident Management Performance Measures Final Task Report*, p. 3.

[37] GDOT establishes annual targets for major incident clearance (90 minutes) and incident response (8 minutes). PM is used to determine if these targets are being achieved.

[38] Annual assessment data is used to identify high crash corridors, plan resource allocation, and identify trends in TIM.

[39] SAIC: *Draft Focus State Initiative Traffic Incident Management Performance Measures Final Task Report*, p. 10.

[40] Ibid, pp. 10-11.

- **Establish working relationships with all agencies involved:** For example, begin a working group(s) to discuss TIM operations and policies and identify areas for improvement and exchange information.
- **Develop a Memorandum of Understanding (MOU) among agencies to define roles and responsibilities.**
- **Develop outreach materials that document the benefits of TIM PM:** Use results from other States or within the State to show how performance measurement can be a benefit.
- **Establish a cost-sharing agreement:** Cost-sharing reduces a particular agency's resource requirements. As an added benefit, leveraging other funding sources and resources can demonstrate how system modifications needed to support TIM PM also can support other program activities.

Technical Integration and Data Exchange[41]

The most common technical integration and data exchange issues identified by participating States revolved around how the different agencies collect and use data. The participating States identified a number of lessons learned that included the following solutions:

- **Establish agreements between law enforcement and DOTs to preclude compromising sensitive data:** For example, some States had to define specific data elements to be provided. These restrictions can then be executed via system filters.
- **Establish technical committees to develop common data dictionaries:** Different agencies frequently collect the same information in different formats. To address this issue, technical committees can help develop common data dictionaries or translators that enable different systems to identify and match information.
- **Establish a common time stamp and common geographic coordinates necessary for data exchange and reporting functions:** Incident management agencies may define incident events differently. For example, an enforcement agency may time stamp the closing of an incident as when the last enforcement vehicle departs the scene, while DOT or other responders may still be on site. It is important to agree on a common time stamp that establishes incident start and close times, since sharing this information among agencies is critical to properly measuring incident duration.
- **Identify and agree to a defined standard or group of standards for data exchange:** To ensure interoperability among all stakeholders, it is critical to identify and agree to a particular standard or group of standards. It also is helpful to develop and use a common ITS architecture to identify standards that are to be used by different agencies.
- **Identify and agree upon methods of integrating text, video, and audio formats for data exchange:** When the stakeholders are able to integrate agreed upon formats from multiple types of data exchange via text, video, and audio, this approach can result in the identification of a more appropriate response strategy. This approach enables accurate information exchange with respect to 511 or Web-based traveler information systems and the enhanced ability to notify media improves overall incident management. This approach also may support the allocation of funds and resources needed for legacy system modifications.

[41] SAIC: *Draft Focus State Initiative Traffic Incident Management Performance Measures Final Task Report,* FHWA, p. 11-12.

- **Identify and agree upon consistent data collection practices within and between agencies:** Inconsistent data collection practices within and among agencies is especially problematic. Specific solutions may include the use of automated data entry wherever possible (GPS, time stamps); utilization of a single point of data entry with emphasis on a simplified means of entry (e.g. drop-down menus); encouragement for the need for a "lane clear" time stamp; and promotion of common and consistent training among all incident responders (DOT, law enforcement, and so forth) for data collection techniques to ensure common practices.

The TIM PM FSI successfully demonstrated the viability and importance of performance measurement. Nine of the 11 States involved in the TIM PM FSI already are using or are planning on how to use performance measurement to improve TIM operations. An additional benefit of the TIM PM FSI is the development of a valuable peer exchange of innovative approaches to TIM PM; data exchange and systems integration; and institutional models to promote multi-agency information exchange. A majority of the participating States are moving forward to implement integrated TIM programs that involve inter-agency data exchange and performance measurement.

2.5 Additional Resources

The guidance provided in this chapter is intended to help States develop and maintain a sustainable, dedicated, and active TIM program as opposed to simply coordinating multiple TIM activities across organizations.

There are numerous examples from established programs from which new and emerging programs should access as best practices, lessons learned, and sample meeting materials. A listing of potential resources can be found in the following section, "*Want to Know More?*"

Want to Know More?

TIM Resources:

- **U.S. Department of Homeland Security National Incident Management System (NIMS):** The original NIMS document and change information is available online: http://www.fema.gov/good_guidance/download/10243 and http://www.fema.gov/pdf/emergency/nims/NIMSWhatsNew.pdf.
- **Federal Highway Administration Guidance on Strategic Highway Safety Plans: Strategic Highway Safety Plans:** A Champion's Guide to Saving Lives available online: http://safety.fhwa.dot.gov/safetealu/toc/.
- **National Traffic Incident Management Coalition (NTIMC) Web site, available online:** http://timcoalition.org/?siteid=41.
- **Traffic Incident Management Performance Measures Focus States Initiative (TIM PM FSI).** For more information, contact **Paul Jodoin**, TIM **Program Manager,** at FHWA at **202-366-5465** or Paul.Jodoin@dot.gov.
- **Traffic Incident Management Self-Assessment (TIMSA):** The TIMSA Guide and accompanying scoring template and National Analysis Reports from 2003 through 2008 are available online: http://ops.fhwa.dot.gov/eto_tim_pse/preparedness/tim/self.htm. For more information, contact **Kimberley Vásconez,** FHWA Office of Operations, Office of Transportation Operations, Emergency Transportation Operations Team Leader, at **202-366-1559** or kimberley.vasconez@dot.gov.

State Best Practices and TIM Multi-Agency Teams:

- ***Washington State Joint Operations Policy Statement*** **(prepared by WSDOT and WSP), July 2008:** http://www.wsdot.wa.gov/NR/rdonlyres/49486131-1579-43D6-999E-77862905DCE7/0/JOPS08.pdf.
- **Wisconsin Traffic Incident Management Enhancement (TIME) Program:** http://www.dot.wisconsin.gov/travel/stoc/time.htm.
- **Washington State agreements between WSDOT, WSP, and county coroners:** http://www.wsdot.wa.gov/Operations/IncidentResponse/coroneragreements.htm.
- **Sample MOU between Tennessee DOT and Tennessee DOS:** http://www.tdot.state.tn.us/news/2004/pdfs/MOU%20TDOT-DOS%20October2004.pdf.
- **Maryland CHART Program:** http://www.chart.state.md.us/default.asp.
- **Strategic Vision:** ***Metro Atlanta Traffic Incident Management Strategic Vision*** (prepared by the Metro Atlanta Traffic Incident Management Enhancement Task Force), May 2006: http://www.timetaskforce.com/documents/final%20strategic%20vision.pdf.

TIM Multi-Agency Teams:

- **Florida Department of Transportation District 4 TIM Meeting Agendas and Minutes:** http://www.smartsunguide.com/TIMMeetingMinutes.aspx.
- **Metro Atlanta TIME Task Force Team Minutes** (see Meetings): http://www.timetaskforce.com/.

3 TIM Tactical Program Elements

3.1 Introduction

The impact of traffic incidents on highway operations and safety is well documented as noted in the following citations:

- According to the Texas Transportation Institute (TTI), in 2007, congestion in the top 85 U.S. urban areas caused 4.2 billion hours of travel delay and 2.9 billions gallons of wasted fuel, for a total cost of $78 billion.[42]
- The National Traffic Incident Management Coalition (NTIMC) estimates that one-quarter of the traffic congestion in the United States is caused by non-recurring traffic incidents.[43] For every minute that an Interstate lane is blocked during peak congestion, 4 minutes of travel delay result.[44]
- The Bureau of Labor Statistics of the U.S. Department of Labor reported that between 2007-2008, 345 workers were killed in struck-by vehicle incidents,[45] and an indication of the dangers emergency responders face in managing traffic incidents.

At the center of every Traffic Incident Management (TIM) Program is the operational activities that occur at the incident scene to quickly, safely, and efficiently clear the incident and restore traffic flow. Strategic program elements (chapter 2) provide the multi-agency planning, programming, and evaluation necessary to support efficient and collaborative on-scene operations. Supporting technical elements (chapter 4) provide the tools and technologies for traffic management and inter-agency communications for on-scene operations.

Regardless of the level of program advancement in Strategic and Technical functions, Tactical operations practices, procedures, and protocols must be followed to expedite scene response and clearance to promote safety of incident responders and motorists. As described in chapter 2 (section 2.2.3), the NTIMC has described goals and strategies for responder safety: safe, quick clearance of incident scenes, and interoperable communications through the National Unified Goal (NUG).

Significant investments made at all levels of government work to improve incident management and responder safety. This chapter discusses new developments in tactical operations, including:

- Response and clearance policies and procedures.
- Responder and motorist safety.

[42] Schrank, David and Tim Lomax, Texas Transportation Institute. "The 2007 Urban Mobility Report," available online: http://tti.tamu.edu/documents/ums/mobility_report_2007_wappx.pdf.

[43] Text adapted from NTIMC Web site, available online: http://www.transportation.org/?siteid=41&pageid=2782. Source for data presented by NTIMC: Strategic Highways Research Plan II (SHRP II) – Reliability Project L02.

[44] Ibid.

[45] U.S. Department of Labor, Bureau of Labor and Statistics, Economic News Release, Table 1, Fatal occupational injuries by event or exposure, 2007-2008, available online http://www.bls.gov/news.release/cfoi.t01.htm.

3.2 Response and Clearance Policies and Procedures

Since the very first traffic incident, there has been traffic incident response. Over time, policies and procedures have been defined and refined to clarify and coordinate responder roles and responsibilities, expedite scene clearance, and maximize traffic flow around the incident scene. As these adjustments occurred, responders came to realize that working through a formalized structure, i.e., TIM programs, would accelerate the process. TIM program evolution has led to changes in the following areas, described in more detail within this chapter:

- Responder Roles and Responsibilities.
- Incident Command System/Unified Command.
- Resource Typing and Identification.
- Fatal Incidents.
- Safe, Quick Clearance Laws and Policies.
- Full-Function Service Patrols for Incident Response.

3.2.1 Responder Roles and Responsibilities

Chapter 1 identifies and separates TIM stakeholders into four discrete categories: traditional responders; special/extreme circumstance responders; incident information providers; and transportation system providers and users. Table 12 lists the stakeholders identified in each of the four categories. While all the stakeholders cited are involved in TIM, this chapter focuses on the roles and responsibilities of the traditional and special/extreme circumstance responders listed in Table 12.

Table 12. TIM Stakeholder Roles and Descriptions

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

Since each incident is different, the sequence of individual responder actions depends upon a variety of factors, such as who arrives first on scene, the severity of the incident, and the surrounding traffic conditions, among others. Additionally, incident responders' actions are heavily interrelated, and generally are not limited to one specific responder group. There are a number of guidance documents and training courses available that can provide more detailed definitions and instruction on traffic incident responder activities (see "*Want to Know More?*" at the end of this chapter).

Traditional Responders
The following information describes the on-scene actions conducted by the traditional responders:

- **Emergency 911 (E911) Dispatchers:** E911 personnel are normally the first responders to have knowledge that an incident has occurred. The mission of dispatchers is to quickly, accurately, and completely convey the necessary information to the proper agencies and field personnel to get the right personnel and equipment to the scene as quickly as possible. E911 personnel normally begin the data collection on an incident by recording information in a Computer-Aided Dispatch (CAD) system.

- **Law Enforcement:** In many cases, law enforcement is the first to arrive at the incident scene. Upon arrival, the first officer on scene assesses the situation and calls for additional resources (fire, EMS, and towing and recovery, among others) as needed. The officer secures the scene for responder and motorist safety, and conducts traffic control as necessary. Law enforcement also conducts scene investigation and/or evidence collection as dictated by the incident scene and severity.

- **Fire and Rescue:** In some cases, fire and rescue personnel may be the first responders to arrive at the incident scene. Upon arrival, fire and rescue personnel secure the scene to protect responders and motorists. Upon securing the scene, these personnel assess injured parties, and if warranted, request EMS support. Fire and rescue personnel provide first aid until EMS personnel to arrive (if requested). Fire and rescue personnel address any fire or potential fire hazards and assist in scene recovery. In most locations, they also assess the scene for hazardous materials (HM) and notify remediation or clean-up contractors, as needed.

- **Emergency Medical Services**: The primary responsibility for EMS is to assess injuries, administer triage on-scene as needed, and remove injured parties quickly to medical facilities for additional care. In those areas of the country where EMS is a fire-based function, the fire and rescue personnel provide EMS functions.

- **Towing and Recovery:** The towing and recovery personnel primarily remove disabled vehicles, clear incident debris, and clean up spilled cargo.

- **Transportation Agencies:** Within transportation agencies, it is the operational sections—Traffic Management Centers, maintenance field staff, and Service Patrols—that play a critical role in TIM. TMCs serve as the hub for the collection and dissemination of incident information and play a critical role with incident detection and verification. At the incident scene, transportation agency responders focus on temporary traffic control, expedite scene clearance, and restore traffic flow. Transportation agency responders include maintenance personnel and specialized traffic incident responders, such as maintenance and service patrol personnel (see section 3.2.6).

Special/Extreme Circumstance Responders
The following specialized responders are required when the incident scene is more severe; when it involves fatalities, spilled cargo, or the release of hazardous materials; and/or when the incident is part of a larger manmade or natural disaster:

- **Hazardous Materials Contractors:** When the incident scene involves HM that require response and cleanup beyond the capabilities provided by fire and rescue resources, specialized HM contractors are dispatched to the incident scene. Their primary responsibility is to remove the HM and mitigate additional risk from the continuous release of material into the environment.
- **Coroners/Medical Examiners:** When incidents involve fatalities, coroners/medical examiners are called to the incident scene. A number of jurisdictions have enacted policies that allow the removal of the deceased by designated personnel to other locations before the coroner/medical examiner arrives at the scene to facilitate incident clearance and preserve the body from loss or destruction, or for prospective organ donation (see section 3.2.4).
- **Emergency Management Agencies:** When the scope and severity of an incident dictates, State and local emergency management agencies may be called upon to direct and/or participate in incident response as part of the overall response to major emergencies. These types of responses are precipitated by man-made or natural disasters, such as weather events, fire, earthquakes, floods, and so forth.
- **Environmental/Natural Resources Agencies:** State and local environmental and natural resources agencies are deployed to provide technical assistance, assess impacts, and recommend mitigation strategies for both hazardous and non-hazardous related cargo releases.
- **Departments of Health:** When an incident involves medical waste, the DPH is called to the scene to identify whether or not medical waste is infectious. DPH is also called to the scene to identify medical radiological materials and respond to incidents involving food, drugs, or cosmetics to decide if the material should be destroyed or if it can be recovered by the owner. DPH can assist with proper disposal options for any of the above-cited materials.

3.2.2 Incident Command System/Unified Command

How responders execute their respective roles and responsibilities at the incident scene is a major factor that contributes to the successful, safe, and quick clearance of the scene. As defined in the National Incident Management System (NIMS), the Incident Command System (ICS) provides a framework for responding to all emergencies, and must be used and understood by all parties at the scene of an emergency.

Incident Command System
The ICS is a well-established, standardized on-scene process for managing incident response activities. The ICS was developed in the 1970s to manage rapidly moving wildfires where response activities were adversely impacted by:

- Too many individuals reporting to one response commander.
- Lack of interoperable communications and lack of reliable information.
- Different organizational structures between emergency response agencies.

- Lack of structure for coordinating response activities and lack of authority over response activities.
- Lack of a common terminology between agencies.
- Differing and/or unclear incident response objectives.

In 2003, the President of the United States charged the U.S. Department of Homeland Security (DHS) with developing and administering NIMS. Designed to improve incident response in a post-September 11th environment, NIMS builds upon and helps to integrate existing Federal, State, and local incident and emergency response systems to advance a nationwide framework for responding to incidents at all levels. Rather than circumvent the existing incident and emergency response processes and protocols, NIMS promotes a common language and uses a systems approach to integrate existing best practices into a unified, national framework.

As a key component of NIMS, ICS is used as the key strategic incident command structure. The rationale is that ICS provides a flexible, yet standardized approach for incident command, and that "ICS defines the operating characteristics, interactive management components, and structure of incident management and emergency response organizations engaged throughout the life cycle of an incident."[46]

NIMS defines five major functions for the ICS, as shown in Figure 3[47] and summarized below:

- **Command:** In an incident command organization, the Command Staff consists of the Incident Command (IC) and various special staff positions:
  - **Incident Command:** Responsible for management and control authority over an incident, including setting incident objectives and ensuring that all responding entities meet these objectives.
  - **Public Information Officer (PIO):** Interfaces with the public and media and/or with other agencies with incident-related information requirements, and monitors public information.
  - **Safety Officer (SO):** Responsible to the IC for the set of systems and procedures necessary to ensure emergency responder safety, as well as the general safety of Incident Operations. The SO has emergency authority to stop and/or prevent unsafe acts during incident operations. In a UC structure, a single SO should be designated and assigned responsibility across all participating agencies.
  - **Liaison Officer:** Point of contact for representatives of other governmental agencies, nongovernmental organizations, and/or private entities.
- **Operations:** Responsible for all tactical operations.
- **Planning:** Assists with the development of the Incident Action Plan (IAP), maintains resource use and situation status, and provides technical resources needed to particular aspects of incident response activities.
- **Logistics:** Provides personnel, facilities, and materials support to the entire incident response effort.
- **Finance and Administration:** Tracks costs and accounts for reimbursements.[48]

[46] *National Incident Management System,* p. 3.

[47] Ibid., p. 13.

[48] Adapted from *Incident Command System/Unified Command (ICS/UC) Technical Assistance Document,* p.9, prepared by the National Response Team, available online: http://www.nrt.org/Production/NRT/NRTWeb.nsf/AllAttachmentsByTitle/SA-52ICSUCTA/$File/ICSUCTA.pdf?OpenElement.

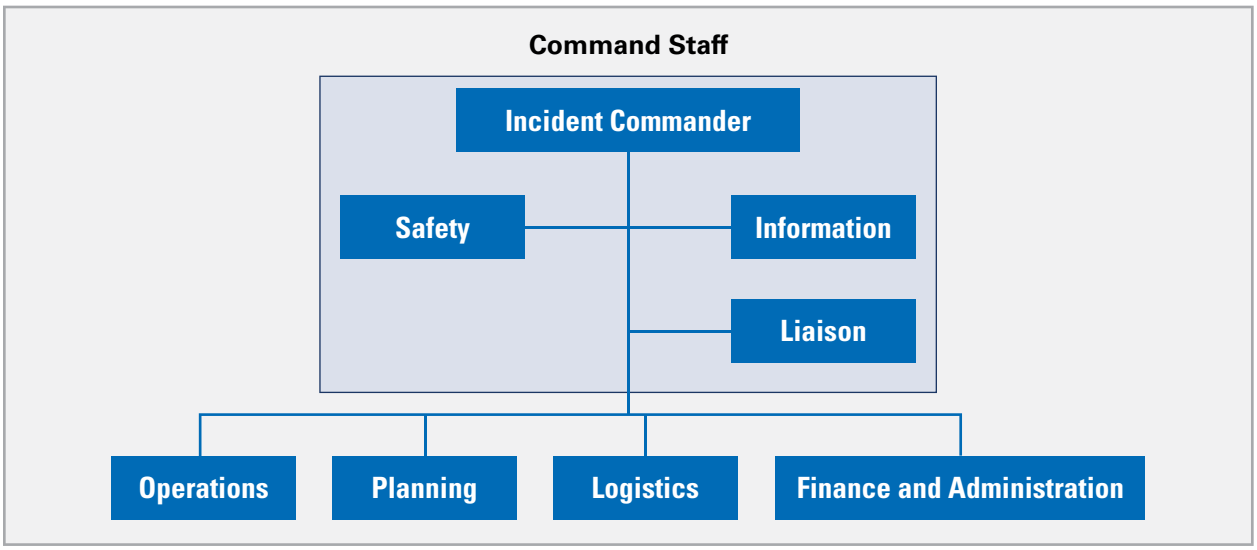

Figure 3. Incident Command Structure.

