Traffic Incident Management Program Plan

For the Iowa City Metropolitan Area

June 2017

IOWA DOT HNTB

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List of Acronyms

AAR	After-Action Reviews
ATMS	Advanced Traffic Management System
ATSSA	American Traffic Safety Service Association
CAD	Computer-Aided Dispatch
CARS	Condition Acquisition and Reporting System
CCTV	Closed-Circuit Television
DMS	Dynamic Message Signs
DNR	Department of Natural Resources
DOJ	Department of Justice
DOT	Department of Transportation
EMA	Emergency Management Agency
EMS	Emergency Medical Services
EPA	Environmental Protection Agency
ERG	Emergency Response Guidebook
ETA	Estimated Time of Arrival
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
GPS	Global Positioning System
HAR	Highway Advisory Radio
HEMS	Helicopter Emergency Medical Services
HVSA	High-Visibility Safety Apparel
ICS	Incident Command System
IFSTA	International Fire Service Training Association
ITS	Intelligent Transportation Systems
LZ	Landing Zone
MAP-21	Moving Ahead for Progress in the 21st Century
MUTCD	Manual on Uniform Traffic Control Devices
NFPA	National Fire Protection Agency
NIMS	National Incident Management System

NIJ	National Institute of Justice
NTIMC	National Traffic Incident Management Coalition
NUG	National Unified Goal
PSAP	Public Safety Answering Point
RWIS	Road Weather Information System
SSP	Safety Service Patrol
TAP	Travel Assistance Program
TIM	Traffic Incident Management
TIMA	Traffic Incident Management Area
TIMSA	Traffic Incident Management Self-Assessment
TMC	Traffic Management Center
TR	Tail Rotor
TRAA	Towing and Recovery Association of America
TTC	Temporary Traffic Control
USFA	U.S. Fire Administration

SECTION 1
Introduction

1.1 Introduction and Purpose

In fall 2015, in conjunction with the preparation of the Transportation Management Plan (TMP) for the reconstruction of the I-80/I-380 Interchange, the Iowa Department of Transportation (DOT) initiated the development of a Traffic Incident Management (TIM) Program Plan for the freeway system and high-volume roadways in the Iowa City metropolitan area. Central to the development and stakeholder acceptance of this plan was the partnership of a multiagency, multidiscipline TIM Stakeholder Group who provided expert input and guidance throughout the project.

The high-level purpose of the Iowa City TIM Program Plan is to enhance response activities of all individuals and agencies responsible for TIM, including law enforcement, fire, DOTs, and towing and recovery, thereby minimizing the negative impact traffic incidents have on safety and mobility. More specifically, the plan is developed to:

1. Identify TIM enhancement needs and corresponding strategies to address needs;
2. Offer practical guidance for on-scene emergency response, traffic management and traveler information, and communication and coordination; and
3. Establish a programmatic structure for ongoing, sustained TIM improvement and training.

The Plan also highlights the Iowa DOT's Intelligent Transportation Systems (ITS) and Traffic Management Center (TMC) and describes how these systems can be used by TIM stakeholders to enhance response.

1.2 Traffic Incident Management

Traffic incident management consists of a planned and coordinated multidisciplinary process to detect, respond to and clear traffic incidents so that traffic flow may be restored as safely and quickly as possible. Effective TIM reduces the duration and impacts of traffic incidents and improves the safety of motorists, crash victims and emergency responders.

TIM can also be described as a process as presented in Figure 1. Each phase or activity of the TIM process is described in detail in the following sections.

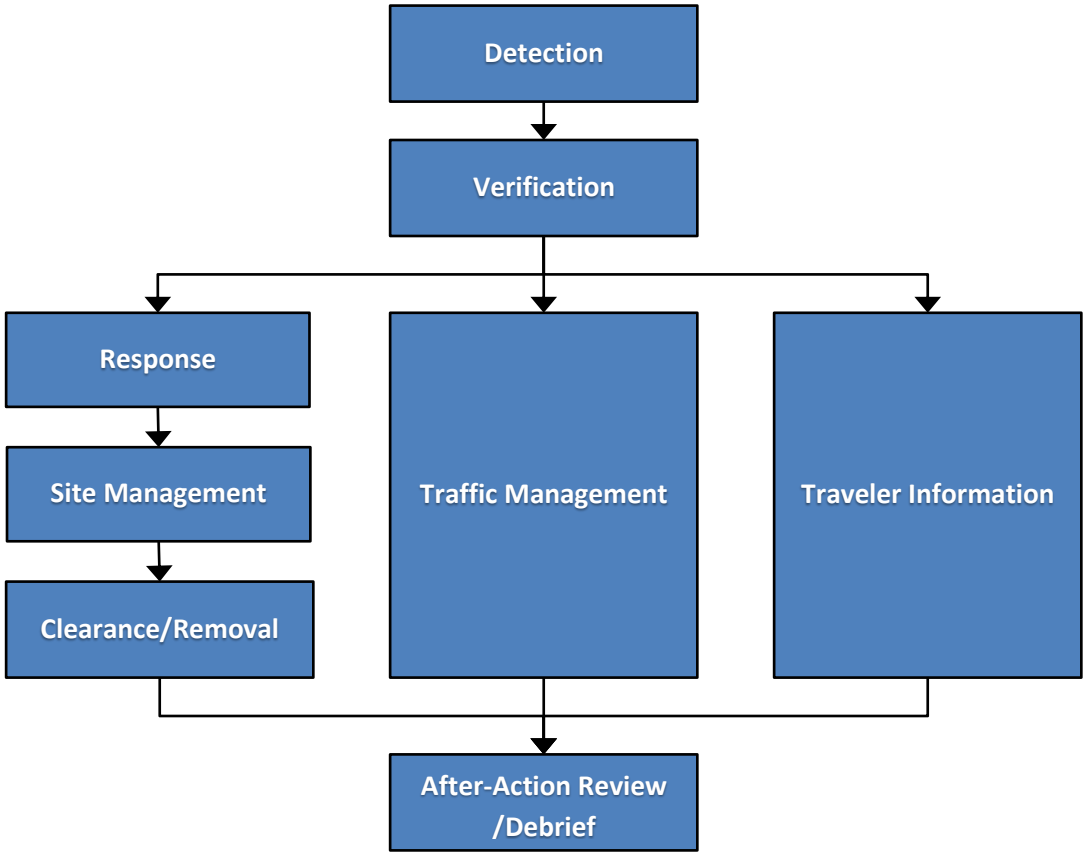


Figure 1: TIM Process

1.2.1 Detection

Traffic incident detection is the process that brings an incident to the attention of the agency or agencies responsible for maintaining traffic flow and safe operations on the facility. Incident victims are most vulnerable from the time the incident occurs until the first responder arrives. Traffic flow is also likely to be most disrupted at this time. The more quickly an incident is detected, the more quickly the appropriate response can be dispatched. Quick response minimizes the exposure of those involved in the incident, speeds the implementation of traffic control, reduces the effect on traffic flow and minimizes overall incident impacts. Detecting traffic incidents quickly and accurately is critical.

Often motorists driving by an incident scene are the first to detect an incident and notify law enforcement by calling 911. However, incidents may also be detected by law enforcement, travel assistance program (TAP) operators or other responders in the field, or by operators working in a traffic management center.

1.2.2 Verification

Verification of a traffic incident encompasses confirming that an incident has occurred, determining the exact location and direction of travel, and obtaining and assessing as many details about the incident as possible.

1.2.3 Response

Responding to a traffic incident involves deployment of the appropriate personnel, equipment, communication links, motorist information and traffic management as soon as it is confirmed that an incident has occurred. Appropriate response requires understanding the incident's nature and scope, as well as understanding the steps and resources necessary to clear it and restore normal operating conditions. Depending on the situation, those agencies that respond to a traffic incident may include fire, emergency medical services and transport, law enforcement/site investigation, transportation, towing and recovery, and hazardous materials clean-up.

1.2.4 Site Management

Site management is the process of accurately assessing traffic incidents, properly establishing priorities, notifying and coordinating with the appropriate agencies and organizations, and maintaining clear communications with each responder. The National Incident Management System (NIMS) and Incident Command System (ICS) are often used as a structure for site management. Ensuring the safety of response personnel, incident victims, and other motorists is the foremost objective of site management. To be effective, responders and commanders at the incident site require accurate information about the incident's current status, overall progress toward clearance, and the equipment needed to complete the process. Effective site management requires continual assessment of the situation, the needs of the responders, and an understanding and respect for the priorities of other responders while working together cooperatively and productively. Regular planning, training, and communications with other responders produce the best results. Those managing the incident site must also have enough authority to determine courses of action, commit agency or other resources, and otherwise do their jobs without having to wait for guidance or approval from superiors who are not on site.

1.2.5 Clearance and Removal

Clearance involves the process of removing vehicles, wreckage, debris, spilled material and other items from the roadway so that capacity can be returned to normal levels. Traffic incident clearance and removal objectives include: restoration of the roadway to its pre-incident capacity as quickly and safely as possible; minimizing motorists' delays; facilitating effective use of all available clearance resources; enhancing the safety of responders and motorists; and, protecting the roadway system and private property from unnecessary damage during the removal process. Clearance and removal is often the most critical step in managing major traffic incidents due to the time requirements to remove obstructions and restore traffic flow.

1.2.6 Traveler Information

Dissemination of traveler information is one of the primary services provided by today's transportation management/operations centers. Public-private partnerships have allowed media outlets to use DOT generated real-time video feeds, traffic flows, incident information, construction information, and special event traffic data. Live video feeds are routinely used for radio and television traffic reports. Other traditional methods commonly used to disseminate traveler information include dynamic message signs (DMS), 511 systems and the internet. Even after an incident is cleared it is important to continue to provide traveler information until traffic flow returns to normal conditions. In some cases, depending on the severity of the traffic incident and the time that it occurs, traveler information may need to be provided for several hours.

1.2.7 Traffic Management

Traffic management is the application of traffic control measures at the incident site and on facilities affected by the incident, including emergency alternate routes. The overall goal is a balance between minimizing traffic disruption while maintaining a safe workplace for responders. Traffic control measures can be categorized into those that are intended to improve traffic flow past the immediate incident scene and those that are intended to improve traffic flow on emergency alternate routes. Techniques to improve flow past the incident include:

- Establishing traffic control at the scene
- Managing the roadway space (opening and closing lanes, blocking only the portion of the incident scene that is needed for safety, staging and parking emergency vehicles and equipment to minimize impact on traffic flow)
- Deploying appropriate personnel to assist in managing traffic

With few exceptions, traffic control is not the primary concern of most emergency responders. A common result is that motorists who are unfamiliar with an area are diverted and left to find their own way past the incident scene. Without proper control, traffic is often unnecessarily delayed, and along with that delay come costs in terms of lost time, wasted fuel, and degradation of air quality. When traffic is unnecessarily delayed, there is an increased likelihood of generating secondary crashes, which significantly impacts the safety of other motorists and emergency responders. Actions by the responders when they reach the scene, both in regard to the incident itself and to traffic affected by the incident, has a tremendous bearing on the safe and successful resolution of the roadway emergency.

1.2.8 After-Action Review/Debrief

Each traffic incident is unique and, as such, one of the most effective ways to enhance quick clearance and improve safety is to regularly conduct after-action reviews (AARs). The purpose of an AAR is to discuss the decisions made and actions taken during an incident and to identify best practices and opportunities for improvement. An AAR can be held for any type or size of incident, but are most commonly conducted for major incidents.

1.2.9 Traffic Incident Management Timeline

It is also very important to understand the temporal perspective of TIM response. The TIM timeline is depicted in Figure 2 and presents the events and activities that occur from the time when an incident happens to when traffic conditions return to normal. The color bar at the top of the chart represents potential traffic congestion along the timeline. The goal of TIM is to reduce the time duration between T0 and T6, recognizing that incremental improvements during each phase are typically easier to accomplish than drastically re-working any one aspect of TIM.

The bottom section of the TIM timeline illustrates two standard TIM performance measures:

1. Roadway Clearance Time (T1-T4) – the time between the first recordable awareness of an incident by a responsible agency and first confirmation that all travel lanes are open.
2. Incident Clearance Time (T1-T5) – the time between the first recordable awareness and the time at which the last responder has left the scene.

The number of secondary crashes is the third standard TIM performance measure identified by the Federal Highway Administration (FHWA).

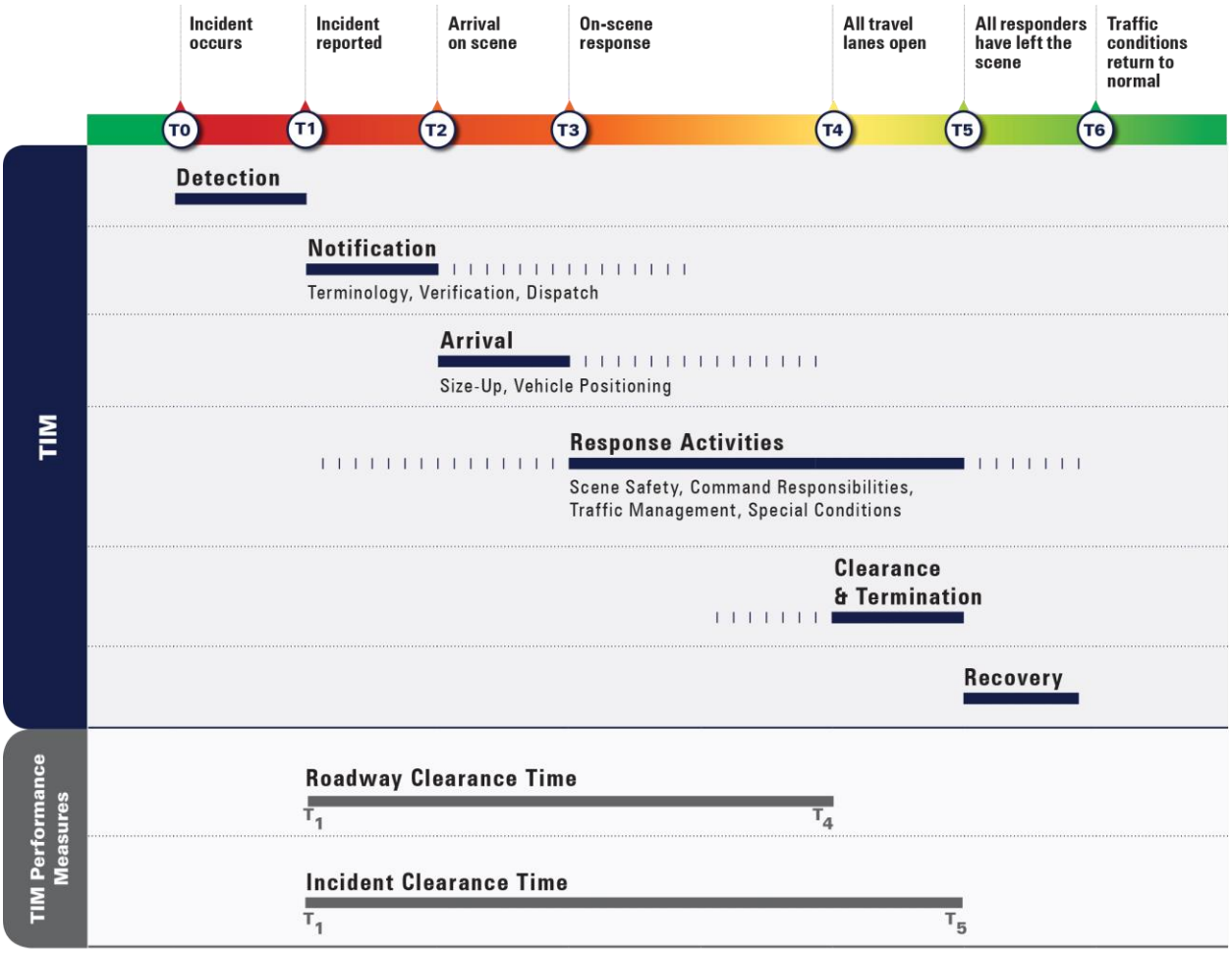


Figure 2: TIM Timeline

1.3 National Unified Goal for Traffic Incident Management

In 2002, a National Conference on Traffic Incident Management was convened with the goal to develop and promote an agenda for improved TIM at the national level. Ultimately, the input received at this conference resulted in the formation of the National Traffic Incident Management Coalition (NTIMC). The NTIMC is a multidisciplinary partnership of national organizations representing public safety, transportation, and towing and recovery communities to coordinate experiences, knowledge, practices, and ideas. The NTIMC is committed to the safer and more efficient management of all incidents that occur on, or substantially affect, the nation's roadways.

One of the first accomplishments of the coalition was the development, and member ratification, of the National Unified Goal (NUG) for TIM:

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

To support implementation of the NUG, the NTIMC also identified 18 strategies, which are summarized in Table 1.

Crosscutting Strategies	
1. TIM Partnerships and Programs	4. TIM Technology
2. Multidisciplinary NIMS and TIM Training	5. Effective TIM Policies
3. Goals for Performance and Progress	6. Awareness and Education Partnerships
Responder Safety Strategies	**Safe, Quick Clearance Strategies**
7. Recommended Practices for Responder Safety	10. Multidisciplinary TIM Procedures
8. Move Over/Slow Down Laws	11. Response and Clearance Time Goals
9. Driver Training and Awareness	12. 24/7 Availability
Prompt, Reliable, Interoperable Communications	
13. Multidisciplinary Communications Practices and Procedures	16. Broadband Emergency Communications Systems
14. Prompt, Reliable Responder Notification	17. Prompt, Reliable Traveler Information Systems
15. Interoperable Voice and Data Networks	18. Partnerships with News Media and Information Providers

Table 1: NUG Strategies

1.4 Stakeholder Roles and Responsibilities

Provided below are the typical roles and responsibilities of TIM stakeholders when responding to an incident as outlined in the Federal Highway Administration (FHWA) TIM Handbook.

1.4.1 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, emergency medical services (EMS), towing and recovery, etc.) as needed. The officer secures the scene for responder and motorist safety and conducts traffic control as necessary. Law enforcement also conducts crash investigations and/or evidence collection as dictated by the circumstances of the incidents.

Local law enforcement agencies include:

- Coralville Police Department
- Iowa City Police Department
- Iowa DOT Motor Vehicle Enforcement
- Iowa State Patrol
- Johnson County Sheriff's Department
- North Liberty Police Department
- University Heights Police Department

- West Branch Police Department

1.4.2 Communication Center Telecommunicators

Telecommunicators are normally the first responders to have knowledge that an incident has occurred. The mission of telecommunicators is to quickly, accurately and completely convey the necessary information to the proper agencies to get the right personnel and equipment to the scene as quickly as possible. Telecommunicators typically also record incident information utilizing a computer-aided dispatch (CAD) system.

Local communication centers, or public safety answering points (PSAPs), include:

- Johnson County Joint Emergency Communications Center (JECC)
- Iowa State Patrol Communications Center

1.4.3 Fire and Rescue

In some areas, 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, and then assess injured parties. Fire and rescue personnel often assist with traffic control until maintenance crews arrive and provide first aid until EMS personnel arrive. Fire and rescue personnel are also responsible for addressing any fire or potential fire hazards. In most locations, they also assess the scene for hazardous materials and notify remediation or clean-up contractors as needed.

Local fire and rescue providers include:

- Coralville Fire Department
- Ely Volunteer Fire Department
- Hills Fire Department
- Iowa City Fire Department
- Jefferson Monroe Fire Department (Swisher Fire)
- North Liberty Fire Department
- North Liberty Volunteer Fire Department
- Oxford Fire Department
- Solon Fire Department
- Tiffin Fire Department
- West Branch Fire Department

1.4.4 Emergency Medical Services

The primary responsibility for EMS is to assess injuries, administer triage on-scene as needed and move 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.

Local emergency medical service agencies include:

- Johnson County Ambulance Service

1.4.5 Transportation Agencies

Within transportation agencies, it is the operational sections – traffic management centers (TMCs), maintenance field staff and the travel assistance program – that play a critical role in TIM. TMCs serve as the hub for 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 typically include maintenance personnel and specialized traffic incident responders, such as TAP operators. Transportation agencies are also responsible for maintaining and operating traffic signal systems and in some cases can modify signal timing to facilitate traffic flow when emergency alternate routes are implemented.

Local transportation agencies include:

- City of Coralville Engineering Department
- City of Coralville Public Works and Utilities Department
- City of North Liberty Streets Department
- City of Tiffin Public Works Department
- City of Iowa City Public Works Department
- East Central Iowa Council of Governments
- Federal Highway Administration
- Iowa DOT – District 6
- Iowa DOT TMC (located in Ankeny, IA)
- Johnson County Secondary Roads
- Metropolitan Planning Organization of Johnson County
- University Heights Streets and Sidewalks Department
- University of Iowa - Parking & Transportation Department

1.4.6 Towing and Recovery

Towing and recovery professionals are responsible for removing disabled vehicles, clearing incident debris and assisting with cleanup of spilled cargo. For the I-80/#80 reconstruction project, contracts with local towing will likely include a provision for performance metrics (i.e., vehicles must be moved within ## minutes).

Local Towing and Recovery agencies include:

- Big Ten University Towing, Inc.
- Darrah's Inc. Towing and Recovery
- Holiday Towing

1.4.7 Emergency Management Agencies

When the scope and severity of an incident dictates, state and local emergency management agencies (EMAs) may be coordinated with as part of the overall response to major emergencies.

Local emergency management agencies include:

- Johnson County Emergency Management Agency

1.4.8 Environmental/Natural Resources Agencies

State and local environmental and natural resources agencies are available to provide technical assistance, assess impacts and recommend mitigation strategies for both hazardous and non-hazardous related spills or cargo releases.

Local environmental/natural resource agencies include:

- Iowa Department of Natural Resources (DNR)

1.4.9 Emergency Medical Examiner

In incidents where a fatality occurs, the emergency medical examiner may need to visit the incident scene. To prevent unnecessary delay, the emergency medical examiner should be called as soon as possible so that the incident scene can be quickly cleared. It is recommended that the emergency medical examiner be invited to local TIM meetings so that the importance of quick clearance can be communicated and understood in performing related duties.

Local emergency medical examiner is:

- Johnson County Medical Examiner

SECTION 2
On-Scene Emergency Response

2.1 On-Scene Emergency Response Issues and Needs

Through multiple stakeholder meetings and discussions, TIM responders in the Iowa City metropolitan area identified the following issues and needs related to on-scene emergency response:

- Responders indicated that the FHWA/SHRP2 TIM training had yet to be provided regionally and that the region should take steps to provide this training locally and on a routine basis.
- State Patrol uses the following lane designation (1,2,3,4) where lane #1 is the inside lane and #4 is the outside lane.
- Responders confirmed the importance of 1/10 mile markers as a means to pinpoint incident locations. Mile markers should be considered as a TMP strategy. Similar reference markers are needed on major interchange (i.e., I-80/380) ramps as well.
- Local law enforcement agencies indicated that there were no formal polices with respect to safe vehicle positioning while Coralville Fire Department indicated that positioning varies with respect to vehicle type. Certain fire vehicles have a rear-pump located on the rear mount and these vehicles are positioned to protect this area of the vehicle.
- City of Coralville has begun to instruct its responders to turn off forward facing lights and to aim tower lights toward the area of interest rather than out at oncoming traffic.
- Iowa State Patrol attempts to do passenger side approaches to stopped vehicles to limit their exposure to traffic.
- There is a need to balance crash reconstruction requirements with quick clearance. It was noted that this will be particularly important within the I-80/380 interchange during reconstruction where capacity will be reduced. The region would like to explore opportunities to learn more about new technologies and option that may be available to law enforcement crash reconstructionists.
- There needs to be better understanding of the circumstances in which the medical examiner is called out to the field so as to improve incident clearance times.
- Need to further evaluate the University of Iowa and Iowa DOT TraumaHawk app and benefits for reporting incident information and reducing response/treatment times.
- Need additional training on and understanding of procedures used to cut cable barriers and removed vehicles that get tangled in them. This is a subject for possible inclusion in future TIM training.

2.2 On-Scene Emergency Response Priority Strategies

2.2.1 Emergency Traffic Control and Scene Management Guidelines

Emergency traffic control and scene management guidelines provide TIM responders with a uniform approach to managing traffic incident scenes. The purpose of these guidelines is to help ensure the safest possible work environment for responders, while also minimizing the risk of secondary crashes.

Emergency traffic control and scene management guidelines for the Iowa City metropolitan area have been developed and are incorporated into Section 2 of this plan starting with Subsection 2.3. The guidelines cover the following topics:

- Responder safety fundamentals
- Scene size-up
- Traffic incident management area (TIMA) establishment
- Scene breakdown and demobilization
- Hazardous materials considerations
- Helicopter emergency medical services landing zones
- Crash reconstruction and investigation
- Quick clearance and removal operations

The guidelines are intended for use by all incident responders and the majority of the information contained in the guidelines is applicable to any traffic incident that occurs on any highway. However, these guidelines are not a substitute for technical knowledge, experience or effective judgment, nor are they intended to be procedures. They are general, broad-based, and each traffic incident scene will require assessment by the Incident Commander and other responders for the specific conditions presented in the field. In practice, the assessment and corresponding actions will require constant reevaluation to ensure that vehicle positioning and traffic control and warning device placement are adequate and safe.

