



TRAFFIC CONTROL CONCEPTS FOR INCIDENT CLEARANCE



**U.S. Department of Transportation
Federal Highway Administration**



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Dear Transportation Professionals & Traffic Incident Management (TIM) Partners:

As part of the mission of the Federal Highway Administration (FHWA) to “***Keep America Moving,***” we need to safeguard the motoring public and those responding to traffic incidents. Safe, quick clearance of highway incidents—a foundation of both mature and developing TIM programs—depends on strong, coordinated multi-agency operations that are supported by integrated communications.

With more vehicles on the Nation’s highways, traffic incidents become increasingly life threatening for those involved, including responders dispatched to help. According to the National Traffic Incident Management Coalition (NTIMC), "struck-by" secondary incidents are on the rise. In conjunction with the NTIMC partner organizations in the public safety and transportation arenas, FHWA promotes policies that enhance responder safety (such as driver removal and move-over laws); encourages the use of new technologies and gear to protect responders during roadside operations; and promotes improved safety procedures and safety training of traffic incident responders. In the coming year, FHWA will be launching a new campaign, similar to the highly successful “***Click It or Ticket***” campaign, to increase driver awareness of their roles and duties in safely addressing traffic incidents or public safety responses on the roads.

As a part of this campaign and in support of TIM practitioners, FHWA is pleased to introduce a new set of primers, collectively known as the “***Safe, Quick Clearance Primer Series.***” This series includes five primers that address various issues associated with roadside clearance operations and provide basic building blocks on:

- ***Information Sharing for Traffic Incident Management***
- ***Traffic Incident Management in Construction and Maintenance Work Zones***
- ***Traffic Incident Management in Hazardous Materials Spills in Incident Clearance***
- ***Traffic Incident Management Resource Management,*** and
- ***Traffic Control Concepts for Incident Clearance***

We encourage comments and contributions to these primers and other FHWA Traffic Incident Management documents. Please feel free to contact our Emergency Transportation Operations Team at ETO@dot.gov with suggestions for future revisions.

Sincerely,

Jeffrey A. Lindley
Associate Administrator for Operations





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1.0 INTRODUCTION

The surface transportation system is crucial to our quality of life and economic wellbeing by moving people, goods and services in a safe, efficient, and orderly manner. Unfortunately, the development of the road system has not kept up with growing demands and this has resulted in congestion, delays, and negative environmental impacts. These adverse conditions are magnified when incidents occur that further the degradation of traffic flow and increase the safety risk for the traveling public as well as the incident responders. While much has and is being done to address and improve safety, over 6.4 million vehicle crashes occur annually.¹ The severity of the reported incidents range from inconvenience and minimal property damage to multi-vehicle, multi-fatality, major structural damage and threatening hazardous cargo materials spills. While each crash is unique and has a varied impact on the travel and safety of others, they must all be safely cleared; and they must be cleared as quickly as possible to minimize the exposure of potential harm for the victims, the first responders, and the motorists traveling through the crash location.

Traffic incident management (TIM) deals with reducing congestion and improving safety for all concerned. The focus of incident management is to develop procedures, implement policies, and deploy technologies, not only to identify incidents more quickly, but to improve response times and manage the incident scene more effectively and efficiently. Traffic control is the element of scene management that helps to secure the scene, protects other motorists, and allows first responders the opportunity to safely deploy the necessary actions. Normally, law enforcement, fire-rescue, and / or transportation service patrols are those first on the scene and charged with the responsibility to implement immediate traffic control. As with any emergency situation, these professionals must use whatever is available to them at the moment, highlighting the importance that they carry the right tools and have the necessary training to safely implement the traffic control under time-limiting conditions. It is also equally important to adapt the traffic control needs as conditions change if a longer time period is required before the situation can return to normal. Under the incident command system (ICS), traffic control allows responders to safely meet the present needs, but also be sensitive to the delays and impacts to the traveling public.

Purpose of This Document

The purpose of this document is to provide a general overview of the practice of traffic control activities associated with incident management and describe various conceptual traffic control elements. Various state laws and policies are in place for the purpose of addressing the safe, quick clearance of incidents. All potential responders have responsible roles in providing immediate and emergency traffic control, with these actions coordinated through the ICS team commander, to eliminate confusing or conflicting actions.

The traffic control elements and applications dealing with incidents can be found in Part 6 of the Manual on Unified Traffic Control Devices (MUTCD).² Should an incident be expected to exceed a 30 minute time frame, the required traffic control should replicate, as much as feasibly possible, the requirements of an applicable temporary work zone set-up as found in the MUTCD or comparable state documents. This approach is based on the proven concept that traffic control applications should be in sync with driver expectancy. The MUTCD as well as state and local government supported manuals address the expected standards for all the various types of work zone traffic control requirements, including emergency incidents. The MUTCD has either been adopted as the state standard or serves as the framework for individual state manuals. In addition to these guidelines, there are a number of supporting enhancements to assist and improve the reach of traffic control efforts with the goal of improving safety and facilitating the quick clearance of incidents.

Target Audience

The information provided in this guidebook is directed toward operations personnel, and first and secondary responders who are responsible for establishing, maintaining, monitoring, modifying, and removing any traffic control at an incident scene.

Operations personnel are typically associated with departments of transportation whose response priorities focus on restoration of normal traffic flow. They may implement on-scene traffic control strategies for quick clearance and, once preliminary traffic control is in place, support clean-up and recovery efforts so that the scene is cleared and traffic delays are minimized. These personnel may be dedicated to providing emergency traffic control and intervention, such as the freeway service patrol staff, or in-house staff, such as maintenance personnel, whose skills include providing traffic control for routine operations. The information will benefit this group by providing them with an understanding of available techniques and devices for on-scene traffic control. It will also highlight the benefits of proper incident scene traffic control.

First responders are just that—the first individuals to arrive at the incident scene. They provide the initial response to assist crash victims and isolate and protect the scene by implementing immediate traffic control. First responders typically include law enforcement, fire-rescue, and emergency medical service. Their priority is the safety of motorists, victims, and other responders; their attention is directed to traffic flow only after addressing immediate life threatening needs. The information in this guidebook will provide first responders with a basic understanding of the need to initiate traffic control to secure and protect an incident scene along with the responding personnel.

Secondary responders are those individuals who take over certain incident scene responsibilities, such as traffic control set-up, from first responders and operations personnel; they are not generally first on the scene. Secondary responders provide support functions to assist in the incident response. Typically, their focus is traffic control and management. Operators at traffic management centers could also be included in this group. They can monitor and report immediate and adjacent traffic conditions to the on-scene responders. Some centers also have the capability to

identify and / or broadcast information on acceptable diversion routes. They could also be capable of remotely adjusting the timing of adjacent signals to address traffic flow. This group will be able to utilize the guidebook as a reference to the required maintenance of traffic from on-going scene control to the recovery of traffic control as the scene changes and clears.

Structure of this Guidebook

This guidebook is one in an Information Series on Traffic Incident Management Safe, Quick Clearance. This guidebook focuses on **Traffic Control Concepts for Incident Clearance**. Other guidebooks available in this information series deal with the following topics:

- Traffic Incident Management in Construction and Maintenance Work Zones,
- Hazardous Materials Spills in Incident Clearance,
- Information Sharing for Traffic Incident Management, and
- Traffic Incident Management Resource Management.

This document discusses various aspects of traffic control for incidents with the focus on the traffic control roles and responsibilities of the responders as well as the safety of the responders and the motoring public. It also recognizes that active traffic management is necessary to meet the fluctuating needs of the incident scene and to minimize clearance and recovery time. Chapter 2 provides an overview of popular state laws and policies enacted to support safe, quick clearance. Chapter 3 addresses the roles/responsibilities of the various categories of responders. Chapter 4 looks at the assignment and responsibilities within the ICS team under the National Incident Management System. Chapter 5 discusses some of the available traffic control tools. Chapter 6 focuses on the affects on traffic control created by the dynamic nature of incident clearance; while Chapter 7 deals with the last stages of traffic control removal and recovery. Chapter 8 highlights some “best practices” to enhance traffic control implementation. Chapter 9 contains references and other suggested readings that were used to develop this guidebook.