Incident Command

IC represents a function, not a person, and is responsible for all aspects of incident response including management of public affairs, health and safety, and liaison activities within the incident command structure. Command determines the size and structure of the ICS organization needed to respond to an incident and makes all decisions with respect to the need to implement all aspects of the ICS. As noted in the *Simplified Guide to the Incident Command System for Transportation Professionals*,[49] Command considers the following three priorities when identifying assisting agencies and structuring the ICS organization:

- **Life Safety:** Protects emergency responders, any incident victim, and the general public.
- **Incident Stability:** Minimizes an incident's impact on the surrounding area, maximizes response efforts, and ensures efficiencies in using resources.
- **Property Conservation:** Minimizes damage to property while still achieving established incident objectives.

Typically, the ranking first responder will assume IC function with overall incident management responsibility. The first responder may well be a Department of Transportation (DOT) unit member if that unit arrives on scene first, even if that person is not fully qualified to command emergency units.[50] In general, the IC function is assumed by law enforcement and/or fire personnel once those units arrive on scene. Some States have statutory mandates identifying which agencies may assume IC, or for liability reasons, prohibit DOT personnel from assuming command.

[49] Olson-Ang, Jeffrey and Steve Latoski. *Simplified Guide to the Incident Command System for Transportation Professionals*, Federal Highway Administration (FHWA) publication, FHWA-HOP-06-004, 2006, p.11, available online: http://ops.fhwa.dot.gov/publications/ics_guide/.

[50] *Simplified Guide to the Incident Command System for Transportation Professionals,* p. 11.

The NIMS notes that a single IC structure should be used when an incident occurs within a single jurisdiction, and there is no jurisdictional or functional agency overlap. This function is frequently handled by the Incident Commander.

Under the IC function, the Incident Commander:

- Has the authority to assume command.
- Knows agency policy.
- Ensures incident safety and establishing response priorities.
- Establishes an incident command post.
- Initiates and controls communications, and approves information released through the PIO.
- Determines incident objectives and strategies to be followed and approves, implements, and evaluates the IAP.
- Coordinates traffic management and control operations.
- Approves resource requests.
- Oversees incident demobilization and reporting.[51]

Unified Command
When multiple jurisdictions or agencies are involved, Unified Command (UC) is one method of conducting the IC function within the ICS organization structure for incident management. As stated in the *Simplified Guide to the Incident Command System for Transportation Professionals*,[52] UC is recommended as the command structure when an incident response activity:

- Involves two or more responding agencies within a jurisdiction that each has a functional responsibility for a major tactical activity related to incident response (e.g., traffic control, medical attention, or crash investigation).
- Impacts more than one political or legal jurisdiction (for example, a municipality and a county, or a municipality and a State), and requires response by multiple agencies from the same discipline (for example, county and/or municipal fire department, or State and/or local police).

UC differs from the sole incident command structure in that the IC function is handled by multiple participating agencies, and not a single Incident Commander. UC has the same Command function responsibilities as does a single IC, but uses a different organizational structure to implement these responsibilities.

[51] *Simplified Guide to the Incident Command System for Transportation Professionals,* p. 25.

[52] Ibid., p. 12.

Each responder agency designates an official responsible for specific disciplines to serve as the agency's representative to the UC, and the UC, as a whole, establishes common objectives and strategies for incident response. DHS, in NIMS, describes the UC structure as:

> ...one where the individuals designated by their jurisdictional authorities (or by departments within a single jurisdiction) jointly determine objectives, strategies, plans, and priorities and work together to execute the integrated incident operations.[53]

UC differs from a single command structure, where the IC establishes incident management objectives and strategies, and is directly responsible for ensuring that all functional area tasks are conducted to meet the objectives and strategies.

The UC should strive to set its mitigation goals and Incident Action Plan through consensus. However, statutory requirements as established by State General Laws may warrant an agency having the overriding lead authority within Unified Command. The responsibilities outside of the Fire Departments normal purview such as highway site safety and traffic control shall continue to be the responsibility of the State Police. Issues and decisions related to lane closures and site safety shall be made jointly by the appropriate agencies throughout the UC. However, the final decisions as they relate to traffic management are the responsibility of the UC.

The initial responder to the incident establishes the command post for the IC. The other responding agencies accomplish their jurisdictional responsibilities based on the goals set by Unified Command (Figure 4). Depending on the size of the incident or event, the IC may assign a command staff to provide services for the entire organization. The proper "mix" of responding agencies within a Unified Command structure depends on the location and nature of the incident.

While the UC generally makes decisions based on a consensus of the agencies included in the UC, the lead agency can make a final decision on any issue that the UC is not able to resolve on a consensus basis. This "lead agency" status may change as particular activities take priority during the course of incident response and as the IAP is executed.

The UC is intended to function as a flexible and adaptable structure that is adjusted based on incident response needs and offers a number of advantages for managing transportation incidents:

- UC provides a common organizational structure that enables agencies to understand joint priorities and restrictions and the specific functional responsibilities of each agency. Each agency also is able to understand the legal authority of other responder agencies, thus avoiding compromise or neglect of each authority.
- By jointly developing the IAP, UC enables agencies to develop a single set of objectives and strategies for responding to an incident, to avoid duplication of effort, and to coordinate the efforts and resource deployments across all responder agencies.
- Agencies are able to establish a single command post for the UC, which helps support the unified planning process, as well as the flow and coordination of information between agencies and jurisdictions involved in the response.

[53] *National Incident Management System*, p. 23.

Relationship between UC and ICS

The National Response Team's (NRT) *ICS/UC Technical Assistance Document* summarizes the relationship between UC and ICS as:

> ...the UC replaces the Incident Commander function and becomes an essential component of an ICS. In this way, the UC provides the organizational management tool to facilitate and coordinate the effective involvement of the various agencies; it creates the link between the organizations responding to the incident and provides a forum for these agencies to make decisions with which all responders can agree.[54]

Figure 4 presents the relationship between a UC and the ICS.[55] The Command function is comprised of the multiple responder agencies—Federal, State, local—that meet the criteria of having a functional responsibility for a major tactical activity. Otherwise, the organizational structure is the same and the command staff and sections have the same duties and responsibilities as under the ICS. The *Simplified Guide to the ICS for Transportation Officials*[56] states that the Operations Section Chief designation must be a unanimous decision by the UC, and further notes that an On-Scene Coordinator (OSC) is drawn from an agency designated as the lead agency.

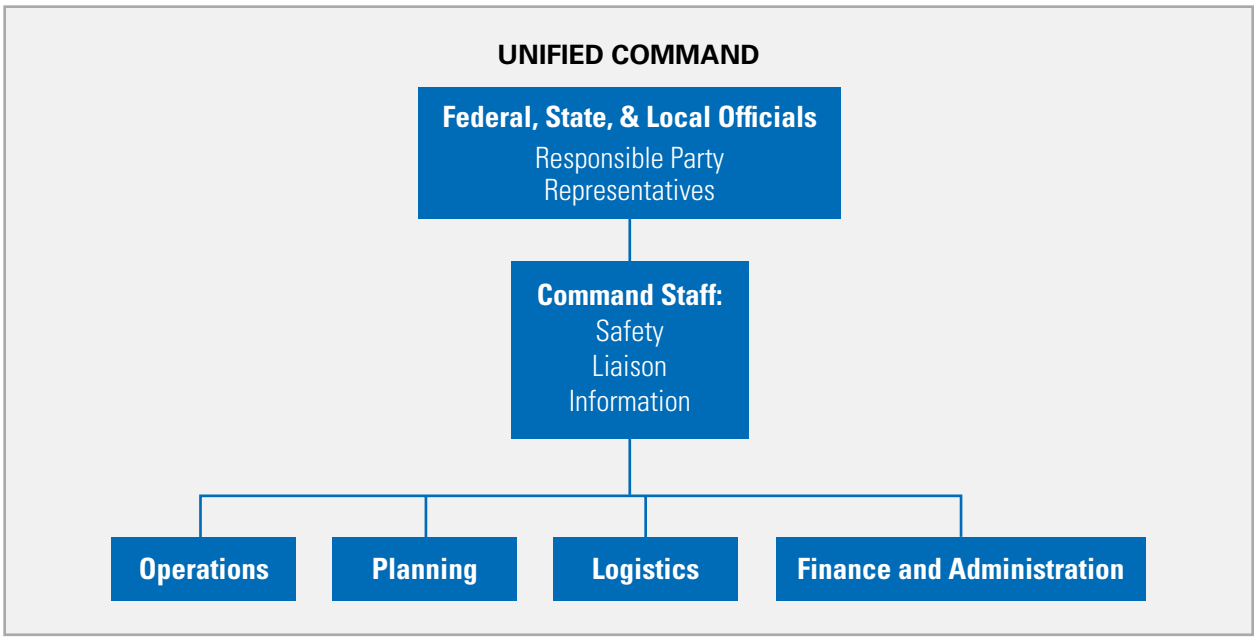

Figure 4. Unified Command Organization Structure.

[54] *Incident Command System/Unified Command (ICS/UC) Technical Assistance Document*, p. 14.

[55] Ibid., p. 15.

[56] *Simplified Guide to the Incident Command System for Transportation Professionals*, p. 29.

IC and UC Preparation and Implementation

Advance planning and ongoing practice and training are critical to the successful implementation of the IC and UC. Each agency needs to know and understand **in advance** the roles and responsibilities of the other responder agencies. The NRT identifies four key issues that must be addressed to have an IC structure through UC:

- All responder agencies should learn ICS and the roles IC and UC have in ICS.
- Responder agencies should conduct the necessary advance planning to define the roles and responsibilities of each responder agency, and to include guidance on when and how to implement IC and UC:
  - The structure must be agreed to by all responder agencies, and ICS functions and responsibilities should be well defined.
  - Individuals should be designated for each function, with a reporting mechanism put in place.
  - Contingency plans should be in place.
- All responder agencies should understand the criteria and conditions necessary to implement UC as early as possible in the incident response process to avoid unnecessary delay and confusion.

A Unified Command Example

The following hypothetical example captures components of incidents that actually have occurred on the highway systems throughout the United States:

> Two passenger vehicles are involved in a collision. One driver is not injured and is able to get out of the damaged vehicle. The other driver is severely injured and needs to be extricated from the vehicle. Responders to the incident include a fire department and an EMS responder, law enforcement, a DOT Service Patrol and the local news media.

Law enforcement is the first to arrive at the incident and immediately implement the procedures for UC: The incident involves multiple responders that have a functional responsibility for a major aspect of the incident, a criterion for implementing a UC:

- **Law Enforcement:** Secures incident scene; first responder; crash investigation; traffic control.
- **Fire Departments:** Rescues/extricates victims; contains/mitigates a HM release; protects incident scene.
- **EMS:** Provides medical treatment to injured parties at the scene; transports victims for additional medical treatment; determines destination and transportation requirements for injured victims.
- **DOTs:** Protects incident scene; provides traffic information; develops and operates alternate routes; implements traffic control strategies.

The UC for this incident[57] includes representatives from law enforcement; the fire department and EMS; and the transportation agency. As noted, each agency has functional responsibility, and is able to provide assistance (resources, personnel) to support incident response operations. Each agency also is responsible for a major component of the command or coordination efforts involved the incident response activities.

A contracted tower who arrives on scene to remove the damaged vehicles is not included in the UC. This is because the tactical activities are directed by agencies already represented in the UC. The contracted tower's input into response activities is provided to the respective UC representatives, and the tower's role in the response activities are defined as "technical specialist".

Initially, law enforcement is designated as the "lead agency" within the UC, since it meets the requirement of primary mission. However, as the IAP is implemented and incident response activities change, the "lead agency" designation moves to other agencies as different tactical activities take priority during the response process.

3.2.3 Resource Typing and Identification

ICS and UC provide the structure and framework for incident responders to execute their respective roles and responsibilities. As described in chapter 2, another key NIMS component is Resource Management, in which the necessary resources are identified for incident response (Strategic) and their deployment as appropriate to the incident (Tactical).

NIMS specifies 120 resource typing definitions, which are described as "the categorization and description of response resources that are commonly exchanged in disasters through mutual aid agreements."[58] The standard resource typing definitions help incident responders "speak the same language" when requesting or deploying the resources needed by using common terminology. Formally documented definitions for response terminology help agencies identify, locate, request, order, and track response resources located outside the individual agency's jurisdiction. Knowing and using the common terminology helps responders to move resources quickly and effectively to the jurisdiction that needs them.

More specific to traffic incidents, standard resource typing definitions include:

- Identifying towing and recovery resources with operator capabilities and equipment availability.
- Identifying HM response contractors with operator capabilities and equipment availability.

It is essential to identify and correctly deploy towing and recovery resources according to operator capabilities and available equipment when responding to incidents involving commercial vehicles. Since not all towing and recovery operators invest in the equipment necessary to upright or remove large commercial vehicles, precious response and clearance time is wasted when the wrong resources are sent to these incidents.

[57] It is assumed here that an IAP governing this type of incident has been developed and that all agencies involved agreed to the roles and responsibilities established in the plan.

[58] NIMS' "Resource Typing System" information available online: http://www.fema.gov/emergency/nims/ResourceMngmnt.shtm#item4.

To address this issue, the Towing and Recovery Association of America (TRAA) produced and disseminates a *Vehicle Identification Guide.* The Guide provides law enforcement and other first responders with necessary information for a towing and recovery operator (disabled vehicle type, size, number of axles, how vehicle is positioned, and so forth) to determine the correct equipment to dispatch for the tow.[59]

3.2.4 Fatal Incidents

When an incident involves one or more fatalities, protocol dictates that additional steps are taken to protect and preserve the incident scene for criminal investigation, and to respect the rights of the deceased and their families.

National Cooperative Highway Research Program (NCHRP) Synthesis 318 found that "…73 % of jurisdictions require that medical examiners or coroners respond to the site of a fatal crash before the deceased can be removed."[60] The notification and response time for a coroner or medical examiner may be lengthy if that person is attending to other duties at some distance from the incident scene. The increased time creates additional congestion and safety hazards for incident responders and motorists. The longer an incident scene is in place, the greater the likelihood for secondary crashes.

Therefore, many States are implementing laws, policies, and procedures that take into account all activities that must be done for crime scene investigation, including dealing with the deceased, as well as expediting scene clearance. These combine quick clearance and hold harmless provisions that address the removal of a fatality from an incident scene where the location obstructs or presents a hazard to the normal flow of adjacent traffic.[61]

Texas is an example of a State that has legislatively addressed the movement of a body in a fatal accident. The statutory language, found in the Texas Code of Criminal Procedure, chapter 49, section 25, part 8, states that:

> When any death under circumstances set out in Section 6 shall have occurred, the body shall not be disturbed or removed from the position in which it is found by any person without authorization from the medical examiner or authorized deputy, except for the purpose of preserving such body from loss or destruction or maintaining the flow of traffic on a highway, railroad or airport.[62]

The Washington State Patrol (WSP) and the Washington State Department of Transportation (WSDOT) have executed a series of memoranda with County Coroner's Offices, titled, *Guidelines for Off-Site Removal of Deceased Persons at Collisions*, which establish the procedures under which a body may be moved after a fatal accident. One example is found in the agreement reached among the WSP, WSDOT, and Skagit County:

> During these investigations, it is important to balance the need to conduct thorough investigations with the need to respect the dignity and privacy of the deceased and the deceased's family. It also is important to prevent on-lookers from viewing the deceased whenever possible and to restore the flow of traffic as soon as possible.[63]

[59] *Towing and Recovery Association of America Vehicle Identification Guide*, TRAA, available online: http://www.towserver.net/products.htm.

[60] NCHRP Synthesis 318, *Safe and Quick Clearance of Traffic Incidents – A Synthesis of Highway Practice*, Transportation Research Board, 2003, p. 33, available online: http://onlinepubs.trb.org/Onlinepubs/nchrp/nchrp_syn_318.pdf.

[61] NCHRP Synthesis 318, p. 32.

[62] Texas Statutes, Code of Criminal Procedure – Article 49.25 Medical Examiners, Part 8, available online: http://law.onecle.com/texas/criminal-procedure/49.25.00.html.

[63] A copy of the agreement among the three entities is available online: http://www.wsdot.wa.gov/NR/rdonlyres/53E65D34-3927-4F9C-B396-4CEA576CD6C9/0/skagit_county.pdf.

The State of Georgia *Open Roads Policy* contains similar language:

> Once the police investigator has completed taking photos of the deceased person(s) and the incident scene, the Office of Medical Examiner agrees to the movement of deceased person(s) from the travel lanes. The movement of deceased persons may include ejected deceased persons and vehicles containing deceased persons to the shoulder of the roadway, to off ramps, accident investigation sites, or other safe areas off the travel lanes for completion of investigation to reduce the delays and secondary crashes associated with motorists slowing to view the incident scene.[64]

3.2.5 Safe, Quick Clearance Laws and Policies

Safe, quick clearance (SQC)[65] is defined as "…the practice of rapidly and safely removing temporary obstructions from the roadway,"[66] and should be a key feature of all responder actions. A number of States, regions, and localities have implemented SQC laws to assist traffic incident responders. Three core laws, in particular, provide a necessary foundation for facilitating the safe and expedited removal of traffic incidents:

- **Driver Removal or "Move It":** These laws require motorists involved in minor crashes, where the vehicle is drivable and there are no serious injuries, to move their vehicles out of the travel lanes to the shoulder or other safe area before initiating the exchange of insurance information, or while awaiting the arrival of law enforcement and/or a tow truck.
- **Authority Removal:** These laws provide authority (and generally immunity from liability) for designated public agencies to remove vehicles and spilled cargo from the roadway to restore traffic flow.
- **"Move Over":** Designed to protect incident responders and stranded motorists alike, Move Over laws require motorists approaching incident responders and vehicles to slow down and move over to an adjacent lane, when possible, to provide an increased safety buffer. (As Move Over laws are a key feature of responder safety, they are discussed in more detail in section 3.3 Responder and Motorist Safety).

Driver Removal or "Move It" Laws

A number of States have enacted laws that require motorists involved in a crash to move their vehicles out of a lane and off the road to avoid blocking traffic when:

- The crash has not resulted in any apparent injuries or fatalities.
- There appears to be only property damage.
- One or more lanes are blocked by the vehicles involved in the crash.

[64] State of Georgia's *Open Roads Policy* is available online: http://www.timetaskforce.com/documents/presentationsmeetings07/Open%20Roads%20Policy%20DRAFT09-11-07.pdf.

[65] NCHRP Synthesis 318, p. 19.

[66] Ibid.

A number of States have made the Move It law applicable only when a crash occurs on a limited access highway, expressway, or multiple lane highway. Several States' laws include statutory language, which states that moving the vehicle does not affect the question of fault in the cause of the accident, nor is it to be considered evidence of leaving the scene of an accident. For example, following is the language of a Move It law contained in the Connecticut Statutes, Title 14, Section 14-262(d) and (e):

> (d) Each person operating a motor vehicle who is knowingly involved in a crash on a limited access highway which causes damage to property only shall immediately move or cause his motor vehicle to be moved from the traveled portion of the highway to an untraveled area which is adjacent to the crash site if it is possible to move the motor vehicle without risk of further damage to property or injury to any person.[67]
>
> (e) No person who acts in accordance with the provisions of subsection (d) of this section may be considered to have violated subsection (b [referring to the duty to 'at once stop']) of this section.