To develop an effective set of guidelines, consideration was given to state and national rules/regulations and to similar initiatives occurring at the local, state and national level. First and foremost, the guidelines use the Incident Command System (ICS) as a foundation principle. Of equal importance, the guidelines are completely consistent with Chapter 6I, Control of Traffic Through Traffic Incident Management Areas, of the Manual on Uniform Traffic Control Devices (MUTCD). The guidelines also incorporate other important standards such as National Fire Protection Agency (NFPA) *1901 Standard for Automotive Fire Apparatus*, which covers retroreflective striping requirements.

Due to the dynamic nature of traffic incident management, it is recognized and expected that periodic reviews and revisions to these guidelines may be required. TIM responders are encouraged to provide suggestions and/or recommended changes as these guidelines are applied in the field. All recommended changes or updates should be brought to the attention of the Iowa DOT regional TIM coordinator.

2.2.2 Emergency Vehicle Lighting Policy

At an incident scene, emergency vehicle lighting is often used to enhance the safety of response personnel and incident victims. However, excessive use of flashing lights can create unnecessary delay and confusion for motorists passing the scene, especially at night. Section 6I.05 of the MUTCD covers the use of emergency vehicle lighting and states that the use of emergency vehicle lighting can be reduced if good traffic control has been established at the incident scene. MUTCD 6I.05 also

recommends that public safety agencies examine their policies on the use of emergency-vehicle lighting, especially after a traffic incident scene is secured, with the intent of reducing the use of this lighting as much as possible while not endangering those at the scene. A complete summary of the guidance provided in 6I.05 of the MUTCD is provided in Section 2.3.3 below.

2.2.3 Crash Investigation/Reconstruction Tools and Resources

Major crashes typically must be treated as crime scenes and subsequently require evidence collection, which may include detailed measurements of skid marks, scrapes or gouges in the pavement, final vehicle position, etc. In-depth crash investigations are generally required for incidents during which a crash victim sustains life-threatening or fatal injuries, or when a crash is believed to be the result of criminal activity.

One tool intended to minimize the on-scene time required for law enforcement to complete crash investigations is photogrammetry. Photogrammetry uses digital pictures and specialized software to create accurate 3D measurements and object models. After photographs are taken in the field, the incident scene can be cleared and law enforcement officials can perform reconstruction calculations and drawings in the safe confines of their office utilizing photogrammetry software.

Photogrammetry can be used as a primary method for collision reconstruction or it can be used as a supplement to other collision reconstruction tools such as total stations. Utilizing photogrammetry, even as a supplement, can eliminate the need to revisit incident scenes to obtain missed measurements.

Total stations have also proven to be an effective tool for crash investigation. In addition to traditional models, total stations are now available as reflectorless, robotic and with GPS applications capability. Reflectorless mode allows for measurements to objects or points without having to place a prism at those points. Robotic mode allows measuring from a distance via remote control, eliminating need for a second operator to hold a prism pole. For GPS applications, a total station can be equipped with a GPS receiver on its prism pole. The receiver uses the transmission from a GPS base station, which establishes a known 3D coordinate point.[1] These features allow for total station measurements to be taken by a single individual if necessary and have been shown to reduce the on-scene time required for data collection during crash investigations. The Iowa DOT has deployed a statewide real-time kinematic (RTK), global positioning system (GPS) network which provides the GPS base station.

As technology advances, it is important to continuously monitor and evaluate feasibility of using new crash investigation/reconstruction tools and technology with the goal of decreasing on scene time for data collection.

2.2.4 Safety Service Patrol

Safety Service Patrols (SSP) have been recognized across the nation as one of the most effective TIM strategies. SSPs generally consist of trained personnel who use specially equipped vehicles to systematically patrol congested highways searching for and responding to traffic incidents and providing motorist assistance. Program services vary across the United States; however, SSPs typically render assistance to motorists when needed and can push vehicles off the road, provide gasoline, and change flat tires or provide minor repairs to help motorists safely drive the vehicle from the highway. More robust programs provide additional functions such as clearance and recovery services, emergency temporary traffic control and management, and assistance with emergency services. State and local sponsoring agencies are using SSPs as a strategy to reduce traffic congestion, improve travel time

[1] Galvin, Bob. "Reconstruction: Faster & Better." *Law Officer.* n.p. 21 July 2012. Web. 23 April 2013.

reliability, and improve highway safety. In Iowa, the SSP is referred to as the Highway Helper Program. Consideration is being made to increase the number of Highway Helper units in the Iowa City area as an I-80/I-380 interchange TMP strategy. The many benefits attributed to SSP programs, including their cost effectiveness, make them a fundamental element of TIM programs and a key tactic in dealing with traffic congestion.

In general, SSPs can be categorized into one of three levels:

1. Baseline – provide services aimed at helping motorists safely drive their vehicle from the highway
2. Mid-level – provide incident response services in addition to motorist assistance and have the ability to relocate vehicles out of traffic lanes
3. Full-Function – provide all baseline and mid-level services, assist with emergency traffic control and management, and provide clearance and recovery services

2.2.5 Authority Removal and Hold Harmless Legislation

Authority removal legislation provides authority to designated public agencies, or their designee, to remove vehicles and/or spilled cargo from the roadway as quickly as possible to restore traffic flow. Authority removal legislation typically also includes hold harmless provisions that grants responders immunity from civil liability when participating in quick clearance activities, such as removing vehicles and/or cargo involved in a traffic incident that is blocking travel lanes. Currently, the only legislation that alludes to authority removal is Iowa Code Chapters 318 (Obstructions in Highway Rights-of-Way) and 321 (Abandoned Vehicles), but neither specifically discusses traffic incidents. Chapter 321.89 defines as "abandoned vehicle" as "any vehicle parked on the highway determined by police authority to create a hazard to other vehicle traffic." While this definition may imply that a vehicle involved in an incident and that blocks roadway lanes may create a hazard, further clarification may be needed to clearly expand the definition of "abandoned vehicles" to include those involved in incidents that cannot be moved from the roadway. This strategy would involve amending the existing law or adding new legislation to provide authority removal and hold harmless coverage that is inclusive of vehicles that cannot be driven off the freeway and is consistent with the needs of traffic incident management.

2.3 Responder Safety Fundamentals

Maintaining the safety of all responders and personnel at traffic incident scenes is of paramount importance. Secondary crashes involving incident responders can take many forms but most often occur when responders are struck by passing vehicles while working at or near the incident scene. Emergency response professions are high-risk, and generally have a safety culture that considers preventable injuries or deaths completely unacceptable. This section describes several fundamentals that are foundational to keeping incident responders safe.

2.3.1 Responder Visibility

As stated in MUTCD Section 6D.03 (see *Appendix A*), all workers, including incident responders, within the right-of-way of a roadway who are exposed either to traffic (vehicles using the highway for purposes of travel) or to work vehicles and construction equipment shall wear high-visibility safety apparel (HVSA). This requirement applies to all incident responders, including, but not limited to: law enforcement, fire/rescue, emergency medical services, towing and recovery, medical examiner/coroner,

county maintenance and transportation officials, insurance investigators, engineers, and media personnel.

MUTCD Section 6D.03 further states that law enforcement personnel are required to wear HVSA when directing traffic, investigating crashes, or handling lane closures, obstructed roadways or disasters. The MUTCD does not require the use of HVSA for law enforcement activities such as traffic stops. Similarly, firefighters or other responders engaged in emergency operations that directly expose them to flame, fire, heat and/or hazardous materials may wear retroreflective turnout gear that is specified and regulated by other organizations (i.e., National Fire Protection Association).

The MUTCD requires that HVSA worn by incident responders meet, and be labeled as meeting ANSI/ISEA 107-2004, ANSI/ISEA 207-2006, or equivalent revisions. Since the MUTCD was published in 2009, FHWA has issued formal letters of acceptance for revisions to the standards including ANSI/ISEA 107-2010, ANSI 207-2011, and ANSI/ISEA 107-2015. Therefore, HSVA labeled as meeting any one of these standards would meet the MUTCD requirements.

The most current version of the standard, ANSI/ISEA 107-2015, consolidated the requirements of ANSI/ISEA 107 and ANSI/ISEA 207 in an effort establish a single, comprehensive standard, and divides HSVA into both performance classes and garment types. There are three garment types, which are designated based on wearer work settings and activities:

- **"O" – Off-Road:** Exposure to moving vehicles/machinery but not on public rights-of-way (such as in parking lots).
- **"R" – Roadway:** Exposure to traffic on public access highways and in temporary traffic control (TCC) zones where construction equipment operates.
- **"P" – Public Safety:** Incident responders and law enforcement personnel with exposure to moving traffic and/or working in TTC zones.

HSVA consists of background material that is fluorescent, retroreflective material that is added to that background, and combined performance material, which refers to retroreflective parts that are also fluorescent. The following performance classes are based on the amount of fluorescent and retroreflective material that they contain:

- **Performance Class 1 (Type O):** Minimum visibility for non-complex work environments at less than roadway speeds.
- **Performance Class 2 (Type R or P):** The minimum practice for HVSA in roadway rights-of-way and TTC as required by the MUTCD.
- **Performance Class 3 (Type R or P):** Greater visibility to wearer in complex backgrounds and through a full range of body movements by the mandatory placement of materials on sleeves and pant legs (if present).
- **Supplemental Class E:** Pants, bib overalls, shorts, and gaiters. When Class E is worn with Class 2 or Class 3, the overall classification becomes Class 3.

Figure 3 provides examples of the HVSA described above.

Figure 3: High-Visibility Safety Apparel Examples
Type R Class 2 Vest, Type R Class 3 Vest, Class E Pant, and Type P Class 2 Vest

Type P accommodates the needs of incident responders who have competing hazards and may require access to special equipment, by reducing the background material requirements and shortening the length of high-visibility safety vests. Additionally, a five-point breakaway function is available as an additional safety feature. It should be noted that Type O and Class 1 HSVA do not meet the requirements of the MUTCD and should not be used by responders.

As outlined by FHWA and the American Traffic Safety Services Association (ATSSA), HVSA should be replaced when it becomes faded, torn, dirty, soiled, worn, or defaced, or if it is no longer visible at 1,000 feet day or night. The typical useful life of HVSA depends on the type of work an individual performs while wearing it. The useful life of HVSA that is worn daily is approximately six months, while HSVA that is not worn daily is expected to have a useful service life of up to three years. Actual lifetimes in the field will vary depending on exposure and care conditions, and could range from weeks to years.

2.3.2 On-Scene Situational Awareness

Responders must always be mindful and aware of the situation or environment they are working in. Following are some basic, but important, safety tips:

- Always wear your seat belt
- Never trust approaching traffic in either direction
- Never turn your back to approaching traffic
- Maintain awareness of:
    - Where you are
    - Where you can go (escape route)
    - Where you can't go (bridges, on-coming traffic, etc.)
- Never stand between vehicles
- Instruct civilians where to stay, out of harm's way
- Do not allow yourself to get tunnel vision, always maintain a view of the "big picture" and remember to consider how your actions may be affecting motorists traveling in the opposite direction
- Maintain knowledge of current weather conditions and consider how they may affect driving or visibility abilities of the passing motorists

Additionally, once a scene is secure and the incident is under control, release personnel that no longer have an active role or specific duty related to the incident from the scene. This will help the Incident Commander maintain order on the scene and will minimize the unnecessary exposure of responders to potentially hazardous working conditions.

2.3.3 Emergency Vehicle Lighting

As discussed in Section 6I.05 of the MUTCD, the use of emergency vehicle lighting is essential, especially in the initial stages of a traffic incident, for the safety of incident responders, persons involved in the incident and motorists approaching the incident scene. Emergency vehicle lighting, however, provides warning only and provides no effective traffic control. The use of too many lights at an incident scene can be distracting and can create confusion for approaching motorists, especially at night.

Emergency vehicle lighting can be reduced if proper traffic control has been established at a traffic incident scene. This is especially true for major traffic incidents that involve a number of emergency response vehicles. If proper traffic control is established through placement of advanced warning signs and traffic control devices to divert traffic, then incident responders can perform their tasks on scene with minimal vehicle lighting. In addition, because the glare from floodlights or vehicle headlights can impair the nighttime vision of approaching road users, it is recommended that any floodlights or vehicle headlights that are not needed for scene illumination or scene safety be turned off.

Section 6I.05 further recommends that public safety agencies review their policies on the use of emergency vehicle lighting and consider modifying them to minimize over-lighting, especially after a traffic incident scene is secured. Additionally, special consideration should be given to reducing or extinguishing forward facing emergency vehicle lighting, especially on divided highways, to reduce distractions to oncoming road users.

Incident Scene Illumination

While it is important to ensure proper illumination, or lighting, of the incident space, exercise care to ensure that scene lights are not blinding traffic. When available, use vehicles with special lighting capabilities. By using vehicle mounted lighting that can be controlled remotely, the lights can be directed downward to minimize the amount of light that reaches the motorists.

2.3.4 Emergency Vehicle Markings

The use of reflective markings can increase the visibility of emergency vehicles parked in or near moving traffic, especially during nighttime conditions. Although there are no national standards associated with law enforcement vehicle markings, *National Fire Protection Association (NFPA) 1901: Standard for Automotive Fire Apparatus* includes the following reflective striping and marking requirements for all fire apparatus built after January 2009:

- Any door of the apparatus designed to allow persons to enter or exit the apparatus shall have at least 96 square inches of retroreflective material affixed to the inside of the door.
- A retroreflective stripe(s), totaling a minimum of 4 inches in width, shall be affixed to at least 50 percent of the cab and body length on each side, excluding the pump panel areas, and at least 25 percent of the width of the front of the apparatus.
- At least 50 percent of the rear-facing vertical surfaces, visible from the rear of the apparatus, excluding any pump panel areas not covered by a door, shall be equipped with retroreflective striping in a chevron pattern sloping downward and away from the centerline of the vehicle at

an angle of 45 degrees. Each stripe in the chevron shall be 6 inches in width and be a single color alternating between red and either yellow, fluorescent yellow or fluorescent yellow-green.

Additionally, *NFPA 1917: Standard for Automotive Ambulances, originally released in 2013, includes similar retro-reflective striping requirements for all new ambulances.* Examples of emergency vehicles with retroreflective chevron striping, during both daytime and nighttime conditions, are shown in Figure 4.

Figure 4: Emergency Vehicles with Retroreflective Chevron Striping
(Photo Courtesy of the City of Oak Creek Fire Department, WI)

In 2009, the *Emergency Vehicle Visibility and Conspicuity Study* analyzed emergency vehicle visibility and conspicuity with an emphasis on expanding efforts to improve vehicle and roadway operations safety for all incident responders. The study was produced in partnership between the U.S. Fire Administration (USFA) and the International Fire Service Training Association (IFSTA), with support from the U.S. Department of Justice (DOJ) and the National Institute of Justice (NIJ). The study identified the following potential opportunities for improving the safety of emergency vehicles using readily available retroreflective products:

- Outline vehicle boundaries with “contour markings” using retroreflective material, especially on large vehicles
- Concentrate retroreflective material lower on emergency vehicles to optimize interaction with approaching vehicles’ headlamps
- Consider (and allow) the use of fluorescent retroreflective materials in applications where a high degree of day-/night-time visibility is desired

- Using high-efficiency retroreflective material can improve conspicuity while reducing the amount of vehicle surface area requiring treatment
- For law enforcement vehicles, retroreflective material can be concentrated on the rear to maintain stealth when facing traffic or patrolling
- Applying distinctive logos or emblems made with retroreflective material can improve emergency vehicle visibility and recognition

2.4 Scene Size-Up

Responders that typically arrive first to the scene of a traffic incident have a multitude of responsibilities. One of the most important initial activities is communicating specifics about the incident (i.e., size-up) to the appropriate communications/dispatch center. An accurate incident or scene size-up is critical in that it serves as the basis for allocating the necessary resources to respond to and manage the incident. Improper or inadequate scene size-up leads to inefficiencies and may unnecessarily prolong the duration of the incident.

Upon first arriving on-scene, an immediate arrival report should be given to the communications center. This report, typically given while still in the vehicle and viewing the scene through the windshield, is also referred to as a windshield size-up. The windshield size-up should include:

- Unit identification
- Exact location of incident
- Number and type of vehicles involved
- Number of lanes closed
- Hazards or unique safety concerns
- Establishment of Command

The windshield size-up provides a quick assessment of the scene for dispatch and other responders monitoring the channel. A more detailed size-up report should be conducted within 15 minutes of arrival at the scene. For the duration of the incident, progress reports should be communicated at regular intervals, or whenever significant changes occur, to provide an update on how response, traffic management, and clearance activities are progressing.

The following subsections review in detail the types of information that should be communicated in size-up reports.

2.4.1 Location

It is critical to relay the exact location (including highway name, direction, cross street and/or mile marker, etc.) of the incident to the communications/dispatch center, as well as to all other responding units. This information will assist other responders in planning response routes and, if necessary, identifying emergency alternate routes.

2.4.2 Vehicles

Relay the number and type of vehicles involved in the incident to the appropriate communications/dispatch center.

2.4.3 Injured Persons

Determine and communicate the estimated number of people injured, the extent of their injuries, and whether extrication will be necessary. This information is critical to responding fire and emergency medical services personnel and will allow them to begin planning for additional resources if necessary. Follow up will likely be required as additional information, such as victim condition and level of consciousness, becomes available.

2.4.4 Incident Classification

All traffic incidents will be classified based on the expected incident duration as outlined in Chapter 6I of the MUTCD. The three incident classes to be used are as follows:

Major (2 hours or more)

Major traffic incidents typically involve closing all or part of a roadway facility for a period exceeding two hours. During major incidents, motorists are usually diverted through lane shifts or directed around the incident using an emergency alternate route. Examples include:

- Fatal crashes or incidents that require a crash investigation
- Incidents involving a hazardous materials spill
- Overturned truck or tractor-trailer
- Structural damage
- Wildfires near the roadway

Intermediate (between 30 minutes and 2 hours)

Intermediate traffic incidents usually require traffic control on the scene to divert motorists past the blockage. Full roadway closures might be needed for short periods during incident clearance to allow responders to accomplish their tasks. Examples include:

- Rollover or multi-vehicle crashes
- Crashes involving personal injury
- Truck or tractor-trailer crashes

Minor (under 30 minutes)

For minor traffic incidents, it is not generally possible or practical to set up a lane closure with traffic control devices. Examples include:

- Disabled vehicles
- Minor crashes (e.g., property damage only)
- Roadway debris

To facilitate resource allocation and planning, relay the incident classification to the communications/dispatch center. An initial approximation is adequate, as it can always be upgraded or downgraded as necessary when more details are available. If the expected duration is bordering between two classifications, it is better to use the higher classification so that additional resources may be requested and mobilized.

The TMC has a similar 3-level incident classification system which they refer to as emergency incident notifications (EINs). These notifications sometimes contain sensitive information and/or media

notification. EINs should not be confused with incident classifications and do not always align with the respective timeframes.

2.4.5 Request for Iowa DOT Maintenance, Public Works or Highway Department Support

For an intermediate or major incident, notify Iowa DOT maintenance, public works or highway department as appropriate. Notify Iowa DOT maintenance when an incident occurs on the interstate, US or state routes, the county highway department when an incident occurs on a state or county facility and notify the municipal public works department when an incident occurs on a municipal road. The DOT maintenance, public works or highway departments can assist by providing the additional traffic control devices necessary for proper temporary traffic control.

2.4.6 On-Scene Conditions

Relay any important information regarding other conditions present at the scene that may affect the safety of responders. For example, limited visibility due to smoke from a vehicle fire, downed wires, or adverse weather conditions such as ice or fog are important details to communicate.

2.4.7 Hazardous Materials

It is necessary to quickly identify the presence or potential presence of hazardous materials at an incident scene in order to maintain the safety of all responders and passing motorists. Hazardous materials response is discussed in more detail in Subsection 2.7.

2.4.8 Towing and Recovery

If it appears that one or more of the vehicles involved in the incident are impacted such that they cannot be driven, notify towing and recovery personnel as early as possible. It is crucial that towing and recovery agencies are provided with accurate incident details to ensure that they are able to respond with the proper equipment.

2.4.9 Traffic Conditions

Traffic conditions, as well as potential alternate response routes for additional personnel, must be relayed to the communications/dispatch center. Traffic related information, such as the length of traffic backups or queues will help responding units ensure they use an appropriate response route and can be used to identify locations where responders may need to set up additional traffic control. In addition, all impacted agencies should be notified when an emergency alternate route is activated. When the communications/dispatch center receives traffic condition information, they should in-turn relay this information to Iowa DOT's TMC.

2.4.10 Additional Resources

Relay any requests for additional resources to the communications/dispatch center. Some additional resource examples include: helicopter emergency medical services, crash investigation/reconstruction services, and medical examiner.

2.5 Traffic Incident Management Area Establishment

A traffic incident management area (TIMA) is an area of highway where temporary traffic controls are imposed by authorized personnel in response to an incident. A TIMA is a type of TTC zone and extends from the first warning device (such as a sign 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. A properly established TIMA helps to

maintain a safe working area for responders at an incident scene. Incident responders should establish a TIMA as soon as possible upon arrival at an incident scene.

2.5.1 Manual on Uniform Traffic Control Devices Chapter 6I

Chapter 6I of the MUTCD specifically focuses on traffic control through a TIMA. The primary functions of TTC devices at a TIMA, as stated in MUTCD Chapter 6I, are to inform road users of the incident and to provide guidance information on the path to follow through the incident area. The ability to quickly deploy proper TTC can greatly reduce the effects of an incident, such as secondary crashes or excessive traffic delays. The MUTCD further states that an essential part of fire, rescue, spill clean-up, highway agency and enforcement activities is the proper control of road users through the TIMA in order to protect responders, victims and other personnel at the site. A copy of MUTCD Chapter 6I can be found in *Appendix A*.

A TIMA consists of four main components:

1. Advance Warning Area
2. Transition Area
3. Activity Area
4. Termination Area

Figure 6 illustrates the components of a TIMA, which are discussed in more detail in the following sections. The MUTCD provides recommended lengths and distances for TTC zone components, which are provided in Figure 7. When establishing a TIMA, responders are not required to meet these distances, but should be working towards achieving them. The longer an incident lasts, the more that is expected from responders regarding traffic control.

2.5.2 Advance Warning Area

The advance warning area is established upstream of the incident in order to alert motorists of the upcoming incident scene and reduction in travel speeds. The advance warning area should also be upstream of any traffic queues so that warning is given to road users before encountering stopped traffic. Typically, advanced warning is provided using advance warning signs or electronic message signs as described below.

Advance Warning Signs

To distinguish TIMAs from work zones, the MUTCD assigned fluorescent pink to incident management. Warning and guide signs used for incident management situations have black lettering and a black border on a fluorescent pink background. Examples of these signs are shown below in Figure 5: Examples of TIMA Advance Warning Signs. Although pink is reserved for incident management in the MUTCD, standard orange warning signs can still be used at incident scenes, especially if pink ones are not readily available.