2.0 LAWS / POLICIES

In response to a growing number of first responder fatalities at incident sites, “move over” laws have been adopted by the majority of states to provide a buffer area between moving traffic and the responders. According to the National Law Enforcement Officers Memorial Fund more than 150 law enforcement officers were killed from 1997 to 2006, after being struck by vehicles along America’s highways.³ As of 2007, all but six states and Washington, D.C. had enacted some type of move over law. Information on this law by state can be found at <http://www.moveoveramerica.com>, a Web site sponsored by the National Safety Commission and its association members.³

There is also growing acknowledgement, given the volume of vehicle crashes, especially in the large metropolitan regions, that there are not enough resources available to physically respond to every incident scene in a timely manner. The intent of “Move It” or “Steer It/Clear It” laws is to reduce the demand on first responder resources and provide for quick clearance to reduce the impact on already congested roadways resulting from a relatively minor collision not requiring any other response besides law enforcement for the purpose of documenting the crash. Legislation has been passed in about half of the states establishing laws requiring drivers involved in minor property damage collisions (no injuries) to move the vehicles from the travel lanes, exchange information, and report the crash information through submission of a proper form.⁴

The laws referred to as “Authority Removal” or “Hold Harmless” Laws establish the authority of public agencies to immediately remove or cause to remove disabled / wrecked vehicles or split cargo blocking travel lanes by immediate means as well as indemnify the agencies from liability for any damage caused in the process of the removal. “Authority Tow” laws are similar in objective as authority removal laws but they address tow service liability exemption if they are directed by law enforcement to remove the vehicles / cargo.

In addition to this legislation, there is a proactive movement by various responder agencies to enter into interagency agreements, solidifying the commitment to work toward the goal of safe, quick clearance of incidents. These types of agreements are often referred to as “open road” policies.

This section highlights some of the laws and the key points now in affect as well as some of the types of open road policies.

Move Over Laws

Motorists are increasingly being required to slow down or move over to adjacent lanes when they approach emergency or public service vehicles on the shoulder of the highway. At times, there can be conflicting goals during the management of an incident with respect to protecting people and property at the scene and maintaining traffic flow. Stopping traffic flow altogether may provide a safer area for personnel at

the incident scene, but this will often result in the unintended consequence of secondary crashes in the resultant traffic queue, some of which may be more severe than the original incident. Insufficient traffic control at the scene can compromise responders' safety by placing them too close to vehicles moving at highway speeds. Requiring passing motorists to slow down or move over to an adjacent lane strikes a balance between providing a safer area in which responders may work and allowing traffic to continue to flow.

Within the United States, almost all of the states have some form of move over law in which passing vehicles are required to slow down and/or safely move to an adjacent lane when approaching an authorized emergency vehicle that is parked or otherwise stopped on or next to a multilane highway. When lane changes are impossible, prohibited, or unsafe, requirements for speed reductions vary from what is considered "reasonable and proper" to specific reductions in miles per hour (e.g., 20 mph). Authorized emergency vehicles typically include first responders, such as law enforcement and fire-rescue vehicles with flashing or rotating blue, white, or red lights. In some areas, "civilian" responders, such as courtesy / service patrols and tow trucks, are considered as authorized emergency vehicles and may also be entitled to the same protections under move over laws.⁴

Move over laws support incident scene traffic control by:

- Providing additional protection for incident responders and motorists at the incident scene,
- Allowing safe traffic movement around or past the incident scene to aid in overall congestion recovery,
- Reducing secondary crashes, and
- Allowing the incident scene to be cleared more quickly.

States whose move over laws include notes of particular interest include: Florida, Minnesota, North Carolina, South Carolina, Tennessee, and Wisconsin. Highlights for each state's move over laws are presented below. This is a representative sample, not a comprehensive listing.

Florida (Section 316.126)⁵ – Requires motorists to slow to a speed of 20 miles per hour (mph) below the posted speed limit when the speed limit is 25 mph or greater; or motorists must travel at 5 mph when the posted speed limit is 20 mph or less.

North Carolina (Section 20-157)⁶ – Includes department of transportation and public service vehicles to the list of vehicles for which move over law applies.

Wisconsin (Section 346.072)⁷ – Requires passing vehicles to slow down or move over when authorized emergency vehicles displaying visual signals are parked or standing on or within 12 feet of the roadway.

Minnesota (Section 169.18)⁸ – Requires motorists passing a parked emergency vehicle to reduce their speed and move to a lane away from the emergency vehicle; and provides penalties in the form of a surcharge equal to the amount of a fine imposed for a speed violation.

South Carolina (Section 56-5-1538)⁹ – Requires motorists to slow down, proceed with caution, and change lanes when approaching stationary emergency vehicles displaying flashing red; red and white; blue; red and blue lights; or amber or yellow warning lights.

Tennessee (Section 55-8-132)¹⁰ – Makes specific provisions for proceeding with caution and making lane changes when possible for stationary recovery vehicles and highway maintenance vehicles that are using authorized flashing lights.

Move It (aka Steer It/Clear It) Laws

Move It, or Steer It/Clear It, laws require motorists involved in crashes to take actions that support quick clearance initiatives. Traffic incidents are categorized as disablements, property damage only (PDO), and injury crashes. When involved in incidents, motorists are required to move their vehicles from the travel lanes if they are able to do so. The intent of move it laws is to relocate disabled vehicles from the through lanes where they could be in danger of being struck, perhaps again, or otherwise worsening the original incident scenario. If the vehicles can be moved to the shoulder, or otherwise off the roadway, the incident scene is safer for everyone and traffic flow is less impaired.

Move it laws vary in their application with regard to the extent of disablement and severity of each incident. Some laws require vehicle relocation only for PDO crashes; while others go so far as to require relocation for all injury and fatal crashes. These laws also provide guidance for communication to authorities to begin the incident clearance process.

Samples of the move it laws are presented below. This is a representative sample and not a comprehensive listing.

Florida (Sections 316.027 & 316.061)⁵ – Requires that stopped motorists do not obstruct traffic more than necessary. If a damaged vehicle is obstructing traffic, the driver must make every reasonable effort to move the vehicle or have it moved so as not to obstruct the regular traffic flow.

Connecticut (Section 14-224)¹¹ – Requires that motorists involved in PDO accidents on limited-access highways immediately move their vehicle to a non-travel area adjacent to the accident site, if possible, without risk of further damage to property or injury to any person.

Arizona (Section 28-674)¹³ – Allows the driver of a motor vehicle involved in an accident, or any other occupant of the motor vehicle who possess a valid driver license, to remove the motor vehicle from the main travel portion of the roadway to a safe location on the shoulder, emergency lane, or median, if a motor vehicle traffic accident occurs and serious physical injury or death is not apparent and if both of the following apply:

1. The motor vehicle can be moved safely.

2. The motor vehicle is capable of being normally and safely driven, does not require towing, and can be operated under its own power in its customary manner without further damage or hazard to the motor vehicle, to traffic elements, or to the roadway.

The motorist involved in a traffic accident may request any person who possesses a valid driver's license to remove the motor vehicle, and the person requested to remove the motor vehicle may comply with the request.

The driver or any other person removing a motor vehicle from the main traveled portion of the roadway before the arrival of a police officer is not liable or at fault regarding the cause of the traffic accident solely by reason of moving the motor vehicle.

Authority Removal (aka Hold Harmless) and Authority Tow Laws

As of 2003, 14 states had passed authority removal (hold harmless) laws. These laws establish the authority of designated public agencies, including departments of transportation and state, county, and local law enforcement, to remove or cause to remove:

- Driver-attended disabled or wrecked vehicles,
- Spilled cargo or personal property blocking a travel lane,
- Or otherwise creating a hazard to the flow of adjacent traffic.¹⁴

With the passage of authority removal laws and policies, incident responders can take an active and immediate role to restore the roadway to normal conditions without fear of damage liability claims since these laws indemnify the agency for damage caused in the removal process. Samples of the authority removal laws and policies are presented below. This is a representative sample and not a comprehensive listing.

Tennessee (Section 54-16-113)¹⁵ – Authorizes the department of public safety, DOT, or local law enforcement to immediately remove or cause to be removed any disabled/ wrecked vehicle, spilled cargo, or other personal property obstructing traffic to an alternate location within the immediate vicinity.

Rhode Island (Section 24-8-42)¹⁵ – Authorizes a public safety agency, if an emergency is created by a disabled/wrecked vehicle on a limited access facility, to remove or cause to remove the vehicle(s). The law also indemnifies the agency or its agents against damage claims incurred by the emergency measures used to remove the vehicle.

Utah(Policy UDOT 06C-36)¹⁶ – Allows Incident Management Team (IMT) operators or other designees of the region to remove disabled vehicles that present a traffic hazard from the roadway. This written policy is supported in large part by the close association and relationship between UDOT and the Utah Highway Patrol.