The Connecticut Statutes language captures the key components of State Move It laws:

- Law addresses crashes with property damage only.
- Law requires that the motor vehicle be moved from a traveled to an untraveled area adjacent to the crash site.
- Law includes the caveat that the move should be done if "it is possible to move the motor vehicle without risk of further damage to property or injury to any person".[68]
- Attaches no blame for the cause of the crash to the driver for moving the vehicle

The Missouri Revised Statutes (chapter 304, section 151) requires that a driver of a vehicle involved in a crash make every reasonable effort to move the vehicle or have it moved as not to block the regular flow of traffic, except in the case of a crash resulting in the injury or death of any person. The law further provides that any person who fails to comply with the requirements may be subject to a fine.[69]

The Missouri Move It law captures the same key components as does the Connecticut law, and adds two additional provisions:

- The law requires that a motorist, if not able to move a vehicle, must make a reasonable effort to have the vehicle moved by a third party.
- The law also establishes a penalty for failure to comply—if convicted, a motorist is assessed a fine between $10 and $50.

[67] Connecticut Statutes, Chapter 248 – Vehicle Highway Use, Section 24-224(d), available online: http://www.cga.ct.gov/2005/pub/Chap248.htm#Sec14-224.htm.

[68] Connecticut Statutes, Chapter 248, Section 14-224(d).

[69] Missouri Revised Statutes, Chapter 304, Section 151, available online: http://www.moga.mo.gov/statutes/C300-399/3040000151.HTM.

Authority Removal

Authority Removal laws provide statutory authority for incident responders to move vehicles or other roadway obstructions out of lanes of traffic or from the shoulder when the vehicle is creating a hazard. The intent is the same as with SQC policies—the safe and fast removal of incapacitated vehicles, cargo, or other obstructions resulting from a crash to remove lane blockages, increase responder safety, and reduce the potential for a secondary incident.

NCHRP Synthesis 318 "Safe and Quick Clearance of Traffic Incidents" defines Authority Removal Laws as follows:

> An authority removal law provides authorization to a predesignated set of public agencies to remove (1) driver attended disabled or wrecked vehicles and (2) spilled cargo or other personal property blocking a travel lane(s) or otherwise creating a hazard to the flow of adjacent traffic. For definition purposes, an "authority" represents a public agency authorized to remove or cause removal of vehicles under an authority removal law. Such agencies generally include State, county, and local law enforcement, in addition to State DOTs.[70]

A key provision of these laws is to provide responders with immunity from liability for any damage that results from moving a vehicle, vehicles, or cargo from a roadway. An example of this is shown in the State of Montana Statute establishing authority removal. The Statute includes a "good faith immunity" clause that holds a responder harmless from liability unless any damages are caused by gross negligence:

> **61-8-909. Good faith immunity.** A person who renders assistance in an emergency that is life-threatening to the occupant of a wrecked, disabled, or abandoned vehicle or that is creating an immediate hazard on a public roadway or who renders emergency assistance as directed by a law enforcement officer or other emergency responder at the scene of a motor vehicle crash is immune from damages arising from acts or omissions related to the rendering of assistance unless the damages are occasioned by the gross negligence or by the willful or wanton acts or omissions of the person rendering the assistance.[71]

Many State Laws specifically indemnify responders and agents acting in good faith in the performance of their duties. Agents acting in good faith may include towing operators operating under the direction of a peace officer and/or under contractual obligation with a State to provide authority removal services. An example of this indemnification is also contained in chapter 6 of Title 49 of the Idaho Statutes (49-662), which states in part:

> Neither the peace officer nor transportation department employee, nor anyone acting under the direction of the officer is liable for damage to the motor vehicle, cargo or debris caused by reasonable efforts of removal.

[70] NCHRP Synthesis 318, p. 25.

[71] Montana Code, Title 61 Motor Vehicles, Chapter 8, Part 9, available online: http://law.justia.com/montana/codes/61/61-8-909.html.

Authority removal laws also include provisions that address:

- The type and severity of an incident that is subject to authority removal laws.
- The type of highway facility that is subject to authority removal laws.
- The type of obstruction blocking lanes (i.e., vehicles or cargo), where responders have the authority to move the obstruction.
- A listing of the agencies granted authority to remove or direct removal of incident.
- Requirements on where to move vehicles and/or cargo that are obstructing traffic
- Guidance on vehicle and/or cargo handling after removal from the roadway.
- Guidance on handling incidents involving commercial vehicles.

An example of a State statute that includes these provisions is found in the Tennessee Code Annotated, Title 54 – Highways, Bridges and Ferries:

> Removal of vehicles, cargo, and other spilled property. The law provides that a vehicle, cargo, or personal property that is creating an obstruction or hazard to traffic may be immediately removed unless the crash involves injury or fatality.[72]

SQC Law Implementation Status

According to Move Over America, an advocacy group for this law, Maryland, Hawaii, and Washington DC are the only jurisdictions without a Move Over law. Approximately 60 percent of States have Move It laws in effect, while approximately 97 percent have enacted the Move Over laws. However, each of these laws covers a different aspect of assuring open roadways after an incident.

To advance safety and mobility on a national level, States should enact all three SQC laws. Additionally, outreach to incident responders and the motoring public is necessary to ensure that the laws are understood and demonstrated by compliance.

To successfully implement SQC laws, they must be incorporated into agency TIM programs, and the agencies involved with TIM have to establish policies and procedures guiding how SQC laws will be enforced. This may require the enactment of supporting regulations or inter-agency agreements governing incident response activities in support of SQC. States also may need to develop procedures and policies on how the laws will be enforced, and provide education and training to all responders so that they understand SQC laws.

The WSDOT and the Washington State Patrol (WSP) developed the "Joint Operations Policy Statement"[73] (JOPS) to govern all aspects of incident management. JOPS, which was first enacted in 2002, and revised in 2005, 2006, and updated in 2008, defines the roles and responsibilities of each agency for incident response teams, hazardous materials handling, service patrols, and tow truck handling. The JOPS also establishes specific performance targets for clearing incidents—90 minutes—and the process by which performance is measured.

[72] Tennessee Code Annotated, Title 54 – Highways, Bridges and Ferries, Chapter 16, Section 113, available online: http://www.michie.com/tennessee/lpext.dll?f=templates&fn=main-h.htm&cp=tncode.

[73] Washington State Joint Operations Policy Statement, available online: http://www.watimcoalition.org/pdf/JOPS.pdf.

By establishing the target of clearing highway incidents within 90 minutes and identifying the agencies involved in response activities, the JOPS accomplishes two key goals. First, the JOPS recognizes the inter-dependencies between all of the agencies involved in response activities and the multi-disciplinary nature of incident response activities. Second, the JOPS establishes the 90-minute target against which actual performance is measured. The JOPS requires that the agencies report on average incident response times and conduct report on incidents that were not cleared within 90 minutes.

The JOPS states that Incident Response (IR) on Washington State Highways has always been a partnership of WSP, WSDOT, local fire/EMS (Fire), the tow industry, the media, auto/truck/ insurance associations and the public. Washington's IR partners are working more closely together than ever before. Following is an excerpt with respect to the collaborative goal of within the partnership of regarding JOPS policy:

> The WSP, Washington State Association of Fire Chiefs (WSAFC), and WSDOT will collaborate to safely clear highway incidents within our mutual goal of 90 minutes. This policy manage resources responding to, mitigating, investigating, and clearing highway lanes and ferry routes in order to minimize traffic disruption. means WSP, WSAFC, and WSDOT will effectively and efficiently.[74]

By identifying the participating agencies and setting a clearance target, JOPS has accomplished a means to establish accountability. Agencies are responsible to report on their performance and assess the effectiveness of SQC. The agencies also have the opportunity to identify necessary operational performance changes and institutional issues that need to be resolved. This is an excellent example of how a State has established communications practices and procedures to coordinate the roles and responsibilities of on-scene, multi-disciplinary responder personnel.

Implementing SQC Laws: The Need for Education and Outreach

The effectiveness of SQC laws, even where they have been enacted, is frequently adversely impacted by a number of issues such as:

- Concern for the political or legal viability of these laws by legislators.
- A lack of widespread awareness among implementers including the general public and insurance companies of these laws.
- A lack of understanding of the relationships between these laws by implementers sometimes due to ambiguity in the legislation or inconsistent enforcement.
- Potential conflicts between agency missions—the enforcement community may need to conduct a crash investigation and moving vehicles, cargo, and/or obstructions out of a lane or off the road may adversely impact an investigation.
- Highly entrenched traditional reactions by many drivers who have previously been advised to not move vehicles involved in an incident before law enforcement arrives and an investigation is conducted.

[74] JOPS, p. 9.

In the case of authority removal laws, there is concern and uncertainty over liability among implementing agencies. The concern of being held liable by a vehicle or cargo owner because of damage causes responders to refrain from using their ability to move vehicles and cargo expeditiously, even in localities with these laws in effect. USDOT support for safe and quick clearance is driven by the need to keep traffic moving, reduce the possibility of secondary incidents, and enhance responder safety. However, there may be times when these objectives conflict with the objectives of other representatives of the responder community.

Additional research has shown that the traveling public is not aware of and does not understand SQC laws. Founded in 2007 to promote national awareness and enactment of Move Over laws, the "Move Over America" campaign reports that at the time there were only seven States that did not have Move Over laws in place. However, even in States with these laws, 71 percent of people surveyed have not heard of them.[75] The Traffic Incident Management Self-Assessment (TIMSA) 2007 National Report states that:

> ... a number of assessments acknowledge that while a quick clearance policy exists, its utilization is minimal. The reasons cited are either a lack of well-defined procedures and policies for executing quick clearance or a lack of public understanding of Move It and Move Over, Slow Down laws (which is in fact a responder safety tool and not a quick clearance policy). The confusion over what constitutes a quick clearance policy continues to hinder any real analysis on progress in this area. Until more clarity on quick clearance exists among incident responders, with whom responsibility resides for execution of the policies, it is unlikely that the motoring public will achieve any greater understanding of their responsibilities in quick clearance (steer it, clear it, etc.).[76]

To further SQC across the country, a number of TIM stakeholder organizations have published guides, provided training, and deployed public outreach campaigns in promoting safe, quick clearance information, as identified in Table 13.

[75] Move Over America" Web site, available online: http://www.moveoveramerica.com/#.

[76] *Traffic Incident Management Self-Assessment: 2007 National Report*, Office of Transportation Operations, FHWA (September 2007).

Table 13. TIM Stakeholder Organizations Promoting SQC Nationwide

Sponsor	Constituency	Approach	Description
National Traffic Incident Management Coalition (NTIMC): http://timcoalition.org/?siteid=41	Multidisciplinary professionals at all levels, which represent the Emergency Medical Services, Fire, Law Enforcement, Public Safety Communications, Towing and Recovery, and Transportation communities.	National Unified Goal (NUG) for Traffic Incident Management.	The 18 NUG strategies provide the framework for achieving the overall NUG goals of: 1) responder safety; 2) safe, quick clearance; and 3) prompt, reliable incident communications. The strategies provide for the development of multi-disciplinary recommended and accepted practices, policies, procedures and training.
I-95 Corridor Coalition: http://www.i95coalition.org/	Transportation professionals at all levels.	Quick Clearance (QC) Toolkit and Workshops.	Documents sample QC laws, policies, procedures, and best practices. The workshops are designed to present QC implementation best practices.
Nonprofit organizations, such as "Move Over America": http://www.moveoveramerica.com/	Motoring public, elected officials, and emergency responders.	"Move Over" video and Web site.	Provides downloadable video and information via Web site, including testimonial about a fallen officer killed by a vehicle while responding to an incident.
American Automobile Association (AAA)	Motoring public; elected officials.	Slow Down/"Move Over America" campaign.	Public information and legislative campaign designed to reduce injuries and death among roadside workers and stranded motorists through enactment of and public outreach on Move Over laws.
State and local governments	Motoring public.	Many States have instituted their own outreach efforts, such as "Steer It or Clear It" in Houston, Texas.	Provides downloadable video, press releases, and other outreach materials to raise awareness of existing SQC laws.
International Association of Chiefs of Police (IACP): http://www.theiacp.org/	Law Enforcement	Law Enforcement Stops & Safety Subcommittee (LESS)	The 2006 Staff Report[77] contains four chapters of original evaluation research by LESS members: • Move Over laws. • Officer Visibility. • Vehicle Emergency Warning Systems. • Vehicle Positioning and Officer Approach.

[77] *Law Enforcement Stops and Safety Subcommittee 2006 Staff Report*, available online: http://www.theiacp.org/Portals/0/pdfs/LESS/LESSS_2006StaffReport.pdf.

Safe, Quick Clearance and the Trucking Industry

Consensual towing refers to the ability of a consumer to negotiate and establish the terms and conditions, including pricing, for a tow service. Non-consensual towing indicates that the consumer has not enjoyed these same privileges. The need to quickly remove damaged vehicles from the roadway necessitates that it is the governmental agencies that will enter into service agreements with towing and recovery based on capabilities, geography, and regulated pricing. The vast majority of incident scene towing is non-consensual.

TIM administrators should be cognizant of the fact that the trucking industry has expressed concern with the scope of authority removal laws.

Obtaining industry involvement is recommended with developing authority removal laws is best done by involving the trucking industry, through the State trucking association or other industry groups, in the development of authority removal policies and regulations. These discussions should include Towing and Recovery capabilities to guarantee that only the most qualified companies are used to remove damaged commercial vehicles and cargo quickly and efficiently from the roadway. The importance collaborative efforts is recognized by the trucking industry as documented in a white paper prepared for the ATA Litigation Center's 2008 Forum for Motor Carrier General Counsels:

> It is imperative for the trucking industry to monitor the non-consensual towing area and to seek to assist governmental agencies with implementation of non-consensual tow programs. There have been important and ground-breaking initiatives in this regard where State motor carrier associations have worked with State Departments of Transportation to develop non-consensual tow programs that are fair and efficient. When these types of programs (where the State motor carrier association has worked with the State DOT to develop a fair and efficient program) are implemented, many of the problems currently found in non-consensual tow can be minimized or eliminated altogether.[78]

A number of States have implemented programs that address the concerns of the trucking industry, while at the same time ensuring safe, quick clearance. The Colorado Department of Transportation (CDOT) and the Colorado Motor Carrier Association developed the CDOT Heavy Tow Program along the I-70 corridor between Denver and Vail. Under the program, heavy tow units are staged at strategic locations along the I-70 corridor during high traffic flow conditions, or when storms are anticipated. When a Class 8 or commercial vehicle becomes disabled, the heavy tow unit in the area quickly responds and removes the vehicle to a safe haven at no cost to the trucking fleet (at this point, the fleet is then responsible to move the vehicle). The success in the first season of this program is documented in the data as lane clearance times were cut in half from previous seasons to an average of 27 minutes. The economic benefit is reported by CDOT at over a 20:1 return on investment on a program that cost the State approximately $500,000 to fund per year.[79]

[78] Op Cit., p. 3.

[79] News Release, Central Eastern Colorado/CDOT Region 1, "Successful Season for Quick Clearing Towing Program," June 3, 2009, available online: http://www.coloradodot.info/news/news-releases/successful-season-for-quick-clearing-towing-program.

Other jurisdictions have implemented incentive-based towing programs designed to award tow companies a cash award for expedited clearings. Examples include the Florida Turnpike Rapid Incident Scene Clearance Program[80] and the Georgia DOT's Towing and Recovery Incentive Program.[81] All programs require training/certified operators, timed response, and performance metrics.

The programs are similar in that the qualifying tow companies are awarded zones and there are designated quality standards for service. The target clearing time to open all travel lanes is 90 minutes from the time a tow company gets the notice to begin recovery. If this time allotment is met, a monetary bonus is paid to the tow company. An additional resource on innovative towing programs is the I-95 Corridor Coalition's *Scanning Tour of Innovative Towing Programs*.[82]

3.2.6 Full Function Service Patrols for Incident Response

Traditionally, Service Patrol programs have offered only motorist assistance[83]— in itself an important service to the public that frees police and other emergency response personnel to perform the activities associated with their primary missions. Over time, service patrol programs have matured from basic motorist assistance into more fully functional programs that are actively involved in incident response and management. As a result, Full Function Service Patrols (FFSP) have become a new generation of first responders, providing valuable public safety and protection services. In this new role, Service Patrol programs help keep incident scenes safe, clear incidents more quickly, and assist other emergency responders at incident scenes.

An FFSP's mission is an extension of the transportation agency's mission to maintain the safe and efficient flow of traffic on the roadways. To accomplish this mission, agencies devote large budgets and resources, which include the operation of FFSP programs.

The basic functions of an FFSP include a multitude of responsibilities. To help maintain traffic flow and safety, FFSPs aid in the prompt detection of incidents or disruptions to traffic; minimize incident duration; clear obstructions; improve scene safety; and prevent secondary incidents. As defined in FHWA's ***Service Patrol Handbook***,[84] an FFSP will:

- Provide Incident response services, clearance resources, and free motorist assistance services 24 hours, 7 days-a-week.
- Provide operators that are highly skilled and specially trained in the following:
  - NIMS/ICS: IS-100, IS-200, and IS-700.
  - ATSSA – Traffic Control Technician.
  - Red Cross – First Aid and CPR.
  - Wreckmaster – Towing and Recovery Operations Specialists.

[80] Florida Turnpike's Rapid Incident Scene Clearance Program, available online: http://vbs.dms.state.fl.us/vbs/ad.view_ad?advertisement_key_num=70896.

[81] Georgia Towing and Recovery Incentive Program PowerPoint presentation, "What is TRIP?", available online: http://www.itsga.org/2008%20Annual%20Meeting/2008%20ITS%20Presentations/Session4A/TRIP-Ted%20Smith.pdf.

[82] I-95 Corridor Coalition: *Scanning Tour of Towing Programs*, April 2007, available online: http://www.transportation.org/sites/ntimc/docs/Tow%20scan.doc.

[83] Motorist assistance generally includes roadside emergency assistance services such as providing gasoline to enable a vehicle to drive to a service station, changing tires, calling in requests for additional services such as a tow truck, and emergency assistance that may be required. Motorist assistance does not in general include an active role in incident response activities.

[84] ***Service Patrol Handbook***, (announced online July 9, 2008, November 2008 edition), p. 32-33, FHWA, available online: http://ops.fhwa.dot.gov/publications/fhwahop08031/index.htm.

- Provide emergency temporary traffic control (TTC) at incident scenes.
- Design and equip FFSP vehicles to fully relocate a stalled or abandoned automobile or light truck from a highway to a safe location.
- Provide a frequency of highway coverage to support statewide incident clearance goals.
- Be fully integrated with regional TMC operations.
- Participate in incident debriefs or after-action reviews.
- Include typical services provided in many service patrol programs today:
  - Provide minor repairs and motorist assistance.
  - Remove debris.
  - Provide fuel.
  - Provide first aid.
  - Relocate vehicles out of travel lanes.
  - Assist emergency services at vehicle crash scenes
  - Reduce traffic congestion, improve travel time reliability, and improve safety on freeway and arterial systems.
- Include the following equipment:
  - Traffic control items.
  - First-aid items.
  - Vehicle-mounted dynamic message signs (DMS)
  - Gasoline.
  - Air compressors.
  - Communications equipment.
  - Basic tools.
- Consider including advanced optional equipment such as:
  - Defibrillators and medical supplies;
  - Fire, animal, and HM containment supplies.
  - Public address system with an external speaker.
  - Automatic vehicle location (AVL).

FFSP vehicles are equipped with incident response equipment such as cones, signs, and message boards for traffic control; and radios, cell phones, and computers for communication. The FFSPs typically carry other equipment to assist in containing and removing an incident and cleaning up after a crash or spill. Their primary duty at incident scenes should be to set up and maintain traffic control to protect incident responders and to provide safer flow of traffic past the incident scene. They also should be the extra set of eyes and ears on the scene for transportation management centers (TMCs).