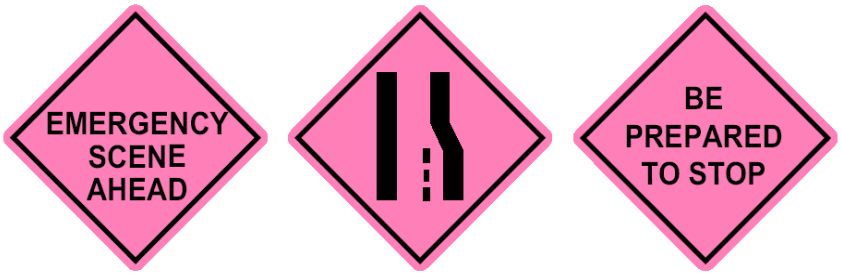


Figure 5: Examples of TIMA Advance Warning Signs

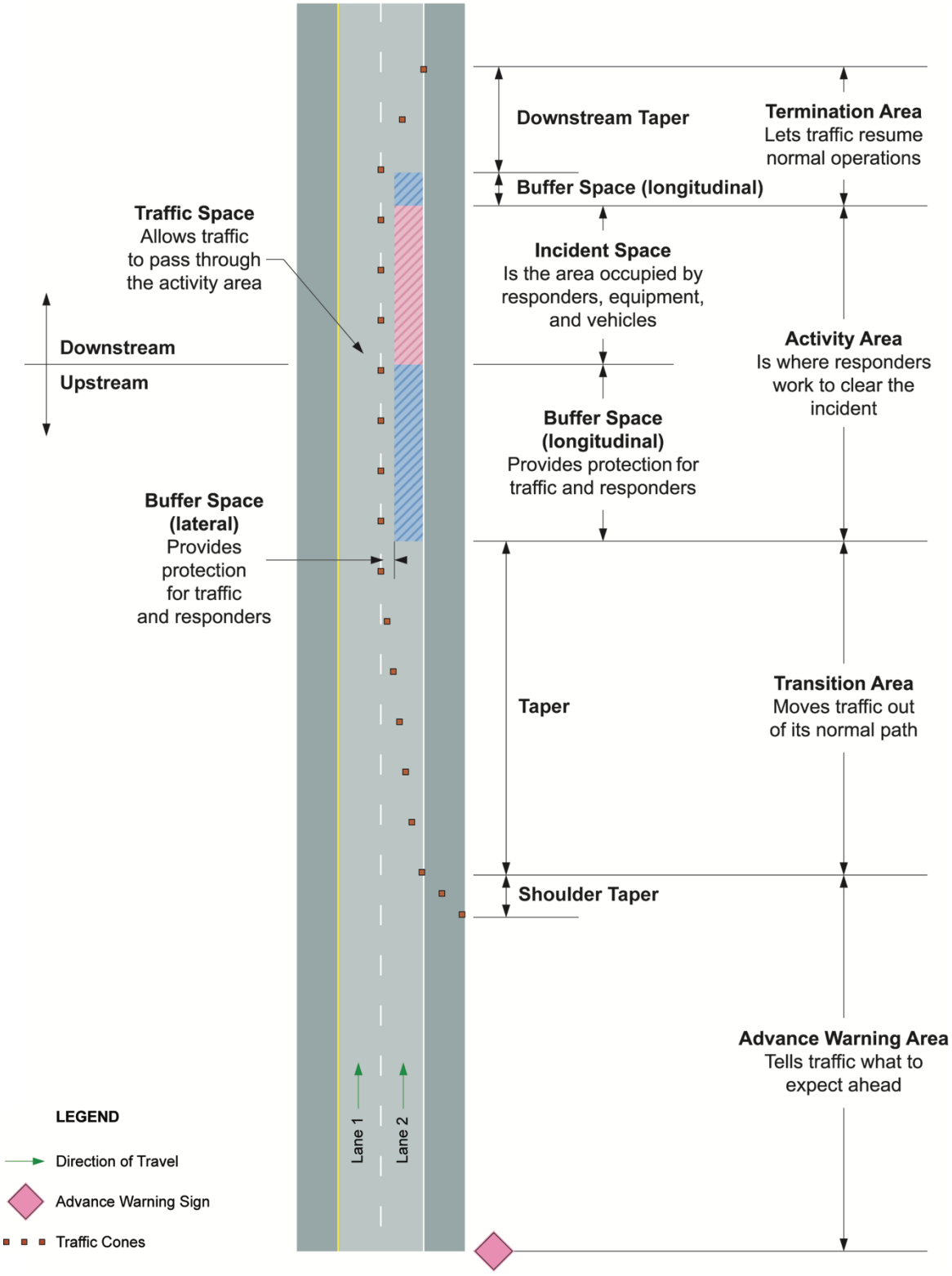
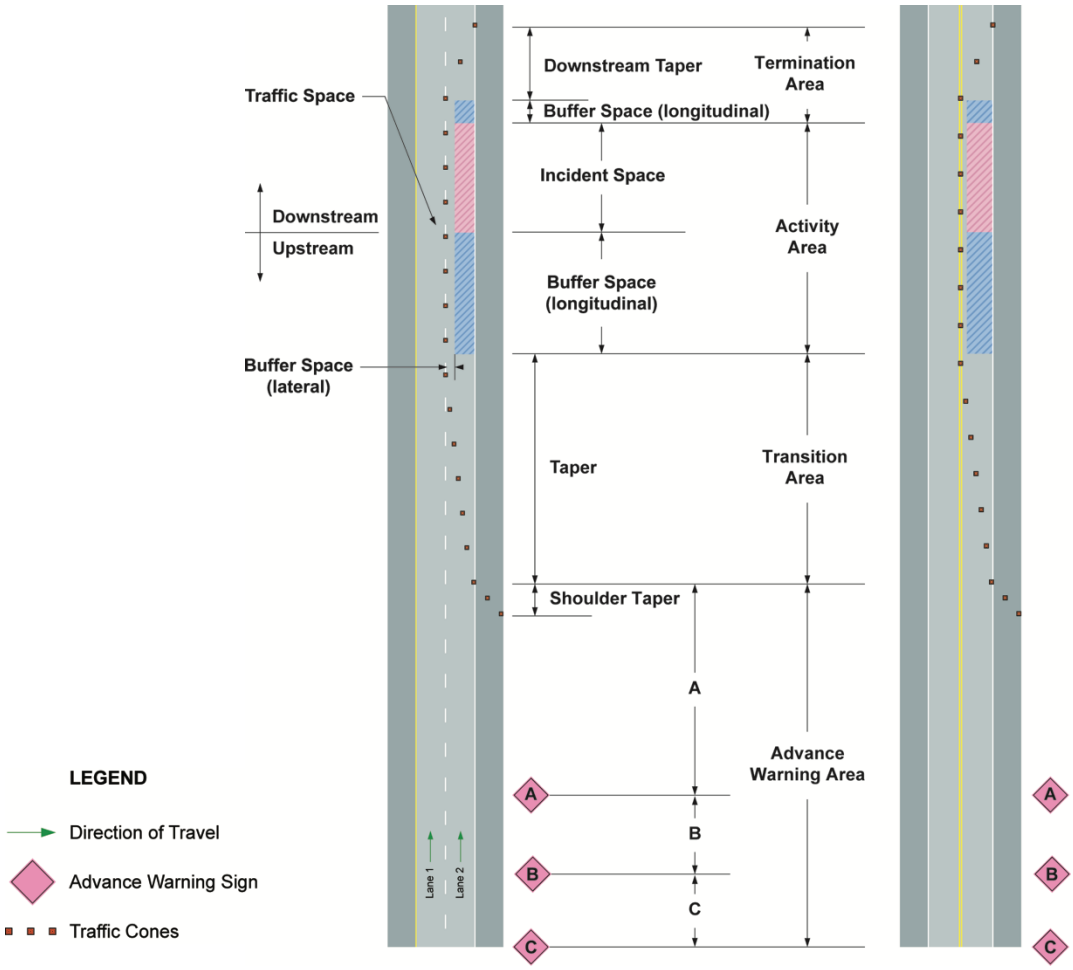


Figure 6: TIMA Components
(Source: Modified from 2009 MUTCD)



	Advance Warning Area				Transition Area		Activity Area	Termination Area	
Speed (mph)	**Advance Warning Sign Minimum Distance (ft)**				**Recommended Lengths (ft)**				**Cone Spacing (ft)**
	A	**B**	**C**	**Cumulative Total[1]**	**Shoulder Taper[2]**	**Taper**	**Distance Between Tapers (longitudinal)[3]**	**Buffer (longitudinal)**	**Downstream Taper**	
25	200	200	200	600	45	125	250	155	50-100	25
35	350	350	350	1,050	85	245	490	250		35
45	500	500	500	1,500	180	540	1,080	360		45
55	1,000	1,500	2,640	5,140	220	660	1,320	495		55
65	1,000	1,500	2,640	5,140	260	780	1,560	645		65

Source: 2009 MUTCD

[1] Total distance measured from the Transition Area to Advance Warning Sign C

[2] Shoulder taper was rounded up to nearest 5 feet

[3] Used when multiple lanes are closed

Figure 7: Recommended Temporary Traffic Control Distances
(Source: 2009 MUTCD – Diagram Not to Scale)

Recommended advance warning sign minimum spacing distances are provided in Figure 7. It should be noted that advance warning signs placed in urban areas may need to be placed at shorter distances to avoid sign clutter.

Dynamic Message Signs

Dynamic Message Signs (DMS) are the permanent, structure-mounted, electronic signs located on some segments of the state's highways. Iowa DOT remotely operates these signs from the statewide TMC and may be able to provide advance warning messages to motorists if an incident occurs near one or more DMS.

Portable Dynamic Message Signs

Portable DMS are another tool for providing advance warning. Portable DMS can be used for intermediate incidents and are strongly recommended for use during major incidents. The DOT is typically responsible for housing and deploying portable DMS. In addition to messages being programmed in the field, the DOT has the ability to operate portable DMS remotely.

Shoulder Taper

The shoulder taper, set up using traffic cones or flares, can also be established as part of the advance warning area. The shoulder taper is used to advise motorists that the shoulder is closed ahead. Recommended shoulder taper lengths can be found in Figure 7 and additional information about properly setting up a taper is provided in Subsection 2.5.3. Due to limited resources, specifically the availability of cones, a typical TIMA may not include a shoulder taper.

Setting up a TIMA for traffic incident management situations near a corner, hill, or other reduced visibility situation may require adjusting the location of advance warning devices. In situations where the queue is continuously growing, a responder vehicle positioned on the shoulder with its emergency lights activated can help slow motorists approaching the incident scene. As the queue length changes, the vehicle can be repositioned appropriately. This role is contingent upon resource availability and is typically filled by law enforcement or a Safety Service Patrol.

2.5.3 Transition Area and Tapers

The transition area is the section of highway where road users are redirected out of their normal path. Proper transition areas usually involve the use of tapers, which can be set up using cones or flares.

The speed of the roadway should be considered when determining the length of a taper. As illustrated in Figure 7, the higher the roadway speed the longer the taper. However, scene set up is dynamic in nature and it is recognized that a balance must be reached between the roadway speed and the number of cones available.

Similarly, cones or flares used to establish a taper should be placed no further apart in feet than the speed limit (i.e., on a 55-mph roadway the cones would be placed 55 feet apart), but placing cones at such specific distances can be difficult. As an alternative, skip lines (the broken pavement markings used to separate two travel lanes) provide a useful guide for placing cones. On roadways without skip lines, placing cones 10 paces apart is a simple and effective alternative.

Establishing a taper can be both difficult and dangerous. Exposure to the traffic flow is almost certain. The methodology described below and illustrated in Figure 8 was designed to minimize responder exposure while setting up a taper. This example is for the deployment of an initial taper with 5 cones and using skip lines to guide placement:

1. The responder retrieves available cones from the truck placing one a reasonable distance from the responder vehicle on the edge line, allowing for a buffer.
2. Walking along the shoulder, facing traffic, a cone is subsequently placed on the edge line at each skip line.
3. When the last cone has been placed on the edge line, the responder begins walking backwards until the next cone is reached.
4. The responder takes one lateral step into the travel lane and places the cone, immediately returning to the shoulder.
5. The responder walks backwards until the next cone is reached and then takes two lateral steps into the travel lane to place the cone, again immediately returning to the shoulder.
6. The steps are repeated until all cones are deployed.

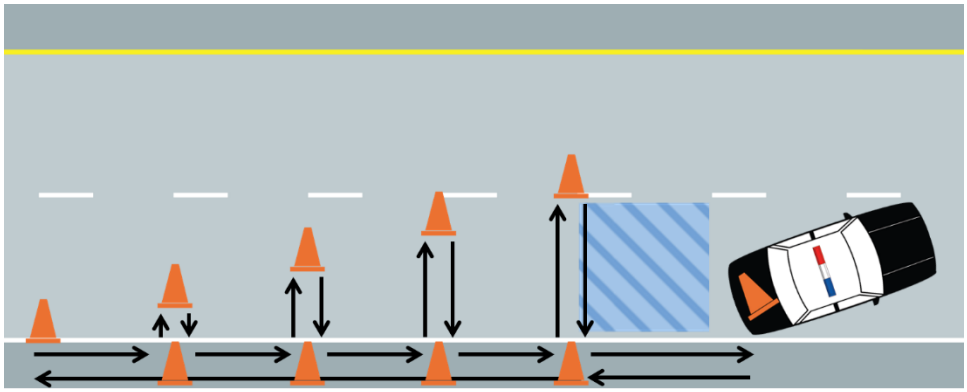


Figure 8: Taper Set Up

Whenever resources permit, a spotter should be present to assist in watching for traffic during taper set up. Alternatively, if available, a separate responder vehicle may be positioned to provide a protective block upstream of the taper while the responder sets up and/or removes the taper.

Cones used for emergency traffic control and scene management should be consistent with the standards established in MUTCD Section 6F.64. Such cones should be predominantly orange and made of a material that can be struck without causing damage to the impacting vehicle. When cones are used on freeways and other high-speed roadways, or at night, they should be 28 inches or greater in height, and should be retroreflective for maximum visibility. Retroreflection of 28 inch or larger cones should be provided by a 6-inch wide white band located 3 to 4 inches from the top of the cone and an additional 4-inch wide white band located approximately 2 inches below the 6-inch band. Figure 9 illustrates the appropriate cone dimensions.

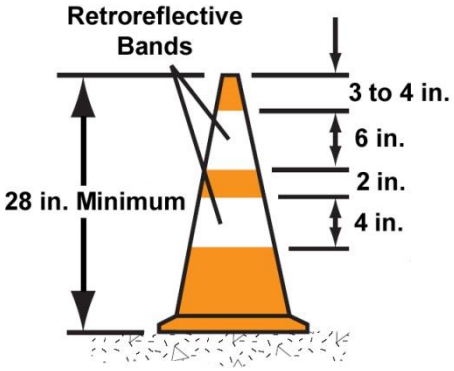


Figure 9: Traffic Cone Dimensions
(Source: Modified from 2009 MUTCD)

It is strongly recommended that all emergency response vehicles be equipped with, at a minimum, five MUTCD compliant traffic cones. This recommendation follows guidance set forth in the *NFPA 1901: Standard for Automotive Fire Apparatus*. Collapsible traffic cones are also available and offer an alternative solution for response vehicles with limited storage space.

2.5.4 Activity Area

The activity area is the section of the highway where incident response activities take place. The activity area is comprised of the upstream buffer space and the incident space.

Traffic cones should be placed along the edge of the activity area starting at the end of the transition area, following alongside the buffer space and the incident space. This will help define a clear boundary between the traffic space and the activity area.

Upstream Buffer Space

It is highly recommended that a longitudinal buffer space be established between the end of the transition area (taper) and the actual incident space to protect on-scene responders. In addition to protecting responders, the upstream buffer space provides a recovery area for errant motorists, so no responder vehicles should be positioned in the upstream buffer space. Longitudinal buffer space is dependent on, but not limited to, the speed of passing traffic and sight distance when approaching the scene, as well as when passing the scene. Figure 7 provides suggested longitudinal buffer spaces as outlined in the MUTCD.

When needed, providing lateral buffer space is also possible. This is the area between the incident itself and the path of traveling vehicles. Lateral buffer space may be necessary to ensure responders have adequate room to work. The amount of lateral buffer space to be used is dependent upon many conditions including, but not limited to, time of day, weather and road conditions. When the lateral buffer space needed to complete response activities encroaches or requires part of an adjacent lane, it is strongly recommended that the entire lane be closed. Partial lane closures can confuse drivers and decrease scene safety.

Incident Space

The incident space is the area of roadway where the incident has occurred and incident responders are working. A blocking vehicle should be positioned at the upstream end of the incident space.

2.5.5 Termination Area

The termination area is used to notify traffic that the TIMA is ending, and that they may resume normal driving. The termination area includes the downstream buffer space and the downstream taper.

Downstream Buffer Space

The need and length of the downstream buffer space is incident dependent. Similar to the activity area, cones should be extended the length of the downstream buffer space.

Downstream Taper

The downstream taper typically only needs to extend over a distance of approximately 50 to 100 feet, but is necessary to prevent motorists from entering the incident space or downstream buffer space where responders may be working. Cones should extend from the downstream buffer space to the shoulder.

2.5.6 Vehicle Positioning

The MUTCD defines safe-positioned as the positioning of emergency vehicles at an incident in a manner that attempts to:

- Protect the responders performing their duties
- Protect road users traveling through the incident scene
- Minimize, to the extent practical, disruption of the adjacent traffic

Positioning emergency vehicles to establish a safe work area is another foundational decision for responders arriving at an incident scene. Vehicle positioning is a critical element to protecting both emergency responders and motorists.

Blocking and Vehicle Positioning

The first emergency vehicle that arrives at an incident scene is responsible for positioning their vehicle as an initial block. Blocking is the act of positioning a responder vehicle upstream of an incident to obstruct the flow of moving traffic in one or more lanes and/or the shoulder. Blocking can be accomplished with the responder vehicle parallel to travel lanes or angled.

Additionally, a block can be to the left or to the right, as illustrated in Figure 10. The decision to block left or right is dependent upon the type of incident, responsibilities of the responding unit, and circumstances of the incident. Blocking towards available travel lanes provides a visual cue to approaching traffic as shown by the block left example below. However, if access to the pump panel on a fire apparatus is required, the vehicle would use a block right as shown below to protect the individual working at the panel.

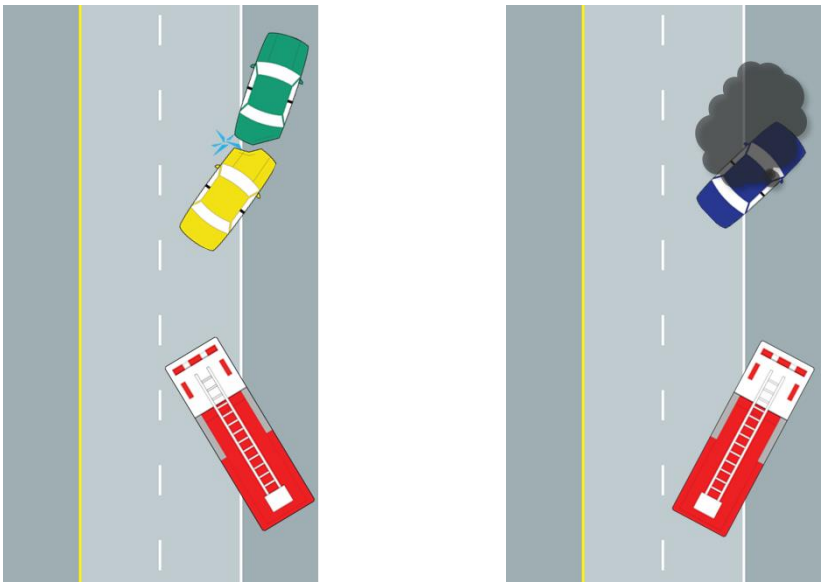


Figure 10: Example of Block Left (Left) and Block Right (Right)

The number of lanes that need to be blocked will vary based on the circumstances of the incident. However, when establishing a block, it is important to remember that the shoulder of a highway is considered a lane.

Blocking creates a barrier between traffic and the incident scene where responders are working. Blocking vehicles should be positioned upstream of the incident scene so that there will be sufficient distance for the vehicle to roll-ahead without hitting the incident area should it get struck, but not so much so that errant vehicles will travel around the blocking vehicle and strike the protected responders.

Critical Wheel Angle

When positioning a response vehicle, drivers should work on the assumption that a vehicle approaching from upstream may hit the unit. Turning wheels so that they are not facing the incident space is a recommended practice referred to as the critical wheel angle. The critical wheel angle may help divert a struck responder vehicle away from downstream responders. The critical wheel angle may not provide protection when a vehicle is struck by a significantly larger vehicle, or by a vehicle traveling at a high rate of speed, but the potential safety benefit makes it a simple good practice to follow. Agency policy about critical wheel angle should be followed, particularly in the case of law enforcement.

Collective Vehicle Positioning

All vehicles responding to an incident scene should be located on the same side of the roadway and in the same direction as the incident. The side will be dictated by the nature of the event, and the initial responding unit will set the example for others to follow. Responders should avoid stopping their vehicles on the opposite side of a divided highway and crossing the median to access the scene.

Island and Split Scene Vehicle Positioning

When an incident occurs in the middle lane of a multi-lane highway it is referred to as an island scene. Island scenes result in traffic passing on both sides of the incident and increase the exposure of all involved. In these situations, it is recommended that additional lanes be blocked to direct all passing traffic to one side of the incident.

A split scene occurs when involved vehicles are positioned on both sides of the roadway and traffic is moving between them. A split scene creates divided attention for approaching drivers, and may result in responders and/or involved parties crossing from one side to the other in the path of traffic. Whenever possible, moving all vehicles to one side of the roadway improves overall scene safety. If vehicles cannot be relocated, responders should stop all traffic temporarily and move all involved parties to one side, preferably where a responder vehicle is providing a protective block.

Lane +1 Blocking

To ensure responder and motorist safety, it may be necessary to close additional lanes for a short time. The practice of blocking the involved lane(s) plus one additional lane to provide a protected lateral space for safety is referred to as Lane +1 blocking. Use of the Lane +1 blocking creates an adequate incident/work space for responders that is protected against moving traffic. Lane +1 blocking can often facilitate quick clearance, but providing the space necessary for responders to quickly and efficiently complete tasks. Once response activities no longer require the extra space for safety, vehicles can be repositioned back to blocking involved lanes only.

Initial Emergency Vehicle Positioning

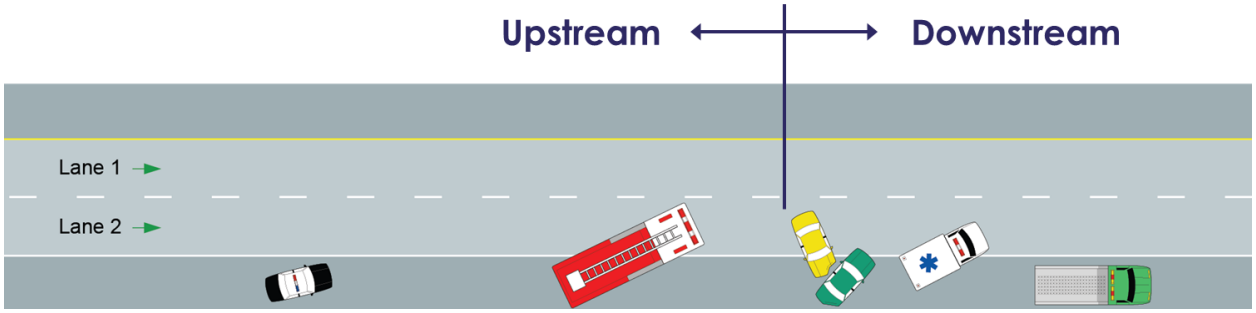


Figure 11 provides recommendations that are intended for initial vehicle positioning at an incident scene. Law enforcement vehicles, fire apparatus, and DOT or TAP vehicles are typically positioned upstream, while ambulances, tow trucks and other support units are typically positioned downstream. Vehicle positioning should be reviewed and adjusted as the incident progresses.

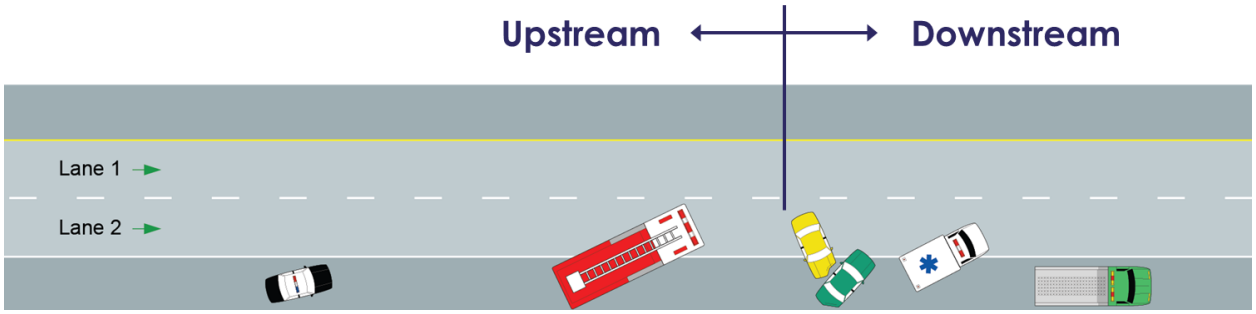


Figure 11: Initial Emergency Vehicle Positioning

Staging Area

The Staging Area is a location established where resources can be placed while awaiting a tactical assignment. Staging Areas allow for the organization of personnel and equipment to be readied for immediate use at the incident scene. The Staging Area is for holding incoming resources that are not actively involved in incident operations. Consideration should be given to the location and whether there is enough room for large response vehicles to easily enter or exit the area. Staging Areas also allow for un-needed resources and/or personnel to immediately depart the scene and return to service.

Personally-Owned Vehicles

Due to the lack of vehicle markings and appropriate emergency lighting, and to reduce the number of vehicles at a scene, the use of personally owned vehicles (e.g., volunteer fire fighters, emergency medical responders, etc.) to respond to the scene of highway incidents is strongly discouraged. When it is necessary for a privately-owned vehicle to respond to a highway incident, the vehicle must be parked safely in the downstream buffer area or, if possible, off of the roadway (e.g. a nearby parking lot). Since they lack the appropriate vehicle markings and lighting, personally owned vehicles should never be used as a blocking vehicle.

Bystanders and Citizens

Oftentimes, passing motorists will stop at a scene to render assistance or to merely look on to satisfy their curiosity. These vehicles and their occupants pose a serious and substantial threat to themselves and everyone working at or passing through the TIMA. If not absolutely needed to render assistance or provide information to law enforcement, they should be directed to leave the scene as safely and expeditiously as possible.

If these people are needed at the scene, their vehicles should be safely moved to the downstream buffer space, or preferably off-site in a staging area where law enforcement investigators can contact them when they are ready.