There is also legislation that has extended the concept of protecting responders from potential damages to tow truck operators. These laws may be referred to as authority tow laws. This type of law may also direct the removal of the disabled vehicles or split cargo to some type of legal parking or storage area. In 2007, Georgia amended its Official Code to limit the damage liability of towing services if they are ordered to remove vehicles or obstructions from the roadway determined to be a threat to safety or to mitigate traffic congestion.¹⁷ Washington State is also considering this type of legislation. Other samples of authority tow laws are listed below.

Oregon (Section 819.120)¹⁵ – Authorizes tow services to remove and take custody of disabled, abandoned or unattended vehicles that is in such a location that constitutes a hazard or obstruction to flowing traffic. The possible locations include vehicles parked so that any part of the vehicle extends within the paved portion of the travel lane, highway shoulder or bicycle lane of any freeway within a city limits during peak travel hours, within 1,000 feet of the area where a freeway exit or entrance ramp meets the freeway; or of any highway during daylight hours if the vehicle presents a clear danger.

Virginia (Section 46.2-1212.1)¹⁵ – Allows law enforcement to remove a vehicle involved in a crash or experiencing a mechanical breakdown if the vehicle creates a traffic hazard and if the owner does not move it; this is at the expense of the owner. In the event of a crash or incident, law enforcement may require the removal, without the consent of the owner or carrier, of the vehicle, cargo, or other personal property that has been damaged or spilled within the right-of-way and is blocking the roadway. The owner and carrier of the removed / disposed vehicle, cargo, or personal property shall reimburse the department of transportation, state police, local law enforcement agency, and local public safety agencies for all costs incurred in the removal and subsequent disposition of the property.

Open Roads Policies

Open Roads policies formally state the agencies' goals in partnership to remove vehicles, cargo, and debris from roadways with the intention of restoring safe, orderly traffic flow after motor vehicle crashes and other roadway incidents. These goals often include timeframes for incident clearance that start with the arrival of the first responding officer. Responding agencies have solidified their responsibility to do whatever is safe and reasonable to reduce the risk to responders, secondary crashes, and incident delays. It is generally recognized that vehicle or cargo damage may occur when clearing the roadway; however, the highest priority is given to restoring traffic to normal conditions. The accepted premise is that roadways should not be closed or restricted any longer than absolutely necessary.

Such agreements, generally known as open roads policies, define agency responsibilities for incident response. For example, law enforcement agencies commit to performing investigations as quickly as possible and may require non-critical portions of the investigation to occur when lighter traffic conditions prevail. They agree to close only the travel lanes necessary to deal with the incident, and they work with transportation agencies to set up appropriate traffic control, establish alternate routes, and expedite traffic movement at the incident scene. Law

enforcement may allow damaged vehicles to be relocated to accident investigation sites or other locations for safe completion of investigations. Departments of transportation in turn commit to responding with appropriate resources for traffic control and incident clean-up within specified time frames, ensuring safe work zones for responders and the motoring public. Transportation agencies may agree to have additional heavy equipment at their disposal to assist tow operators in quicker clearing of blocked lanes. Most importantly, these incident response partners commit to work together to ensure **all** motorist needs are being met in a safe, professional, and efficient manner.

States with open roads policies include: Florida, Georgia, Maryland, Tennessee, and Washington. Highlights for each state are presented below. This is a representative sample, not a comprehensive listing.

Florida¹⁸ – This agency agreement, between the Florida Department of Transportation and the Florida Highway Patrol, requires clearance of incidents from the roadway within 90 minutes with the understanding that more complex scenarios could require additional time. Research and training of advanced technologies, equipment, and methods for quickly re-opening blocked travel lanes is required.

Georgia¹⁹ – This agreement was executed by the Georgia Governor on behalf of state incident response agencies. It provides guidance for the Metro Atlanta area in the quick, safe clearance of freeway traffic incidents. Agencies are required to work together to minimize traffic flow disruptions through implementation of initiatives from Metro Atlanta's *Traffic Incident Management Strategic Vision*. The agreement authorizes establishment of local traffic incident management teams, requires formal training and certification for towing and recovery operators, and provides monetary incentives for quick (90 minute) clearance of incidents with significant traffic impacts. It also allows coroners and medical examiners to remove decedents' bodies from the roadway to facilitate clearance whenever possible.

Maryland¹⁸ – This interagency agreement, between Maryland State Highway Administration, Maryland Department of Transportation, and Maryland State Police, recognizes that clearance activities may damage vehicles or cargo, but places greater priority on public safety. This agreement has some discussion of liability acceptance to the extent that Maryland's Tort Claims Act allows for damages. Personnel have the responsibility to reopen travel lanes as quickly as possible when it is safe to do so.

Tennessee¹⁸ – There is an agreement between the Tennessee Department of Safety (DOS), Tennessee Highway Patrol (THP), Commercial Vehicle Enforcement (CVE), and Tennessee Department of Transportation (TDOT) requiring expeditious crash investigations and allows for relocation of vehicles involved in non-injury collisions. The THP is authorized to call for wrecker services when zone wreckers do not have the capability to clear a crash; THP can also override owner requests for specific towing companies when this action is not expected to be the fastest response possible. CVE works actively with the trucking industry to encourage proper loading and operating procedures to minimize truck rollovers; and DOS includes information in the Driver's Handbook and other publications. TDOT establishes policies and

procedures to provide support at incident scenes. All agencies commit to work together for continuous improvement in their clearance practices.

Washington²⁰ – A joint operations policy statement between the Washington Department of Transportation and the Washington State Patrol requires agency mission and organizational alignment for data sharing, traffic management, coordinated public communications, traveler information, and incident response. It also encourages the use of technologies to expedite investigations. Incident command system (unified command) is established through this joint policy statement and it supports planning for planned and unplanned events. Specific requirements for commercial vehicle operations and security are provided along with outlines for new initiatives to reduce crashes. This policy statement requires comprehensive performance measurement and analysis.



3.0 INCIDENT RESPONDERS

Identification of affected jurisdictions and agency responsibilities is critical for effective response to incidents. While involvement will vary depending on the scope and severity of an incident, each entity should be involved in the planning process so that each has a clear understanding of roles, responsibilities, resources, communications protocols, and other aspects of the incident management program. This is especially true when roles overlap; addressing all issues outside of an actual incident will reduce conflicts and confusion.

Operations Personnel

Operations personnel are typically associated with transportation departments whose response priorities focus on restoration of normal traffic flow. They may implement on-scene traffic control strategies for quick clearance and, once preliminary traffic control is in place, they support clean-up and recovery efforts so that the scene may be cleared and traffic delays minimized.

First Responders

First responders are those individuals who arrive first at the incident scene. They provide the initial response to assist crash victims while isolating and protecting the scene and responders by implementing immediate traffic control. First responders typically include law enforcement, fire-rescue, and emergency medical services (EMS). Their first priority is the safety of motorists, victims, and other responders; they have a secondary emphasis on resuming traffic flow.

Secondary Responders

Secondary responders are those individuals who take over certain incident scene responsibilities from operations personnel and first responders, such as traffic control set up. They are not generally first on scene and provide support functions to assist in the incident response. Typically their focus is traffic control and management.

Table 1 indicates typical roles and responsibilities of incident responders.

Table 1. Typical Roles and Responsibilities of Potential Response Agencies²¹

Response Agency	Roles and Responsibilities
Law Enforcement (state patrols, sheriffs, local police departments)	<ul style="list-style-type: none"> • Assist in incident detection and verification • Determine severity of incident and condition of victims and relay information to dispatch • Isolate and secure incident scene • Provide emergency medical aid until help arrives • Serve as incident commander, as conditions warrant • Supervise scene clearance • Direct traffic • Conduct crash investigations
Fire Rescue (career and/or volunteer fire departments)	<ul style="list-style-type: none"> • Protect and contain incident scene • Suppress fire • Rescue crash victims from damaged vehicles and treat injuries • Arrange transportation for injured • Provide initial hazardous material (HazMat) response and request additional clean-up resources • Serve as incident commander, as conditions warrant • Assist in incident clearance
911 and Other Dispatch	<ul style="list-style-type: none"> • Receive 911 calls from land lines, cell phones, and call boxes • Dispatch appropriate response agencies
EMS	<ul style="list-style-type: none"> • Provide advanced emergency medical care • Determine destination and transportation requirements for injured • Coordinate evacuation with fire, police, ambulance, or airlift • Stabilize and transport incident victims
Department of Transportation (DOT) Personnel – Maintenance	<ul style="list-style-type: none"> • Provide initial and short-term traffic control • Provide special equipment or resources as requested • Contain minor spills if possible • Coordinate with law enforcement regarding alternate routes • Coordinate personnel resources for DOT • Assess infrastructure damage
DOT Personnel – Traffic Operations	<ul style="list-style-type: none"> • Assist in incident detection and verification • Operate intelligent transportation systems (ITS) field devices per approved response plans • Provide traveler information to public and media • Dispatch service patrols • Notify other agencies of incident as required
DOT Personnel – Construction	<ul style="list-style-type: none"> • Similar duties as DOT maintenance personnel, but within work zone • Coordinate with contractor for traffic control and repairs
Service Patrol (Public and Private)	<ul style="list-style-type: none"> • Assist in incident detection and verification • Secure incident scene • Assist with and relocate disabled vehicles • Provide emergency medical aid until help arrives • Provide containment of minor spills • Provide initial traffic control