FHWA encourages FFSP deployment in all major metropolitan areas in the United States, and recommends that FFSPs perform as 24/7 operations to provide ongoing incident management and response assistance, as well as traditional motorist assistance activities.

In some jurisdictions, service patrols known as "motorist assist" or "courtesy" patrols often are subject to budget cuts. These titles belie their vital operational and safety functions in incident response. Therefore, it is important to establish methods for quantifying costs and benefits, including customer feedback and operational information such as clearance times (integrated with other first responders) to document the true role of service patrols at incidents. However, most cost-benefit analyses do not take into account the cost savings to other governmental agencies that service patrols provide.

In its *2008 SMART SunGuide Annual Report*, Florida District Four described the adverse effects in the Intelligent Transportation Systems (ITS) Program concerning its performance measurement of program effectiveness. The 4 percent drop from 2007 is based, in part, on a reduction of the District's service patrol (Road Ranger fleet) hours. Specifically, when the Road Rangers' service hours in Palm Beach and Broward Counties were reduced from 24/7 service to weekdays, 6 a.m. to 7 p.m. (13 hours) in September and October, respectively, the report's benefit-cost ratio analysis revealed the following statistics:[85]

- The response activity of the Florida Highway Patrol (FHP) increased 59 percent.
- Towing response from wreckers dispatched (in lieu of Road Rangers) increased 48 percent.
- During Road Ranger "off periods" in the fourth quarter of 2008 during which 3,863 incidents occurred, the average duration increased by 1 hour per incident. This equated to $47,370,230 in unrealized benefit to the motorists, as well as a 3 percent decrease to the FHP's annual clearance time measures.

As another example of quantifying cost savings to other State agencies, the California Freeway Service Patrol (FSP) is operated jointly by the California Highway Patrol (CHP), the California Department of Transportation (Caltrans), and the local transportation agency.[86] The FSP is a congestion management tool that removes disabling events quickly, thereby maintaining maximum traffic flow. There is a direct benefit to the CHP. Prior to the implementation of the FSP program when an officer was conducting a crash investigation or performing other law enforcement related activities, additional CHP resources had to be dispatched or redeployed to provide the services now being accomplished by the FSP. Both Florida and California provide examples of using "capable but not overly qualified" resources that allows another State resource to conduct tasks that they are uniquely qualified to conduct.

[85] *2008 SMART SunGuide ITS Annual Report*, Florida Department of Transportation, District Four, Fort Lauderdale, Florida, p.4, available online: http://www.smartsunguide.com/pdf/2008AnnualReportFinal.pdf.

[86] Adapted from the CHP/Freeway Service Patrols Web site, available online: http://www.chp.ca.gov/programs/fsp.html.

In some jurisdictions, there are service patrols that provide more than basic services, but less than the services provided by the FFSPs. The Georgia DOT's Highway Emergency Response Operators (HEROS) is a good example of a hybrid service patrol program that provides many of the services identified for an FFSP. The HEROS units patrol the Atlanta-area freeways 7 days a week, Monday through Friday, 5:30 a.m. to 9:30 p.m., and Saturday and Sunday, 9:30 a.m. to 9:30 p.m. The HEROS units also are on call to respond to incidents that occur outside of working hours, as necessary. HEROS personnel wear uniforms that identify them as Georgia DOT Incident Management Technicians and carry required identification that is provided to motorists as needed.

The HEROS respond to between 55,000 and 60,000 incidents and calls annually. The Georgia DOT TMC is responsible for dispatching HEROS units to traffic-related incidents. The HEROS are primarily responsible for reducing traffic congestion and delays, and provide support to law enforcement, first responders, and other emergency agencies during incident response activities. The HEROS also aid motorists by clearing stalled vehicles from travel lanes, and help resolve minor mechanical problems when they:

- Change flat tires.
- Jump-start batteries.
- Provide fuel, coolant, etc.
- Provide road and travel information.
- Provide transportation to safer areas.
- Provide courtesy use of a telephone.[87]

Figure 5 shows a mobile HEROS unit supplied with advance warning arrow panels to warn oncoming traffic about a disabled car on the right shoulder.[88]

Figure 5. Georgia DOT HEROS Unit.

[87] Adapted from Georgia DOT Web site, available online: http://www.dot.state.ga.us/travelingingeorgia/hero/Pages/default.aspx.

[88] "Safety Service Patrols – Improving Mobility and Saving Lives," FHWA brochure, available online: http://www.fhwa.dot.gov/tfhrc/safety/pubs/its/pabroch/improveobil.pdf.

The ***Service Patrol Handbook*** recommends that to be most effective, FFSPs:

1. Be part of an integrated TIM program that includes Memoranda of Understanding (MOU) between responder agencies, which outline roles, responsibilities, and incident response functions. FFSPs significantly expand DOT response capabilities, which may require revisions to incident response procedures. Any such changes need to be documented and included in inter-agency agreements.

2. Have a dedicated source of funding. This should include both capital funding for procurement of equipment and vehicle funding for operations. The Handbook does identify several States that have contracted for all or part of FFSP services or have engaged in public-private partnerships to spread costs.

3. Need well-trained staff. Providing the resources to train staff properly in incident response and emergency management techniques and procedures is critical to ensuring that FFSPs provide the anticipated benefit.

4. Need to be supported by management and elected officials. While the benefits offered by deploying FFSPs are substantial, the cost of 24/7 services and the associated staff, equipment, and vehicles need to be understood and accepted by all decision makers—agency and elected. Documenting, and if possible, quantifying benefits realized from the deployment of FFSPs is critical for obtaining this support.

3.3 Responder and Motorist Safety

The impacts of traffic incidents on responder and motorist safety are well documented as shown in the following citations:

- Data collected by the National Institute for Occupational Safety and Health (NIOSH) shows an upward trend in numbers of all types of workers killed as a result of being struck by vehicles. In 2005, NIOSH reported 390 workers killed in struck-by incidents, up from 278 in 2004, and up from an annual average of 365 over the 2000-2004 period. In 2005, struck-by incidents accounted for 7 percent of the total number of fatal occupational injuries.[89]

- The U.S. Fire Administration (USFA) reports that over the last decade for which complete figures were available (1996 to 2006), vehicle collisions claimed 227 firefighter lives, and another 52 firefighters were involved in struck-by incidents. Between 1996 and 2006, vehicle collisions/struck-by incidents accounted for 20 percent of all fatalities. In 2003, this figure jumped dramatically to 35 percent of all fatalities, with 34 firefighters killed in vehicle collisions and 5 struck-by vehicles. This trend continued in 2005, with 24 percent (25) of the 115 fatalities resulting from vehicle collisions, and 2006, with 21 percent (22) of fatalities resulting from vehicle collisions.[90]

[89] NIOSH data included in an NTIMC Responder Safety publication available online: http://www.transportation.org/sites/ntimc/docs/ResponderSafety3xFinal.pdf. NTIMC data source from Occupational Safety and Health Administration (OSHA): *Fatal Occupational Injuries by Event or Exposure*, 2000-2005.

[90] *Traffic Incident Management Systems*, April 2008, USFA, p. 3, available online: http://www.usfa.dhs.gov/downloads/pdf/publications/tims_0408.pdf.

- Information presented at the National Conference on Traffic Incident Management indicated that secondary crashes account for more than 20 percent of all crashes. The U.S. Department of Transportation (USDOT) estimates that 18 percent of the fatalities occurring on Interstates are due to secondary crashes.[91] Overall findings show that improvement in all aspects of TIM, especially in incident duration and responder roadside exposure, reduces the probability of secondary crashes. An additional finding states that TIM improvements promote a significant safety benefit as well.

This section discusses new developments in tactical operations designed to improve responder and motorist safety.

3.3.1 Move Over Laws

Move Over laws are one of three key safe, quick clearance laws (see section 3.2.5 Safe, Quick Clearance). Move Over laws protect incident responders by providing specific requirements for motorists' reactions when approaching an incident scene. These laws provide for an additional "buffer zone" between the emergency vehicle and traffic. When approaching a stationary emergency vehicle displaying emergency lights or amber lights In general, Move Over laws require that motorists must:[92]

- Change lanes into an available lane that is not adjacent to the stationary emergency vehicle, but only if a lane change can be made safely.
- Slow down and be prepared to stop if a lane change is not possible.

The laws specify that these actions be taken when no other traffic direction is being given by an enforcement officer.

Some State statutes include specific speed reductions. For example, Florida requires that motorists slow down by 20 miles per hour (mph) on roadways where the posted speed limit is 25 mph or greater, or slow down to 5 mph when the posted speed limit is below 25 mph, unless otherwise directed by a law enforcement officer. Most State statutes, however, specify that motorists simply slow down to a speed that is safe for the road, weather, and traffic conditions in and around the stationary emergency vehicle.

In general, State statutes establish the presence of an "authorized emergency vehicle" with flashing emergency lights as the threshold for when a vehicle is required to move over. Authorized emergency vehicles, whether defined in the prevailing statutes or another companion statute, include police, fire, and EMS vehicles. A number of States expanded the definition of emergency vehicles to include towing and recovery vehicles. Some States also include service patrols, highway maintenance vehicles, and even animal control vehicles within the definition of an "authorized emergency vehicle".

The Tennessee Code provides an example of a State statute that specifically defines highway maintenance and service patrol vehicles as emergency vehicles included in a Move Over law as found in Title 55, chapter 8, section 132:[93]

[91] Proceedings from the *National Conference on Incident Management,* June 2002.

[92] Adapted from the "Move Over America" Web site, available online: http://www.moveoveramerica.com/.

[93] The Tennessee Code, available online: http://www.michie.com/tennessee/lpext.dll?f=templates&fn=main-h.htm&cp=tncode.

55-8-132. Operation of vehicles and streetcars on approach of authorized emergency vehicles.

(c) Upon approaching a stationary recovery vehicle or a highway maintenance vehicle, when the vehicle is giving a signal by use of authorized flashing lights, a person who drives an approaching vehicle shall:

(1) Proceeding with due caution, yield the right-of-way by making a lane change into a lane not adjacent to the stationary recovery vehicle or the highway maintenance vehicle, if possible with due regard to safety and traffic conditions, if on a highway having at least four (4) lanes with not less than two (2) lanes proceeding in the same direction as the approaching vehicle; or

(2) Proceeding with due caution, reduce the speed of the vehicle, maintaining a safe speed for road conditions, if changing lanes would be impossible or unsafe.

For further information on Move Over and related quick clearance laws, see the FHWA publication, *Traffic Incident Management Quick Clearance Laws: A National Review of Best Practices*.[94]

3.3.2 Protective Apparel

The use of high-visibility safety apparel by incident responders is a key element of enhancing responder safety at roadside.[95] Based on the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) Section 1402 requirements, on November 24, 2006, the FHWA adopted regulations that require all "workers" within the rights-of-way of Federal-aid highways to use high-visibility safety apparel.[96] On November 21, 2008, the FHWA issued an Interim Final Rule modifying the 2006 rule to address concerns of firefighters working at incident scenes requiring other special protective equipment. The rulemaking, codified in Title 23 of the Code of Federal Regulations (CFR), Part 634, became effective November 24, 2008, which states:

§ 634.2 Definitions.
"Workers" means people on foot whose duties place them within the right-of-way of a Federal-aid highway, such as highway construction and maintenance forces; survey crews; utility crews; responders to incidents within the highway right-of-way; firefighters and other emergency responders when they are not directly exposed to flame, fire, heat, and/or hazardous materials; and law enforcement personnel when directing traffic, investigating crashes, and handling lane closures, obstructed roadways, and disasters within the right-of-way of a Federal-aid highway.

[94] *Traffic Incident Management Quick Clearance Laws: A National Review of Best Practices*, FHWA, available online: http://ops.fhwa.dot.gov/publications/fhwahop09005/index.htm.

[95] "Illustration of Seeing Distances and Required Stopping Distances," University of Michigan Transportation Research Institute (UMTRI), available online: http://www.usfa.dhs.gov/downloads/pdf/research/SAEpedslide.pdf. This article discusses the results of research demonstrating the benefits of using high-visibility safety apparel for improving responder detection by motorists.

[96] Code of Federal Regulations (CFR) 23, Part 634.4, available online: http://edocket.access.gpo.gov/cfr_2007/aprqtr/pdf/23cfr634.4.pdf.

§ 634.3 Rule.
All workers within the right-of-way of a Federal-aid highway who are exposed either to traffic (vehicles using the highway for purposes of travel) or to construction equipment within the work area shall wear high-visibility safety apparel. Firefighters or other emergency responders working within the right-of-way of a Federal-aid highway and engaged in emergency operations that directly expose them to flame, fire, heat, and/or hazardous materials may wear retroreflective turn-out gear that is specified and regulated by other organizations, such as the National Fire Protection Association. Firefighters or other emergency responders working within the right-of-way of a Federal-aid highway and engaged in any other types of operations shall wear high-visibility safety apparel.

The use of high-visibility safety apparel is governed by the requirements of the International Safety Equipment Association's (ISEA) "American National Standard for High-Visibility Apparel" and the American National Standards Institute (ANSI) Standard 107-1999. The ***Manual on Uniform Traffic Control Devices (MUTCD)*** standard for high-visibility safety apparel[97] is based on these requirements, and much of the equipment in use is designed to the ISEA requirements and ANSI standard. The standard defines high-visibility safety apparel requirements for retroreflectivity, type of material, colors, and fluorescence. Figure 6 presents two samples of ANSI/ISEA-compliant Class II (sleeveless vest) and Class III (vest with sleeves) high-visibility apparel in appropriate colors with retroreflectivity and florescence properties.[98]

Figure 6. ANSI/ISEA Standard 107-Compliant Vests.

Source: Photo courtesy of Mr. Ronald Moore, McKinney Fire Department, McKinney, Texas.

[97] *MUTCD*, Chapter 6, Part 6, Temporary Traffic Control, Section 6E.02, available online: http://mutcd.fhwa.dot.gov/pdfs/2003r1/Ch6A-E.pdf.

[98] The garment is fluorescent yellow-green, orange-red, or a combination of these two colors. The garment requires 775 square inches of background fabric and 201 square inches of reflective material.

ANSI/ISEA revised and updated the standard in 2004 and released ANSI/ISEA 107-2004. The new standard sets performance criteria and guidelines for the selection, design, and wearing of high-visibility safety clothing. The new standard defines three protective classes based on background material, retroreflective material, and design and usage requirements. The new standard also provides criteria to assist in determining the appropriate garment based on roadway hazards, work tasks, complexity of the work environment, and vehicular traffic and speed.[99]

The NTIMC also is actively involved in promoting the use of high-visibility safety apparel.[100] Working with ISEA, the NTIMC sought and successfully obtained a standard for a public safety vest designed to address concerns of public safety responders working at incident scenes. In 2007, ANSI/ISEA released a new standard, ANSI/ISEA 207-2006, American National Standard for High-Visibility Public Safety Vests. ANSI 107-2004 specifically prohibited the classification of sleeveless garments when worn alone. However, this standard did not meet certain special needs of responders, that of apparel that can fit over belt-mounted equipment and apparel that will tear away if caught on a moving vehicle. ANSI/ISEA 207-2006 establishes design, performance specifications, and use criteria for high-visibility vests and meets the special needs not addressed under ANSI 107-2004. It should be noted that ANSI 207-2006 does not replace ANSI 107-2004, and that the new standard is intended to primarily meet the needs of public safety response personnel.[101] Functionally, the public safety vest is a Class II garment.

3.3.3 Traffic Management/Vehicle Placement/Emergency Lighting

The primary goals of TIM-related traffic management, vehicle placement, and emergency lighting are defined in the following excerpt from ***MUTCD***, chapter 6I:

> An essential part of fire, rescue, spill clean-up, highway agency, and enforcement (Traffic Incident Management) activities is the proper control of road users through the traffic incident management area in order to protect responders, victims, and other personnel at the site while providing reasonably safe traffic flow.[102]

These same goals also are reflected in Objective 1– Responder Safety and Objective 2 – Safe, Quick Clearance the TIM National Unified Goal developed by the NTIMC.[103]

The key issue here is that all partners involved in TIM activities and incident response are concerned with safety for responders and the traveling public, as well as the safe, quick clearance of incidents. Where consensus is still developing, however, is on how such key factors in incident response such as traffic management and vehicle placement should be accomplished.

The following subsections present a summary of practices recommended by TIM stakeholder groups for addressing these issues. The intent is not to recommend a particular approach but to enhance awareness that there are different recommendations regarding approaches, and that as of the publication date of ***the Handbook***, there is no national consensus on these issues.

[99] *Traffic Incident Management Systems*, USFA, p. 35.

[100] "Responder Safety" publication, NTIMC, available online: http://www.transportation.org/sites/ntimc/docs/ResponderSafety3xFinal.pdf.

[101] Op Cit., p. 37-38.

[102] ***MUTCD***, Chapter 6I, Section 6I.101 General, available on line at: http://mutcd.fhwa.dot.gov/HTM/2003r1/part6/part6i.htm.

[103] "The National Unified Goal for Traffic Incident Management", NTIMC publication, available online: http://www.transportation.org/sites/ntimc/docs/NUG%20Unified%20Goal-Nov07.pdf.

Traffic Management

Current DOT traffic management practices for TIM are based on ***MUTCD***, chapter 6 (Temporary Traffic Control-TTC). The ***MUTCD*** defines a traffic incident as "an emergency road user occurrence, a natural disaster, or other unplanned event that affects or impedes the normal flow of traffic"[104] and establishes the structure for managing incident response activities.

MUTCD, chapter 6I (Control of Traffic through Traffic Incident Management Areas) describes three levels of traffic incidents: Major, Intermediate, and Minor.[105] A "Major Traffic Incident" typically requires closing all or part of the roadway for a period exceeding 2 hours. An "Intermediate Traffic Incident" typically affects travel lanes for a period of 30 minutes to 2 hours. When the use of traffic control is discussed, usually it is focused on these two incident types, which require the close coordination emblematic of mature TIM Programs.

A "Minor Traffic Incident" typically last no more than 30 minutes and does not require lane closures or extensive traffic control. This type of incident is handled by law enforcement, towing and recovery, or a service patrol alone or in combination.

A "Traffic Incident Management Area" (TIMA) is defined as an area of a highway where TTC is imposed by authorized officials responding to a road user incident, natural disaster, hazardous material spill, or other unplanned incident. The TIMA extends from the first warning device (such as a sign, light, or cone) to the last TTC device, or to a point where vehicles return to the original lane alignment and are clear of the incident. ***MUTCD***, chapter 6I contains detailed guidance on the recommended size of a TIMA, depending upon road configuration, vehicle speed, and weather conditions.[106]

The ***MUTCD*** further establishes the primary functions of TTC at a TIMA: to move road users reasonably, safely, and expeditiously past or around the traffic incident; to reduce the likelihood of secondary traffic crashes; and to preclude unnecessary use of the surrounding local road system. Examples include a stalled vehicle blocking a lane; a traffic crash blocking the traveled way; a hazardous material spill along a highway; and natural disasters such as floods and severe storm damage.[107] Decades of research by transportation agencies and practitioners into the science and practical application of traffic control have led to "Typical Applications for Traffic Incident Management Areas". They have established an accepted and expected standard that emergency responders should meet.

Figure 7 presents a diagram that displays how an ***MUTCD***-compliant TIMA should be established. Key elements of a TTC/TIMA include:

- **Advance Warning Area:** The advance warning area is that area of the highway where advance warning signs are placed to inform road users as they approach an upcoming incident area. Typical distances for advance warning sign placements on expressways and freeways should be longer because drivers are conditioned to uninterrupted flow. Since rural highways are normally characterized by higher speeds, the effective placement of the first warning sign also is substantially longer. Advance warning is provided by traffic control flaggers, DMS, and cone placement, and the key is to ensure

[104] *MUTCD*, Chapter 6I, available online: http://mutcd.fhwa.dot.gov/HTM/2003/part6/part6i.htm.