2.5.7 Flagger and Spotter

In certain circumstances, such as incidents occurring on a two-lane, bi-directional roadway, flagging operations may be required for safe direction of traffic. MUTCD Section 6E outlines basic flagging procedures for emergency situations, which are described in further detail below.

First and foremost, incident responders performing flagging duties must be wearing high-visibility safety apparel. Flaggers should also use clear and distinct hand signals when directing traffic. The flagger should stand either on the shoulder adjacent to the road user being controlled or in the closed lane prior to stopping road users. A flagger should only stand in the lane being used by moving road users after road users have stopped. The flagger should be clearly visible to the first approaching road user at all times and should be visible to other road users. The flagger should be stationed sufficiently in advance of the responders to warn them (for example, with audible warning devices such as horns or whistles) of approaching danger by out-of-control vehicles. The flagger should stand alone, away from other responders, vehicles or equipment.

While STOP/SLOW paddles are preferred, a flag may be used at an emergency scene. The flag should be a minimum of 24 inches square, made of a red material, and securely fastened to a staff that is approximately 36 inches in length. Flags used at night should be retroreflectorized red. The free edge of the flag should be weighted so the flag will hang vertically, even in heavy winds. Figure 12 illustrates the appropriate methods of signaling with a flag as described below.

- To stop traffic, the flagger should stand on the shoulder of the road and extend the flag across the traffic lane. The flagger's free hand should be raised above shoulder height with the palm facing the approaching vehicle and eye contact should be made with the driver.
- To let traffic proceed, the flagger should lower the flag to their side and with their free arm motion traffic to proceed. Do not use the flag to motion traffic through.
- To alert and slow traffic, the flagger should extend the flag staff and slowly move the flag up and down in a sweeping motion between shoulder height and straight down. Their free hand should be kept down.

Figure 12: Use of Hand Signaling Device by Flaggers

When working at night, a flagger may use a flashlight, which can be equipped with a small traffic direction cone, to supplement the STOP/SLOW paddle or flag. The flagger should hold the flashlight in their left hand and hold the paddle or flag in their right hand. The flashlight should be used as described below and illustrated in Figure 13.

- To stop traffic, the flagger should hold the flashlight with the left arm extended and pointed down toward the ground, and then slowly wave the flashlight in front of the body in a slow arc from left to right.
- To let traffic proceed, the flagger should point the flashlight at the vehicle's bumper, slowly aim the flashlight toward the open lane, then hold the flashlight in that position. The flagger should not wave the flashlight.

- To alert or slow traffic, the flagger should point the flashlight toward oncoming traffic and quickly wave the flashlight in a figure eight motion.

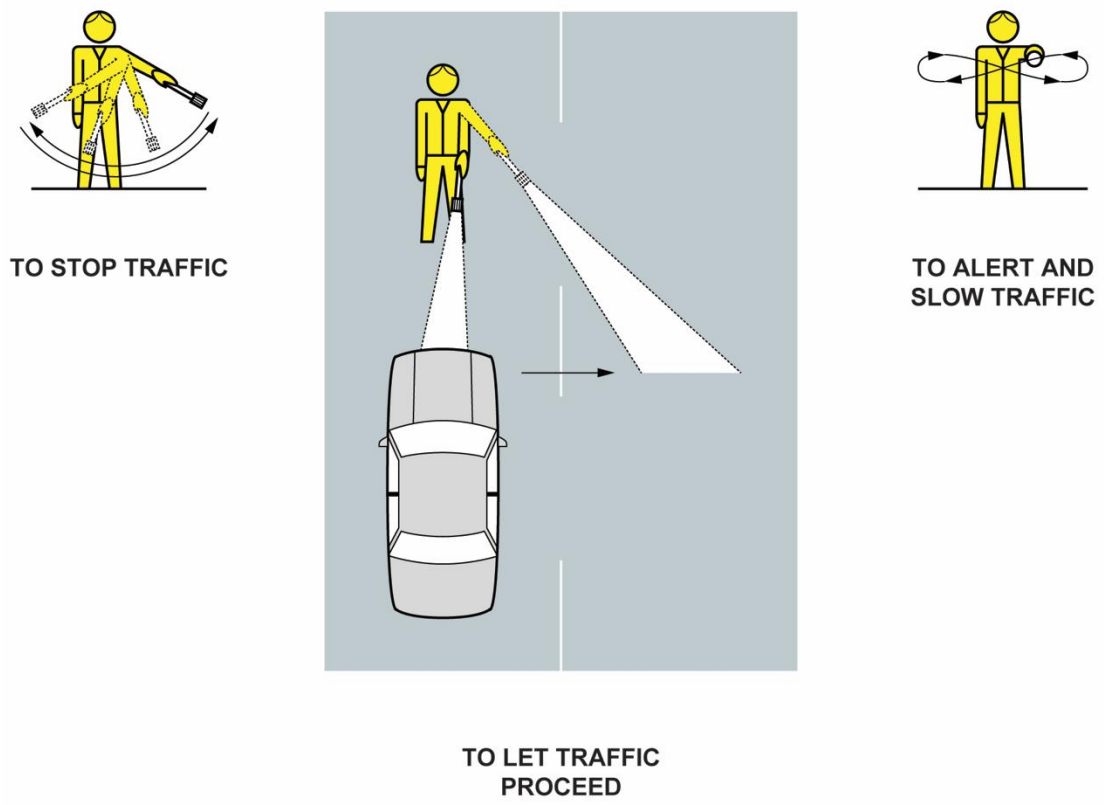


Figure 13: Use of Flashlight by Flaggers

Typically, flagging operations will require using a flagger at each end of the TIMA. Communication between the flaggers is critical and it is recommended that two-way radios be used. A single flagger can be used, but only in situations where there is a low volume of traffic, the TIMA is relatively short and the roadway is straight.

It is also recommended that, when resources permit, a traffic spotter be utilized to monitor traffic and activate an emergency signal if the actions of a motorist do not conform to established traffic control measures in place at the incident scene. The use of a portable air horn or similar device is suggested for use as an emergency signal. A portable radio is not recommended for this purpose, as it is unlikely that all responders on the scene would be monitoring the same radio frequency.

2.5.8 Traffic Incident Management Area Examples

MUTCD Chapter 6I provides guidance on the types of temporary traffic control devices that should be used at a TIMA based on incident type. For major and intermediate incidents, Chapter 6I states that temporary traffic control should include proper traffic diversions, tapered lane closures and upstream warning devices to alert approaching traffic of the end of a queue. For minor incidents, Chapter 6I recognizes that it is not generally possible or practical to set up a lane closure with traffic control devices

and recommends that when a minor incident blocks a travel lane, it should be moved from that lane to the shoulder as quickly as possible. In the early stages of an incident, responders should use all equipment on hand to set up traffic control, realizing that the TIMA will be expanded and enhanced as additional resources become available. The TIMA should evolve as the incident progresses and the number of closed lanes changes.

The following examples illustrate the ideal TIMA that responders should be working towards while on-scene.

Shoulder Closure

Figure 14 provides a shoulder closure TIMA example. Even though a travel lane is not directly impacted/blocked, if response activities are expected to last more than a few minutes a TIMA should be established to ensure on-scene safety. Incident response activities, including provisions for lateral buffer space, should not encroach on the travel lanes. If additional lateral space is required for response or recovery activities, the adjacent lane should be closed.

Divided Roadway

Figure 15 provides an example of a TIMA on a divided roadway. When establishing traffic control for incidents on this type of roadway, it is important to consider motorists' sight distance due to various roadway geometry including hills and crests.

Two-Way Roadway

Figure 16 provides a TIMA example for a lane closure on a two-lane roadway. Flaggers and spotters should be positioned within the shoulder taper and adjacent to the downstream taper to direct motorists. Flaggers should be in radio communication with one another.

Curved Roadway

Figure 17 provides an example of a TIMA when the incident occurs on or near a curve. Due to reduced sight distances, additional advance warning is required to advise approaching motorists of the incident scene. When possible, it is recommended that the advance warning area, transition area and buffer space start upstream of the curve. Similar practices should be followed for incidents on or near hills.

Full Freeway Closure

Figure 18 provides a TIMA example for a full freeway closure. Shoulder, double or triple tapers with appropriate longitudinal spacing between each taper are implemented to transition traffic to the nearest off-ramp. It is recommended that all response vehicles be positioned on the same side of the roadway even though the freeway is closed. This will serve to facilitate quicker lane openings as the incident de-escalates. In addition, anytime a full freeway closure occurs, consideration must be given to managing and addressing traffic stuck between the incident and the closure point.

Freeway Off-Ramp Closure

In Figure 19, the incident is located on a one-lane freeway off-ramp requiring its closure. In situations where there is a dedicated exit only lane, the entire lane should be closed if the ramp is closed.

Multi-Lane Intersection

Figure 20 depicts a TIMA at a major intersection where multiple lanes are entering the intersection from each direction. This particular scenario is for an incident near the center of the roadway. For some incidents, it may be possible to maintain at least one through movement. Other movements can be restricted to a right turn only. Vehicles should stage within the multiple buffer spaces around the incident and position such that they can easily maneuver away from the incident scene.

Four-Way Intersection

Figure 21 provides an example of a TIMA at a four-way intersection where one quadrant is blocked. It is preferred that motorists approaching the incident be restricted on which movements they can make. A flagger should be stationed within the intersection and spotters should be positioned within the advance warning and termination areas. In this example, motorists approaching from upstream are diverted around the incident scene.

Roundabouts

Establishing a TIMA in a roundabout can be challenging and largely depends on the location of the incident and the number of traffic movements required. Adding to this challenge is the relative lack of familiarity motorists have with roundabouts. Special attention must be given to ensure motorists are channeled in the appropriate lane/direction to maintain scene safety. Figure 22 provides a single lane roundabout TIMA example and Figure 23 provides a multi-lane roundabout TIMA example.