Response Agency	Roles and Responsibilities
Towing/Wrecker Services	<ul style="list-style-type: none"> • Protect victims' property and safely remove vehicles from the scene when authorized • Remove debris from roadway • Clean up minor vehicle spills • Provide transportation for uninjured vehicle occupants • Provide minor repairs on scene • Serve as incident commander as conditions change from rescue to recovery
Hazardous Material Responders	<ul style="list-style-type: none"> • Manage fluid spill cleanup
Media/Information Service Providers	<ul style="list-style-type: none"> • Distribute traveler information via radio, television, internet, and 511 telephone services • Provide real-time information • Provide advance information regarding planned events and proper procedures
Coroners/Medical Examiners	<ul style="list-style-type: none"> • Investigate fatalities



4.0 ASSIGNMENTS OF TRAFFIC CONTROL FUNCTIONS WITHIN THE INCIDENT COMMAND SYSTEM

The incident command system (ICS) is a federally adopted approach for the systematic management of all types of incidents. ICS provides clear procedures for inter-agency coordination and outlines roles and responsibilities for incident responders. Rather than just defining who is in charge, ICS provides the management structure for **who** is in charge of **what**. ICS allows agencies to work together using common terminologies and operating procedures. An important outcome of the use of ICS is that command personnel have a better understanding of other agencies' priorities, leading to fewer conflicts and greater effectiveness of response. However, because of the many agencies involved in incident response, this is a process that is under continual attention and improvement.

Unified command (UC) provides a management structure that allows agencies with incident responsibilities to work within an established set of common objectives and strategies that can include:

- Agency assignments
- Incident priorities
- Assignment of agency objectives
- Communications protocols
- Knowledge of duties within agency responsibilities
- Acquisition and allocation of materials and resources

When applied effectively, UC benefits facilitate the ability of multiple agencies to work together, fostering a cooperative environment. Duplication of tasks can be avoided, and greater teamwork leads to efficiencies in response. UC allows all agencies with jurisdictional authority to provide managerial direction at an incident scene while maintaining a common set of objectives and strategies.

Command staff report directly to the incident commander. The identity of this person actually depends on the priority of the mission at the time. Fire-rescue or EMS is typically in charge until the injured are treated and moved. Once priorities shift to investigation, law enforcement takes over. As the incident moves into clean-up/recovery, command can shift to the transportation agency or towing contractor. Personnel participate actively until they no longer have a role at the incident. During this process, other agencies have the opportunity to participate in decision-making and provide direction to their own personnel; however, overall charge resides in the incident commander.

Table 2. Typical Roles and Responsibilities Within the UC Structure²¹

Incident Responder	Role and Responsibilities
Incident Commander	<ul style="list-style-type: none"> • Overall incident management • Has clear authority and knowledge of policies and procedures • Determines priorities and strategies • Coordinates operations
Information Officer	<ul style="list-style-type: none"> • Develops and releases information to news media, incident personnel, and other appropriate organizations
Liaison Officer	<ul style="list-style-type: none"> • Used during multi-jurisdictional incidents • Point of contact for representatives from other agencies • Contact for personnel from other agencies with roles in response support
Agency Representatives	<ul style="list-style-type: none"> • Individuals assigned to the incident response from other cooperating agencies with delegated authority to make decisions on their agency's participation at the incident
Safety Officer	<ul style="list-style-type: none"> • Develops and recommends measures to assure personnel safety and assess unsafe/hazardous situations • Monitors incident operations and operational safety for incident responders

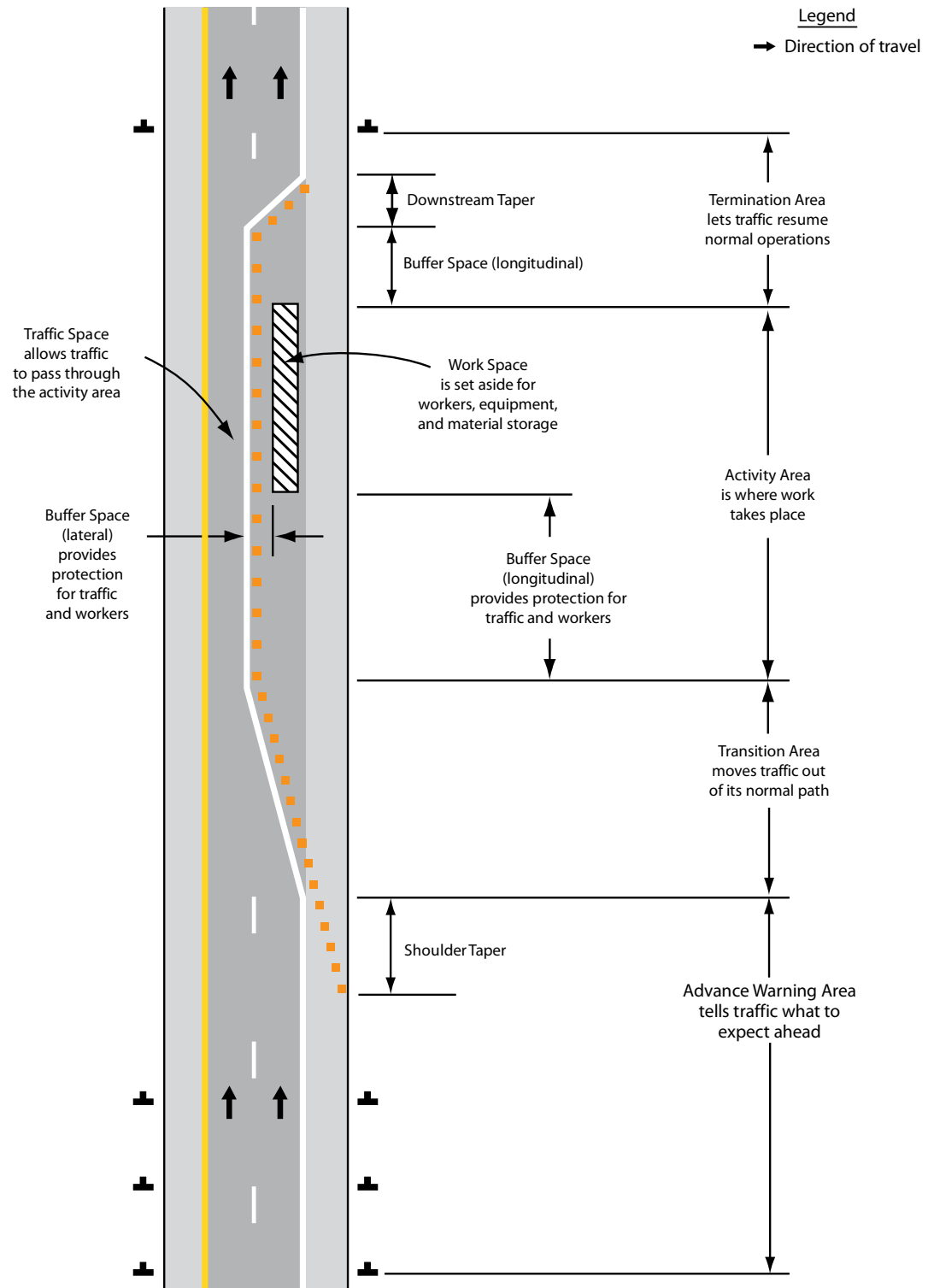
5.0 ROLE OF TRAFFIC CONTROL DEVICES AS WARNINGS FOR APPROACHING TRAFFIC

An incident scene should be considered a temporary work zone: an area of impact that must be secured and that must be balanced with the need to control traffic flow. Reducing the incident duration is also important because that will reduce the risk of secondary incidents. There are various traffic control devices available to incident responders. Guidelines for application, use, and placement can be found in Part 6 of the MUTCD.² Some of the devices are used during the initial traffic control as a temporary measure; others are set up with longer term traffic control in mind. Whatever their intended duration, these traffic control devices help to secure the incident scene and provide protection for incident victim, responders, and the motorists passing by the incident.