[105] *MUTCD*, Chapter 6I.02 through 6I.04, available online: http://mutcd.fhwa.dot.gov/HTM/2003/part6/part6i.htm.

[106] *MUTCD*, Chapter 6I.02 through 6I.04.

[107] *MUTCD*, Chapter 6I.

that motorists receive adequate advance notice. Considerations with respect to the starting point for providing advanced warning depends upon traffic speed, weather conditions, roadway configuration, and user expectations. (For additional information, see section 3.4 Additional Resources, in particular, the ***MUTCD***, chapter 6I, the USFA's "Traffic Incident Management Systems", and the Calgary Fire Department's "Emergency Traffic Accommodation" [authored by Battalion Chief Richard Elvey]).

- **Transition Area:** The transition area is that section of the highway where motorists are redirected from their normal path. The ***MUTCD*** provides guidance for the length of taper required and for the structure of multi-lane transitions. The ***MUTCD*** does state that longer tapers are not necessarily better than shorter tapers (particularly in urban areas characterized by short block lengths, driveways, etc.) because extended tapers tend to encourage sluggish operation and to encourage drivers to delay lane changes unnecessarily. The test concerning adequate lengths of tapers involves observation of driver performance after temporary traffic control plans are put into effect.
- **Activity Area:** The activity area is the section of the highway where the work activity takes place, and is comprised of the work space, the traffic space, and the buffer space. The "work space" is that portion of the highway closed to road users and set aside for workers, equipment, and material. The "traffic space" is the portion of the highway in which road users are routed through the activity area. The "buffer space" is a lateral and/or longitudinal area that separates road user flow from the work space or an unsafe area, and might provide some recovery space for an errant vehicle. Neither work activity nor storage of equipment, vehicles, or material should occur within a buffer space. When work occurs on a high-volume, highly congested facility, an incident management vehicle storage space may be provided so that emergency vehicles (for example, tow trucks) can respond quickly to road user incidents. When used, an emergency vehicle storage area should not extend into any portion of the buffer space.
- **Termination Zone:** The termination zone marks the end of the incident area and the location where vehicles are able to resume normal driving patterns and driving speeds.

In the following diagram, the TIMA begins at the first warning sign. General considerations must be given to the speed of the highway when placing the first warning sign. The higher the speed, the less time the motorist has to make decisions; therefore, the greater the need for a longer advance warning area. The same considerations are true for the taper in the transition area, and the need to close or block two 12-foot lanes requires twice the taper distance than one lane.

Advanced warning signs are placed off the shoulder of the roadway at an appropriate distance upstream from the point where the transition (taper) begins. On slower speed or urban roads, this distance is measured at four to eight times the speed limit in miles per hour (mph). The greater the speed limit, the greater the need for advance warning. Therefore, on high-speed roadways the first advance warning sign is placed 8 to 12 times the speed limit in mph.

When a piece of equipment, such as a response vehicle or arrow board, is considered for use at this incident scene, the equipment is positioned at the shoulder and at the beginning of the taper. It is important to note that the start of the taper is in the shoulder lane, and not in a travel lane.

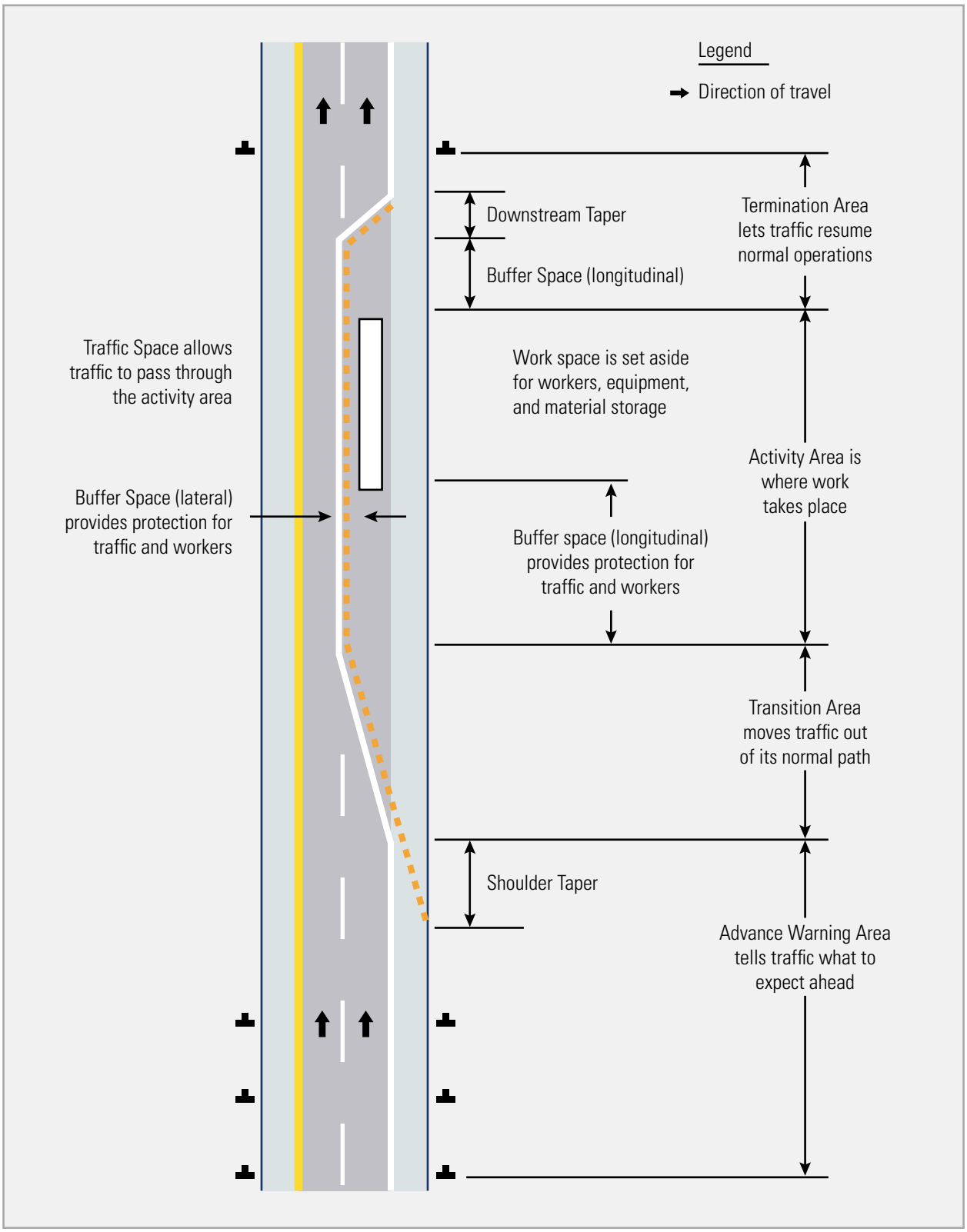

Figure 7. *MUTCD* Traffic Incident Management Area.

Source: Diagram courtesy of Mr. Ronald Moore, and the McKinney Texas Fire Department's "Safe Parking" Training course, McKinney, Texas.

A flashing arrow board or lighted vehicle helps draw the motorist's immediate attention to the start of the taper. The taper length is a combination of the speed in mph of the roadway and the distance in feet at which traffic is required to merge. Although various formulas exist within the ***MUTCD*** and are dependent upon the speed of the roadway, for illustrative purposes here, the length of a typical taper is speed times width. Channelizing devices, such as cones, are placed no more than the speed of the roadway measured in feet apart, i.e., no more than 55 feet apart when the speed limit is 55 mph.

Vehicles and equipment should not be in the transition area, since this area is designed for vehicle merging, and in many cases, this activity tends to be performed at high speeds. Sufficient distance should be allowed for the act of transitioning. After traffic has transitioned from its normal path, it should be moving parallel to the incident scene in the traffic space. Sometimes, however, the act of merging does not proceed as smoothly as designed. Therefore, as indicated in the diagram above, an additional buffer space should be provided. This buffer space is measured from the end of the transition area to the beginning of the work area (identified as the first safe-parked vehicle in the parallel or fend-off position.)

Proper application of positive and unambiguous traffic control measures is needed to protect responders and to ensure that motorists are able to safely pass the incident. Typical applications for traffic incident management have been developed as a joint effort of the National Committee on Uniform Traffic Control Devices and the NTIMC. The typical applications are available as a companion to ***MUTCD***, chapter 6I. Two of the better known models developed by the responder community are "Safe Parking" (also known as "vehicle positioning"), developed by the McKinney Fire Department, McKinney, Texas, and the "Emergency Traffic Accommodation," (ETA) developed by the Calgary, Alberta Fire Department.

The "Safe Parking" concept advocated by the Emergency Responder Safety Institute (ERSI)[108] uses ***MUTCD***, chapter 6, in particular, the guidance on establishing a TTC zone, and is ***MUTCD*** compliant.

The ESRI has developed a Standard Operating Procedure (SOP)[109] for Safe Parking that expands upon the ***MUTCD*** requirements by incorporating the following elements:

- **Safety Benchmarks:** These benchmarks are specific tactical procedures that should be taken to protect all crewmembers and emergency service personnel at the incident scene.
- **Apparatus and Emergency Vehicle Benchmarks:** These benchmarks involve procedures for safe parking of apparatus and emergency vehicles at an incident location when operating in or near moving traffic.
- **Incident Command Benchmarks:** These critical benchmarks provide procedures to ensure that a safe and protected work environment for emergency scene personnel is established and maintained.

[108] ERSI Web site, available online: http://www.respondersafety.com/.

[109] The complete ERSI SOP is available online: http://www.nfpa.org/assets/files//Fire%20service/University_of_Extrication_Apparatus_SOP.pdf.

- **Emergency Crew Benchmarks:** These benchmarks provide tactical procedures to ensure individual safety.
- **High-Volume, Limited-Access Highway Operations:** These benchmarks provide procedures for responding to incidents on turnpikes, toll roads, freeways, and other limited access, high-volume roadways.

The ETA developed by the Calgary Fire Department in Alberta, Canada, also builds upon ***MUTCD***, chapter 6, and provides additional detail, such as the inclusion of an additional buffer space between the first emergency vehicle and other responders, "Fend-Off" vehicle positioning (Canadian terminology for "Safe Positioning"), and additional guidance on how to establish a TTC to enhance responder safety.[110]

Vehicle Placement

The responder community is testing a new concept for vehicle placement at an incident known as "Safe Positioning" (shown as the "Fend-Off Position" from the original concept design as presented by the Calgary Fire Department in Alberta, Canada) and represented in Figure 8.[111] Key elements of Safe Positioning include:

- When establishing the buffer, place the vehicle at a 30° angle to the road, which is referred to as the "fend-off position". If the vehicle is struck, the angle of the buffer may help to deflect a vehicle that otherwise may run into the incident scene. This positioning follows the National Fire Protection Association (NFPA) 1451 guideline about shielding emergency responders, and with emphasis on showing more of the vehicle's retroreflective striping and emergency lights. This vehicle positioning placement improves the ability of oncoming motorists to recognize the emergency vehicle.[112]
- When establishing the buffer, the driver should attempt to position the front bumper of the fire truck at least 2 feet from the longitudinal pavement marking line as shown in Figure 8. This area is referred to as the lateral buffer, and is designed to reduce encroachment into designated traffic lanes. A traffic cone with a strobe light inserted into the top also should be placed on the longitudinal pavement marking line beside the apparatus to allow personnel safer access around that corner of the vehicle.[113]

[110] Elvey, Richard and Dr. John Morrall. *Emergency Traffic Accommodation A Guide for First Responders* publication (U.S. Version), presented at the ITE 2006 Technical Conference and Exhibit, February 27-March 2, 2005, p. 7, available online: http://i95coalition.org/i95/Portals/0/Public_Files/uploaded/Incident-toolkit/documents/Guide/Guide_Clear_AB_CN.pdf.

[111] Ibid., p. 8.

[112] *Emergency Traffic Accommodation A Guide for First Responders* publication, p. 6.

[113] *Emergency Traffic Accommodation A Guide for First Responders* publication, p. 7.

When emergency medical services are involved in incident response, the vehicle should always be positioned such that the rear doors are positioned away from traffic. The wheels also should be turned away from the incident. This vehicle placement enables the apparatus itself to shield the patient loading area.

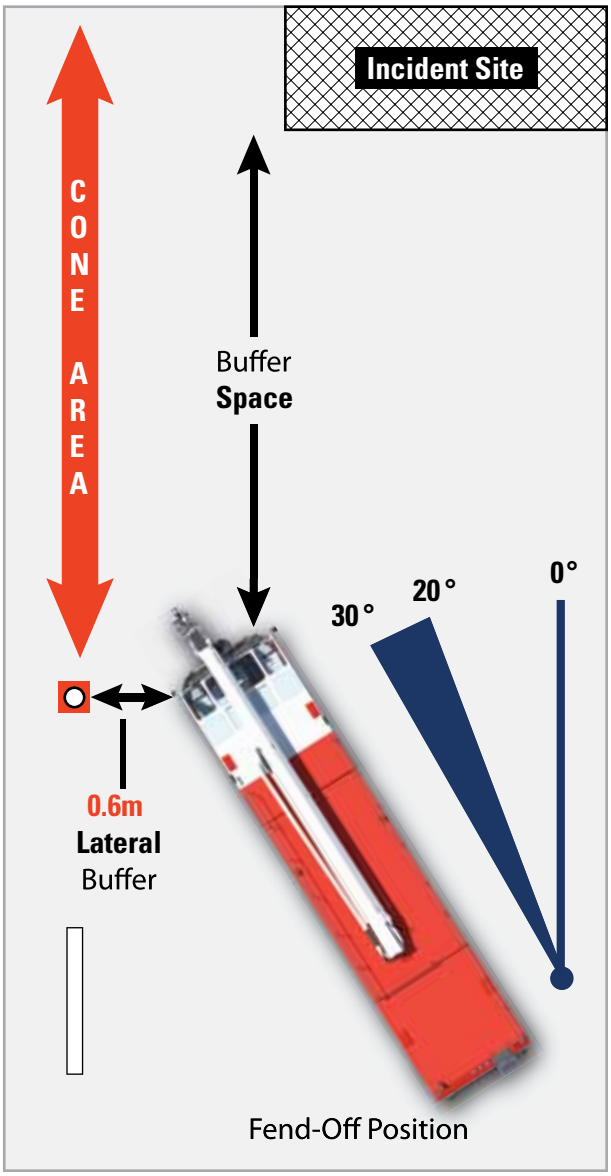

Figure 8. Safe Positioning Diagram.

Photo Source: *Emergency Traffic Accommodation A Guide for First Responders* publication, p. 8.

Figure 9 shows an ***MUTCD***-compliant TIMA that incorporates the elements of safe positioning.[114] As shown, the larger fire apparatus in the left foreground is parked at the 30° angle with wheels turned out. This placement creates the appropriate buffer and space for the incident work area. The vehicle's left front end is located approximately 2 feet from the cone, creating the lateral fend-off area. Cones are placed to mark the incident and a law enforcement vehicle is placed between the buffer vehicle and the incident to help with traffic control. The EMS vehicle is parked mid-way and angled to the right to protect the patient loading area.

Figure 9. *MUTCD*-Compliant TIMA.

Photo source: U.S. Fire Administration, "Traffic Incident Management Systems", p. 46.

Emergency Lighting

MUTCD, chapter 6I.05, addresses the use of warning lights as follows:

> The use of emergency lighting is essential, especially in the initial stages of a traffic incident. However, it only provides warning; it does not provide effective traffic control. Emergency lighting is often confusing to drivers, especially at night. Drivers approaching the incident from the opposite direction on a divided roadway can be distracted by the lights, causing a slowed response, which can result in a hazardous situation for them and others traveling in their direction. (It also often results in traffic congestion in the unaffected opposite lane[s] and increases the chance of a secondary collision.)[115]

While there is a consensus within the responder community that some lighting is necessary to warn approaching motorists about the presence of emergency responders, it also is suspected that too much or certain types of lighting can actually increase the hazard to on-scene personnel,

[114] Photo source: USFA "Traffic Incident Management Systems", p. 46.

[115] ***MUTCD***, Chapter 6I, Section 61.05, Control of Traffic through Traffic Incident Management Areas, available online at http://mutcd.fhwa.dot.gov/HTM/2003/part6/part6i.htm#section6I05.

particularly during nighttime operations.[116] The USFA Emergency Vehicle Safety Initiative,[117] a project with a long-term goal of reducing the number of firefighters killed when responding to and returning from emergencies, and from being struck on the roadway, includes extensive research on emergency vehicle warning lighting to assess the impact of warning lights on responder safety. One key finding is the effect and disorientation of motorists caused by using day and nighttime emergency warning lights.[118]

The USFA's 2008 report, *Traffic Incident Management Systems*,[119] provides additional guidance on the impact of warning lights. Specifically, the USFA identifies several critical issues related to the use of warning lights. The first deals with the color of the lights being used. Research has shown that as the human eye adapts to the dark, it is less able to identify all colors of the spectrum. The first color within the spectrum that the human eye is not able to see is red, which is the color of most emergency lights. As a result of this research, many emergency response agencies are switching to amber-colored lights, which are easier to see at night, since amber lights do not blend in to the nighttime surroundings in the same way that red lights do, and therefore, are easier to detect.[120]

The second critical issue deals with the impact of vision recovery from the effects of glare. USFA notes that vision recovery from dark to light takes 3 seconds, and from light to dark takes at least 6 seconds. A vehicle traveling at 50 mph covers approximately 75 feet per second—or 450 feet in the 6 seconds before the driver fully regains night vision. This is extremely important when emergency vehicles operate on roadways at night, especially on two-lane roads. Headlights on the appa¬ratus that shine directly into oncoming traffic can result in drivers literally passing the incident scene blind, with no sense of apparatus placement.[121]

The USFA further notes that wearing protective clothing and/or ANSI-compliant traffic vests does not improve the ability of the blinded driver to see personnel standing in the roadway. Studies show that the opposing driver is completely blinded at two and one-half car lengths from a vehicle with its headlights on. USFA notes that existing research indicates that stimuli such as the combination of lights, light colors, and varying degrees of reflection and flashes, hold a driver's central gaze, with the driver tending to steer in the direction of gaze. This has been termed the "moth effect".[122]

USFA and ISEA are currently engaged in additional research on emergency vehicle lighting, visibility and conspicuity, and the impacts these have on responder safety.

Both USFA and the ESRI Safe Parking SOP[123] offer guidance on reducing the potentially negative effects of emergency lighting. Vehicle and apparatus headlights and fog lights should be turned off at night scenes. Floodlights should be raised to a height that allows light to be directed down on the scene, thus reducing shadows and the potential blinding of motorists.

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[116] *Traffic Incident Management Systems*, April 2008, USFA, p. 47, available online: http://www.usfa.dhs.gov/downloads/pdf/publications/tims_0408.pdf.

[117] *Vehicle Warning Lighting System Study*, USFA, available online: http://www.usfa.dhs.gov/fireservice/research/safety/vehicle.shtm#c.

[118] *Emergency Vehicle Visibility and Conspicuity Study*, FA-323, USFA, August 2009, available online: http://www.usfa.dhs.gov/downloads/pdf/publications/fa_323.pdf.

[119] *Traffic Incident Management Systems*, USFA, April 2008.

[120] The I-95 Corridor Coalition's Quick Clearance Tool Kit includes an excellent PowerPoint presentation on the issue of emergency vehicle warning lights, including the benefits of using amber lights, available online: http://www.i95coalition.net/i95/Training/QuickClearanceWorkshop/tabid/188/Default.aspx.

[121] *Traffic Incident Management Systems*, USFA, p. 47.