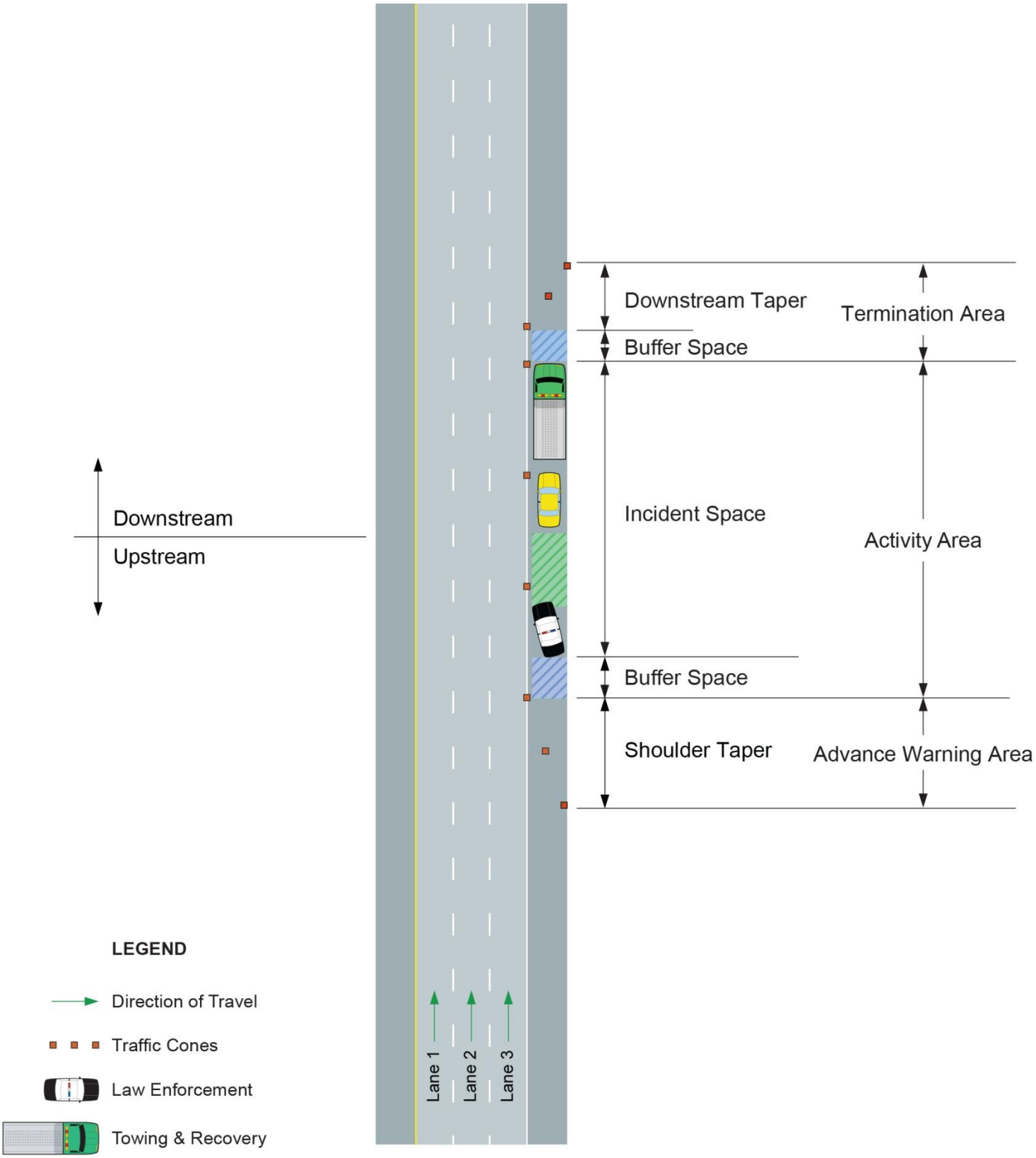


Figure 14: Shoulder Closure TIMA Example

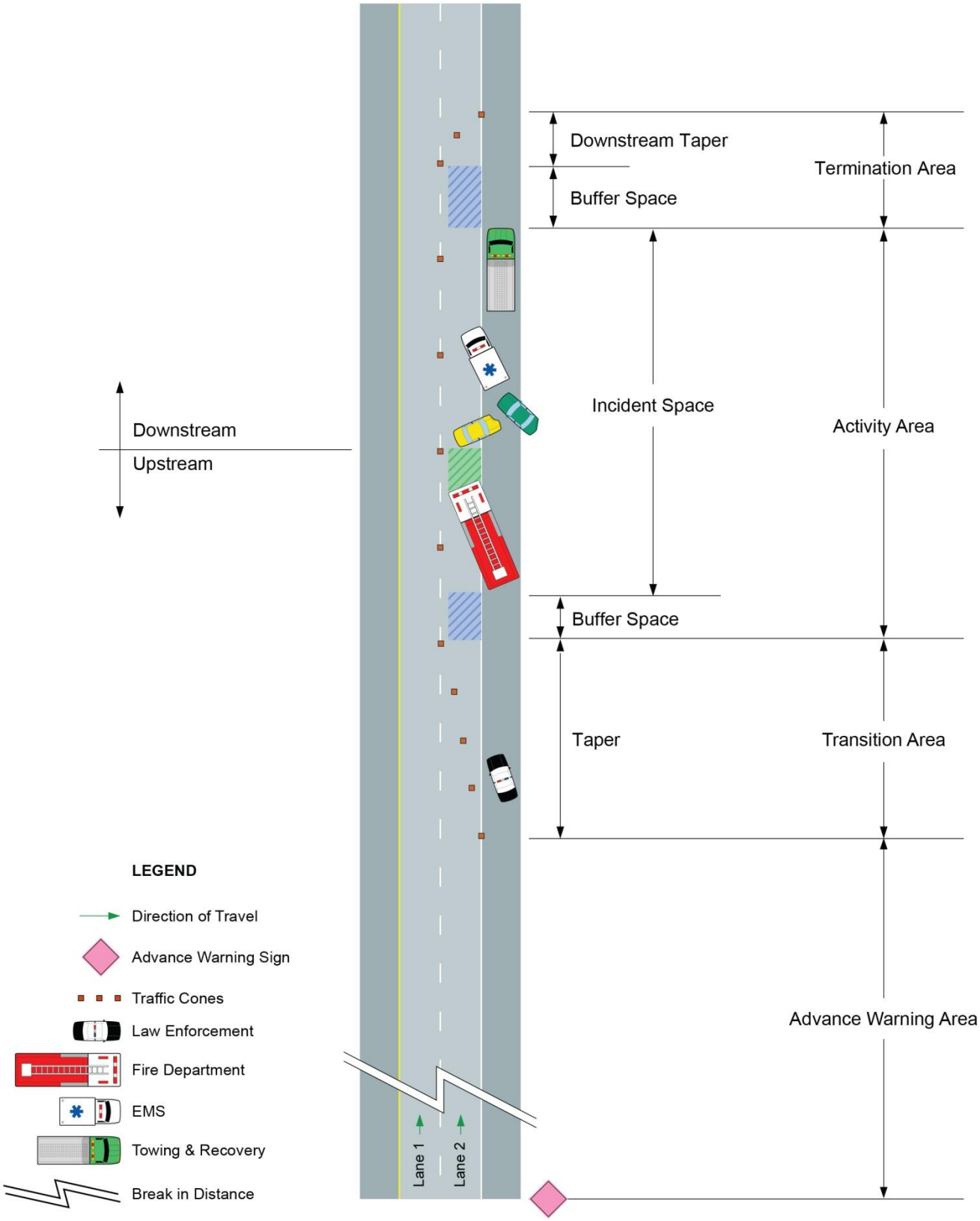


Figure 15: Divided Roadway TIMA Example

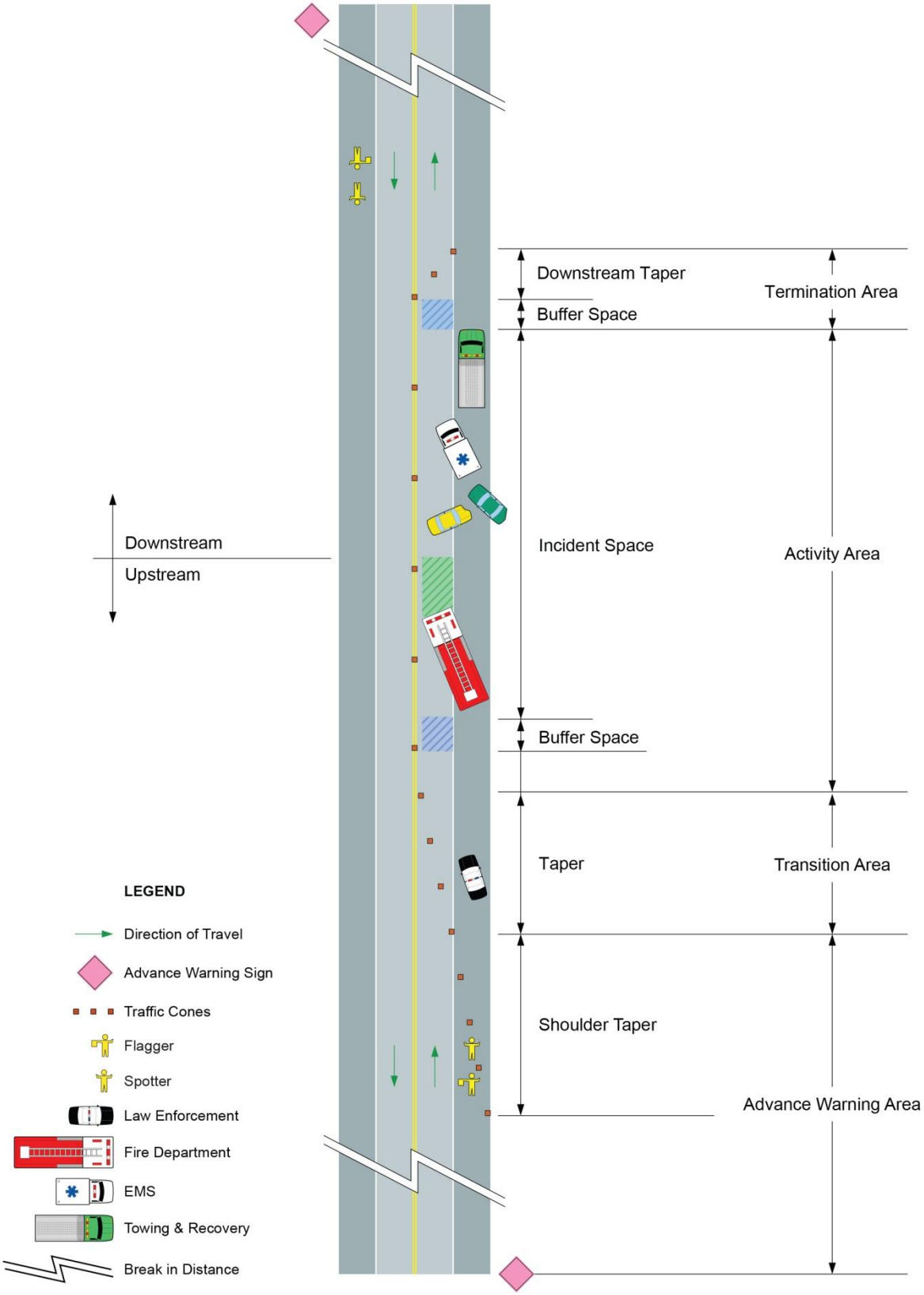


Figure 16: Two-Way Roadway TIMA Example

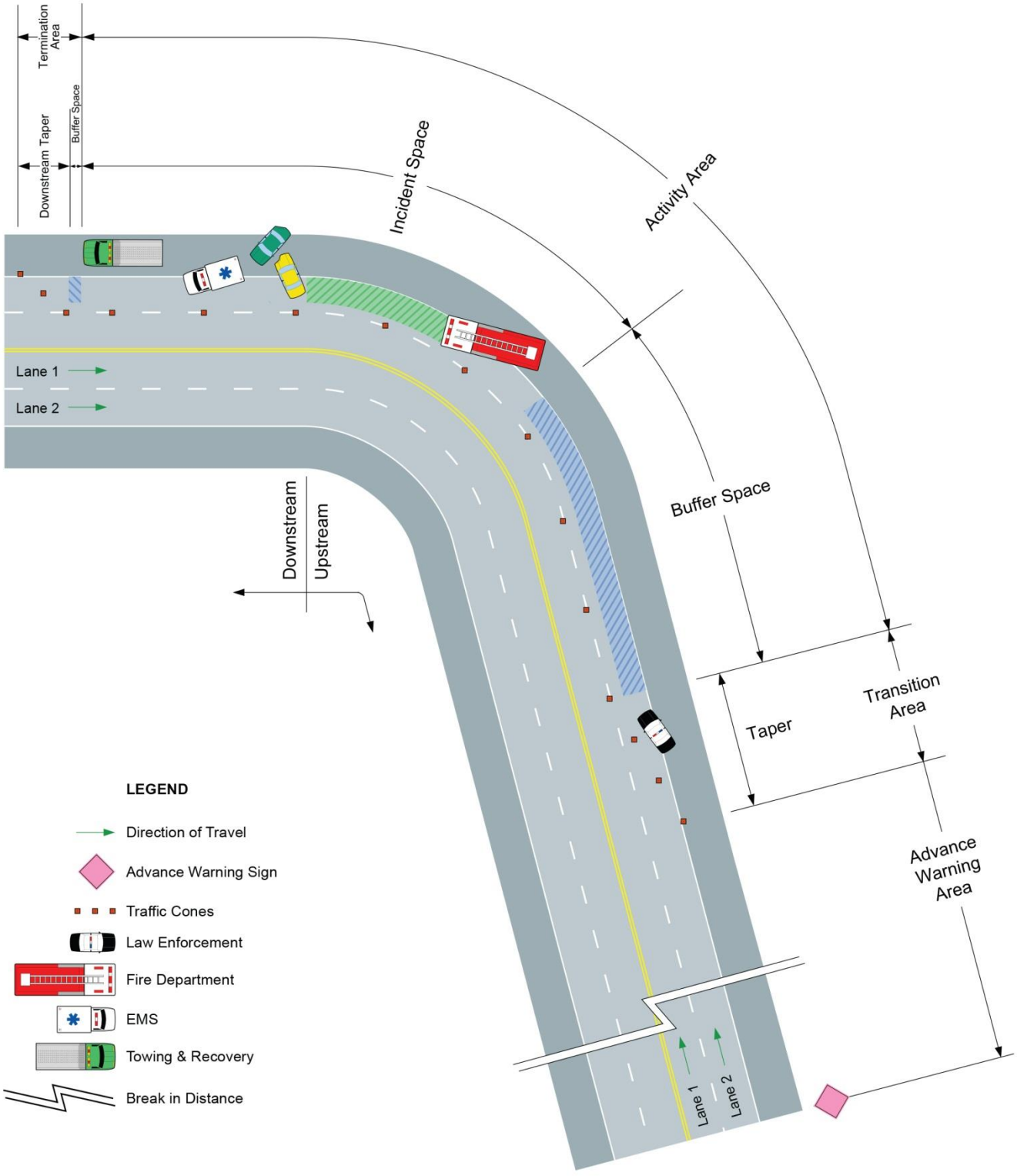


Figure 17: Curved Roadway TIMA Example

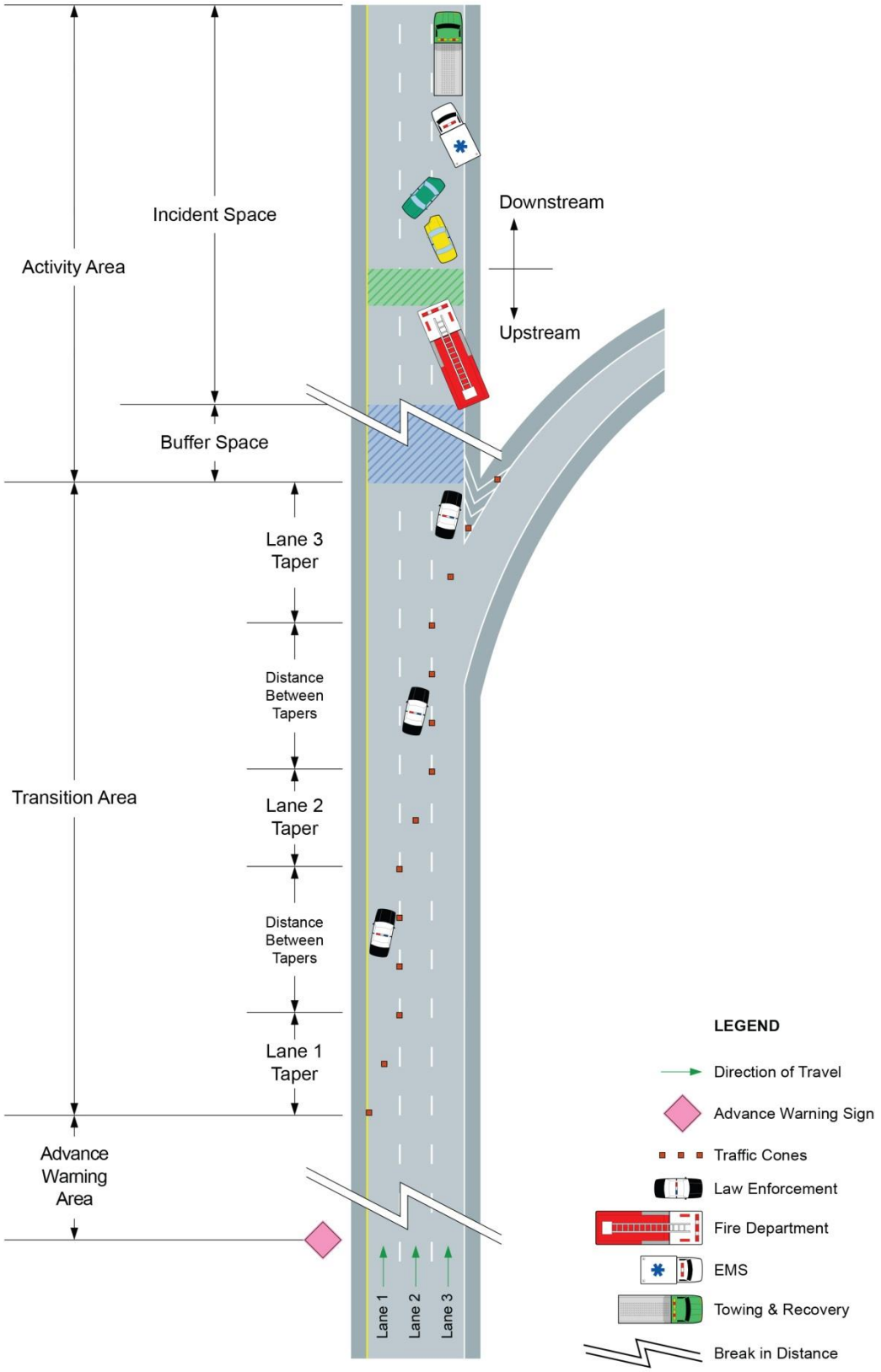


Figure 18: Full Freeway Closure TIMA Example

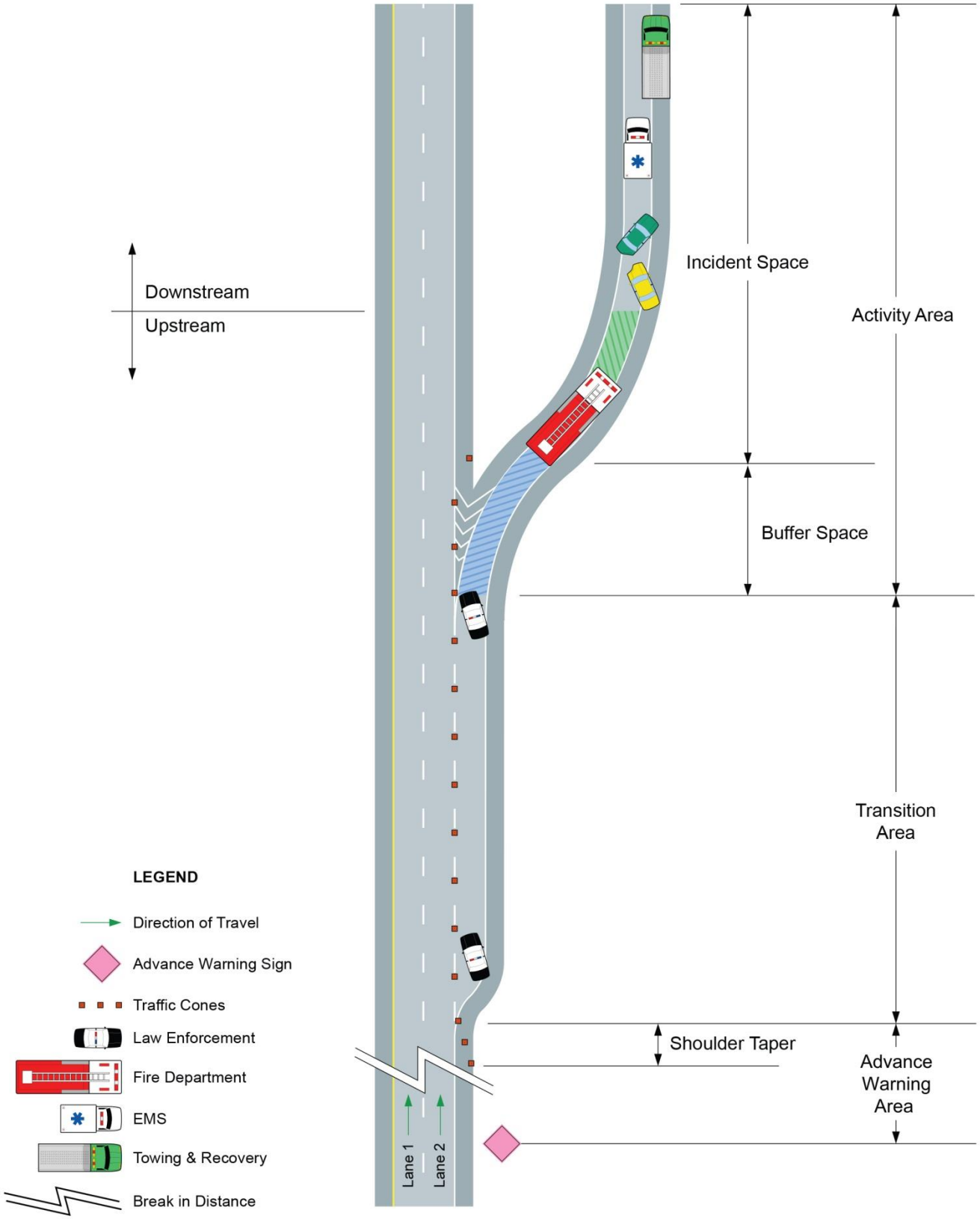


Figure 19: Freeway Off-Ramp Closure TIMA Example

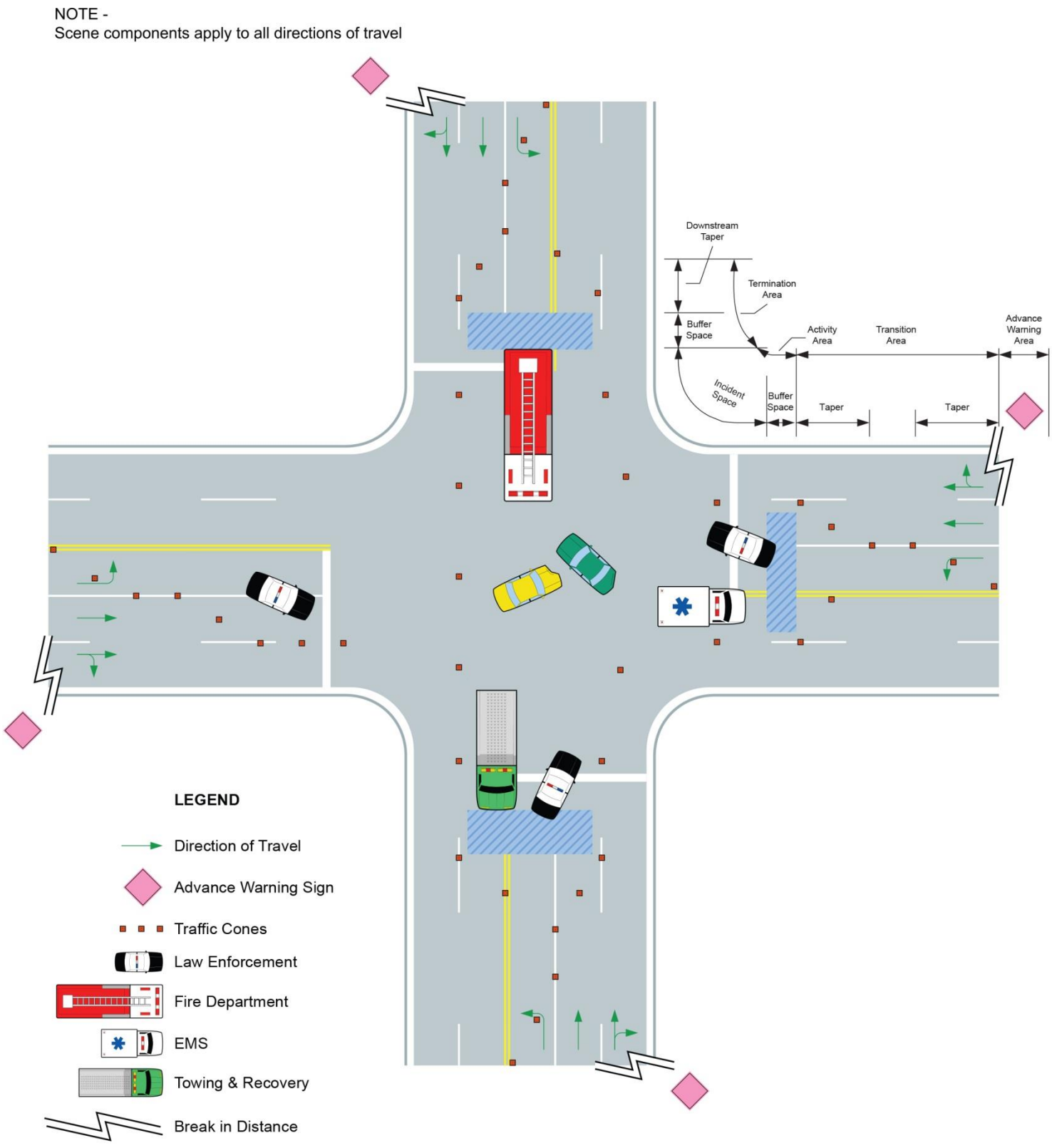


Figure 20: Multi-Lane Intersection TIMA Example

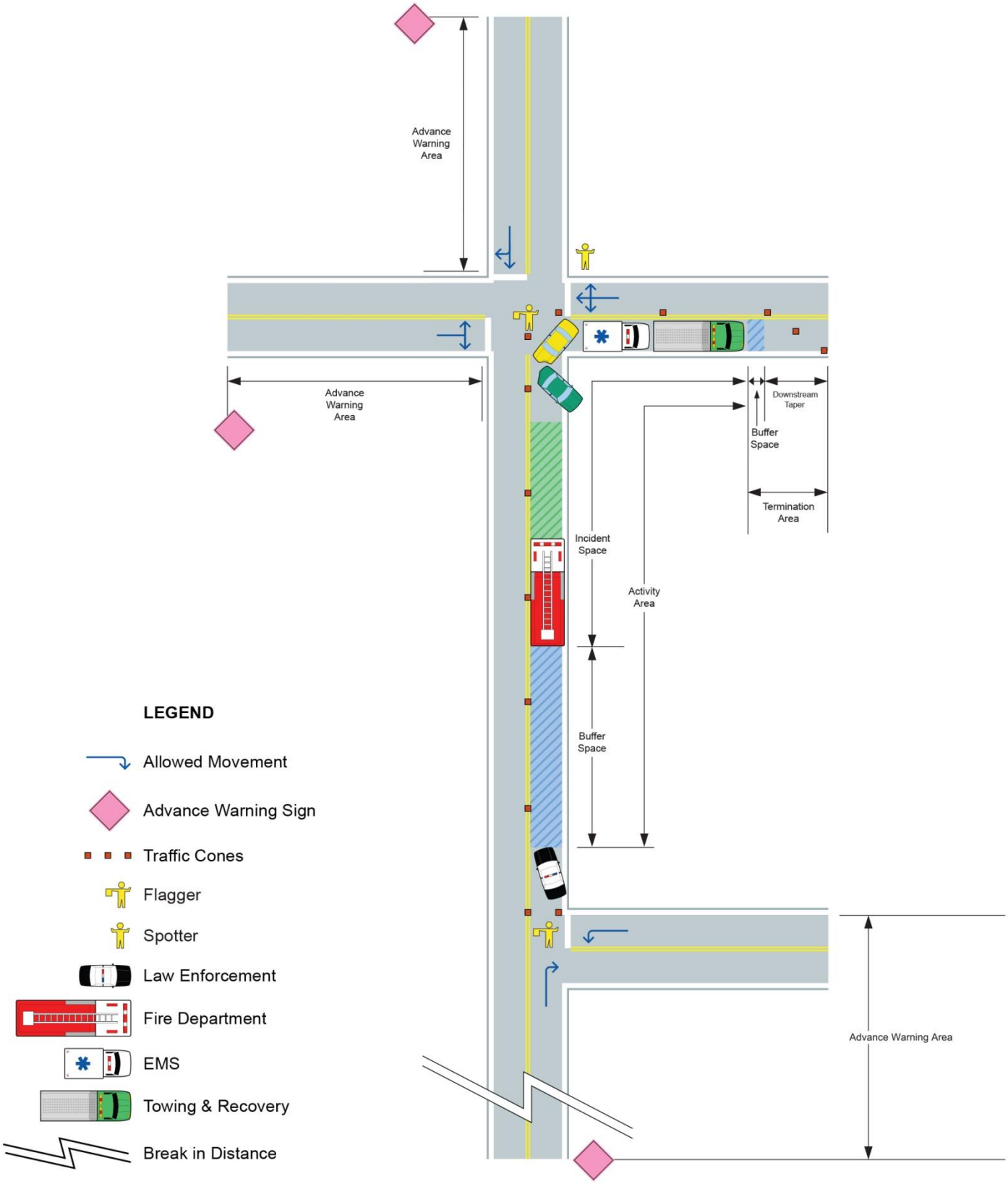


Figure 21: Four-Way Intersection TIMA Example

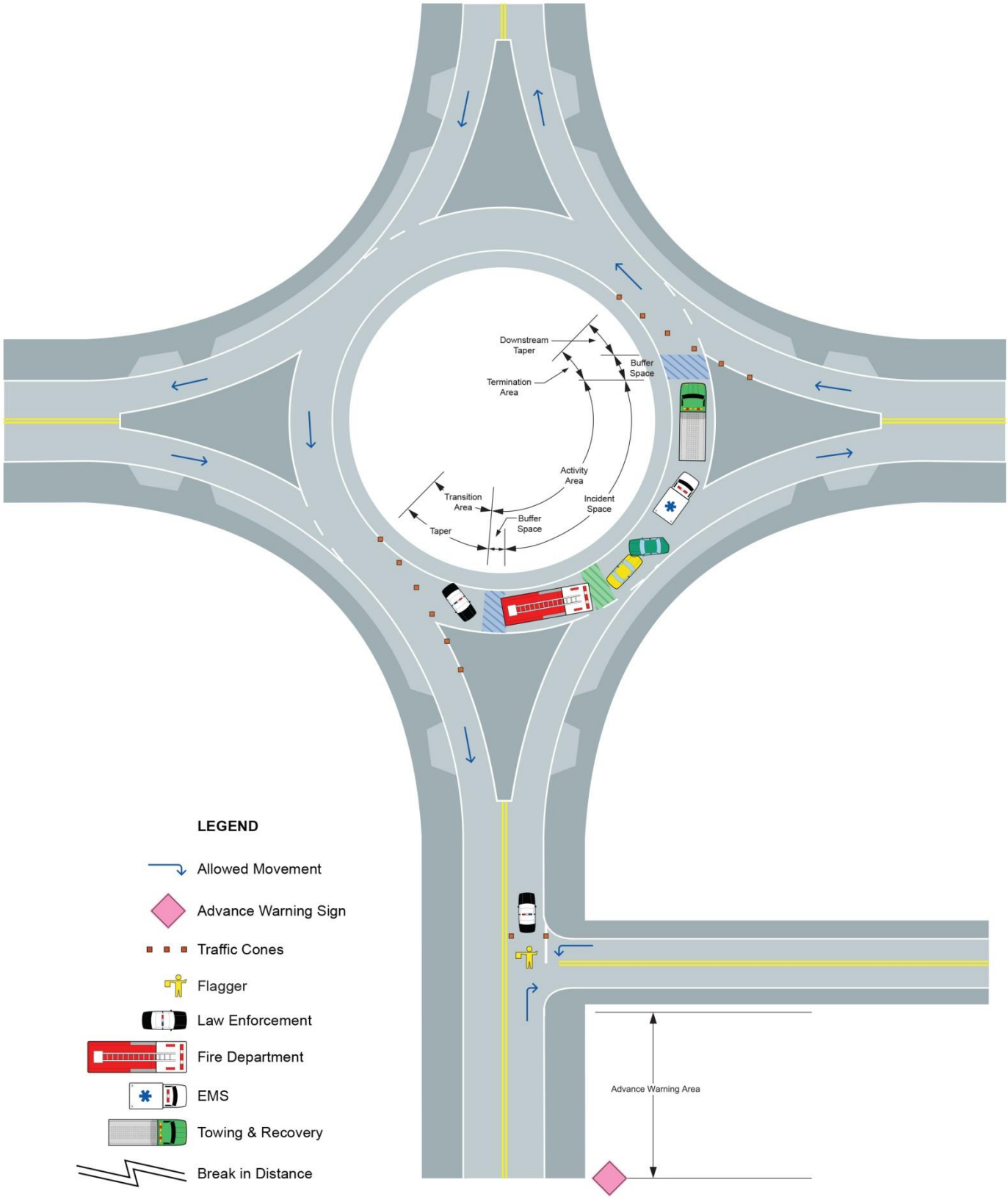


Figure 22: Single Lane Roundabout TIMA Example

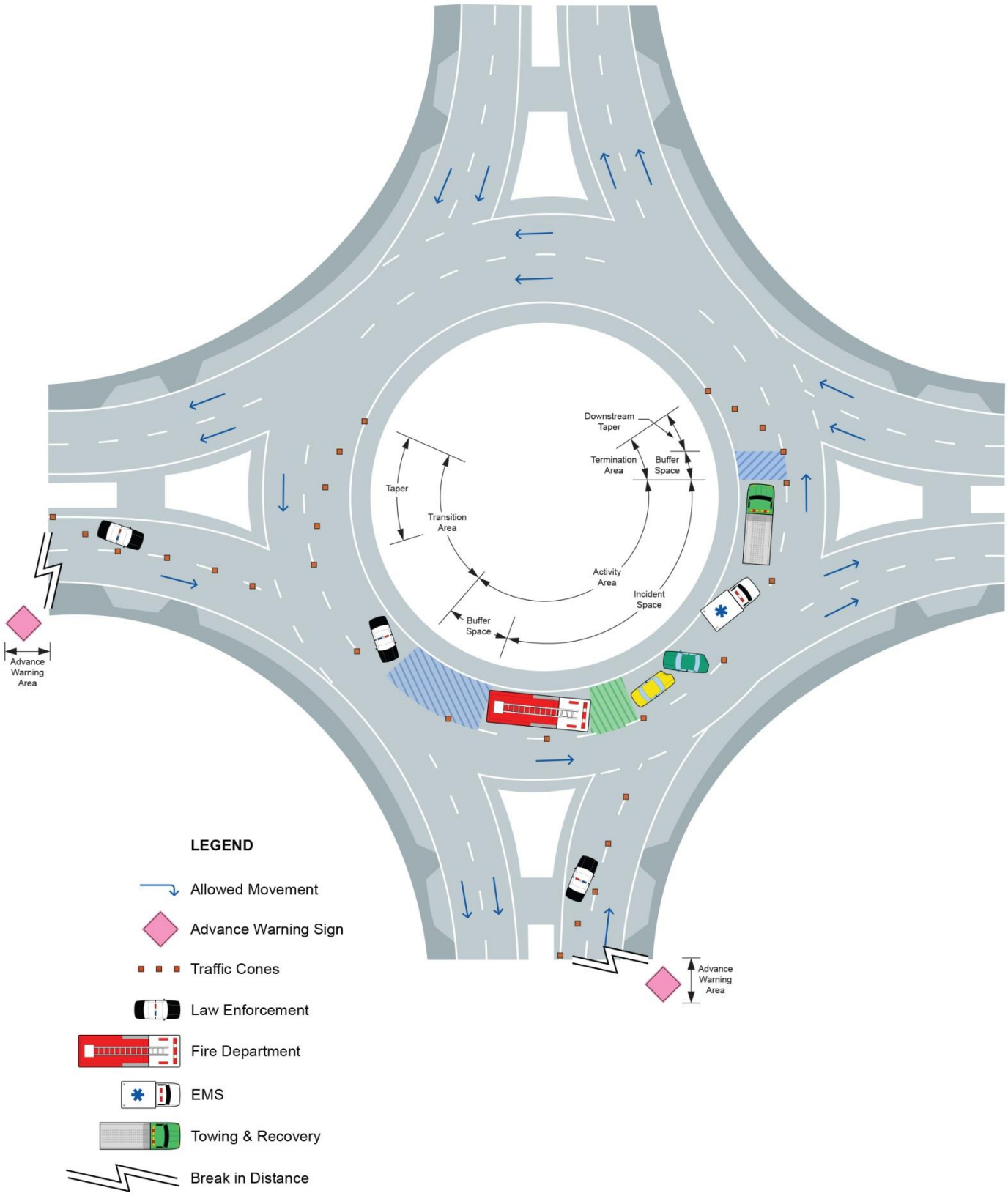


Figure 23: Multi-Lane Roundabout TIMA Example

2.6 Scene Breakdown and Demobilization

Equally important to properly establishing or setting up a TIMA, and associated traffic control, is safely breaking down or dismantling the scene. This activity includes demobilizing and removing equipment, personnel and response vehicles. All responders must exercise care when demobilizing, particularly if other responders remain present. In order to maintain safety, the Incident Commander must be notified of any responders departing the scene and the equipment or response vehicles that will be removed with them. Once victims, crashed vehicles, spills and associated debris have been removed, the Incident Commander must also monitor and control scene dismantling while recognizing the dangers of changing conditions and traffic returning to normal flow, oftentimes at high speeds. This is especially important for scene dismantling during nighttime or reduced visibility conditions. It is very important to dismantle the scene from the termination area backwards to the advance warning area. Other important scene demobilizing/dismantling considerations:

- Temporary traffic control or blocking may be required for responder departure (e.g., ambulances, towing and recovery, etc.)
- As responders depart, be aware that other responders may still be present
- Blocking vehicles (e.g., fire apparatus, truck mounted attenuators, etc.) may no longer be present and the “safe” area may no longer be intact – never turn your back to traffic and always watch for errant vehicles entering the scene
- Frustrated motorists that have been delayed by the incident may be particularly aggressive and drive at higher speeds or weave into lanes that appear to be open
- If possible, position a vehicle with its emergency vehicle lighting activated upstream of responders that are removing traffic control devices

Finally, when an incident scene has been fully cleared and all on-scene response is complete, ensure that the appropriate agencies (including communications/dispatch centers and the Iowa DOT TMC) have been notified that the roadway is open.

2.7 Hazardous Materials Considerations

2.7.1 Identification

Hazardous materials can be identified through labels, markings or placards. Labels are placed on the actual item or the individual package that the material is contained in. Markings are placed on the boxes that the materials are transported in. Placards are placed on the outside of the trucks that the material is being transported in. Placards, which should be placed on each side and each end of the transport vehicle, are typically the first reference responders use when trying to identify a hazardous material. Placards are color-coded based on the class of hazardous material being transported.