Traffic control components at an incident, same as in standard maintenance of traffic work zones, can be broken into four major areas:²

- Advance warning area (advance warning signs, cones, flares, or emergency vehicles)
- Transition area (strategic use of tapers)
- Activity area (channelizing devices)
 - Buffer space (protected by energy absorption or attenuation devices or official vehicles)
 - Work or incident area (responders)
- Termination area (strategic use of tapers)

Figure 1. Component Parts of a Temporary Traffic Control Zone²



The traffic control setup calls for various types of devices and configurations within these zones. The following are some devices that are used either in the initial traffic control and/or for longer duration periods.

Personal Protection Equipment (PPE)

All responders, inclusive of fire-rescue personnel, emergency medical service (EMS) crews, law enforcement, department of transportation (DOT) personnel, and tow truck operators, face inherent risks when responding to an incident. For obvious reasons, including public recognition of roles and responsibilities, conspicuity, and personal safety, Section 6D.03 of the MUTCD² recommends that all workers should wear bright, highly visible clothing when working in or near moving traffic. This includes fire-rescue personnel, EMS crews, DOT personnel, law enforcement, and tow truck drivers.

Federal regulation (23 CFR 634), in effect by November 24, 2008, mandates the requirement for all emergency responders working in the right-of-way of a federal-aid highway to wear high-visibility clothing that meets the requirements of American National Standards Institute (ANSI) / International Safety Equipment Association (ISEA) 107; 2004 edition class 2 or 3.²²

These new requirements stipulate entity specifics, type, minimum material coverage, color, retroreflective performance, and material dimensions and placement.

Vehicle Lights and Flares

Flashing lights (red, white, amber, blue, and / or green) on emergency vehicles are used to enhance the safety of response personnel and incident victims and are essential in the initial response stage. The National Highway Traffic Safety Administration and Federal Motor Carrier Safety Administration of the Federal DOT have the authority to establish these vehicle lighting requirements; however, the allowable light colors for emergency response vehicles are normally spelled out in individual state code.

Warning light applications are being advanced with the development of light emitting diode technology and include relatively new features, such as wig-wag, oscillating, and strobe capabilities. There are also a limited number of states, such as Texas, that allow blue auxiliary lights along with standard amber lights on DOT maintenance and freeway service vehicles used in high-risk activities.²³

Flashing lights, high-intensity rotating, flashing, oscillating, or strobe light systems, mounted outside as well as inside emergency response vehicles, provide visibility and give immediate information to the traveling public of an emergency situation. However, once at the scene, and as the traffic control is being addressed, it is recommended that only amber, rather than red color, warning lights be used and that the number of lights be minimized to avoid creating a glare for motorists and reduce "rubber necking" behavior.²⁴

There is also evidence that suggests too many warning lights can be confusing to drivers. Flashing lights should, therefore, be used with discipline and discretion to





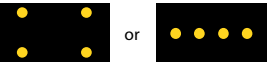
minimize the impact on traffic flow. Their use should be reduced once good traffic control is established at the incident scene with particular attention to forward-facing emergency lighting, especially on divided highways.

In addition to using emergency vehicle placement as an initial traffic control setup, the responders should carry enough emergency flares that can be used to set up a temporary lane closure taper until other efforts, such as traffic cones, can be placed. Flares are especially useful in night time incidents to warn motorists of lane changes as the bright red lights of the flares tend to visually merge. They also can be used to supplement the visibility of traffic cone placement under night conditions. When the flares are placed near the cones, they not only warn up stream traffic, but the light also illuminates the cones.²⁴

Arrow Panels

Arrow boards are additional advance warning traffic control devices used where a lane(s) is closed and traffic must merge with other traffic in an adjacent lane. The effective placement of arrow boards is contingent on sight visibility; attention must be paid to the road geometry and speed of the roadway when determining placement. For multiple lane closures, the arrow board should be placed at the beginning of the taper. Figure 2, taken from the MUTCD, shows the various panel displays that are acceptable. However, there are restrictions on the use of an arrow board on a two-lane, two-way highway; only the “Caution” display should be used for this type of facility.²

Figure 2. Arrow Board Displays²

Operating Mode	Panel Display (Type C panel illustrated)
I. At least one of the three following modes shall be provided:	(Right arrow shown; left is similar)
Flashing Arrow	 Move/Merge Right
Sequential Arrow	 Move/Merge Right
Sequential Chevron	 Move/Merge Right
II. The following mode shall be provided: Flashing Double Arrow	 Move/Merge Right or Left
III. The following mode shall be provided: Flashing Caution	 Caution or Caution

While trailer mounted arrow boards are required for certain work zone traffic control setups applicable to intermediate and long term incident traffic control, the immediate availability of the boards and transport to the scene of an incident can be a logistical

issue. Some DOTs are now mounting arrow boards on their maintenance or other work vehicles, not only for use in routine maintenance activities, but also to have immediately available for emergency response. These vehicle mounted boards can be used to provide supplemental displays to support traffic control. Some of the devices have the capacity not only to display the arrows, but also text and other symbol messages. It is important that the responders receive training in the actual operational requirements of the arrow board as well as in the development of appropriate message sets to fully utilize the available board functions at the incident scene.

Figure 3. Traffic Control Example of the Use of a Truck Mounted Arrow Board²⁵



Changeable Message Signs

Changeable message signs (CMS), either portable or those placed permanently at critical major decision points of the road system, can be used to provide notice and information, such as lane changes and available alternate routes as well as to alert motorists to detour or expect delays in advance of the incident. The earlier the information can be provided, the greater the opportunity to reduce traffic demand at and approaching the scene as well as reduce motorist frustration. Because these signs are a powerful communication means with motorists, information should be as real-time as possible. The portable trailer mounted CMS can be procured with remote communication capabilities, such as cell phone, radio, or internet; the permanent signs are normally operated via a traffic management center. While the CMS text capability is limited as to the amount of information provided, this form of communication is very effective. Information relayed can include:

- Specific incident location
- Expected incident duration
- Alternate route details
- Diversion directions, including non-standard motorist actions (such as temporarily driving on the shoulder)²

States such as Minnesota have developed and published guidelines to assist determining the appropriate use as well as appropriate and consistent incident management message development.²⁶

Shadow Vehicles

Heavy trucks or trailers, often with rear-mounted energy adsorption attenuation equipment, become a traffic control device when parked to protect a work zone or incident area. It should be placed with the traffic 100 to 250 feet up-stream from the incident work space with the wheels cut toward the shoulder. It should not be occupied by anyone as its purpose is to protect the work area by taking any hit before an errant vehicle can enter the zone where people may be otherwise unprotected.²⁴