[122] Ibid., p. 48; see also *Emergency Vehicle Visibility* and *Conspicuity Study*, August 2009, USFA, p. 22, available online: http://www.usfa.dhs.gov/downloads/pdf/publications/fa_323.pdf.

[123] ERSI SOP.

USFA, the ***MUTCD***, chapter 6I,[124] and the ESRI Safe Parking SOP[125] all note that the key to reducing emergency vehicle lighting is by establishing good traffic control. When good traffic control is established by placing advanced warning signs and TTC devices, minimal emergency vehicle lighting is needed for responders to safely perform their duties. All cited resources recommend that departments review their policies on emergency vehicle lighting—especially after a traffic incident scene is secured—with the goal to reduce vehicle lighting usage at the scene, with special consideration given to reducing or extinguishing forward-facing vehicle lighting. The ***MUTCD*** emphasizes, however, that any reduction in emergency vehicle lighting should not compromise responder or motorist safety.[126]

3.4 Additional Resources

The guidance provided in this chapter is intended to help States develop and maintain a sustainable, dedicated, and active TIM program involving Tactical operations to expedite scene response and clearance, while providing for the safety of incident responders and motorists. There are numerous related examples from established programs discussing safe, quick clearance. A listing of potential resources is contained in the following section, "*Want to Know More?*"

[124] ***MUTCD***, Chapter 6I, Section 61.

[125] ERSI SOP.

[126] ***MUTCD***, Chapter 6I, Section 61.

Want to Know More?

Resources:

- **Connecticut Statutes, Chapter 248 – Vehicle Highway Use, Section 24-224(D),** available online: http://www.cga.ct.gov/2005/pub/Chap248.htm#Sec14-224.htm.
- **"Dude, Where's My Truck? Non-Consensual Towing Issues,"** American Trucking Associations' (ATA) Litigation Center 2008 Forum for Motor Carrier General Counsels, June 30, 2008.
- **Emergency Responder Safety Institute** Web site, available online: http://www.respondersafety.com/Default.aspx.
- **Georgia DOT Web site,** available online: http://www.dot.state.ga.us/travelingingeorgia/hero/Pages/default.aspx.
- **Indiana Quick Clearance Web site,** available online: http://indianaquickclearance.org/.
- **ITE Web site** available online: www.ite.org.
- **Missouri Revised Statutes, Traffic Regulations, Chapter 304, Section 151,** available online: http://www.moga.mo.gov/statutes/C300-399/3040000151.HTM.
- **Montana Code, Title 61 Motor Vehicles, Good Faith Immunity, Chapter 8, Part 9,** available online: http://law.justia.com/montana/codes/61/61-8-909.html.
- **"Move Over America"** Web site, available online: http://www.moveoveramerica.com/#.
- **National Conference on Incident Management, June 2002,** available online: http://onlinepubs.trb.org/onlinepubs/archive/conferences/TIM/TIMProceedings.pdf.
- **NCHRP Synthesis 318: "Safe and Quick Clearance of Traffic Incidents – A Synthesis of Tennessee Code Annotated, Title 54 – Highways, Bridges and Ferries, Title 54, Chapter 16, Section 113,** available online: http://www.michie.com/tennessee/lpext.dll?f=templates&fn=main-h.htm&cp=tncode.
- **"Highway Practice,"** Transportation Research Board, 2003, available online: http://onlinepubs.trb.org/Onlinepubs/nchrp/nchrp_syn_318.pdf.
- **NIMS Resource Typing System,** available online: http://www.fema.gov/emergency/nims/ResourceMngmnt.shtm#item4.
- **NTIMC Web site** available online: http://www.transportation.org/?siteid=41&pageid=2782.
- **"Safety Service Patrols – Improving Mobility and Saving Lives,"** available online: http://www.fhwa.dot.gov/tfhrc/safety/pubs/its/pabroch/improveobil.pdf.
- ***Simplified Guide to the Incident Command System for Transportation Professionals,*** FHWA-HOP-06-004, 2006.
- **Society of Automotive Engineers International Web site,** available online: www.sae.org/servlets/index.
- **Tennessee Code Annotated, Title 54 – Highways, Bridges and Ferries, Title 54, Chapter 16, Section 113,** available online: http://www.michie.com/tennessee/lpext.dll?f=templates&fn=main-h.htm&cp=tncode.

- **The National Response Team, Incident Command System/Unified Command (ICS/UC) Technical Assistance Document,** available online: http://www.nrt.org/Production/NRT/NRTWeb.nsf/AllAttachmentsByTitle/SA-52ICSUCTA/$File/ICSUCTA.pdf?OpenElement.
- **TRAA, "Towing and Recovery Association of America Vehicle Identification Guide,"** available online: http://www.towserver.net/products.htm.
- ***Traffic Incident Management Self-Assessment: 2007 National Report,*** prepared by American Transportation Research Institute for the Office of Transportation Operations, Federal Highway Administration (September 2007).
- **Texas Statutes, Code of Criminal Procedure, Section 49.25 Medical Examiners, Part 8,** available online: http://law.justia.com/texas/codes/cr/001.00.000049.00.html.
- **U.S. Department of Homeland Security publication, National Incident Management System, March 1, 2004,** available online: http://www.fema.gov/pdf/nims/nims_doc_full.pdf.
- **U.S. Department of Labor, Bureau of Labor and Statistics,** available online: http://www.bls.gov/news.release/cfoi.t01.htm.
- **U.S. Department of Transportation. National Strategy to Reduce Congestion on America's Transportation Network, May 2006,** available online at: http://isddc.dot.gov/OLPFiles/OST/012988.pdf.
- **USFA Traffic Incident Management Systems, 2008,** available online: http://www.usfa.dhs.gov/downloads/pdf/publications/tims_0408.pdf.
- **Washington State Joint Operations Policy Statement,** available online: http://www.watimcoalition.org.

4 TIM Program Support – Communications and Information Exchange

4.1 Introduction

This chapter summarizes operational, tactical, and institutional support to effective communication and information exchange, and reviews common challenges, as well as successfully implemented approaches. This chapter also presents an overview of related policies and provides information on where readers can learn more.

The operational domain of Traffic Incident Management (TIM) spans a broad range of incident types (as discussed in chapter 1 of ***the Handbook***), ranging from simple roadside debris incidents to major natural or manmade emergencies that affect our Nation's roadways. Further, TIM involves more than just incident clearance; it involves managing the traffic affected by the incident that may affect just one facility or the overall transportation system or network. As incidents increase in complexity and scale, so do the number and types of responders involved who must communicate effectively to manage the incident, while minimizing further risk to responder and driver safety.

State and local transportation and public safety agencies manage the vast majority of traffic incidents at the local level. Larger-scale incidents may involve agencies from multiple jurisdictions; and incidents of national significance, managed in accordance with the National Incident Management System (NIMS), involve a host of Federal, local, and State response agencies. The responsibilities of the multiple jurisdictions and agencies involved have the potential to overlap. Agencies must manage resources effectively, including technology, to maximize the effectiveness and safety of incident management efforts.

While large-scale and catastrophic incidents are rare, it is clear that even seemingly small improvements in efficiency or effectiveness that are mastered in traditional incidents can translate into dramatic life-saving strategies when implemented in catastrophic events.

Effective interoperable interagency communications and information exchange[127] are vital to TIM. The different and responding agencies need access to important pieces of information that other agencies know or collect to better manage and improve on-scene operations. The term "interoperable" refers to "the ability of two or more systems or components to exchange information and to use the information that has been exchanged."[128] It is not enough for TIM response partner agencies to be able to send and receive data or information; they must develop common terminology, definitions, and usage to facilitate understanding.

[127] For the purposes of this document, "communications" refers to the technological means and "information exchange" to processes for sharing information.

[128] *Institute for Electrical and Electronics Engineers (IEEE) Standard Computer Dictionary: A Compilation of IEEE Standard Computer Glossaries*, New York, NY: 1990, available online: http://en.wikipedia.org/wiki/Interoperability#cite_note-0, April 2009.

Lessons learned from incidents of all sizes occurring in all areas within the United States point to the critical importance of effective communications, information exchange, and shared use of supporting technologies for an effective TIM program. TIM responders in California identified as joint strategies the development of interoperable communication systems; establishment of interagency protocols and agreements; joint training and debriefs; and standard terminology for improving overall TIM.[129]

According to Captain Henry deVries, a national TIM leader from the New York State Police, "Clearing incidents safely and quickly depends on developing coordinated multi-agency operations that are supported by integrated communications."[130]

Sponsored by the Delaware Valley Regional Planning Commission, the multi-jurisdictional I-295/I-76/NJ 42 Incident Management Task Force notes that integrated communications support "will improve the safety of responding agency personnel, reduce the chance of an associated traffic accident, and minimize the amount of apparatus and number of personnel responding onto the highway."[131]

4.2 Background

The U.S. Department of Homeland Security's (DHS) NIMS describes four levels of incident-related communications: strategic, tactical, support, and public address. Communications occur across all of these levels in TIM response as described here:

- **Strategic Communications:** These communications include those practices and protocols established by a TIM Team and measured by responder comprehension and actions while managing an incident. Strategic communications also includes gathering and consolidating multiple pieces of data used to evaluate and improve operations.
- **Tactical Communications:** From the TIM perspective, tactical communications occur between a public safety answering point (PSAP) and a Traffic Management Center (TMC), and between responders on scene during an incident.
- **Support Communications:** These communications include the actions required for activation of non-traditional resources to support tactical operations.[132]
- **Public Address Communications:** These communications include traveler information, emergency alerts and warnings, and communications among response agencies and the media (via on-site press briefings, television and radio broadcasts, local news and transportation and/or law enforcement agency Web sites, etc.).

Figure 10 illustrates all agencies that potentially may be involved in responding to an incident and the types of information the various agencies need to perform their incident response activities.[133] Without multi-agency communications and information-exchange capabilities, these agencies collect

[129] *The California Highway Incident Management Summit*, held April 3-4, 2007, available online: http://www.dot.ca.gov/hq/traffops/summit.html.

[130] Helman, David. "Clearing incidents safely and quickly requires an effective traffic incident management program 24 hours a day, 7 days a week," *Public Roads*, November/December 2004, available online: http://www.allbusiness.com/management/336098-1.html.

[131] *I-295/I-76/NJ 42 Incident Management Task Force Policy and Procedures Manual*, January 2005.

[132] These non-traditional resources may include NIMS implementation guidance and compliance guidance for stakeholders, available online: http://www.fema.gov/emergency/nims/ImplementationGuidanceStakeholders.shtm#item1; NIMS implementation for nongovernmental organizations as supplied via a FEMA fact sheet, available online: http://www.fema.gov/pdf/emergency/nims/ngo_fs.pdf; and through a FEMA fact sheet on NIMS compliance requirements for local Emergency Planning Committees, available online: http://www.fema.gov/pdf/emergency/nims/lepc_comp_fs.pdf.

[133] The diagram is included in the *Prompt, Reliable Traffic Information Systems* brochure, p. 7, published by the NTIMC, available online: http://www.transportation.org/sites/ntimc/docs/Incident%20Communications11-16-06-v3.pdf.

data and information and operate based on their own information. This narrow view limits the effectiveness both of the agencies individually, as well as the overall TIM response.

For mass casualty incidents, additional national-level organizations, such as through DHS' Homeland Security Advisory System (HSA),[134] various U.S. Military resources, FEMA, and the U.S. Secret Service,[135] also may be employed as needed to supplement the organizations defined in the NTIMC's *Prompt, Reliable Traffic Information Systems* brochure.

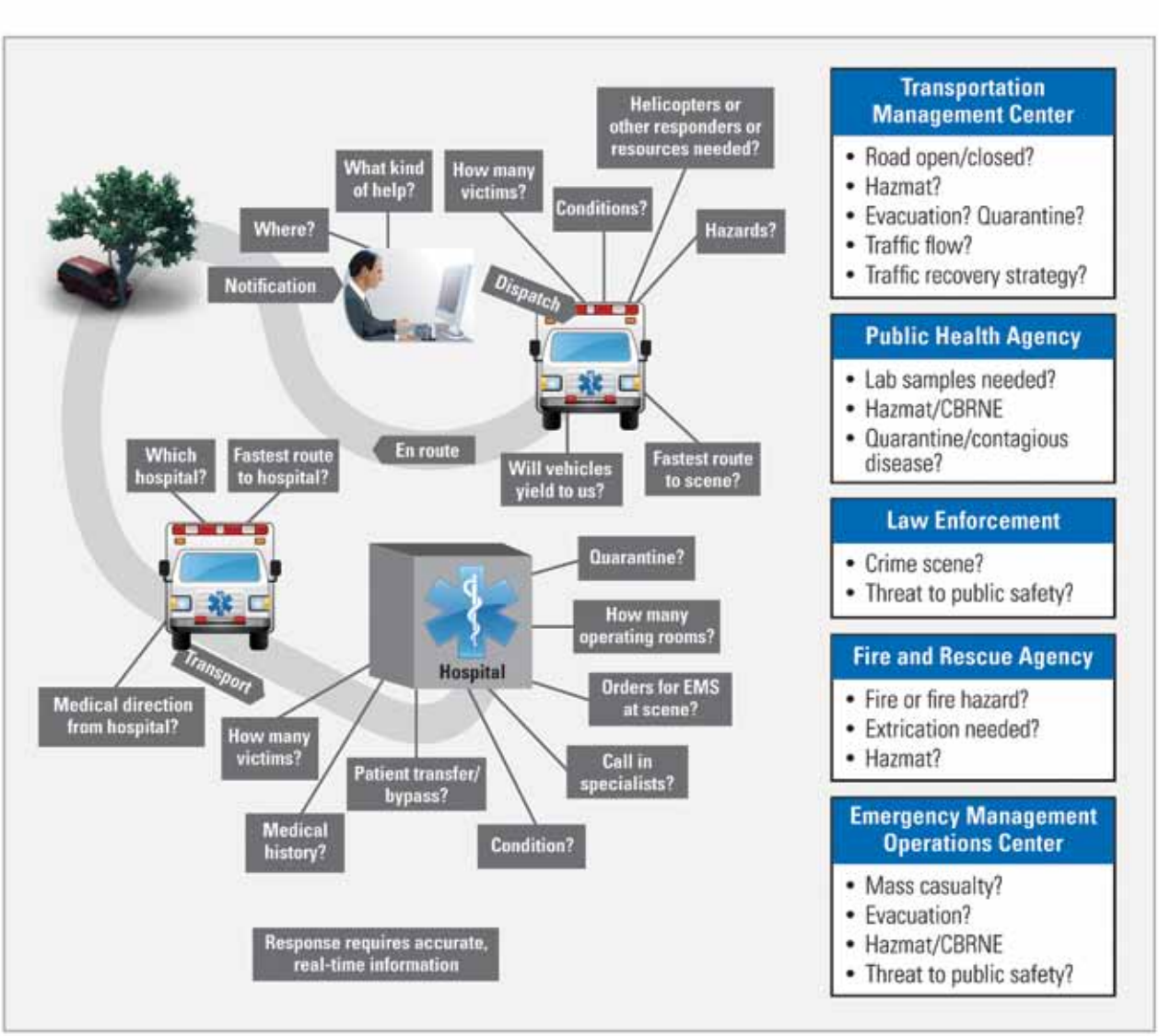

Figure 10. Information Flows in Emergency Response.

[134] DHS Homeland Security Advisory System Web site, available online: http://www.dhs.gov/files/programs/Copy_of_press_release_0046.shtm.

[135] United States Secret Service Web site, available online: http://www.secretservice.gov/protection.shtml.

The Need for Communications and Information Exchange in TIM

In reviewing each responder's information needs, it is clear that much of the data collected by a particular agency also benefits other responding agencies. For example, each agency shown in Figure 10 requires information about hazardous materials (Hazmat). While the use of the data may be different—e.g., transportation focuses on cleanup and traffic management and law enforcement focuses on the potential public safety threat—obtaining this information on a real-time basis from the first responder can significantly improve TIM.

Figure 10 also illustrates the information needs of various responders, and how intelligent transportation systems (ITS) support incident management. For example, calls for emergency incident response made to a PSAP responsible for 9-1-1 calls (the notification box) are routed to fire, and public safety agencies. Integrating a TMC with the PSAP (or the PSAP's computer-aided dispatch [CAD] system) could enable transportation agencies to more efficiently initiate support operations such as traffic management, traffic diversion, and provide real-time traveler information. If a TMC were able to share a video feed from a closed-circuit television (CCTV) system with other responders, those responders could tailor their own incident response activities to identify Hazmat spills, the presence and seriousness of injuries, or to determine whether extrication is needed. For incidents that occur on a road system not covered by ITS, integrating a TMC with a responding law enforcement CAD system could provide the TMC with dispatch notification and an incident log whenever a public safety responder is dispatched to an incident. These examples demonstrate the complex nature and diversity of communications used to support TIM. These examples also illustrate the overlapping information each responding agency needs to perform its role on scene.

Today, most jurisdictions have invested in the development of emergency call centers (PSAPs), which receive 911 calls. These call centers are staffed by highly trained professional dispatch personnel, who use the latest technology to identify the caller and dispatch the closest emergency services to the scene. TMCs provide critical support communications to agencies involved with TIM and the traveling public. These entities act as important multi-agency coordination hubs in TIM, and often host the systems that maintain the data archives for incidents.

The growing integration of ITS into roadway infrastructure and operations centers; the continued expansion of regional approaches to transportation operations; and the increased appreciation of the role of TIM and emergency transportation operations in homeland security are helping to improve multi-jurisdictional TIM information and data exchange. To activate multi-disciplinary response resources, the exchange of information between agencies must be accurate and timely. Co-location of personnel from different agencies facilitates real-time communication at an operational level for more coordinated and efficient decision-making and resource allocation.

The most efficient way to accomplish real-time, accurate information exchange is to develop interoperable systems that can electronically exchange data. Real-time communication and information exchange requires institutional, technical, and operational coordination among agencies, operational support centers, and systems.

Multi-Agency Communication and Information Exchange in TIM
Effective communication among responder agencies is essential, even for minor incidents. When considering a scenario in which a motor vehicle is blocking a travel lane on a major highway, the following activities may occur:

> The PSAP receives a cellular 911 call reporting a disabled vehicle. The local law enforcement and transportation agencies have a shared functional responsibility to maintain safety and mobility of the highway by ensuring quick response to any lane-blocking incident.
>
> The law enforcement agency and the PSAP are informed that the nearest police cruiser is miles away and involved in a motor vehicle stop based on data transmitted from an Automatic Vehicle Location (AVL) device that automatically tracks the vehicle's location and transmits this information back to the PSAP and law enforcement agency.
>
> The PSAP and the local TMC share a common mutual aid/frequency channel. Based on a predetermined protocol, the PSAP uses this common channel to notify the TMC. Using its own radio system, the TMC dispatches a service patrol capable of immediate response. The TMC uses its CCTV to locate the disabled vehicle, and guide the service patrol to the disabled vehicle's exact location. The service patrol vehicle is able to clear the incident before it disrupts the flow of normal traffic.
>
> Because the TMC shares video with the PSAP in real time, law enforcement personnel are kept apprised of the incident's status from the point of notification stages through to its final clearance.
>
> During this incident, the Department of Transportation (DOT) provided the emergency response, while at the same time saving the police agency valuable resources.

4.3 Support to TIM Communications and Information Exchange

4.3.1 Operational Support

This section presents an overview of operational centers that support communications and information exchange among responders to facilitate effective TIM:

- **PSAPs**: The PSAP often serves as the point of origin for TIM-related information exchange and communication since it receives and processes 911 calls and other requests for assistance, and serves as the main dispatch center for law enforcement, fire, and emergency medical services. CAD is the PSAP's primary information system and most common means used to manage and dispatch multiple response vehicles from the PSAP. When a PSAP operator/dispatcher receives a call for service, the information is entered into the CAD system.