It is important to note that if the amount of transported material is below a certain quantity, the truck is not required to be placarded. However, a ‘dangerous’ placard may be used if the shipment contains non-bulk packages of two or more classes of hazardous materials. If available, the vehicle’s bill of lading, or shipping papers, should identify the type of material(s) being transported. It is important to always verify what material is being transported during an incident prior to initiating any recovery efforts.

The placard, or an orange panel placed below the placard, should include a four-digit number that can be referenced to identify the hazardous material using the Emergency Response Guidebook (ERG). The ERG is primarily a guide to aid incident responders in: 1) quickly identifying the specific or generic

classification of the material(s) involved in the incident; and 2) protecting themselves and the general public during this initial response phase of the incident. The ERG can found online at:

www.phmsa.dot.gov/hazmat/library/erg

2.7.2 Notification

Any discharge of a hazardous substance that adversely impacts or threatens to adversely impact public health, welfare or the environment must be reported to the Iowa Department of Natural Resources (DNR) and the local police department or county sheriff's office as soon as possible but no later than six hours after the onset of the hazardous condition. To ensure that the DNR has been properly notified, a sheriff or police chief who has been notified of a hazardous condition shall immediately notify the DNR. Responders should contact the DNR using their 24-hour release reporting hotline, 1-515-281-8694. Even if the responding agency is licensed and able to handle a hazardous materials spill, they still must contact the DNR within six hours of the onset of the hazardous condition.

If the hazardous condition involves the release of an Environmental Protection Agency (EPA) regulated material or an oil, the release may also need to be reported to the National Response Center at 1-800-424-8802. The state of Iowa also requires a written report be submitted to the DNR within 30 days of the incident. The 30-Day Written Report Form can be found online at:

www.iowadnr.gov/portals/idnr/uploads/forms/5420029.doc

As outlined in Iowa Administrative Code Chapter 131, a hazardous condition is defined as any situation involving the actual, imminent or probable spillage, leakage, or release of a hazardous substance onto the land, into a water of the state or into the atmosphere which, because of quantity, strength and toxicity of the hazardous substance, its mobility in the environment and its persistence, creates an immediate or potential danger to the public health or safety to the environment. A hazardous substance is any substance or mixture of substance that presents a danger to the public health or safety. The hazardous condition should be reported if it meets any of the following criteria:

- The hazardous substance has the potential to leave the property by run-off, sewers, tile lines, culverts, drains, utility lines or some other conduit
- The hazardous substance has the potential to reach a water of the state – either surface water or groundwater
- The hazardous substance can be detected in the air at the boundaries of the facility property by the senses (sight or smell) or by monitoring equipment
- There is a potential threat to the public health and safety
- Local officials (fire department, law enforcement, hazardous materials, public health, and emergency management) respond to the incident
- The release exceeds a federal reportable quantity

For federal reportable quantities of specific substances, refer to Designation, Reportable Quantities and Notification (40 CFR, Part 302) which can be found online at:

www.gpo.gov/fdsys/pkg/CFR-2011-title40-vol28/pdf/CFR-2011-title40-vol28-part302.pdf

2.7.3 Response and Cleanup

Iowa Administrative Code Chapter 131 requires that any person manufacturing, storing, handling, transporting or disposing of a hazardous substance shall notify the DNR and the local police department or county sheriff's office of the occurrence as soon as possible but not later than six hours after the

onset of the hazardous condition. In addition, those same persons must take the actions necessary to restore the environment to the extent practicable and minimize the harmful effects from the discharge to the air, lands or waters.

Once a contractor has been hired by a responsible party, it is essential that they communicate directly with the DNR. This will ensure that the contractor is aware of the on-site conditions, brings proper equipment, and understands the Department's expectations for cleanup and coordinates with other state and local officials as necessary. Public hazardous materials teams respond only at the request of local officials and do not contract with private companies. The DNR does not have a hazardous materials team and will not hire a contractor for the responsible party.

2.8 Helicopter Emergency Medical Services Landing Zones

When incident victims sustain critical injuries, Helicopter Emergency Medical Services (HEMS) may be required to respond. To ensure the safety of HEMS staff, on-scene responders and the traveling public it is essential that a proper landing zone (LZ) be established.

2.8.1 Landing Zone Coordinator and Tail Rotor Guard

A LZ Coordinator should be designated by the Incident Commander to set up the LZ and maintain communications with the aircraft pilot through all phases of the HEMS response including approach, on-scene operations and departure. During aircraft approach, landing and takeoff, this individual should stand with their back to the wind in a location far enough back from the touchdown area that they can maintain eye contact with the pilot.

The LZ Coordinator should also designate someone to serve as the Tail Rotor (TR) Guard. The TR Guard is responsible for ensuring that no one approaches the tail rotor and should be positioned a minimum of 50 feet behind the tail rotor. If resources are limited, the LZ Coordinator can serve as the TR Guard once the aircraft has landed, but it is preferred that a separate TR Guard be designated. The TR Guard should remain in-place for the entire period between landing and takeoff (arrival to departure).

2.8.2 Landing Zones

The preferred LZ area is 150 feet x 150 feet regardless of time of day or wind speed/direction. As shown in Figure 24, the LZ should be a flat (maximum slope 5 degrees), firm surface that is free of overhead obstructions and easily blown debris. The LZ should not be in a low-lying area. If possible, the LZ should be located on the downwind side of the scene, which will help to reduce noise and dust and enables the helicopter to land closer to the scene. The LZ Coordinator should mark the direction of the wind by standing with their back to the wind, on the upwind side of the landing zone.

The LZ should be clearly marked with four lights, one in each corner. The LZ can be marked with red or amber strobes, weighted illuminated cones or weighted LED flares. The LZ should not be marked with lightweight items such as police/fire barrier tape or non-weighted cones. Responders should keep in mind that LED flares are difficult to see during the day but are beneficial at night. Similarly, cones are difficult to see at night but are preferred during the day. Green markings may not be visible to HEMS crews that are utilizing night vision goggles so LEDs that produce a green light should not be used.

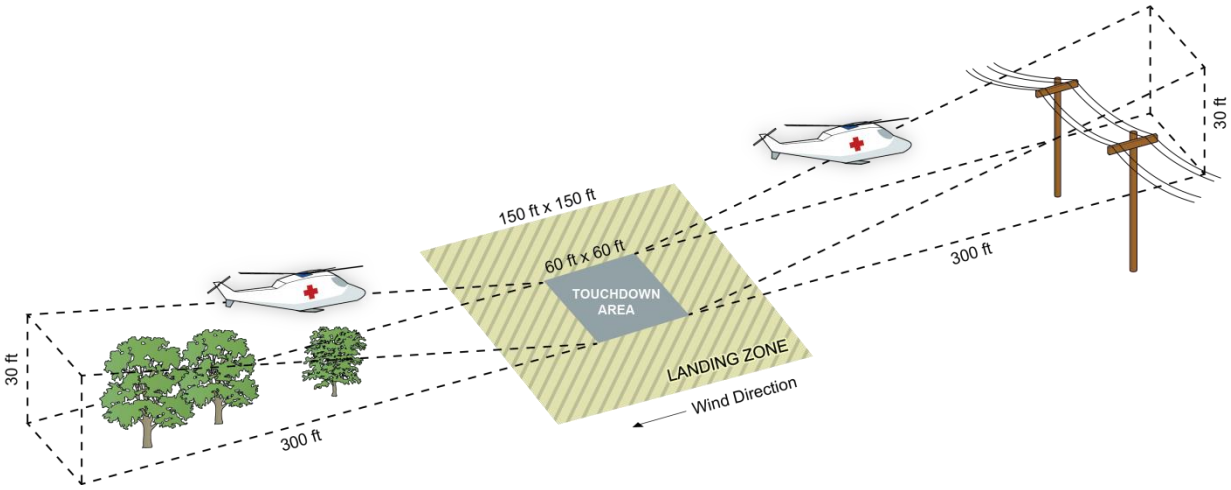


Figure 24: Landing Zone Example

Emergency lighting and low beam headlights can be used to help mark the LZ if necessary. Lights should be directed upwind towards the center of the LZ at a 45 degree angle. Lights should never be pointed upward towards the helicopter. If night vision goggles are being used the HEMS crew may request that lights, including those on response vehicles close to the LZ, be turned off. The LZ Coordinator should maintain communications with the pilot and be prepared to turn off lights if requested.

Emergency personnel and vehicles providing lighting assistance for aircraft landing must remain 100 feet away from the LZ. Non-emergency personnel (including crowds and media) and all other vehicles must be kept back a minimum of 200 feet from the LZ. Obstructions at the edge of the LZ that are in line with the approach/departure paths should be no higher than 4 feet and should be clearly marked with a row of lights, extending the length of the landing area.

Highway Closure Requirements

If an aircraft is landing on an undivided highway, on-scene personnel must close both directions of travel. The highway should remain closed until the helicopter departs.

If an aircraft is landing on a divided highway, on-scene personnel must close both directions of travel during landing and take-off. Traffic lanes in the opposing direction may be opened while the aircraft is on-scene; however, the pilot has the authority to request that both directions remain closed. If possible, adjacent crossovers should be blocked to prevent vehicles from accessing the scene counter-directional.

It may not be necessary to close both directions of travel in rural areas where the highway is divided by a large, wooded median. Based on access and resource restrictions, and the limited visibility of passing motorists, on-scene personnel may determine that it is not necessary to close traffic lanes in the opposing direction during landing and take-off.

An example of a TIMA with a HEMS LZ is illustrated in Figure 25.

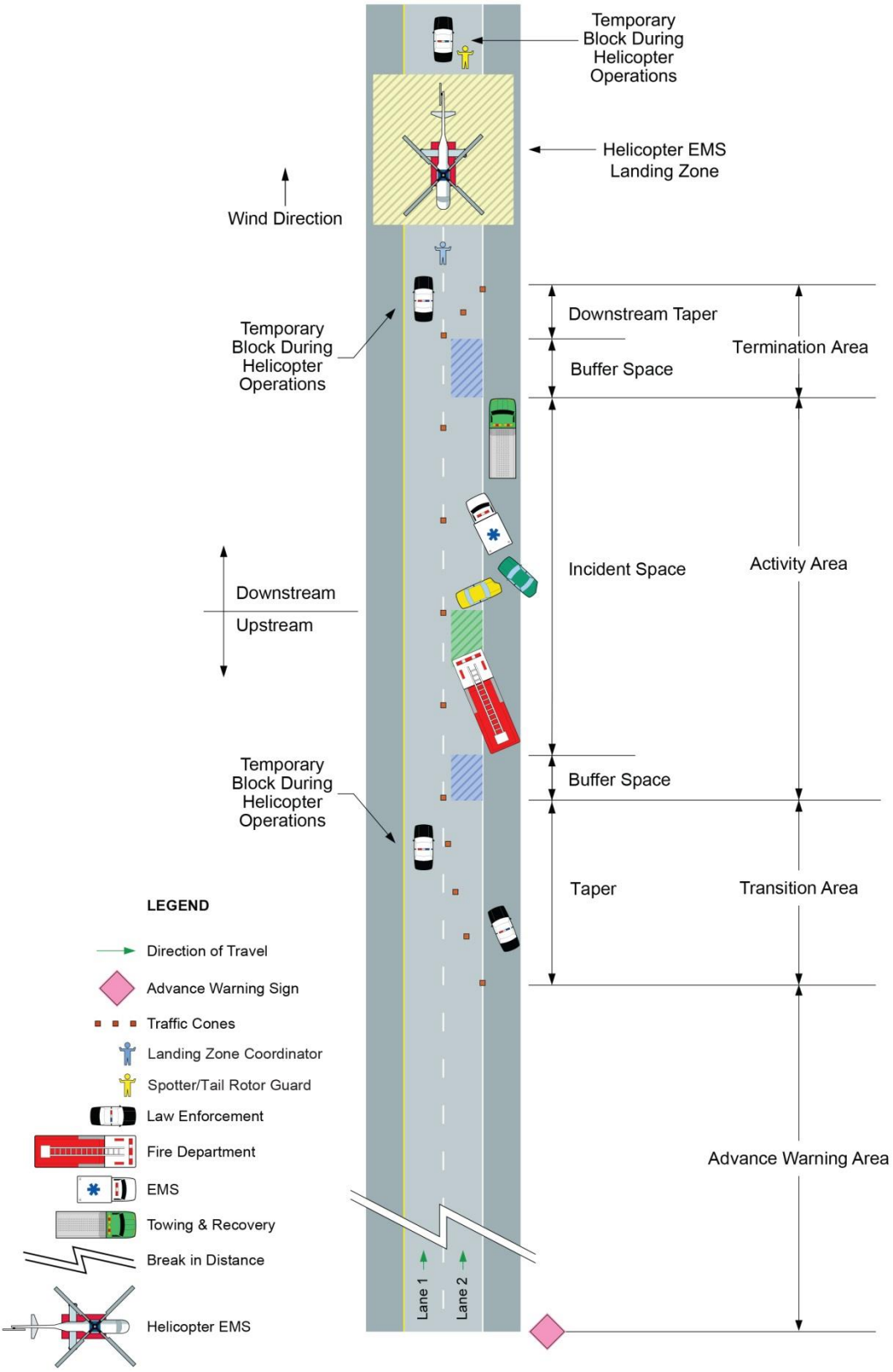


Figure 25: HEMS Landing Zone TIMA Example

Off-Site Landing Zones

It is preferable for the helicopter to land at the scene. The use of a safe, off-site LZ is acceptable as long as there will not be a delay in providing patient care. On-scene personnel should consider that use of an off-site LZ might cause other complications, most notably the need for enough resources to both secure the alternate LZ while maintaining a safe and secure incident scene and to transport the patient from the incident scene to the off-site LZ. The HEMS crew is responsible for all loading and off-loading of patients and equipment. If help is needed, the crew will designate on-scene personnel to assist and will provide instructions.

Multi-HEMS Response

If multiple HEMS need to respond to an incident scene, it is essential to notify both programs that there will be another helicopter approaching. Aircraft should be directed to the landing zone so they do not need to fly over one another. Each LZ should be a minimum of 150 feet x 150 feet. If there is not enough room to land two helicopters, sequencing of the landings may be required. This coordination will most likely occur between the two pilots in consultation with the LZ Coordinator. It is essential that both helicopters and on-scene personnel use the same radio frequency for communications.

2.8.3 Communications

A preferred radio frequency, free from excessive traffic, should be designated immediately for air to ground communications. The LZ Coordinator must use this frequency and establish communication with the responding HEMS aircraft prior to the pilot initiating any landing operations. An alternate, or back-up, frequency should also be identified in advance.

If there are issues with communication, the HEMS dispatch center can be contacted to discuss status and estimated time of arrival (ETA), and to assist with establishing communications. It is important for the LZ Coordinator to also be aware that if a portable radio is being used to communicate with the responding helicopter, the transmission range may be limited to 2-5 miles.

The ETA provided by the responding HEMS program is based on the global positioning system (GPS) location at the time of the initial call. Once the responding aircraft is airborne, it is likely that the ETA will be updated and a final update will be provided as the aircraft approaches the scene.

The pilot may not land until clear radio communications have been established with on-scene personnel. It is imperative that the pilot be advised of anything that may assist with or impede their arrival and response. Upon contact with the HEMS pilot, the LZ Coordinator should provide the following information:

- Wind direction (helicopters land and take off into the wind)
- Nearby landmarks to identify the LZ (airport, town, water tower, highway, etc.)
- Direction and distance from town, major landmarks or highways
- GPS coordinates (if available)
- Location of the LZ relative to the incident scene
- Location of any obstructions in the area

If possible, on-scene personnel caring for the patient(s) should also relay any known patient information, including number of patients, injuries and patient weight(s).

Hand Signals

While the use of hand signals may not occur often, there may be times that radio communications between the LZ Coordinator and the HEMS aircraft pilot may be lost or interrupted. For these situations, the standard hand signals illustrated in Figure 26 should be used. During nighttime conditions, the LZ Coordinator can hold lights to help ensure that the hand signals are clear to the pilot.

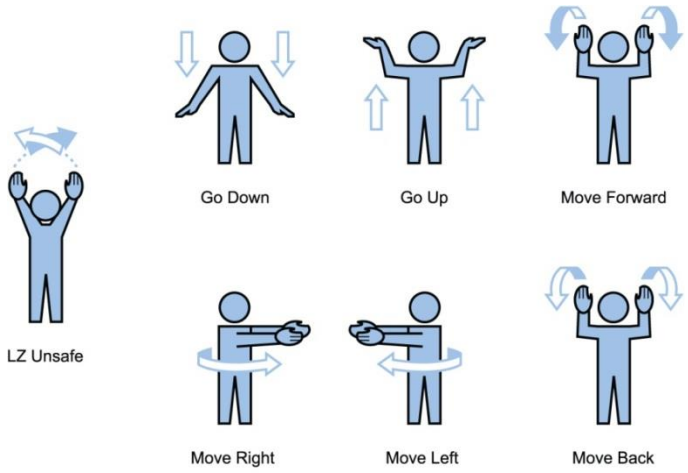


Figure 26: Landing Zone Coordinator Hand Signals

2.8.4 Safety Considerations

Never approach the aircraft from the rear as the spinning tail rotor is nearly invisible. Furthermore, on-scene responders should not approach the helicopter unless requested by HEMS personnel. If requested to approach the aircraft, the individual should be accompanied by one of the HEMS staff members, remain in the pilot's field of vision and only approach the aircraft from the front/side. Responders should not approach or depart the helicopter from an area that is higher than the aircraft. On-scene personnel need to be aware of the rotor wash created by the helicopter and the potential for flying debris during landing and take-off. Everyone near the LZ should wear eye and hearing protection or remain in a vehicle. In addition, secure all loose items, such as equipment, headgear and vehicle doors and windows.

The LZ must remain under the control of the LZ Coordinator and the TR Guard at all times including during aircraft approach, ground operations and aircraft departure. It is important to ensure the safety of everyone at the scene including, but not limited to, on-scene personnel, the HEMS crew, motorists and all bystanders. Other on-scene emergency response personnel should assist with maintaining scene safety and security by:

- Providing traffic/crowd/media control
- Monitoring pedestrian and vehicular traffic (authorized and non-authorized)
- Ensuring no one crosses into the LZ
- Notifying the LZ Coordinator and/or HEMS crew of any hazards or obstructions
- Calling off the landing if needed
- Monitoring communications with the HEMS crew

HEMS Response to Scenes Involving Hazardous Materials

Upon initial radio contact, the HEMS crew must be made aware of any hazardous materials in the area. Never assume they have been previously informed. Patients must be field decontaminated prior to transport by helicopter. The Federal Aviation Administration (FAA) prohibits transportation of hazardous materials and helicopter crews do not have protective gear or breathing apparatus with them. The LZ should be at least 1 mile upwind of and not in a low-lying area for:

- Explosives
- Poisonous gases/vapors
- Chemicals in danger of exploding or burning
- Radioactive gas or materials

2.9 Crash Reconstruction and Investigation

Traffic incident scenes should be cleared as quickly as is practical, emphasizing restoration (i.e., opening) of all available traffic lanes without compromising short-lived and often un-retrievable evidence necessary for a thorough crash investigation. The investigation and reconstruction of traffic crashes has become increasingly more important in recent years. Among the most significant reasons for this include:

- Criminal, including homicide investigations, and civil aspects of traffic crash cases
- Litigation against law enforcement agencies and personnel
- Documentation of the economic and personal loss and injury of those involved in traffic crashes

Reconstruction is the objective analysis of physical evidence present in a collision event that serves to establish how the collision occurred, factually and objectively. In order to perform reconstruction of incident scenes, evidentiary items must be accurately documented and preserved for analytical purposes.

2.9.1 Evidence Collection

Consideration must be given to balancing the necessity of road or lane closure with the collection of evidence. There may be times when evidence is photographed and marked, and location measurements are collected at a later time. All responders must be mindful of the impact closures have on traffic and the potential for secondary crashes. When necessary, crash reconstructionists should gather key crash related evidence immediately and consider measuring the roadway itself at a later time when proper traffic control can be established. However, regardless of the situation, it is most important that safety be maintained for all personnel.

If something of potential evidentiary value needs to be moved in order to open the roadway, that item should be photographed and its location marked (with paint or other semi-permanent marking) prior to it being moved. Additionally, documentation recording the person(s) that marked, photographed and moved the item should be kept.

When available, the most current technology for capturing detailed measurements should be utilized to aid in quick clearance of the crash scene. Available technologies include total station, GPS, surveying, laser mapping and photogrammetry. Consideration should also be given to utilizing the closest qualified reconstruction personnel for initial scene documentation to aid in clearing the crash scene as quickly as possible.

Short-Lived Evidence

Short-lived evidence is most susceptible to being destroyed at a crash scene. Short-lived evidence is any evidence relative to a crash that will most likely be lost, destroyed or compromised due to weather or during the process of clearing the crash scene. Critical short-lived evidence can consist of blood, hair, tissue, fibers, tire marks, fluid trails, debris fields, gouges, scrapes, paint transfer, and the final rest positions of all vehicles and the bodies of victims. If at all possible, make note of occupant seating location/position, seat belt usage, and air bag deployment. Additionally, the presence of drugs, open containers, or any other suspicious substances or activities should be noted.

Some tire mark evidence can be wiped off of the roadway similar to how eraser shavings can be wiped off of a piece of paper. These marks should be protected from foot traffic, fire hoses and vehicle movement until photographed and marked.

Vehicle Evidence

Within the vehicle there is potential DNA and other sensitive evidence such as blood, hair, tissue and fibers that may need to be collected and preserved. Other vehicle evidence may include seat positions, seat belts, deployed airbags and contents of the vehicle, including driver logbooks, cellular telephones, GPS units and other personal electronic devices. Extra care should be given to cases where the driver of the vehicle is not readily identifiable.

Under no circumstances should the vehicle itself be used as a garbage can. Debris that is swept up at a crash scene should be placed in appropriate containers and not dumped into the vehicle.

Electronic Evidence/Data

Electronic data, including that related to the deployment of airbags in passenger cars and light trucks, can be destroyed or deleted by providing power to the vehicle or cycling the ignition. Ignition keys should be removed and turned over to the personnel investigating the crash, not to tow operators. It is preferred that if power to the vehicle needs to be disconnected that it is disconnected by removing the cables from the battery terminals rather than physically cutting the power cables themselves. It is understood that when more severe circumstances exist, cutting the cables may be required. However, when no extrication of occupants is required, and there is no immediate fire hazard, the cutting of power cables is not necessary.

Some commercial motor vehicles contain electronic data pertaining to the crash and the events leading up to it. Portions of this data can also be destroyed by disconnecting power to the vehicle. In all cases, it is recommended that the ignition be turned off, and the keys be removed and turned over to the personnel investigating the crash. Unless exigent circumstances exist (such as a fire hazard), it is preferred that power lines not be disconnected or cut on commercial motor vehicles. Since most commercial motor vehicles are currently not equipped with air bags, leaving power supplied to these vehicles should not pose any additional hazard to rescue personnel.

2.10 Quick Clearance and Removal Operations

2.10.1 Quick Clearance

Motorists who are involved in crashes are exposed to the same dangers responders face when working in or near traffic. To improve the safety of motorists involved in minor crashes, Iowa Code 321.262

instructs drivers involved in crashes with vehicle damage only to stop their vehicles without obstructing traffic more than is necessary.

2.10.2 Towing and Recovery

Incident clearance can be significantly delayed when towing and recovery agencies respond with the incorrect equipment because they were provided inaccurate information or simply told what equipment to bring. To facilitate information exchange, the Towing and Recovery Association of America (TRAA) developed a vehicle identification quick reference guide for law enforcement. A copy of the reference guide is provided in *Appendix B* and laminated copies of the guide can be obtained from TRAA at:

http://traaonline.com/

2.10.3 Vehicle Removal

If a vehicle is in the shoulder/median and removal does not require that a lane be closed, towing and recovery professionals can remove the vehicle and coordination with local law enforcement is not necessary. However, towing and recovery professionals can request law enforcement assistance.

If a vehicle is in the shoulder/median and removal requires a travel lane to be closed, towing and recovery professionals must coordinate with law enforcement. In situations where law enforcement is on-scene, they, as acting Incident Commander or part of Unified Command, can determine if the lane closure can be done with the equipment on hand or if assistance from the public works or highway department will be necessary.

2.10.4 Delayed Heavy-Duty Clearance/Recovery

Depending on the circumstances, delaying some or all clearance/recovery activities may be appropriate in the interest of safety or facilitating traffic flow through the incident scene. For example, it may be safer for responders and motorists to pull a stuck vehicle out of the ditch area adjacent to the roadway after rush hour or when inclement weather subsides. In all cases, the decision to delay clearance/recovery must be made either by the Incident Commander or as part of Unified Command. During this decision process, it is important to consider:

1. Where the incident vehicles, spill, debris, etc. will be left with respect to the traveled way and/or clear zone. The term “clear zone” is used to designate the unobstructed, relatively flat area provided beyond the edge of the traveled way for the recovery of errant vehicles. Consideration should be given to whether the location of the vehicle may cause a safety hazard. Simply stated, the closer the vehicle is to the edge of the traveled way the greater the safety hazard.
2. The time period that the incident vehicles, spill, debris, etc. is anticipated to remain at the scene before they are cleared/removed. It is important to understand when traffic volumes may be reduced so that the impact on traffic flow may be minimized. The time of day for clearance/removal must also be considered, recognizing the safety implications of doing the work at night when visibility is reduced.
3. Mark the incident vehicles, spill, debris, etc. so that other motorists do not unnecessarily contact 911 when observing incident debris left for later removal. One method for marking involves the use of caution tape to border the incident debris.
4. Delayed clearance/removal is considered a planned activity. Therefore, lane closures and traffic control must be consistent with and conform to Iowa DOT and county highway department

policies and procedures. In other words, MUTCD requirements for TTC must be followed as opposed to a TIMA establishment, which is used for emergency conditions.