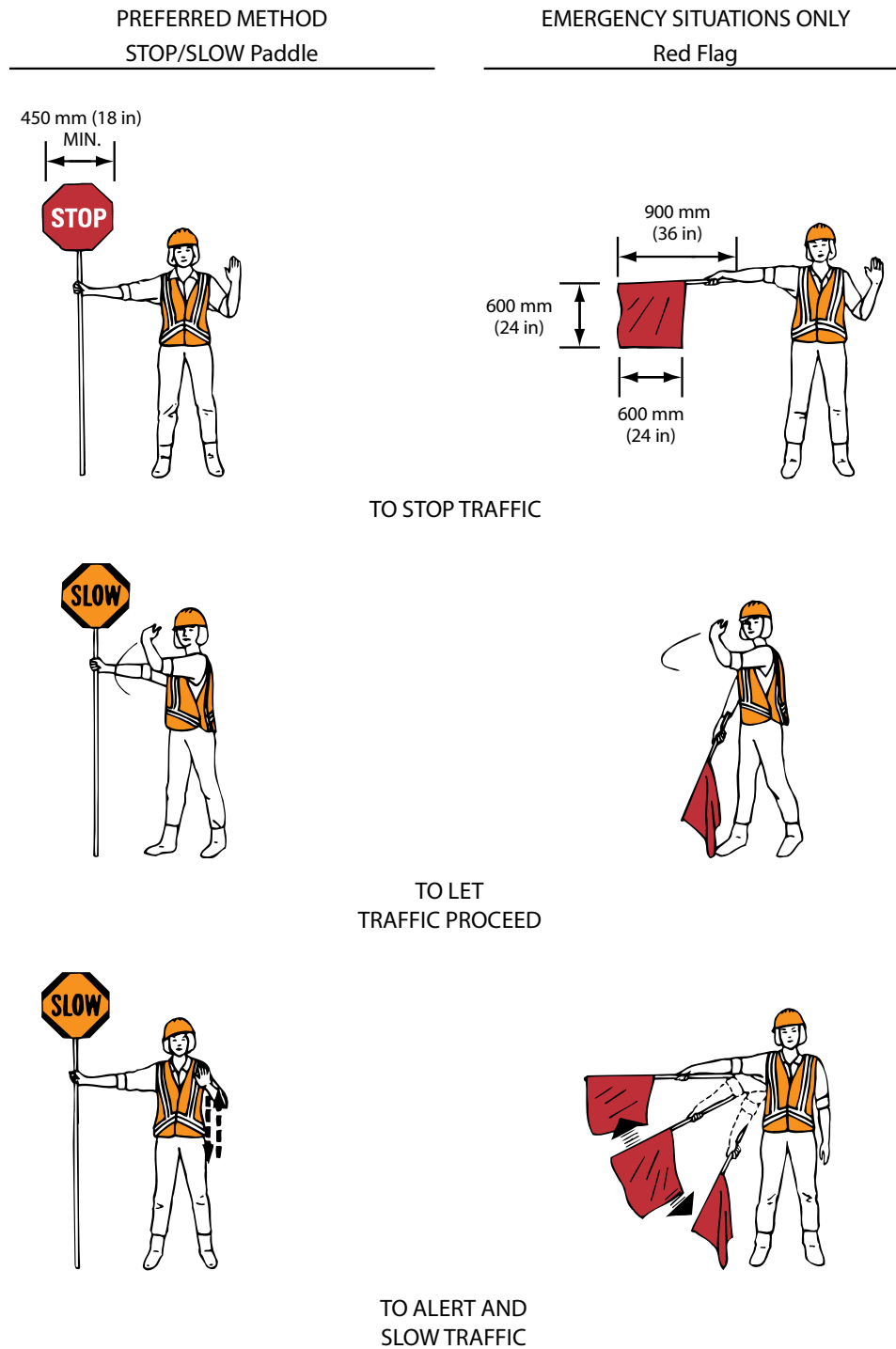
Flaggers

Initially, manual traffic control may have to be provided by qualified trained personnel during the initial phase of the response; this is normally the responsibility of the responding law enforcement personnel, but could also be other emergency responders, such as DOT or freeway service patrols, fire or tow operators. Flagmen may be used to guide traffic when:

- Travel lanes are partially blocked,
- Shoulder must be used to pass by the incident, or
- Only one direction of traffic is available.

It is important that the flag person knows to always face traffic and direct the traffic away from and safely around the incident, using large, extended, and consistent gestures to convey the required actions to drivers.²

Figure 4. Flagging Methods²



These responders should be properly trained. While some agencies, such as DOTs, offer their own flagger training and certification program, the most common commercially available programs are offered through the American Traffic Safety

Services (ATSSA) and the National Safety Council. ATSSA also offers training specifically for law enforcement personnel.

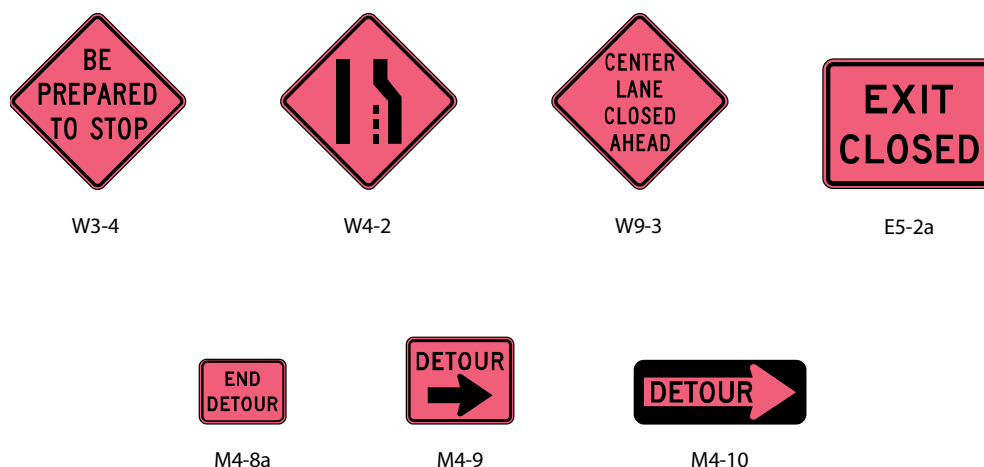
A resource for additional information on individual state requirements and available courses and programs is the National Work Zone Clearing House Web site available at http://wzsafety.tamu.edu/training/flagger_training.²⁷

The Towing and Recovery Association of America also offers a three level National Driver Certification for tow truck operators, which includes incident management training.²⁸

Signs

First responders such as DOT personnel, law enforcement, and fire-rescue, may also carry flexible, roll-up signs with specific incident messages that can be set up quickly using portable light weight spring stands at an incident site. The color of fluorescent pink has been designated as an option to orange by the MUTCD as the color to indicate an emergency incident. However, there are some jurisdictions, such as the state of Minnesota, that continue to use orange colored signs and have not adopted the fluorescent pink signs.²⁹ At locations where there are historically recurring incidents, there may be consideration to permanently mount this type of roadside signage that only has to be uncovered during the time of an incident. The signs for incident management may be of the mesh or fabric type. Chapter 6I of the MUTCD² has details on specific roll-up sign designs for incidents. They have a black legend and are on a fluorescent pink background. Incident responders can carry these signs in their vehicles and have them available during the initial traffic control setup. Cones, barricades, and other devices are supported by signs when informing motorists of actions needed to merge or otherwise adjust for lane tapers and closures.

Figure 5. Incident Management Signs²



Highway Advisory Radio

Highway advisory radio (HAR) may be a portable AM unit brought out to the incident scene or a permanent roadside installation that can be used to disseminate incident

information in advance of an incident so that motorists can adjust their travel choices and avoid any traffic queue resulting from the incident. Remote communication links to the HAR allow the operators the ability to activate and modify the broadcast messages as required for the incident. Like the CMS, HAR is most effective for motorists who are still at least one interchange or other decision point away from the scene of the incident. The earlier information can be provided, the greater the opportunity to reduce traffic demand at and approaching the scene as well as reduce motorist frustration. HAR message content is similar to that shown on CMS, except it can be provided in much greater detail. HAR cannot, however, always be relied upon because not all motorists will tune in to the emergency broadcasts. There are also issues regarding the range and quality of broadcast because of a variety of interference factors.

Traffic Cones and Barricades

Traffic cones and barricades are used to set up lane closures and their associated tapers to control traffic moving past the incident scene.² Incident responders may be able to carry a limited amount of cones or barricades; however, the “standard” amount needed for regulation tapers and closures usually arrives when transportation agency personnel arrive on-scene to support with longer-term lane closures. The “standard” length of taper and placement of the cones and barricades are dictated by the offset (or width of the required shift of the traffic lane) and speed of the facility as prescribed in normal work zone directives. Such a set up is normally required if, in the judgment of the ICS team commander, the estimate of the affect on the travel lanes will exceed a 30 minute time frame.

Cones may be carried as standard equipment by first responders. Since limited storage is a consideration, one solution to carrying this device is to use the “collapsible” cones, cones that can be compressed for storage and “pop up” to the correct height when needed.²⁴

Emergency Vehicles

Emergency vehicles may be parked in such a way as to protect incident responders and secure the scene before more permanent traffic control devices arrive. However, the vehicles should be placed in a way that minimizes their impact on traffic flow. Preferably all emergency vehicles should be parked on the same side of the roadway, in the same direction of the incident. For example, law enforcement and fire-rescue vehicles can be parked to provide some security for the incident scene; however, if they unnecessarily block lanes, they will cause significant disruption to traffic flow and lengthen the time needed to restore normal traffic flow. As soon as these vehicles complete their response function, the incident commander can require their relocation out of the travel lanes

Figure 6. Photo Example of Safe Parking



North Carolina DOT has developed a convenient Emergency Responder Reference Card³⁰ which provides a quick reference to how and where emergency vehicles should be parked at the scene. Tools such as these are extremely helpful as a reminder especially for new first responders or when there is confusion in the field.