  A typical CAD system includes other functions in addition to receiving emergency call information and dispatching emergency responders. The CAD system also tracks the locations of the closet available units, the locations of other units, the status of previously

dispatched units, and the disposition of a call for service. Emergency units equipped with mobile data terminals may be dispatched or otherwise communicate using message units rather than voice, a practice referred to as "silent communication". Silent communication is often needed when voice channels are inappropriate for the sensitive nature of the information to be exchanged or when the radio channels become overcrowded during major incidents with multiple responders. The CAD may have interoperability with other PSAPs or TMCs. An agency can archive the data from its CAD system and maintain the information in agency records.

A growing number of jurisdictions are integrating PSAP CAD systems into TMC operations to facilitate the real-time exchange of incident data. Examples of successful CAD-TMC integration include:

– Traffic Management Center (TMC): Designed to monitor traffic conditions and manage traffic management resources in a specific metropolitan or regional area. TMCs are staffed by representatives from the transportation agency, law enforcement, and other emergency service agencies, whose personnel share space and which sometimes have interoperable systems in the center. The TMC is the heart of an effective TIM program, and for mature TIM programs, is the single point of contact among responder agencies for highway incidents. These centers use the transportation tools of facility surveillance and traffic monitoring. Using a TMC as the primary point of contact for all responder agencies confirms the concept that TIM also is about managing traffic affected by the incident that may impact not just one facility, but the overall transportation system or network.

  Many jurisdictions staff TMCs on a 24 hour/7 day per week basis. A TMC uses ITS to monitor and manage real-time traffic conditions. Ideally, the TMC also receives and integrates data from the PSAP's CAD system and TMC systems to enable faster and more efficient incident detection, verification, and response.

  TMC operators can take steps to reduce congestion, dispatch resources, and make appropriate actions based on intelligence-driven decision-making data. Traffic engineers use automated traffic control signals and other devices to control traffic into, or divert traffic away from, congested areas. Instant access to decision-making data enables traffic engineers to respond to solve traffic problems quickly. TMC staff use a combination of ITS (CCTV, fiber optic cables, loop detectors) to advise motorists (through changeable or variable/dynamic message signs [VMS/DMS], highway advisory radio [HAR], the Internet, and other forms of traveler information) of current traffic conditions and alternate routes.

– AZTech™ in Phoenix, Arizona: Awarded "Best of ITS" in 2005 for integration of ITS and center-to-center communications in its TMC, this regional, multi-agency coalition has co-located law enforcement, transportation, and fire services, along with extensive ITS, into its TMC. TMC operators have access to law enforcement, fire, and PSAP dispatch, and can control DMS, 511, and Internet-based traveler information from their desktops. They have real-time access to non-sensitive law enforcement CAD data (AZTech blocks sensitive data, and because of privacy concerns and given the volume of data, the center has not yet implemented automated data exchange between systems). Operators are able to support TIM response through extensive CCTV coverage and via direct voice and data access to responders.

- Florida DOT (FDOT) CAD-TMC integration: Florida is deploying CAD-TMC integration statewide. FDOT District 4 has deployed an Interagency Video Event Data Distribution System (iVEDDS) that enables member agencies to view incident data in real time. Software captures data for use in analyzing incident performance metrics. Details such as agency arrival and departure times, location, and traffic conditions are available, as are images and video from all District 4 CCTV cameras. TMCs in the region are establishing center-to-center connections for interconnectivity to the various TMCs. The District uses this information to facilitate communications between TMCs and update the statewide 511 Automated Traveler Information System (ATIS) system, which all the TMCs manage directly (no separate 511 provider). Staff can use iVEDDS via desktop or mobile devices. TMC staff verifies all information before posting it onto iVEDDS.
- Real-time data sharing in New York City, New York (NY): Operated by the New York Department of Transportation (NYDOT), the New York City's Integrated Incident Management System (IIMS) enables incident response personnel to transmit data about an incident to other responders and dispatchers on a real-time basis. When an incident is entered into IIMS, the system uses a Global Positioning System (GPS) to identify the incident's exact location. Using a digital camera, response personnel can take and transmit pictures of an incident. The system creates an incident log, including timestamps on incident duration, and enables responders to exchange data about the incident. Deployed in each New York City borough, IIMS is used by New York State and New York City transportation, law enforcement, and emergency response personnel. IIMS data exchange capabilities have helped to reduce incident response time by enabling responders to verify incidents and identify what response assets they need.

4.3.2 Technical Support

ITS Support

TIM professionals use many communications and information exchange technologies to support incident detection and verification and to coordinate overall incident response. In the past, incident detection and verification largely occurred via CCTV observation, service patrols and/or call boxes. With the proliferation of personal cellular phones and in-vehicle communications systems, incident detection has become more efficient, with motorists reporting incidents. TMC staffs increasingly use technologies such as CCTV to monitor and guide more efficient incident response and traffic operations (by providing responders with information based on visual monitoring of the incident scene, surrounding traffic conditions and possible diversion routes).

Many States have invested in ITS deployment in roadways to monitor traffic conditions. ITS technologies may include roadway and traffic data collection devices, such as weather and traffic detectors, as well as DMS, ramp metering, and adaptive signal control devices, which help regulate traffic.

The TMC is the focal point for receipt, analysis, and synthesis of all roadside-generated data. TMC operators support incident detection, verification, and responder coordination. TMC operators monitor data from ITS sensors and video images from CCTV. The FHWA publication, ***Best Practices in Traffic Incident Management***, highlights examples of tools and ITS designed to manage the transportation system and that have application for incident management:[136]

[136] *Best Practices in Traffic Incident Management*, FHWA, June 2009.

Following is a list of tools and ITS designed to manage the transportation system with the following application devices for incident management:

- **CCTV:** When shared with public safety agencies, this device provides multiple agencies with a common operating picture of an incident scene. CCTV can monitor normal traffic conditions, verify the existence of an incident, and provide a view of progress toward clearance of the incident.
- **Traffic Detectors:** These devices monitor the flow and volume of traffic, and when combined with CCTV, identify anomalies in traffic flow.
- **Ramp Meters:** These devises are used to increase freeway volumes, trip reliability, and freeway speeds, while decreasing travel time and the number of crashes. The TMC can use data from lane and ramp metering to control flow into an incident scene and to facilitate a more rapid response of an emergency vehicle to an incident scene.
- **Lane Control Signals:** These applications can alert motorists of an incident in a specific travel lane or in a lane within a tunnel. Lane control signals provide motorists with advance warnings about impending lane closures, and are particularly valuable where physical separations exist at the entrance to a tunnel.
- **Traffic Modeling Tools:** These applications can assist motorists in selecting a choice of alternative routes. When combined with signal timing technology, these tools can help determine the most efficient use of these particular traffic modeling tools. Traffic modeling tools can predict or determine important timelines in an incident. By knowing how many vehicles can pass a given point at a specific time with specific traffic volumes, models can determine queue lengths when one or more lanes are blocked. The modeling tools can help decision-makers evaluate implications and tradeoffs associated with various operational decisions, such as completely closing a highway to provide responders with time and space to clear an incident versus simply reducing traffic throughput by diverting a portion of this traffic to alternative routes.
- **Adaptive Signal Controls:** These programmable devices can respond to and reduce traffic congestion, either on the primary route or on detour routes during incidents.
- **Variable or Dynamic Message Signs (VMS/DMS):** These devices are used to alert motorists about incidents, direct them to alternative routes, or provide estimated travel time past an incident.

ATIS are another type of ITS technology that provides highway and transit users with the right information at the right time to assist in travel decisions. ATIS involves the collection, consolidation, analysis, and dissemination of decision-making information to the public. As the capabilities of technology and communication expand, the capabilities of ATIS also expand.

Many jurisdictions are developing traveler information capabilities to provide information gathered by the TMC to the traveling public. Public Information Officers/Officials (PIOs) provide communications directly to the news media with regard to the nature and extent of an incident. TMC operators provide information to reroute and divert the traveling public to minimize incident-related delay and to help prevent secondary crashes. The TMCs freely share traveler information with media outlets that package and deliver information to the traveling public by radio, television, and the Internet. Traveler information system tools include the following:

- **Internet-Based Traveler Information:** Travelers rely upon the transportation information provided by government agencies, media and other private sector firms. Transportation agencies are most often the initial supplier of information to commercial information service providers. Information service providers can send information directly to communication devices or to a designated State, regional, county, city, or other local Web site. When public transportation is available in any area, it is important to include a link to the transit Web site to provide conditions and mode travel schedules.

- **511 Traffic/Traveler Information Number:** FHWA obtained approval from the Federal Communications Commission (FCC) to dedicate the 511 phone number to traveler information. 511 is implemented at the State level, and offers travelers the option of touchtone and/or voice-activated prompts to obtain information on travel conditions for specific routes or route segments, as well as for special events. This single nationwide number allows travelers to decide on routes of travel; select means of travel; or make the basic choice of whether to begin or delay travel.

- **HAR:** Information provided by HAR offers an effective, if limited, means to alert travelers of incidents in a general area, whether planned or unplanned. HAR must be combined with messaging systems to direct travelers to tune to the HAR frequency for information.

- **DMS:** Fixed DMS (also known as Variable, Changeable, Electronic) message signs are often located on highly traveled roadways to provide updated traveler information. Portable DMS can be used in incident management and highway construction applications. Whether fixed or portable, DMS can provide information regarding expected travel time to certain locations, incident status, and alternate routing.

Tactical Communications Support

"Tactical communications" refer to those communications relayed between a PSAP and a TMC, and between on-scene incident responders during an incident. Prompt, reliable, and interoperable tools can enable personnel from all agencies to share important information regarding roadway incidents or special events. These technologies combine multiple data strings from multiple agencies and convert this information into a single-source information system. The following list defines some technologies that facilitate tactical communications and response between incident responders:

- **Radio.** The most effective means of multi-agency communications is the transition to a single common "voice-over" radio system. Agencies can have their own internal communications groups that allow them to communicate when there is no need for multi-agency response. The radios can be configured to allow cross-communication when the need for interoperability exists. Cross-installation of radios among different responders from different disciplines is another solution. This approach may be realistic in smaller jurisdictions, but it may become problematic for larger areas where the available space within a response vehicle provides limited room for multiple radios. Responder radios can support a gateway interface call that allows a transmission from one radio to be broadcast on the frequency of another radio, where one frequency is used to rebroadcast interagency messages. Alternatively, responders can establish a single frequency for all responders at a scene. A limitation of this approach is that the single frequency can quickly become over-crowded at major scenes with multiple responders.

- **Mobile Data Terminals.** Another way to communicate is through mobile data terminals mounted in response vehicles. This form of silent communication allows a single agency to communicate additional or lengthy information to any responder without interfering with voice communications on a shared channel. This type of communication also allows responders to share sensitive information on a prioritized basis.

- **Personal Communication Devices.** These communications devices, such as Personal Digital Assistants (PDAs), cell phones, and camera phones, are common among TIM responders. Responders exchange numbers prior to an incident and use them during an incident for communication. However, the National Task Force on Interoperability discourages reliance on personal communication devices because, by doing so, responders are required to share frequencies with the private sector. These frequencies can become overcrowded or be unavailable for numerous reasons. This is especially true as the nature of the incident escalates. Also, personnel in command must be able to reach multiple responders at the same time—an ability that is not always available with a cell phone. Another consideration is that dialing and waiting for a cell phone connection is not feasible or acceptable during an incident. However, camera phones are simple devices that can be used to transmit exact information on an incident scene, and can be useful in identifying vehicle size and type parameters that must be considered for vehicle removal.

Following are additional tools that facilitate tactical incident response:

- **Automatic Crash Notification (ACN) and Advanced Automatic Crash Notification (AACN):** These vehicle-equipped tools alert a telematics provider when a vehicle is involved in a collision or an airbag is deployed. As the more sophisticated model, AACN is capable of predicting the severity of the crash and injuries, thereby enabling operators to more quickly dispatch the appropriate incident and emergency responders. As the initial notifications are sent to private service providers, technology must be developed to coordinate with and alert public service providers in real time.

- **E911 and Next-Generation (NG) 911:** These key response tools identify the immediate and exact location of an emergency call.

- **AVL:** This tool allows a dispatch center to locate the vehicle closest to an incident scene for immediate dispatch.

- **Traffic Signal Preemption:** By using a vehicle-mounted preemption emitter device, this system allows emergency vehicles to disrupt normal signal cycle operations and proceed through an intersection with quick access to a green signal light, and maintain a red signal light for cross-traffic vehicles. Traffic signal preemption provides emergency vehicles with immediate right-of-way, prevents cross-traffic, reduces response times, and enhances overall traffic safety.

- **Work Zone Intrusion Devices:** These devices provide deployed detectors that establish an "invisible fence" to protect the incident scene and responders from potential stuck-by events. When the "fence" is broken by an intruding vehicle, an audible siren alerts responders of the intrusion, providing (limited) reaction and evasion time.

- **Emergency Vehicle-Mounted Lighting:** The use of emergency vehicle lighting, such as high-intensity rotating, flashing, oscillating, or strobe lights, is essential, especially in the initial stages of a traffic incident. Emergency vehicle lighting enhances driver and pedestrian awareness regarding the incident scene, thereby increasing the level of the

safety of emergency responders and victims, as well as oncoming vehicles approaching the incident. It should be noted that emergency vehicle lighting provides warning and awareness only, and yields no effective traffic control.

- **Retroreflective Vehicle Markings:** In 2009, fire apparatus and emergency vehicles became subject to new guidelines with respect to reflective striping as stipulated in ***National Fire Protection Agency (NFPA) 1901: Standard for Automotive Fire Apparatus, 2009 Edition***. The new standard calls for striping on the front, sides, and rear of all fire and emergency apparatus, thereby increasing awareness and visibility to road users.

- **Police Investigative Tools:** The use of "total station" and "photogrammetric" tools combine to aid crash investigators by improving the accuracy of the crash investigation, while greatly reducing investigation time. The total station is an electronic/optical surveying instrument with built-in capabilities to measure slope distances, angles, vertical height differences and other physical properties. Photogrammetry is a technique using remote sensing technology to make precise measurements from photographs to determine physical dimensions involved in crash investigations.

Media Communications

Delivering accurate and effective media communications are important functions that transportation agencies must develop and maintain to provide current roadway information that is valuable to travelers. When a highway incident escalates to the point where evacuation is necessary, such as in the case of a major hazardous materials spill, responders enact and implement protocols established by jurisdictional emergency management groups. At any incident scene, both major and minor, one agency representative should be pre-selected to provide information to a central point of contact (POC). This policy serves three purposes:

- First, this policy provides the media with a pre-determined POC from which to receive accurate and timely information to disseminate to the public.

- Second, this policy allows responders and their agencies to continue with the task at hand, uninterrupted by repeated requests for information from multiple sources.

- Third, this policy assures that the information is well-developed, accurate, and consistent.

An agency's Public Information Office and designated PIO can develop and distribute a Media Guide to assist in providing guidance on how to handle public communications. A Media Guide details policies and procedures for handling media access to an incident; establishes guidelines on timing and message content provided to the public; and supplies guidance on how media relations are managed during an emergency. Even when a State agency has established formal working agreements with the media agencies, a Media Guide can help clarify the "ground rules" that govern how the working relationship is conducted. This ensures that the media agencies are able to receive the information needed to provide travelers with information on an incident or event without compromising incident response activities and responder safety. Following are two Media Guide examples, with one prepared by a State, and the other from an airport facility:

1. **The Oregon State Police Media Guide**, available online: http://www.oregon.gov/OSP/NEWSRL/docs/Webmediaguide.pdf.

2. **Lambert-St. Louis Airport Media Guide**, available online: http://www.flystl.com/flystl/media-newsroom/media-guide/.

4.3.3 Institutional Support for Communications and Information Exchange

Technical integration of key information systems is a critical element of interoperability, but it is not a stand-alone issue. Interoperability is not just about technology; it is about changing the culture of a State or region in how it gathers and communicates information that is accessible to multiple public and private sector entities, law enforcement, transportation, and safety organizations. Institutional support for interoperability involves strategic planning and operational changes among all participating entities for it to be successful. Achieving interoperability requires a multi-faceted, multi-dimensional approach, as well as a governance structure documented in memorandums of understanding (MOUs); sustained funding; and Standard Operating Procedures (SOP).

Governance Structure

The first step to achieving real-time communication and information exchange is development of a strong governance structure, an essential element to ensuring that a multi-jurisdictional and multi-disciplinary team maintains a shared vision. Guidance and involvement of high-level representation from each agency provides the experience and focused vision that helps an interoperability committee maintain focus. The governance group members must remain fully involved in the decision-making process because they are responsible for identifying sources of initial and continued funding.

A governance structure can take several forms. For example, the governance structure may consist of subject matter experts (SMEs) in the areas of technology, operations, and program management from each agency. In this instance, it is common for SMEs to speak for statewide agencies. However, if the State elects to take a regional approach, there is a need to establish interoperable committees from each region, consisting of SMEs that make decisions for that region. In other areas, the Governor (or other designated county or municipal elected official) appoints a governance or advisory committee that chooses its own SMEs, who then work within a committee structure and report to the governance committee. In still other locations, a pre-existing agency achieves the interoperability needs of the jurisdiction or region.

Funding

Grant funds are often useful in jump-starting multi-agency efforts to achieve interoperability, but significant reliance on grants for funding interoperability programs cannot sustain a program for an extended period. Therefore, any initial achievements made through grant funding must be sustained using agency funds. Participating agencies should develop an MOU, encourage additional agencies to participate, and seek legislative support on interoperability issues to sustain its funding resources.

Standard Operating Procedures

It also is imperative that SOPs be established for effective communication. An SOP should cover procedures to maintain and upgrade equipment; provide requirements for training and certification; guide the process for acquiring new technology; ensure that all responding agencies have signed the SOP document; and provide an oversight committee to enforce the requirements of the SOP. An effective SOP details the issues related to technology reserves (radio caches), survivability, and redundancy.

Strategic Planning
As with any operational or technical investment, agencies want to ensure they generate a measurable return on investment in communications and information exchange. Being able to demonstrate return on investment makes it easier for agencies to secure ongoing or increased funding support for interoperable systems that support effective TIM communications. A results-oriented strategic plan is a critical component of effective communication and information exchange.

An effective strategic plan defines goals and objectives; provides strategies to achieve those objectives; defines performance measures to evaluate the effectiveness of the strategies to achieve or support accomplishing the defined goals and objectives; and assigns roles and responsibilities. Following are some examples of established State strategic plans:

- *The Strategic Plan for Highway Incident Management in Tennessee*, August 2003, available online: http://www.tdot.state.tn.us/incident/CompleteIMPlan.pdf. The plan is a joint effort by governmental and private organizations with responsibilities for highway incident management and public safety. The Plan establishes the framework for a systematic, statewide, multi-agency effort to improve the management of highway incidents.
- *Florida Traffic Incident Management Program Strategic Plan*, February 2006, available online: http://www.dot.state.fl.us/trafficoperations/Traf_Incident/pdf/TIM%20Strategic%20Plan%20Final.pdf. This Plan is developed to identity programs and actions to sustain the commitment to–and expand–the TIM Program in Florida to meet travel needs. Emphasizing the need for multi-agency communications, the Plan notes that "while managing traffic incidents is the primary focus of Florida's TIM Program, the same coordination and communication lessons are essential to successfully managing large-scale emergencies."
- *State of Delaware Transportation Incident and Event Management Plan*, August 2004, available online: http://deldot.gov/information/projects/tmt/pdfs/TIEMP.pdf. The Plan defines the communication, response, resource, and responsibility procedures and guidelines of the county Transportation Management Teams (TMT) across the State for response to any event or incident that impacts the transportation system.