Once the decision to delay recovery operations is made, coordination and communication must occur between the responsible party, the Iowa DOT (including the TMC), the highway department, local law enforcement and the agency responsible for recovery operations.

SECTION 3

Traffic Management and Traveler Information

3.1 Traffic Management and Traveler Information Issues and Needs

Through multiple stakeholder meetings and discussions, TIM responders in the Iowa City metropolitan area identified the following issues and needs related to traffic management and traveler information:

- Enhance availability, accuracy and timeliness of traveler information
    - Influence travelers to route around incidents
- Provide awareness of Iowa DOT TMC capabilities and resources
- Conduct emergency alternate route planning
    - Develop coordinated signal timing plans that can be implemented during incident conditions to support emergency alternate route operations
    - Confirm that all emergency alternate routes have acceptable turning radii for all traffic that may divert from the freeway.
    - Confirm that all emergency alternate routes have static signing to effectively guide motorist along alternate routes.
- Consideration during incident response for region's evacuation plans, particularly I-380 as a radiological evacuation route
- Enhance driver education for incident reduction
- Continuously monitor new project investments to routinely report performance.
- Investigate methods for improving communication and coordination of construction activities and availability of alternates routes.
- Develop pre-canned messages that can be quickly sent to the media when incidents occur.
- Schedule media briefing prior to using alternate/detour routes to promote use and understanding.
- Need to consider approaches to address the bottleneck between Oakdale and Forevergreen Roads
- Add additional CCTV cameras in the I-80/380 interchange and along I-380
- Limited shoulder width (2 foot min) will present a challenge to emergency vehicles access along I-80/380 within the workzone. Need to consider having emergency vehicle staging areas.
- Limited pavement within the workzone cannot support over response to minor incidents. Policies may need to be revised to ensure that the requested emergency response vehicles arrive at minor incident scenes.

- Need to establish a working group that meets during the period of reconstruction and beyond.
- Need dedicated overtime funding for State Patrol (and other agencies as needed).

3.2 Traffic Management and Traveler Information Priority Strategies

3.2.1 Preplanned Emergency Alternate Route Plans/Guides

An emergency alternate route is a roadway or series of roadways that provide additional capacity to service primary route traffic that is being diverted due to an incident. The term "emergency" implies that the route is to be used for additional primary route capacity only under emergency conditions (i.e. major traffic incidents), not as a general, everyday "by-pass". Often an activity of formal TIM programs, advance planning and preparation of emergency alternate route plans enhances the on-scene traffic management capability of interagency incident responders. Proper emergency alternate route planning has a significant effect on improving the safety and efficiency of freeway operations under traffic incident conditions without undue impact on the surrounding community. This project included the development of an emergency alternate route application for I-80, U.S. 218 and I-380, which is discussed in detail in Section 3.4.

Traffic Signal Timing Plans

In deploying emergency alternate routes, law enforcement and transportation responders must consider the operations of traffic signals along the route(s), particularly in urban areas where volumes are likely to be higher. Given the significant increase in traffic due to incident diversion, traffic signals may not be timed or have the required field equipment capabilities to accommodate the sudden volume increases. For preplanned routes, responders must follow the information in the guides to determine where traffic signals exist along a given route. Consideration should be given to developing special signal timing plans that accommodate the diversion volumes during incident conditions. An example of this is the I-80/I-380 interchange construction TMP strategy that is being explored to adaptively control Highway 965 traffic signals in the cities of North Liberty and Coralville.

3.2.2 Pre-Positioned TIM Equipment

Storing equipment required for incident response near high incident locations instead of one central location can reduce the time needed to respond to an incident. Stored equipment may include trailers containing traffic control equipment (signs, cones, flags, etc.) specifically reserved for TIM. For example, assembling additional traffic control equipment trailers similar to an existing unit used by Iowa District 6 Maintenance is being considered as an I-80/I-380 TMP strategy. Field personnel should be consulted as to which materials and equipment they need and thought must be given to determine what resources would be most feasible to be kept at these sites. The storage sites must be secure to ensure that resources are available when needed. In addition, agreements should be established between responding agencies regarding material and equipment use.

3.2.3 Driver Outreach and Education Programs

Driver outreach/awareness and education programs are intended to teach roadway users how to react to incidents on the roadway in order to prevent secondary crashes, reduce responder and roadway user injuries and deaths, and reduce congestion. This includes awareness of TIM-related laws, including move over and driver removal, as well as the availability of traveler information tools such as Iowa 511.

FHWA recently developed a TIM public outreach toolkit to facilitate educating the general public about the value of TIM. The toolkit includes talking points, sample press releases, brochures and PowerPoint presentations, all of which can be customized to a specific area. The toolkit can be accessed online at:

http://www.ops.fhwa.dot.gov/eto_tim_pse/timtoolbox/

Additional driver education mechanisms may be developed as needed under the I-80/380 interchange reconstruction Engagement and Communication Plan.

3.3 Intelligent Transportation Systems Technologies

Traffic incident management is an operational approach that employs all available resources to identify, manage and clear incidents in a quick, effective manner. These resources include not only staff and equipment but also technologies that can be leveraged to monitor, verify and report incidents. The use of these technologies, referred to collectively as intelligent transportation systems (ITS), may allow operators to initiate a response soon after an incident occurs, reducing its duration and overall impact. In select cases, ITS technologies may even prevent incidents from occurring, reducing the burden placed on staff and resources that would otherwise be needed if incidents did occur. In either case, the use of ITS investment can be instrumental in reducing response time, improving safety and mitigating incident-related impacts. Additionally, ITS investment serves as a mechanism for multiagency collaboration and coordination, which itself will lead to improved incident response and management.

In early 2011, the Iowa DOT began a process to evaluate the potential deployment of additional ITS technologies within the Iowa City metropolitan area. To date, and with respect to incident management, the Iowa DOT has used ITS technologies primarily to identify and verify incidents and to communicate incident details to partner agencies and the public. The following section highlights the role and importance of Iowa DOT's ITS systems with respect to TIM.

3.3.1 Iowa DOT Traffic Management Center

The Iowa DOT TMC located in Ankeny serves as the nerve center for most of the freeway management systems within the state (all 6 DOT districts) including the Iowa City metropolitan area. The TMC is a 24/7/365 operation which provides a range of services/functions statewide including, but not limited to, traffic operations management, traffic incident response, field operations support, emergency response notifications and transportation facility security reporting.

The TMC collects and processes freeway system data, combines it with other operational and control data, and synthesizes it to produce meaningful information. The TMC plays a key role in TIM activities by serving as the focal point for communication and coordination among the multiple incident response agencies. Specifically, the TMC supports incident detection, verification and response, site management, traffic management, clearance and motorist information.

The TMC manages the statewide network of ITS devices, including, Advanced Traffic Management System, condition acquisition and reporting system, traffic detection, 511 systems, dynamic message signs, CCTV cameras, highway advisory radio, and road weather information system. In additional to these Iowa DOT operated field devices, WAZE and INRIX data are also used by the TMC to monitor transportation conditions throughout the state, including the Iowa City Metropolitan area.

3.3.2 Statewide Advanced Traffic Management System

The statewide advanced traffic management system (ATMS) is the traffic control software platform that is used by traffic operators at the TMC to monitor and control regional freeway traffic. The ATMS integrates the operation of regional traffic management subsystems including closed-circuit television (CCTV) cameras, dynamic message signs (DMS), traffic detectors, and highway advisory radio (HAR) stations so that these individual subsystems can be operated in a coordinated manner. Operators use the ATMS in part to detect and verify incidents and to communicate related information to partner agencies and the public. Based on the information collected, the TMC and partner agencies are able to initiate control strategies and coordinate their response to incidents. Information disseminated to the public can be used to divert traffic away from incidents, helping to improve emergency responder access to these areas.

The ATMS software is the primary means for controlling state-owned traffic management field devices and the exclusive means of entering incident information, apart from data imported by a CAD interface. The ATMS software platform has a graphical user interface that allows operators to select or type messages which in turn can be posted to DMS. Similarly, through the ATMS software platform, operators can operate CCTV cameras to view images and video and to push incident information to the public. The ATMS system also automatically collects, processes, and archives data from detectors and other field elements and then processes this information to calculate traffic flow and speeds. Detectors generally consist of side-fire radar units that collect the following types of traffic data:

- Traffic speeds
- Traffic volume
- Occupancy

The above traffic data is processed, plotted graphically for operators and displayed on a color-coded traffic map that indicates the status of traffic flow (i.e., free flow, slow, or congested). Based on observed differentials in traffic speeds, operators can easily determine the location of possible incidents and verify them through use of CCTV cameras. The traffic map is available for public viewing on the state's 511 website.

The agencies that have authority to enter incident information in the ATMS and control field devices are:

- 911 Communications Centers
- Iowa State Patrol Communication Center
- Iowa DOT (Statewide TMC, the Technology and Research Bureau, the District Maintenance Office, the Resident Construction Engineer's office, and the area maintenance garage)

Based on incident location and characteristics, the ATMS will generate response plans that include recommended DMS to activate and suggested messages for each. The ATMS can be used to manually edit messages (if necessary).

To improve incident management capabilities, Iowa DOT and its partner agencies should continue to explore potential enhancements to the ATMS software that can improve the manner in which incidents are detected, verified and communicated between agencies and the public. This may include communications enhancements between the TMC and regional emergency service dispatch/PSAPs and CAD systems. For instance, integrating filtered, non-sensitive CAD information within the ATMS platform

may result in improved incident management response and coordination, and more rapid dissemination of information to the public. Similarly, integration or sharing of CCTV camera images or video with emergency response agencies may improve emergency response operations as well. Other potential enhancements may be identified through development of a performance monitoring program or standard after-action reviews/lessons learned.

3.3.3 Condition Acquisition and Reporting System

The Condition Acquisition and Reporting System (CARS) is a non-proprietary, web-based software database tool that allows authorized staff (i.e., DOT personnel, police, and city officials) to input and report accident, construction, delay, and other roadway and weather information. Users can store information on active incidents (e.g., hazardous material spills, crashes, or natural disasters) or planned incidents (e.g., events, construction activities, road closures) in the database quickly using pull down menus, or manually using text entries. This information is then plotted and illustrated graphically for quick reference and understanding. Once information is entered into CARS it is verified by an operator and then automatically disseminated to travelers via the state's 511 website, HAR, DMS, or other communication channel (e.g., social media or subscription-based alerts). To improve incident response, the Iowa DOT and partner agencies should seek procedures and enhancements to speed up the reporting and verification of 511 information. Likewise, to ensure credibility with the public, information should be removed quickly when it is no longer valid.

The CARS system was developed through a Federal Pooled Fund Study for use by transportation agencies. The system uses national center-to-center standards to send and receive data via XML, facilitating seamless integration with other ITS applications and systems including the Statewide ATMS software. The Iowa DOT is one of a handful of states that currently use CARS. The Iowa DOT's ATMS includes an automated interface with CARS in order to provide incident-related HAR messages and to feed incident information to the 511 phone system and website.

3.3.4 511 Traveler Information System

Iowa's 511 traveler information service provides real-time travel information to the public. The service is free and was developed in part as a response to a nationwide effort to simplify travel information services within states and across state borders. The easy to remember 511 number is similar to those enacted for other services including emergency services (i.e., 911) and information services (i.e., 411).

Iowa's 511 system began operation in November 2002 and at that time it provided travelers with winter road condition information. Since that time, the system has been expanded multiple times to include additional types of information and methods of dissemination. Today, the system provides information pertaining to:

- Road closures and restrictions
- Road conditions
- Traffic speeds
- Congestion and delays
- Construction and maintenance activity
- Incidents
- Camera images
- Messages posted to DMS
- Weather warnings

511 information is available via the following methods:

- An interactive website (511ia.org),
- Any phone by calling 5-1-1 (locally) or 1-800-288-1047 (locally and nationally)
- Smartphone app available on the Android and iPhone platforms
- Subscription based text and e-mail alerts
- Social media feeds, including Facebook and Twitter. The Iowa Department of Transportation asks local media outlets to sign up for their social media feeds to receive incident updates. This reduces workload for TMC operators. The TMC has developed a one-page informational brief that helps agencies/individuals sign up for social media feeds.

The availability of information varies depending on the method used to access 511. For instance, the Iowa 511 app reports information for interstates, U.S. routes and state highways in Iowa but does not include information for county roads or city streets. Stakeholders suggested that the 511 website be printed on University of Iowa Sporting tickets as a regional means to promote the website in advance of games. Users can easily tailor 511 for their own purposes via the system's "my reports" feature.

Currently, counties within Iowa do not have the ability to enter information into the Iowa DOT 511 system.

3.3.5 Dynamic Message Signs

Dynamic message signs (DMS) are electronic signs that display real-time travel information and alerts to motorists. The Iowa DOT uses both permanent and portable DMS units. Permanent DMS are larger signs that are located in advance of major decision points and are installed over or alongside the highway. Typically, these signs are used to manage traffic by providing one of the following types of messages:

- Advance warning – Messages that give motorists advance warning to the downstream presence of slow or stopped traffic and queues. These messages are effective in reducing secondary crashes and for diverting traffic to other routes.
- Advisory messages – Messages that give motorists advance notice of a specific problem or condition along their route. These messages allow motorists to alter their driving behavior and may advise them to take voluntary action such as taking an alternate route or mode of travel. Advisory messages also include those where the public's involvement is needed, such as during AMBER alerts.
- Alternate route messages – messages that instruct motorists to take an alternate route and that guide them back to their intended route.

Permanent DMS are operational at the following locations:

- I-80 EB - Little Amana-Side Mount
- I-80 EB - Ireland-Side Mount
- I-80 EB - Iowa River-Side Mount
- I-80 EB - Wapsi Ave-Side Mount
- I-80 EB - Tiffin MM 236.4-Overhead
- I-80 WB - US 6-Side Mount
- I-80 WB - Wapsi MM 250.5-Overhead
- I-80 WB - 12th Ave-Overhead

- I-380 NB - Forevergreen Rd-Side Mount
- US 218 NB - Melrose-Overhead
- US 218 NB - Riverside-Overhead
- US 218 SB - Rohret Rd-Side Mount
- I-380 SB - Forevergreen Rd-Side Mount
- I-380 SB - Swan Lake-Overhead

It is noted the permanent DMS on I-80 EB at Ireland (side mount) will be eliminated in the summer of 2018 during the I-80/I-380 interchange reconstruction project. Permanent DMS on I-80 WB at US 6 (side mount), I-380 NB at Forevergreen Rd (side mount), and I-380 SB at Forevergreen Rd (side mount) will be removed during the summer of 2018 and replaced in a later phase of construction with overhead DMS.

The portable units are similar to the permanent units, but are smaller in size and are mounted on a trailer so they can be relocated to other areas when needed. These units are most often used for construction-related messaging, but are also used in response to a major incident or to assist with traffic control during a special event. Use of portable DMS units frees up the permanent units so that they can be used for incident-related messages and AMBER alerts.

Operation of Iowa DOT's portable DMS is the responsibility of the Iowa DOT's contractor. Iowa DOT will notify its contractor of messages to be displayed and the general locations where portable DMS units should be located. Portable DMS are able to be remotely controlled.

DMS messages may be selected from a preset menu of available message sets within the ATMS or composed by an operator in real-time. DMS message sets allow for consistency from one event to the next by displaying the same message every time a certain event occurs. The repetition of familiar, understandable messages improves driver reaction time and assists in incident response through more clear understanding of actions expected of the driver.

Iowa DOT Highway Helper trucks also have small portable DMS installed on the vehicle to assist in incident clearance activity.

3.3.6 Rest Area DMS

Rest area DMS are interior, miniature DMS installed within rest area facilities and welcome centers across Iowa. These devices are typically used for AMBER Alerts, time/temperature and road construction/condition information. Incident information can be displayed on rest area DMS to inform travelers destined for Iowa City of major incidents. Travelers may be advised to seek alternate routes or to delay their trip until the incident is cleared.

3.3.7 Highway Advisory Radio

The Iowa DOT uses portable HAR transmitters for emergencies. HAR is a low-power radio transmitter that delivers pre-recorded messages to motorists via their in-vehicle AM radio receiver. In the past permanent HAR was used for disseminating traveler information to en-route motorists. However, recently the Iowa DOT announced that HAR will be discontinued. Static HAR signs that advise motorists to tune into an AM frequency will be taken down.

Motorists are typically alerted to the presence of a HAR message via a static warning sign located upstream of the HAR transmitter. Often these signs are accompanied by beacons that flash if a message is actively being transmitted. The sign advises the motorist to tune to a specific radio frequency

(typically on the AM band) to receive the message. Such signs may state: “Traffic advisory – Tune AM XXX when flashing”, or similar message.

3.3.8 Traffic Surveillance Cameras

Traffic surveillance cameras often referred to as closed-circuit television (CCTV) cameras are used to monitor and verify congestion, incidents, weather and road surface conditions. CCTV cameras greatly enhance incident management operations through quick identification and verification of incidents. This enables quick dispatch of appropriate equipment needed to clear the incident, treat injured persons, and clear or treat the roadway.

In addition to the uses discussed above, CCTV cameras are also used by traffic management operators to monitor the operational status of field devices like DMS and to verify that these devices are working correctly and that posted messages are correct and legible.

The Iowa DOT has installed twenty-four (24) pan-tilt-zoom cameras within the Iowa City metropolitan area, with several more located along I-380 north of the metro area. The cameras located within the Iowa City area are located at:

- I-80 @ Y Ave
- I-80 @ Black Hawk Ave NW
- I-80 @ Eagle Ave NW
- I-80 @ Half Moon Rd
- I-80 @ Jasper Ave
- I-80 @ I-380/US 218
- I-80 @ Hwy 965
- I-80 @ East of Hwy 965
- I-80 @ 12th Ave
- I-80 @ 1st Ave
- I-80 @ Dubuque St
- I-80 @ Prairie DuChien
- I-80 @ Hwy 1
- I-80 @ Herbert Hoover Hwy
- I-80 @ Wapsi Ave
- US 218 @ Hwy 1
- US 218 @ Melrose
- US 218 NB @ DMS
- I-380 @ Forevergreen Rd
- I-380 @ Penn St
- I-380 @ Swan Lake
- I-380 @ Hwy 965 NE
- I-380 @ Iowa River
- I-380 @ Swisher

The Iowa DOT TMC and local DOT maintenance staff can view and control these cameras within the statewide ATMS software platform. Within the Iowa City Metropolitan area, JECC and Coralville PD have cameras access. Other local stakeholders will be provided access by the Iowa DOT upon request and execution of a formal agreement. Consideration should be given to expanding the network of CCTV

cameras on both the freeway and along alternate routes. The goal should be to have 100% coverage along monitored routes. Low lying locations where fog, ice or flooding occur may be potential suitors for additional near-term camera installations. High crash locations, bridges, or critical infrastructure should also be considered for camera placement.

3.3.9 Road Weather Information System (RWIS)

A road weather information system (RWIS) is in operation just off the west end of the I-380 Cedar River bridge. The RWIS site collects data on air temperature, dew point, relative humidity, precipitation type, precipitation intensity, wind speed, wind direction and four surface sensors. Three of the pavement sensors are on the Cedar River bridge and one in the ramp pavement. The sensors report pavement temperature, surface condition, salinity and winter chemical information. Another site is installed in the northbound 1st Street NW on-ramp fill slope just west of 1st Street NW. Along with the environmental sensors, the RWIS site also has a radar detector and a surveillance camera. Sensor data is polled by a server at the TMC every 10 minutes over a DSL communications line.

To assist in the identification of additional weather-caused events, the Iowa DOT should consider expanding the network of RWIS sensors to fill in coverage where there are gaps. Additionally, it is recommended that further steps be taken to integrate RWIS and weather sensor data into traffic management functions. This will improve situational awareness during weather related events and feed into predictive modeling so that warnings can be issued prior to when weather events occur. Also, by archiving weather related information and analyzing it side-by-side with traffic and incident information, operators can gain a greater understanding of how weather impacts traffic and can apply this understanding to proactively respond to these events.

3.4 Emergency Alternate Routes

One tactic for managing traffic diverted around an incident scene is preplanning and implementing emergency alternate routes. Before emergency alternate route implementation, a number of factors must be considered including the incident type, its expected duration, and anticipated traffic impacts on the affected highway and the alternate route. The final decision on whether to implement a formal emergency alternate route is always an incident command decision.

In cases where the roadway is completely blocked or must be closed, preplanned emergency alternate routes have been developed for the I-80 corridor between U.S. 151 (Exit 225) and Herbert Hoover Hwy. (Exit 249), the U.S. 218 corridor between Iowa State Highway 22 (Exit 80) and I-80 and the I-380 corridor between I-80 (Exit 0) and 120th St. (Exit 10). For each roadway segment along these three corridors, an emergency alternate route map is provided that illustrates an agreed upon primary and in some cases, a secondary diversion route. The maps also show the location of traffic signals, stop signs and at-grade railroad crossings along the routes. Along with the maps is information on critical locations along the route, response decision-making guidelines, a list of responding agencies, suggested permanent dynamic message sign messages and suggested traffic control along the routes.

The emergency alternate routes and associated information are provided in an electronic application that provides easy access to the information on a computer. The application can be used in a dispatch center or a response vehicle equipped with a computer and internet access. With three “clicks” a user can access the emergency alternate route map for any location along the corridors. The individual emergency alternate routes and associated information is stored on the Google Drive cloud storage

website. An Adobe PDF-based user interface saved on a local computer allows users to open emergency alternate routes quickly. From the map, the associated information for the route can be accessed by scrolling down the PDF file. To run the application on a computer, only a copy of Adobe Reader or other applications that will allow viewing of PDF files are needed.

3.4.1 Development of Preplanned Emergency Alternate Routes

Local emergency alternate routes were developed to accommodate diverted traffic while minimizing out of direction travel. For each I-80, U.S. 218 and I-380 roadway segment a primary and in some cases a secondary diversion route was identified. The secondary route can be used if the primary route cannot handle the amount of traffic being diverted. Most of the roadways used are two-lane state highways or arterial roadways, so during high demand traffic periods a significant amount of congestion is expected. Additionally, regional routes to/from Des Moines and the Quad-Cities have also been established to be used in concert with primary and secondary routes (see Section 3.4.2). All of the proposed routes were driven to assess their ability to accommodate diverted traffic. The following considerations were taken into account when selecting routes:

- Roadway design and geometry (e.g., number of lanes, lane widths, shoulder widths, limited secondary access, etc.)
- Proximity of alternate to diverted highway
- Truck/trailer weight, height and turning movement restrictions
- Presence of traffic control devices such as signals and stop signs
- Impacts of additional traffic on emergency response routes
- At-grade railroad crossings
- Existing signing (back to original route)

The initial routes were reviewed with the Iowa City TIM stakeholders. The routes were modified to address the comments received.

Along the primary and secondary emergency alternate routes, traffic signals and stop sign locations were identified and are shown on the maps. These locations where traffic control devices manage right of way can be critical locations along the routes. If significant congestion occurs at intersection approaches controlled by stop signs, initially a law enforcement officer must manually direct traffic. For longer term diversions, stop signs can be covered and temporary signs deployed to only require the cross street to stop. Similarly, at signalized intersections law enforcement may initially be required to manually direct traffic, but for longer-term events signal timings can be adjusted to accommodate the added demand resulting from the diverted traffic. At-grade railroad crossings can have a very significant impact on traffic flow. When a train is present no traffic flow can occur, but fortunately the blockages are for a limited amount of time.

3.4.2 Emergency Alternate Route Application

The primary means of distributing the emergency alternate route information is the emergency alternate route application briefly discussed earlier. The guide is available via computer workstation and mobile devices. Stakeholders should test the emergency alternate route guide prior to using in for a real incident. Each component of the application is discussed in more detail below.

Map Interface

The map interface is designed to allow a user to access a specific emergency alternate route map and associated information very efficiently. The user "clicks" on a regional map in the general area of an incident. This opens a corridor-specific map that will present roadway segment icons (arrows) by direction. The user "clicks" on the segment icon nearest the incident location that reflects the appropriate direction of travel. This opens the roadway segment-specific emergency alternate route map that shows the primary, secondary (if applicable) and regional diversion routes. At the bottom of the map is a list of associated information that can be viewed by scrolling through the pages of the document. The information includes Diversion Information, Response Matrix, Response Agencies, DMS Messages and Barricading/Traffic Control. The information that can be accessed for each item is discussed below.