Figure 7. North Carolina DOT Emergency Responder Highway & Interstate Safety Reference Card³⁰

Emergency Responder Highway & Interstate Safety Reference Card Jan-08

	No injury, shifted to emergency lane	Traffic Shift to Left	Traffic Shift to Right
NORMAL TRAFFIC FLOW PATTERN ↑ AIR/CLEER ↑ EMS ↑ INCIDENT ↑ FIRE or RESCUE ↑ LAW ↑ IMAP			
Responder On-Scene Goals	Quick Clear G.S.	Move-Over G.S.	
<p>1st arriving Fire or Rescue, attempt to angle vehicle in the direction of desired traffic flow on the upstream side.</p> <p>An open lane(s) gets your additional resources there FASTER!</p> <p>Fire or Rescue to deploy a 50' traffic shift cone buffer within 5 minutes of arrival. (When scene priorities dictate)</p> <p>IMAP on-scene or sign deployment 200' upstream within 20-minutes of initial arrival.</p> <p>Vehicle demobilization to begin within 10 minutes of Pt. transport or extrication complete.</p>	<p><u>North Carolina G.S. 20-152 section (f)</u> Any investigating law enforcement officer, with the concurrence of the Department of Transportation, may immediately remove or cause to be removed from a controlled-access highway any wrecked, abandoned, disabled, unattended, burned, or partially dismantled vehicle, cargo, or other personal property interfering with the regular flow of traffic or which otherwise constitutes a hazard. In the event of a motor vehicle crash involving serious personal injury or death, no removal shall occur until the investigating law enforcement officer determines that adequate information has been obtained for preparation of a crash report.</p> <p>No state or local law enforcement officer, Department of Transportation employee, or person or firm contracting or assisting in the removal or disposition of any such vehicle, cargo, or other personal property shall be held criminally or civilly liable for any damage or economic injury related to carrying out or enforcing the provisions of this section.</p>	<p><u>North Carolina G.S. 20-207 section (d)</u> When an authorized emergency vehicle as described in subsection (a) of this section or any public service vehicle is parked or standing within 12 feet of a roadway and is giving a warning signal by appropriate light, the driver of every other approaching vehicle shall, as soon as it is safe and when not otherwise directed by an individual lawfully directing traffic, do one of the following:</p> <p>(1) Move this vehicle into a lane that is not the lane nearest the parked or standing authorized emergency vehicle or public service vehicle and continue traveling in that lane until safely clear of the authorized emergency vehicle. <u>This emergency applies only if the roadway has at least two lanes for traffic proceeding in the direction of the approaching vehicle and if the approaching vehicle may change lanes safely and without interfering with any vehicular traffic.</u></p> <p>(2) Slow the vehicle, maintaining a safe speed for traffic conditions, and operate the vehicle at a reduced speed and be prepared to stop until completely past the authorized emergency vehicle or public service vehicle. <u>This emergency applies only if the roadway has only one lane for traffic proceeding in the direction of the approaching vehicle or if the approaching vehicle may not change lanes safely and without interfering with any vehicular traffic.</u></p>	



6.0 MONITORING AND ADJUSTING TRAFFIC CONTROL

On-scene traffic control needs can change dynamically as the response efforts progress. The first priority upon arrival is to establish initial traffic control to provide a safe work area for responders and minimize chances of secondary crashes. As resources with traffic control devices/equipment arrive, the traffic control can be adjusted to a more “standard” format. Traffic management hierarchy at an incident scene includes: ³¹

- Establishing initial traffic control,
- Managing roadway space by opening and closing lanes,
- Blocking the area of the scene needed for victim and responder safety,
- Parking vehicles to minimize impacts,
- Deploying personnel to assist,
- Using intelligent transportation systems (ITS) field devices as support, and
- Using detour routes when necessary.

Traffic control device placement is impacted by the expected duration of the incident. Upon arrival, responders should make an estimate of the magnitude of the incident and then estimate an expected duration for recovery; traffic control can then be set up based on this estimate. Expected durations of an incident are defined as follows: ²

- Minor – Under 30 minutes
- Intermediate – From 30 minutes to 2 hours
- Major – Over 2 hours

Responders without the understanding of basic traffic control concepts may prefer to block all lanes, which may unintentionally increase the chances of secondary crashes. A preferred sequence would be to go from full roadway closure to directional lane closure to multiple lanes to single lane and to shoulder closure until the incident is fully resolved and traffic flow returns to normal.

The roadway lane closure must be managed so that only the lanes absolutely necessary for protection of the responders and victims are closed. Every effort should be made to minimize the times these lanes are closed. The number of closed lanes may change several times during clearance efforts, so traffic control needs to be established and then monitored/changed to fit changing conditions.

Traffic control devices need to be adjusted, as warranted and as conditions change, by personnel familiar with their use. Incident responders responsible for traffic management need to stay informed about recovery operations, and they need to

continually assess incident impacts on traffic flows and monitor the traffic queues. Incident responders need to pass this information on to traffic management center staff, charged with passing this information on to motorists. On-scene traffic control needs can change dynamically as the response efforts progress. As resources with traffic control devices/equipment arrive, the traffic control can be adjusted to a more “temporary work zone” format.

Alternate routes can be used when necessary. For example, they may be used with full roadway closure, in either or both directions, especially when long duration closures are expected, such as when there is roadway or structural damage. Agencies that implement detour/alternate routes need to be engaged in the planning process and be knowledgeable of the implementation procedures. Traffic control may also be needed on these detour/alternate routes because of abnormal traffic conditions as vehicles divert around an incident in search of a less congested way to travel.

7.0 INCIDENT RECOVERY

Reducing incident clearance times has the greatest potential benefit in reducing overall incident recovery times. Responders can take a number of actions that, when taken together, can have positive impacts on closure times:³¹

- Immediately move vehicles that can move under their own power
- Give responders push bumpers to expedite clearance
- Open individual lanes as they are cleared
- Try to systematically clear from left to right and move to the right shoulder
- Ensure correct resources are dispatched and used
- Encourage responders to remove debris to reopen lanes
- Use absorbents or other accepted methods to remove small spills
- Require wreckers to move quickly with proper equipment and training
- Expedite cargo recovery efforts in travel lanes
- Encourage investigating agencies to do their work quickly since roadway closures may not always be needed, or they may be of short duration

When responders work systematically, they can follow a logical roadway closure sequence, as previously discussed. They can follow this straightforward process:

- Extricate trapped victims
- Make the site safe by eliminating hazardous conditions
- Investigate crash and collect evidence
- Clear site by removing debris, wreckage, etc.

Upon arrival at a scene, first responders should position their vehicles upward from the scene at a point most effective to warn motorists of the incident. This should be done with forward facing emergency lighting activated and in a manner to protect both the first responder as well as assist in diverting traffic away from the incident scene. Fire-rescue should block as few lanes as possible, while protecting personnel. Once their task is completed, they should immediately remove their apparatus from the travel lane.

As the scene compresses, responders should move their vehicles closer to the incident to reduce the size of the scene. When the incident is cleared and the responders are finalizing paperwork they should move their vehicles as far off the roadway as possible with all emergency lighting disengaged to prevent traffic from slowing. By doing this, responders reduce the potential for a secondary accident. If it is not possible for responders to safely move their vehicles off to the side and out of

the travel lanes, then they should relocate to an off-site location to complete the required paperwork.

8.0 MAINTENANCE OF TRAFFIC BEST PRACTICES

National Emphasis

The United States Department of Transportation (USDOT) has launched an aggressive campaign to promote congestion reduction; incident management is a key focus to achieving this goal. The USDOT Secretary's initiative is titled, "A National Strategy to Reduce Congestion on America's Transportation Network."³² As has been referenced, part of this initiative includes such efforts as the driver removal laws and strategies to speed the clearance of collisions for non-injury crashes accounting for more than half of all reported crashes as referenced in Chapter 2.

Laws

Chapter 2 of this guidebook addresses the move it and move over laws that focus on the proactive actions by drivers. Both types of laws are designed to minimize the exposure of risk to first responders in the line of duty and the risk to the motoring public involved in minor non-injury crashes.

Expanding Role of Freeway Service Patrols

The initiative also promotes service patrol capabilities. Full function service patrols, when properly equipped, can offer support in implementing the traffic control functions required at the scene in a timely manner. As an example, in addition to its other service patrol duties, Georgia's Highway Emergency Response Operators Program, is charged with quickly and proactively removing lane-blocking incidents.³³ Another program of note is the Illinois Service Patrol, the Minute Men, which has been a model since 1961, providing incident response support in addition to assisting disabled vehicles.³¹ Maryland's Coordinated Highways Action Response Team Program utilizes emergency response units to set up overall traffic control at accident locations.³⁴

Temporary Traffic Control Plan Guidance

Traffic control guidelines for incidents are addressed in Part 6 of the Manual of Unified Traffic Control Devices (MUTCD)² or a similar state manual. The traffic control measures required for an incident are the same as for temporary work zones. Because of the emergency nature, in the initial phase of clearance, traffic control is normally done manually by the first responders using equipment such as a vehicle, flares, roll-up signs, flagging, etc. The placement and staging of the emergency vehicle response units must be coordinated to ensure efficiency and mobility to/from the site. If it is the judgment of the incident control system (ICS) commander that the time necessary to clear the incident may exceed 30 minutes, than a standard traffic control plan, as depicted in the MUTCD or state development manual or standard, will need to be implemented. In June 2006, in an effort to supplement the MUTCD,

the Temporary Traffic Control Committee of the National Committee on Uniform Traffic Control Devices published its recommendations of traffic control management of incidents by type of highway incident, for possible inclusion in the MUTCD. While this guidance has not been included yet, it does provide guidance for traffic incident responders for various roadway configurations and different incident time frames.³⁵

Similar information can be found in documents such as the *Guidelines for Emergency Traffic Control* developed by the University of Kentucky, College of Engineering, and the Kentucky Transportation Center.³⁶ This guideline goes through the basics of the MUTCD as well as identifying and addressing the four phases of traffic control.