4.4 Challenges and Solutions to Real-Time Communications and Information Exchange

As TIM teams across the country seek to improve or achieve real-time, multi-agency communication and information exchange, they can expect to encounter challenges. Many State and local TIM programs have overcome these challenges, and offer lessons learned for others. This section cites some of the challenges, along with solutions and examples of State or local TIM teams that have experienced success overcoming those challenges, as reported through both the TIM Program Level Performance Measurement Focus State Initiative and the TIM Self-Assessment respondents.[137]

[137] See FHWA's Emergency Transportation Operations Web site to learn how these States structured their TIM programs to overcome challenges, available online: http://ops.fhwa.dot.gov/eto_tim_pse/index.htm.

- **Challenge: Proprietary systems that are not integrated (different terminology or data dictionary).** Typically, most agencies purchase communication systems to serve their internal communication needs. Frequently, the systems are proprietary and not readily integrate with other agencies' communication systems.

Solution	Success Stories
• Identify the shared data needs and reach agreement on a shared data dictionary as the first step toward facilitating data sharing between, or integration of, incompatible systems. Once key data fields are identified and mapped, apply the technical patches necessary to extract and import or export the data. • Alter CAD import mechanism with vendor or design solution. • Have law enforcement provide DOT with CAD systems.	• New York • Connecticut • Washington

- **Challenge: Concerns about sharing sensitive data.** Law enforcement agencies are prohibited from sharing sensitive information contained in CAD systems (i.e., criminal information). Some agencies are reluctant to share electronic data with TMCs out of concern that sensitive information may be inadvertently accessed following data exchange.

Solution	Success Stories
• Because DOTs and TMCs generally do not need the sensitive information for TIM purposes, create agreements to export non-sensitive data. • Implement effective actions to filter out sensitive data to improve TIM communications without compromising security.	• New York • Connecticut • Washington

- **Challenge: Incompatible standards, systems, networks, and frequencies.** Systems incompatibility is one of the major issues with large-scale, multi-agency emergency response. Radios and data systems lose contact outside of jurisdictional ranges, cell phone networks may be inconsistent, and agencies may operate on different frequencies.[138]

Solution	Success Stories
• Achieve multi-agency agreement on data standards (such as the IEEE 1512, "Common Incident Management Message Sets for Use by Emergency Management Centers," Association of Public Safety Communications Officials (APCO) 25 (project to develop standards for CAD to CAD information exchanges). • Consider that it may not be necessary to achieve agreement for the entire system. Often, shared standards apply to only part of the system needed to achieve the operational objectives. Ideally, this is accomplished prior to procurement of any major system. • Alter frequencies, if possible, to support expanded range.	• Florida • Maryland (Coordinated Highways Action Response Team [CHART])[139] • New York • Utah

[138] In response to the problem of incompatible data standards among responding agencies, the USDOT and the DOJ, Bureau of Justice Assistance, established the ITS and Public Safety (ITS/PS) Information Exchange Project. The project's goal is to establish a standards-based approach to critical information exchange among transportation and public safety agencies during planned and unplanned incidents. The Integrated Justice Information Systems (IJIS) Institute published the study's results in March 2007. The project committee identified 22 potential incident management information exchanges, and selected 12 for XML modeling in the project. The report contains findings and recommendations for further research.

See also the National Information Exchange Model (NIEM). NIEM was launched on February 28, 2005 to support the Homeland Security Act of 2002 to exchange data on terrorist information, through a partnership agreement between the DOJ and the DHS. NIEM does not attempt to standardize all databases; it does, however, identify the required cross-discipline activities needed to share information for numerous purposes. Every agency and jurisdiction is required to have a homeland security contact that can provide additional information on NIEM.

[139] The mission of the Maryland multi-jurisdictional CHART program is to improve real-time operations of Maryland's highway system through teamwork and technology, available online: http://www.chart.state.md.us/.

- **Challenge: Multiple and inconsistent entries for the same data fields.** Data entry can vary among agencies and among personnel within the same agencies. Entering dates and times in inconsistent formats can create a significant barrier to otherwise straightforward data exchange. When multiple agencies independently collect the same information (such as incident start time), data conflicts are created when agencies exchange data.

Solution	Success Stories
• Minimize human interface by using automated data entry where possible, i.e. automated CAD interfaces, GPS, and time-stamped data entry. • Establish clear data entry guidelines and procedures, including single point data entry, where possible, when manual data entry is required. • Implement a structured, user-friendly interface (pull down menus, etc.) to promote consistent data entry. • Agree on the owners of specific pieces of information, which can help streamline these issues. Ownership may be conditional in some cases. For example, the owner of incident start time may be the agency first notified of the incident. This agency may vary, but the agreement between stakeholders may be when time stamps differ, the earliest time is considered to be authoritative.	• Florida • New York • Washington • Wisconsin

- **Challenge: Cost-sharing between agencies of shared systems.** Key systems, such as CAD systems, may be owned by law enforcement agencies that do not have the budget to pay for expensive integration initiatives.

Solution	Success Stories
• In some cases, have DOTs help fund the law enforcement CAD system or integration costs, in exchange for data sharing agreements regarding data collected by the CAD system. • Where possible, collaborate to develop a cost-sharing policy during ITS architecture design, which can help eliminate this barrier.	• Wisconsin • North Carolina • Arizona • Utah

4.5 Supporting Policy and Guidance

To activate multi-disciplinary response resources, the exchange of information between agencies must be accurate and timely. The most efficient way to accomplish real-time accurate information exchange is to automate this exchange. Numerous national organizations have issued policy statements or developed guidance to support communication and information exchange.

4.5.1 National Policy

At the national level, Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), the NIMS, and the National Traffic Incident Management Coalition's (NTIMC) National Unified Goal (NUG) emphasizes the importance of effective interagency and multi-jurisdictional communication among TIM responders, as highlighted here:

- **SAFETEA-LU:** Section 1201 of the SAFETEA-LU requires the Secretary of Transportation (Secretary) to establish a Real-Time System Management Information Program that provides, in all States, the capability to monitor, in real-time, the traffic and travel conditions of the major highways of the United States, and to share that data with State and local governments and with the traveling public. This proposed rule would establish minimum parameters and requirements for States to make available and share traffic and travel condition information via real-time information programs. The FHWA includes the reporting of all traffic incidents that block roadway or lane travel as an element that must be reported. This rule reflects the intent of other Federal legislation that agencies that respond to highway incidents must be capable of instantaneous communication and data exchange in order to mitigate, in an expedient manner, all highway incidents.
- **NUG:** "Prompt, Reliable Incident Communications" represents one of the NUG objectives. The last 6 of the 18 NUG strategies directly relate to the principle of effective communications,[140] in particular:
  - Strategy 13. Multidisciplinary Communications Practices and Procedures.
  - Strategy 14. Prompt, Reliable Responder Notification.
  - Strategy 15. Interoperable Voice and Data Networks.
  - Strategy 16. Broadband Emergency Communications Systems.
  - Strategy 17. Prompt, Reliable Traveler Information Systems.
  - Strategy 18. Partnerships with News Media and Information Providers.

[140] Launched in 2004, the NTIMC promotes the safe and efficient management of traffic incidents (see http://timcoalition.org/?siteid=41). Members include representatives from the Emergency Medical Services (EMS), Fire, Law Enforcement, Public Safety Communications, Towing and Recovery, and Transportation communities. The NTIMC promotes multidisciplinary, multi-jurisdictional TIM programs to achieve objectives of enhanced responder safety; safe, quick traffic incident clearance; and more prompt, reliable, interoperable communications. Information available online: http://cms.transportation.org/?siteid=41&pageid=590.

- **NIMS:** One of the five components of the NIMS focuses on communication and information management. First created in March 2004 and updated in December 2008, the NIMS is a comprehensive national approach to emergency management designed to improve the effectiveness of emergency management and response personnel across the spectrum of potential incidents and hazard scenarios. Applicable at all jurisdictional levels and across functional disciplines, NIMS provides a unifying framework for incident management. The NIMS states that "Emergency management and incident response activities rely on communications and information systems that provide a common operating picture to all command and coordination sites."[141]

  The NIMS defines a common operating picture as an overview of an incident created by collating and gathering information—such as traffic, weather, actual damage, and resource availability—of any type (voice, data, etc.) from agencies/ organizations to support decision making.

  The NIMS explains that a common operating picture is

  ...established and maintained by gathering, collating, synthesizing, and disseminating incident information to all appropriate parties. Achieving a common operating picture allows on-scene and off-scene personnel to have the same information about the incident, including the availability and location of resources and the status of assistance requests.[142]

Additional National-Level Resources and Guidance

In addition to these national policies, several related national or Federal initiatives underscore the importance of communications, and suggest that this area remains one of the most dynamic and evolving aspects of TIM. The following list of resources is available on the Lessons Learned Information Sharing (LLIS) Web site.[143] LLIS is a national database of lessons learned, best practices, and innovative ideas for the emergency response and homeland security communities sponsored by the DHS Federal Emergency Management Agency. Focusing on information sharing, the system seeks to improve preparedness nationwide by allowing local, State, and Federal homeland security officials and response professionals to tap into a wealth of front-line expertise on the most effective planning, training, equipping, and operational practices for preventing, preparing for, responding to, and recovering from incidents.

- **National Emergency Communications Plan:** The purpose of the National Emergency Communications Plan is to promote the ability of emergency response providers and relevant government officials to continue to communicate in the event of natural disasters, acts of terrorism, and other manmade disasters, and to ensure, accelerate, and attain interoperable emergency communications nationwide.

[141] NIMS, DHS, 2008. *Component 2: Communications and Information Management,* p. 23. The NIMS was originally published on March 1, 2004, and revised in 2008 to reflect contributions from stakeholders and lessons learned during recent incidents.

[142] NIMS, DHS, 2008.

[143] LLIS Web site, available online: https://www.llis.dhs.gov/index.do.

- **Interoperability Continuum:** SAFECOM is the Federal (DHS) umbrella program designed to foster interoperability among the Nation's public safety practitioners so that they can communicate across disciplines and jurisdictions during an emergency.[144]
- **Operational Guide for the Interoperability Continuum:** This SAFECOM document provides guidance in each area of the interoperability continuum, including leadership and planning; governance; SOPs; technology; training and exercises; and interoperable communications usage.
- **National Response Framework:** Emergency Support Function (ESF) No. 2—Communications Annex: ESF No. 2, Communications, supports the restoration of public communications infrastructure, facilitates the recovery of systems and applications from cyber attacks, and coordinates Federal communications support to response efforts during incidents requiring a coordinated Federal response.
- **National Interoperability Field Operations Guide (NIFOG) Version 1.2:** The NIFOG is a collection of technical reference material for radio technicians responsible for radios used in disaster response applications. The NIFOG includes information from the National Interoperability Frequency Guide (NIFG), the instructions for use of the NIFG, and other reference material.
- **Guide for Short-Term Interoperability:** The Oregon State Interoperability Executive Council developed this Guide to assist non-technical, everyday public safety personnel in achieving simple, short-term interoperability solutions. The intent of the solutions is to enhance day-to-day operations and that afford preparation for major multi-jurisdictional events.
- **Technical Guide for Communications Interoperability:** A Guide for Interagency Communications Projects: This document provides background on the subject of communications interoperability, and presents tools to carry out technology initiatives that make this interoperability possible. The Guide also provides strategies, best practices, and recommendations for public safety radio projects.

4.5.2 National Association Support and Policy

TIM stakeholders also broadly affirm the importance of information exchange. Following are examples of policy and guidance promulgated by national stakeholder associations:

- **The International Association of Chiefs of Police (IACP).** At the 112th Annual Conference of IACP held on September 27, 2005 in Miami, Florida, the IACP passed a resolution calling for Information Technology Standards. The IACP made a specific appeal:

  > ...that Federal funding agencies should prioritize funding for the purpose of promoting, developing, maintaining, and expanding information technology standards within the criminal justice domain and beyond to all public safety domains (fire, EMS, and transportation).

[144] SAFECOM is a communications program of the Department of Homeland Security. SAFECOM provides research, development, testing and evaluation, guidance, tools, and templates on interoperable communications-related issues to Federal, State, tribal, and local emergency response agencies. More information available online: http://www.safecomprogram.gov/SAFECOM/.

Previously, the IACP, Highway Safety Committee, in the document titled, ***Traffic Safety Strategies for Law Enforcement: A Planning Guide for Law Enforcement Executives, Administrators and Managers (August 2003)***,[145] recognized the need for an effective TIM program (Strategy No. 16); sharing of resources (Strategy No. 13); and the use of ITS to manage incidents (Strategy No. 26). The planning guides provide many other strategies in addition to interoperability and resource sharing that are applicable to TIM.

- **The International Association of Fire Chiefs.** This organization passed a similar resolution on November 6, 2006, regarding support of new broadband spectrum and to create "a fully interoperable, advanced nationwide public safety communication system, capable of linking each and every local, tribal, State, and federal emergency responder...."[146]

  Strategies for States to Achieve Public Safety Wireless Interoperability, was released by the National Governors Association (NGA) Center for Best Practices on November 19, 2006. This document identifies barriers to interoperability and suggests strategies to achieve interoperability. One strategy is to support funding for public safety agencies that work to achieve interoperability and reject agency budgets that do not include interoperable solutions. The document further emphasizes

  > ...the urgent need for public safety departments and other agencies, including police, firefighters, transportation operators, and public health officials, to communicate reliably and effectively with each other when called upon in a crisis.[147]

- **Why Can't We Talk: Working Together to Bridge the Communications Gap to Save Lives—A Guide for Public Officials (February 2003).** The DHS, Office for Interoperability and Compatibility, National Task Force on Interoperability published the referenced document to help define interoperability as

  > ...the ability of public safety service and support providers—law enforcement, firefighters, EMS, emergency management, the public utilities, transportation, and others—to communicate with staff from other responding agencies, to exchange voice and/or data communications on demand and in real time.[148]

  The National Task Force membership includes public safety, public communications, State legislators, governors, mayors, and city officials.

[145] *Traffic Safety Strategies for Law Enforcement: A Planning Guide for Law Enforcement Executives, Administrators and Managers* (August 2003), IACP, available online: http://www.theiacp.org/tabid/299/Default.aspx?id=1040&v=1.

[146] IAFC Web site, available online: http://www.iafc.org/.

[147] NGA Center for Best Practices, available online: http://www.nga.org/portal/site/nga/menuitem.9123e83a1f6786440ddcbeeb501010a0/?vgnextoid=4434303cb0b32010VgnVCM1000001a01010aRCRD.

[148] *Why Can't We Talk: Working Together to Bridge the Communications Gap to Save Lives—A Guide for Public Officials* (February 2003), published by the DHS, Office for Interoperability and Compatibility, National Task Force, available online: http://www.ojp.usdoj.gov/nij/pubs-sum/204348.htm.

- **Traffic Incident Management Systems (April 2008).** The United States Fire Administration published the ***Traffic Incident Management Systems***, its final list of recommendations, which includes (No. 13), which states:

  > Develop a formal TIM information sharing method between public safety and transportation agencies. Factors involved in developing an effective information-sharing program are institutional, technical, and operational. Implement cooperative partnerships and frameworks based on formal agreements or regional plans to guide day-to-day activities and working relationships. Consider using compatible information systems to establish effective interagency information exchange whenever practical.[149]

4.5.3 State and Local Policies

Numerous examples of State and local policies and procedures affirm the importance of multi-agency communication among agencies and with the public and the importance of technology and data sharing from a TIM context. Most States have interoperability policies, due to DHS requirements for interoperable systems in emergency response. Several areas of the country indicate that interoperability issues remain the purview of the Urban Area Security Initiative (UASI). The USAI recognizes that major metropolitan areas of the country have issues, vulnerabilities, and threats unique to large cities. Through Federal grant funding from the DHS, the UASI mission is to reduce area vulnerability, prevent terrorism, and prepare regions for an all-hazards environment. The tri-State UASI region of Southwest Ohio, Southeast Indiana, and Northern Kentucky (SOSINK) identifies highway incidents as a major threat and concern. The Advanced Regional Traffic Interactive Management and Information System (ARTIMIS) provides incident services using the common tool of a TMC, while the incident management tools of data and voice communication standards are established by SOSINK. A similar model is followed in Charlotte, North Carolina, where the TMC coordinates incident management and response, and the Charlotte UASI drives the communication and mutual aid agreements.

Many State and local agencies have gone beyond these agreements to develop specific policies that support joint TIM operations and information sharing. Following are three examples of joint State and local agency agreements:

- **The Washington State Patrol and Washington Department of Transportation's Joint Operations Policy, available online:** http://www.watimcoalition.org. In 2002, the Washington State Patrol (WSP) and the Washington State Department of Transportation (WSDOT) developed A Joint Operations Policy Statement[150] (JOPS) to govern all aspects of incident management. JOPS establishes policies and procedures for operational areas of mutual concern and involvement with both the WSP and WSDOT. These policies and procedures included data sharing and coordinated public communications with the media and for traveler information for incident traffic management. JOPS also clearly defines the roles and responsibilities of each agency for incident response teams; hazardous materials handling; service patrols and motorist assistance vans; and tow truck handling. The JOPS also establishes specific performance targets for clearing incidents and the process for performance is measurement. JOPS is updated

[149] *Traffic Incident Management Systems, USFA*.

[150] *A Joint Operations Policy Statement*, prepared and agreed to by the WSP and WSDOT, February 13, 2002, available online: http://tmcpfs.ops.fhwa.dot.gov/cfprojects/uploaded_files/washington%20joint%20operations%20policy.doc.

on a regularly by the State and is an excellent example of how a State established communications practices and procedures to coordinate the roles and responsibilities of on-scene, multi-disciplinary responder personnel.

- **Delaware Valley Regional Planning Commission (DVRPC) Incident Management Task Force Policies, available online:** http://www.dvrpc.org/Operations/IncidentManagement.htm. DVRPC, in coordination with Pennsylvania and New Jersey DOT (PennDOT and NJDOT, respectively) and Pennsylvania and New Jersey State Police (PSP and NJSP, respectively), established multi-jurisdictional Incident Management Task Forces (IMTF) for multiple areas along the East Coast. These task forces publish guidance for their members. One example is the **I-295/I-76/NJ 42 Incident Management Task Force Policy and Procedures Manual,** available online: http://www.i95coalition.net/i95/Portals/0/Public_Files/uploaded/Incident-toolkit/documents/Plan/Plan_TIM_NJ.pdf.

- **Florida's Open Roads Policy, available online:** http://smartsunguide.com/pdf/Open%20Roads%20Policy.pdf. This document provides a powerful foundation for interoperable communication and information exchange between core TIM response agencies—law enforcement and transportation. These agencies share information through Florida's SunGuide system,[151] which allows the TIM teams to respond more efficiently and effectively to incidents, and provides real-time information to travelers through 511, DMS, and on-line traffic information.

4.6 *Want to Know More?*

For additional resources and information, please view the items listed in the following resource guide.

[151] Florida's SunGuide system, available online: http://www.sunguide.org/.

Want to Know More?

Resources:

- **511 Web page,** available online: http://www.deploy511.org/whatis511.html.
- **511 Deployment Status** Web page, available online: http://www.deploy511.org/deployment-stats.html.
- **APCO Project 25** Web page, available online: http://www.apco911.org/frequency/project25/information.html#whatis.
- **Applications Overview,** Research and Innovative Technology Administration (RITA), available online: http://www.itsoverview.its.dot.gov/.
- **Benefits Database,** RITA, available online: http://www.itsbenefits.its.dot.gov/.
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CONTACT INFORMATION

For additional information on this handbook, contact:
Kimberly Vasconez, via e-mail at:
Kimberly Vasconez@dot.gov.

Federal Highway Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

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