Phase 1—Provide immediate traffic control

Phase 2—Establish the traffic control

Phase 3—Monitor and adjust

Phase 4—Hand off or removal

Several entities have simple, but formal, reference documents dealing with traffic control. An example of this is the *Work Zone Traffic Control Guidance* developed by Washington State Department of Transportation for frequent types of emergency incidents. The prepared guidance addresses the adjustment to the traffic control contingent on various scenarios.³⁷

Active Traffic Management

Traffic flow can be impacted beyond the incident scene, especially when alternate detours are on the surface roadway system and should be addressed. Because the diversion can affect normal volume and traffic patterns, especially at signalized intersections where jurisdictions have a signal network operated by central software, the timings can be modified remotely during the diversion period. One example of this additional support is the City of Scottsdale, Arizona. The city operates a centrally located computerized traffic signal system, monitoring approximately 300 traffic signals. Their system allows the operators to make changes to the signal timing when unexpected traffic incidents affect the road system.³⁸

Another innovative example of addressing the traffic flow needs on surface streets is the City of Houston's Mobility Response Team. While most efforts for safe, quick clearance and traffic control have been focused on the freeway system, the City of Houston has supplemented the local incident management program within the city by creating a team of trained "service officers," dispatched from the Houston regional traffic management center, TranStar, to respond to and lessen the effects of the impact of significant traffic congestion resulting from malfunctioning traffic signals, crashes, and other mobility issues by providing traffic control and direction on the city streets. This program is a partnership between the Public Works Section and the Houston Police Department.³⁹

Planning, Cooperation and Coordination

Because of the nature of incidents, each is different and the set of responders will vary by the nature and location of the event; traffic control needs will vary with the clearance activities of the responders. Improvements in planning, cooperation, and coordination between responding agencies as well a mutual understanding of the various roles and responsibilities of the each agency can significantly improve the response and implementation time of the required traffic control.

At the national level, the National Traffic Incident Management Coalition⁴⁰ consists of the following member associations that also serve as important resources regarding the advancement and applications within the field of traffic incident management:

- American Automobile Association
- American Association of State Highway and Transportation Officials
- American Public Transportation Association
- American Traffic Safety Services Association
- American Transportation Research Institute
- Association of Public-Safety Communications Officials International
- Cumberland Valley Volunteer Firemen's Association
- Federal Highway Administration
- I-95 Corridor Coalition
- Institute of Transportation Engineers
- International Association of Chiefs of Police
- International Association of Fire Chiefs
- International Association of Fire Fighters
- International Fire Service Training Association
- International Municipal Signal Association
- ITS America
- National Association of State EMS Officials
- National Emergency Number Association
- National Fire Protection Association
- National Volunteer Fire Council
- Towing and Recovery Association of America
- Transportation Research Board
- U.S. Fire Administration

There are also several regional or corridor coalitions that promote, educate, and advocate for improved traffic incident management. Active participation in these coalitions strengthens local response capabilities. Some examples of these regional coalitions and their activities include:

State of Washington – In 2007, the Washington State Department of Transportation joined with the Washington State Patrol to form a Traffic Incident Management

Coalition focusing on state-specific traffic incident management needs. The Coalition members include the Washington State Firefighter's Association, American Automobile Association, Washington State Department of Transportation, Washington State Police, and the Towing and Recovery Association of Washington. One of the initial actions of this Coalition was to hold a statewide conference bringing together all of the stakeholders and initiating interagency dialog.⁴¹

State of Wisconsin – Under the leadership of the Wisconsin Department of Transportation, the Traffic Incident Management Enhancement program is comprised of multiple stakeholders that have joined forces and are dedicated to fostering and improving incident management response. Initiated in 1995, in the Southeast region of the state, the program has since been expanded to include the entire state.⁴²

I-95 Corridor Coalition –Members of the I-95 Corridor Coalition include state and local departments of transportation, transportation authorities, transit and rail agencies, port authorities, motor vehicle agencies, state police/law enforcement, regional transportation organizations, US Department of Transportation, transportation industry associations, and Canadian affiliates along the I-95 corridor from Florida to Maine. This Coalition fosters the coordinated traffic control response of the various traffic management, law enforcement, fire, safety and emergency, or other incident management personnel intra- and inter-state. The Coalition allows a forum for these stakeholders to meet regularly to discuss and critique how to manage incidents and emergencies more effectively. An Information Exchange Network Clearinghouse is offered through a Coalition workstation that shares incident and traveler information with member agencies along the corridor.⁴³

Availability and Use of Traffic Control Devices

Maryland – In addition to service patrols, Maryland operates emergency response units that are used to set up overall traffic control at accident locations. They utilize freeway incident traffic management trailers pre-stocked with the necessary traffic control devices, such as signs, cones, and trailblazers, to facilitate the timely set up of the necessary traffic control for incidents requiring a full roadway closure.⁴⁴

Florida – The Florida Department of Transportation's (FDOT) District 4 (Fort Lauderdale / Palm Beach) service incident response vehicle (SIRV) carries additional equipment and supplies for traffic control during major incidents. The vehicle also serves as an incident command post when fire rescue forces leave the scene. It brings portable radios for each responding agency's incident commander. Once on the incident scene, SIRV staff contact the appropriate personnel to discuss and implement the necessary emergency maintenance of traffic.⁴⁵

Figure 8. FDOT District 4 Service Incident Response Vehicle



Texas – The Metropolitan Transit Authority of Harris County has also adapted a commercial bus to serve as a mobile command post for major incidents. This bus is outfitted with video transmission ability so that live incident and traffic conditions can be sent back to a traffic management center using wireless communication transmission during major incidents.⁴⁶

Training

Best practices start with sound education training programs. While not intended to be an exhaustive list, some training resources available to the incident management community that focus on traffic control training and present the latest in traffic control approaches include:

Florida – FDOT is developing a formal Maintenance of Traffic Training program for incident responders in Florida. Its purpose is to provide a standard of understanding and approach to various agency responders.²⁴

Texas – North Central Texas Council of Governments offers an extensive training program dealing with freeway incident management. They offer courses tailored for responders, managers, and executives. The content of these classes include detailed information and best practice techniques in operations and training, providing motorist information, detection and verification, response, site management, clearances, and traffic operations/management.⁴⁷

I-95 Corridor Coalition – A strong traffic control training program is one of the main focuses of the I-95 Corridor Coalition efforts. Information on the available training modules and videos, including a safe, quick clearance tool kit, can be found on the Coalition's Web site at <http://i95coalition.org>.⁴³ The Coalition also conducts various workshops dealing with safe, quick clearance methods. This Web site has a wealth of information regarding incident management response

Training for Tow Operators – Industry associations, such as the Towing and Recovery Association of America (TRAA), are also raising the bar and using their influence to promote good practices in implementing traffic control plans. TRAA, through a DOT grant, has developed a multiple level certification program for towers that includes incident management training.⁴⁸

National Traffic Incident Management Coalition – This is a coalition of all the multidisciplinary agencies charged with the responsibility of incident management. The Coalition's Web site, <http://timcoalition.org/?siteid=41>,⁴⁹ provides access to a number of traffic control guidance documents and courses, including information on the American Traffic Safety Services Association Emergency Traffic Control for Responders Course and the Safe and Effective Use of Law Enforcement Personnel in Work Zones as well as a one-day course offered by the International Fire Service Training Association, Guidelines for Highway Incident Scene Safety and Traffic Control.

Incident Management Workshops – A popular and effective method of providing regional training and strengthening of partnerships among the various responders is the workshop. Several states, including Texas, Wisconsin, Michigan, and Missouri, have held traffic incident management workshops in 2007. Many of these are being done in conjunction with the departments' of transportation Self-Assessment on Traffic Incident Management initiative.⁵⁰

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