Diversion Information

The diversion information is provided as a table of critical locations to be monitored along the primary diversion route. Specific locations such as signalized or stop-controlled intersections and at-grade railroad crossings are listed along with the possible adverse situation that may occur and a recommended response. For example, at an at-grade railroad crossing the crossing may be blocked by a train. The recommend response is typically to use the secondary route. The emergency alternate route guide will also contain information on route restrictions so these restrictions can be effectively communicated to drivers.

Response Matrix

The response matrix provides general response guidance based on the volume of traffic, expected duration of the incident and amount of roadway blockage. Every incident will be different, so specific response plans cannot be developed beforehand. The guidance provides possible responses that can be considered and used if appropriate for each individual incident's situation. The expected duration categories are less than 30 minutes (minor incident), 30 minutes to 2 hours (intermediate incident) and greater than 2 hours (major incident). The magnitude of roadway blockage ranges from an incident being off the roadway to all lanes being blocked.

Response Agencies

The response agencies information includes a list of response agencies in the region including law enforcement, fire departments, public works departments, Iowa DOT facilities and the emergency management agency. For each agency, publicly available contact information is provided. Since the agencies involved in the initial incident response or providing support can vary from incident to incident, the comprehensive contact list is provided. The list of response agencies should include telephone numbers that go directly to on-call staff (i.e., not a desk number or intermediary). The list of response agencies should also be tested prior to using it for an actual incident. This will reduce the risk that numbers for individuals on the list do not work. Lastly, roles and responsibilities of the individuals appearing on the list should be defined and reviewed by everyone on the list so that each individual knows their responsibilities prior to receiving a call. This will speed response and reduce the amount of communications that occur before initiating a response.

DMS Messaging

There are currently multiple DMS that can be used to notify the traveling public of incidents impacting travel. Suggested messages are provided for use when roadway closures occur and

emergency alternate routes are implemented. The suggested messages associated with each emergency alternate route are customized for the route and the available permanent DMS. The messages notify motorists approaching a closure of the closure and the exit being used for diversion. A message is also provided to motorists traveling in the opposite direction so they are not surprised by flashing lights or other response activities.

Barricading/Traffic Control

The traffic control information addresses traffic control needs along primary and if applicable, secondary emergency alternate routes. The traffic control recommendations are made to direct motorists along the diversion route and help facilitate traffic flow. Initial and extended duration recommendations are provided for each route. The recommendations include the location of temporary detour signs and enhanced traffic control at critical intersection. As an example, at a signalized intersection the initial recommendation is that law enforcement personnel direct traffic to accommodate the added diversion traffic. If the use of the emergency alternate route is of an extended duration, the recommendation is to adjust the signal timings to accommodate the additional traffic, eliminating the need for manual traffic control.

3.4.3 Implementation of Emergency Alternate Routes

Deployment of emergency alternate routes can be resource intensive. Therefore, it is imperative for responders to coordinate with each other as early as possible. Responders should recognize and account for a number of potential challenges, issues and resource needs in the deployment of an emergency alternate route. These include:

- Information dissemination to diverted motorists (e.g. static and dynamic signing) and positive reinforcement of information leading motorists back to the primary highway
- Need for personnel to monitor alternate route operations and for traffic control at certain intersections
- Need for additional temporary traffic control equipment on alternate route
- Real-time communications with local jurisdictions, the TMC and other responders
- Contingencies for incidents that occur on the alternate route itself
- It is also important the responders communicate as incidents are cleared and the roadway is reopened, so that response actions can be discontinued and deployed equipment can be collected.

3.4.4 Regional Emergency Alternate Routes

Regional emergency alternate routes were developed to provide longer distance travelers options to avoid using the local emergency alternate routes. While these routes require out of direction travel they do allow incidents and congestion on local diversion routes to be avoided. For the I-80 corridor there are two regional routes identified. To avoid incidents between U.S. 151 and I-380 the regional route uses Iowa State Highway 330, U.S. 30 and I-380. The second proposed regional emergency alternate route uses I-380 / U.S. 30 and U.S. 61 to avoid incidents on I-80 between I-380 and Herbert Hoover Highway. The regional emergency alternate route for U.S. 218 uses Iowa State Highway 34, U.S. 63 and I-80. The regional emergency alternate route for I-380 uses Iowa State Highway 330 and U.S. 30 for traffic to and from the west. For traffic to and from the east U.S. 60 and U.S. 61 are used.

SECTION 4
Communication and Coordination

4.1 Communication and Coordination Issues and Needs

Through multiple stakeholder meetings and discussions, TIM responders in the Iowa City metropolitan area identified the following issues and needs related to communication and coordination:

- Improve inter/intra-agency communication, notification and information sharing among all agencies, including the DOT and towing companies
    - CCTV video sharing with responders
    - Anticipated incident duration and location communicated to the Iowa DOT TMC
    - Notify cities when diversions are likely to occur
    - Investigate the use of an early notification system (e.g., reverse 911 system) to quickly disseminate incident alerts and for issuing alerts on a tiered basis
- Enhance responder understanding of available TIM resources to enable more efficient resource sharing
- Improve identification of incident location
    - Lanes are not numbered or named in a standard manner in the Iowa City metropolitan area
    - Availability and usage of reference markers is currently inconsistent
- Identify opportunities to provide earlier notification to enable quicker tow mobilization
    - Tow calls are often made after law enforcement arrives on scene
- Enhance communication procedures and response
    - Radio systems are being consolidated, but the Iowa State Patrol will remain on their own system. However, the VLAW mutual aid channel/frequency will be implemented at the Iowa State Patrol communication center in Cedar Rapids that will facilitate radio communication interoperability. Another possible means of enhancing communications that was mentioned by stakeholders, was a secure app, similar to the RACOM BeOn application that allows agencies to use RACOM communication towers to facilitate secure communications between responders.
    - When agencies or responders cannot communication directly with one another, they often need to rely on their dispatchers to relay information.

- Improve communications between JECC and the TMC and Highway Helpers. The TMC currently dispatches for Highway Helpers and direct communications will reduce response times.
- Highway helper currently does not have tow capability. Stakeholders desire to pass legislation to allow vehicle removal (to safe location).
- Equipment should be pre-positioned near areas where incident can be expected to occur rather than having to pick up equipment at maintenance garages.
- Maintenance crew response may take as long as 2 hours since maintenance staff can live up to 30 minutes away from maintenance garages and need to first stop at the garage to pick up equipment. Stakeholders indicated a need to investigate having 24/7 maintenance crew staffing.
- Need to contract a 24/7 on-call barricade company to respond to barrier knockdowns.

4.2 Communication and Coordination Priority Strategies

4.2.1 Communication Procedures

In locations where agencies are operating on different radio systems (i.e., 800 MHz and VHF) it is important that clear communication procedures be developed, distributed and trained to. These procedures are needed to facilitate incident response and support information sharing.

4.2.2 Computer-Aided Dispatch Linkages

Computer-aided dispatch (CAD) linkages provide a direct link between a law enforcement agency's CAD system and a TMC's freeway management system. CAD linkages provide TMCs "instant" notification of traffic related incidents reported to law enforcement. CAD data can be filtered to limit information sharing to traffic related incidents only.

Currently, the TMC calls local agencies to determine the status of incidents. The Iowa State Patrol dispatch communicates with JECC. JECC currently communicates incident information to local law enforcement agencies.

4.2.3 TIM Callout Lists

TIM callout lists, and/or communication plans, provide key agency contacts on a city/county/regional basis. Plans can include general roles and responsibilities for each agency, communication flow diagrams, contact information (including names, positions, phone/cell/pager numbers, etc.), and/or media contact guidelines. TIM callout lists are distributed to all responsible agencies and can be used by dispatchers/operators to ensure the most efficient and effective responders are dispatched for TIM.

As part of the I-80/I-380 interchange TMP, contact lists were developed in the context of the Incident/Crisis Communications Plan (ICCP) and the emergency alternate route application discussed in Section 3.4.

4.2.4 CCTV Video Sharing

In order to facilitate verification and response activities, some TMCs have started providing other responding agencies access to their CCTV video. Video sharing provides responding agencies the ability to verify incident details so they can ensure they are dispatching the proper response. Video sharing can be accomplished via the internet or, if available, using direct connections (wire or wireless) between agencies. JECC and Coralville PD currently have access to the Iowa DOT CCTV cameras. Other local

stakeholders can be provided access by the Iowa DOT upon request and execution of a formal agreement.

4.2.5 Enhanced Reference Markers

Enhanced reference markers, also referred to as enhanced reference location signs, provide motorists and responders an additional tool for accurately identifying their location on the highway. Enhanced reference markers are signs posted along the highway that provide the name, direction and mile marker of the highway. Enhanced reference markers are typically placed every one-tenth or two-tenths of a mile along the median of the highway. An example of an enhanced reference marker is provided in Figure 27. One-tenth mile markers are being proposed as an I-80/I-380 interchange TMP strategy.

Figure 27: Enhanced Reference Marker Example – I-94 EB at Mile Marker 301.2

4.2.6 ATMS Incident Detection Algorithms and Automatic Alerting

Incident detection algorithms utilize traffic surveillance data (i.e. volumes, speeds, occupancy) collected by field devices. Various incident detection algorithms have been developed to allow TMC computer systems to alert operators to the possibility of an incident on the highway system. TMC operators can then use other equipment, such as CCTV cameras if available, to verify that an incident has occurred. Use of algorithms is limited to areas of the system for which traffic data is available. Multiple types of incident detection algorithms, including comparative, statistical, time-series/smoothing and modeling, exist. The performance of algorithms is typically measured in three ways: 1) the percentage of incidents detected, 2) the time required to detect an incident, and 3) the percentage of "false alarms." Generally, there is a tradeoff between two of these measures. In addition, in order for the algorithms to be effective and correctly generate alerts, dedicated staff time is typically needed to study and "fine-tune" the system.

SECTION 5
TIM Program

5.1 TIM Program Issues and Needs

Through multiple stakeholder meetings and discussions, TIM responders in the Iowa City metropolitan area identified the following issues and needs related to a TIM program:

- Promote and support on-going, multidiscipline TIM training and exercises
- Understand the relationship between TIM response and a TIM program
- Continue TIM meetings to address Iowa City metropolitan area TIM issues/needs and facilitate multiagency coordination and communication

5.2 TIM Program

This document is the culmination of a process that served to assess current needs and develop a plan to enhance TIM in the Iowa City metropolitan area. Since the beginning of this process, strong emphasis was placed on the importance of continuing the dialogue initiated through this project. The area's TIM program will serve as the mechanism or venue for this critical activity. To clarify, the goal of a TIM program is not to create a response, but rather to create a more effective, efficient response for all responding agencies. This distinction is very important. Incident response in and of itself does not entail the same degree of coordination, planning, and conscious effort required for TIM to be effective.

5.2.1 Organization

The Iowa DOT's Office of Traffic Operations will continue to serve in a leadership role for coordinating TIM program activities. However, for the ongoing program to be successful and effective, all area agencies with TIM responsibility, including law enforcement, fire, departments of public works/transportation, and towing and recovery are expected to participate. In addition to their participation, their direct involvement in the program is vital to acquiring a multidiscipline perspective on TIM issues, needs, lessons learned and enhancements. Program participation also fosters the establishment of close working relationships among responders.

5.2.2 Mission

The mission of the Iowa City TIM program is for all participants to work together as partners to:

- Improve responder safety
- Enhance the quick clearance of traffic incidents
- Promote safe, efficient mobility on the area's roadways
- Support prompt, reliable, interoperable communications

5.2.3 Agreement

To achieve the mission, the Iowa City TIM program participants further agree to:

1. Assess – Regularly share and assess traffic incident management issues and needs within the context of the on-going TIM program and associated after-action reviews.
2. Strategize – Collaboratively plan for and develop solutions and strategies to address identified needs.
3. Measure – Monitor and measure TIM performance as a means of enhancing mobility, accountability, system preservation, safety and service.
4. Sustain – Sustain the ongoing TIM program by fostering multiagency, multidiscipline partnerships and actively participating in program meetings.
5. Promote – Promote widespread use of the information and guidelines contained in the Iowa City TIM Program Plan as well as existing/emerging related initiatives.
6. Train – Embrace multidisciplinary training as the foundation for effective traffic incident management.
7. Commit – Commit to a culture of responder safety.

5.3 TIM Program Activities

Activities associated with a TIM program can be diverse and are often dependent on available resources (both human and monetary). At a minimum, it is recommended that the Iowa City TIM program include the following activities.

5.3.1 Meetings

TIM program partners and participants should meet on a regular basis to discuss issues and advance the state of the practice. Most successful programs throughout the U.S. meet on a monthly or bi-monthly basis. In addition to fostering partner relationships, the meetings will offer the opportunity to coordinate other program activities such as those listed below and others including the travel assistance program, funding opportunities, and continued strategy development.

5.3.2 After-Action Reviews

As discussed in Section 1.2.8, one of the most effective ways to enhance quick clearance and improve safety is to regularly conduct after-action reviews. Effective AARs provide a constructive forum to identify conflicts and inefficiencies, and then take steps to resolve or eliminate them. AARs can also help open lines of communication and foster relationships among responders. It is essential that AARs be multidiscipline and include all agencies and personnel that were involved with the incident, including dispatchers. AARs can be initiated by any agency involved in the response to an incident and should take place as soon as possible. Finally, it is important that follow-up occur on the areas requiring improvement.

5.3.3 Training

Multiagency, multidiscipline TIM training serves to establish the foundation for ensuring the capability of responders to achieve the National Unified Goal (NUG) for Traffic Incident Management: responder safety; safe, quick clearance; and prompt, reliable, interoperable communications. Routine training as part of an ongoing TIM program also enables responders to acquire a common set of core competencies that promote a shared understanding of the requirements for achieving safety of responders and motorists, quick response, and effective communications at traffic incident scenes.

FHWA established a TIM training framework that targets responders, managers, and decision makers. This framework can serve as an excellent foundation for the training element of the Iowa City TIM program.

5.3.4 Performance Measurement

The program plan includes multiple strategies to enhance the operational characteristics and effectiveness of TIM in the Iowa City metropolitan area. As the area progresses with an ongoing, sustained program, the effectiveness of TIM strategies must be assessed and reported. In addition, the Moving Ahead for Progress in the 21st Century (MAP-21) legislation has put additional emphasis on performance measurement. With exception to a few non-TIM related provisions, the recently enacted FAST Act continues all of the MAP-21 performance management provisions. TIM performance management and reporting can help partner agencies make difficult decisions about longer-term policy priorities (i.e., “doing the right thing”), as well as where and how to apply day-to-day staff and capital resources (i.e.,“doing the right things well”). The success of the program and sustainable funding will be contingent on maintaining accountability for TIM program performance to policy makers and the traveling public.

To quantify the performance and benefits of incident management in the Iowa City area, the TIM program should start with the following three nationally adopted performance measures and phase in reporting on more measures such as number of incidents, response time, and TAP assists as the program moves forward.

1. Roadway Clearance Time – The time between first recordable awareness of an incident by a responsible agency and first confirmation that all lanes are available for traffic flow.
2. Incident Clearance Time – The time between first recordable awareness of an incident by a responsible agency and time at which the last responder has left the scene.
3. Number of Secondary Crashes – The number of unplanned crashes beginning with the time of detection of the primary incident where a collision occurs either a) within the incident scene or b) within the queue, including the opposite direction, resulting from the original incident.

Assessing TIM performance is dependent on the ability to collect high quality data that supports identified measures. The systems associated with the Iowa DOT’s TMC and law enforcement CAD are likely to be the source for much of the incident data required to measure TIM performance.

5.3.5 Outreach and Awareness

Building on TIM performance measurement is the activity of communicating benefits of TIM and program elements. FHWA has developed a number of templates for TIM outreach strategies such as brochures, posters, presentations, driver education program inserts, press releases and talking points. As the Iowa City TIM program progresses forward and begins to gather performance related

information, consideration should be made to implementing communications strategies such as these to increase awareness and promote benefits.

5.3.6 FHWA TIM Capability Maturity Self-Assessment

The purpose of the FHWA TIM Capability Maturity Self-Assessment (CMSA) is to provide a formal process for state and local transportation, public safety and private sector partners to collaboratively assess their traffic incident management programs and identify opportunities for improvement on an annual basis. The assessments enable state and local program managers and practitioners to evaluate their TIM programs and identify strengths and weaknesses in their programs in order to prioritize program activities and initiatives. Each year the assessment is compared against the national baseline and previous year's assessments.

The assessment consists of questions covering the three main TIM program areas. These are:

- Strategic
  - Formal TIM Programs
  - TIM Training and After-Action Reviews
  - TIM Performance Measures
- Tactical
  - TIM Laws
  - Policies and Procedures for Incident Response and Clearance
  - Responder and Motorist Safety
- Support
  - Data Collection/Integration/Sharing

APPENDICES

Appendix A

MUTCD Section 6D.03 and Chapter 6I

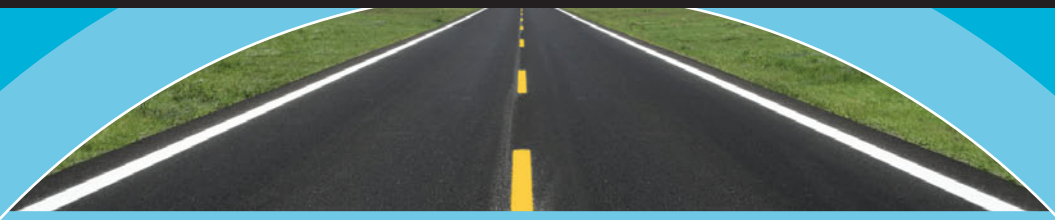
Manual on Uniform Traffic Control Devices

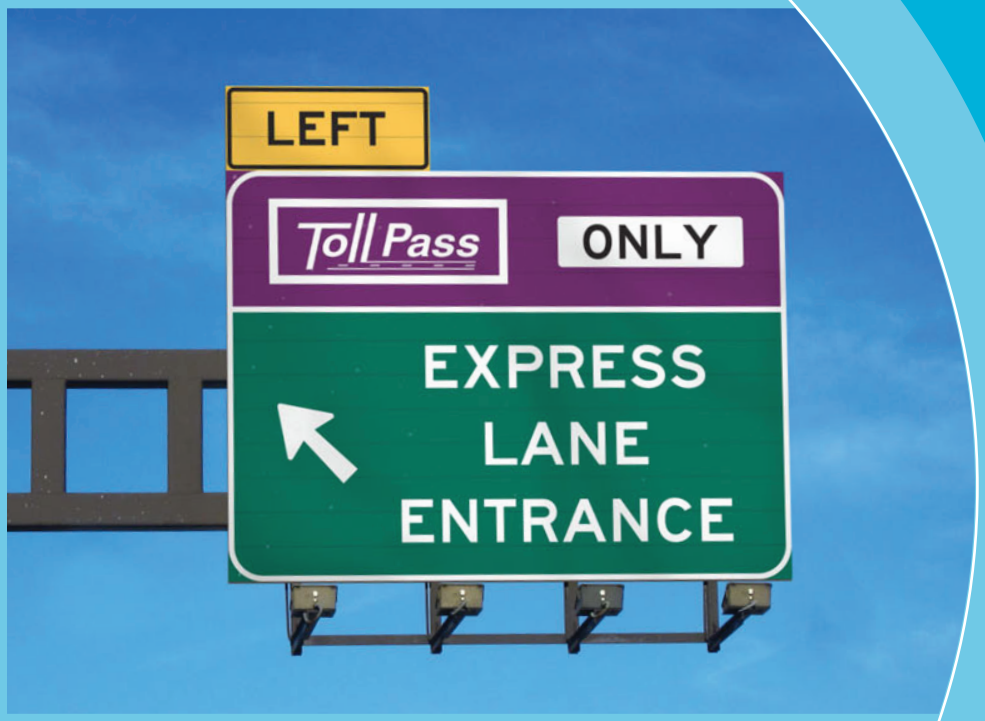
for Streets and Highways

2009 Edition

Including Revision 1 dated May 2012
and Revision 2 dated May 2012

Excerpts Only:
Section 6D.03 Worker Safety Considerations
Chapter 6I Control of Traffic Through Traffic Incident Management Areas





U.S.Department of Transportation
Federal Highway Administration

Guidance:

07 *If a pushbutton is used to provide equivalent TTC information to pedestrians with visual disabilities, the pushbutton should be equipped with a locator tone to notify pedestrians with visual disabilities that a special accommodation is available, and to help them locate the pushbutton.*

Section 6D.03 Worker Safety Considerations

Support:

01 Equally as important as the safety of road users traveling through the TTC zone is the safety of workers. TTC zones present temporary and constantly changing conditions that are unexpected by the road user. This creates an even higher degree of vulnerability for workers on or near the roadway.

02 Maintaining TTC zones with road user flow inhibited as little as possible, and using TTC devices that get the road user's attention and provide positive direction are of particular importance. Likewise, equipment and vehicles moving within the activity area create a risk to workers on foot. When possible, the separation of moving equipment and construction vehicles from workers on foot provides the operator of these vehicles with a greater separation clearance and improved sight lines to minimize exposure to the hazards of moving vehicles and equipment.

Guidance:

03 *The following are the key elements of worker safety and TTC management that should be considered to improve worker safety:*

- *A. Training—all workers should be trained on how to work next to motor vehicle traffic in a way that minimizes their vulnerability. Workers having specific TTC responsibilities should be trained in TTC techniques, device usage, and placement.*
- *B. Temporary Traffic Barriers—temporary traffic barriers should be placed along the work space depending on factors such as lateral clearance of workers from adjacent traffic, speed of traffic, duration and type of operations, time of day, and volume of traffic.*
- *C. Speed Reduction—reducing the speed of vehicular traffic, mainly through regulatory speed zoning, funneling, lane reduction, or the use of uniformed law enforcement officers or flaggers, should be considered.*
- *D. Activity Area—planning the internal work activity area to minimize backing-up maneuvers of construction vehicles should be considered to minimize the exposure to risk.*
- *E. Worker Safety Planning—a trained person designated by the employer should conduct a basic hazard assessment for the worksite and job classifications required in the activity area. This safety professional should determine whether engineering, administrative, or personal protection measures should be implemented. This plan should be in accordance with the Occupational Safety and Health Act of 1970, as amended, "General Duty Clause" Section 5(a)(1) - Public Law 91-596, 84 Stat. 1590, December 29, 1970, as amended, and with the requirement to assess worker risk exposures for each job site and job classification, as per 29 CFR 1926.20 (b)(2) of "Occupational Safety and Health Administration Regulations, General Safety and Health Provisions" (see Section 1A.11).*

Standard:

04 **All workers, including emergency responders, within the right-of-way who are exposed either to traffic (vehicles using the highway for purposes of travel) or to work vehicles and construction equipment within the TTC zone shall wear high-visibility safety apparel that meets the Performance Class 2 or 3 requirements of the ANSI/ISEA 107–2004 publication entitled "American National Standard for High-Visibility Safety Apparel and Headwear" (see Section 1A.11), or equivalent revisions, and labeled as meeting the ANSI 107-2004 standard performance for Class 2 or 3 risk exposure, except as provided in Paragraph 5. A person designated by the employer to be responsible for worker safety shall make the selection of the appropriate class of garment.**

Option:

05 Emergency and incident responders and law enforcement personnel within the TTC zone may wear high-visibility safety apparel that meets the performance requirements of the ANSI/ISEA 207-2006 publication entitled "American National Standard for High-Visibility Public Safety Vests" (see Section 1A.11), or equivalent revisions, and labeled as ANSI 207-2006, in lieu of ANSI/ISEA 107-2004 apparel.

Standard:

06 **When uniformed law enforcement personnel are used to direct traffic, to investigate crashes, or to handle lane closures, obstructed roadways, and disasters, high-visibility safety apparel as described in this Section shall be worn by the law enforcement personnel.**

07 **Except as provided in Paragraph 8, firefighters or other emergency responders working within the right-of-way shall wear high-visibility safety apparel as described in this Section.**

Option:

08 Firefighters or other emergency responders working within the right-of-way 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.

09 The following are additional elements of TTC management that may be considered to improve worker safety:

A. Shadow Vehicle—in the case of mobile and constantly moving operations, such as pothole patching and striping operations, a shadow vehicle, equipped with appropriate lights and warning signs, may be used to protect the workers from impacts by errant vehicles. The shadow vehicle may be equipped with a rear-mounted impact attenuator.
B. Road Closure—if alternate routes are available to handle road users, the road may be closed temporarily. This may also facilitate project completion and thus further reduce worker vulnerability.
C. Law Enforcement Use—in highly vulnerable work situations, particularly those of relatively short duration, law enforcement units may be stationed to heighten the awareness of passing vehicular traffic and to improve safety through the TTC zone.
D. Lighting—for nighttime work, the TTC zone and approaches may be lighted.
E. Special Devices—these include rumble strips, changeable message signs, hazard identification beacons, flags, and warning lights. Intrusion warning devices may be used to alert workers to the approach of errant vehicles.

Support:

10 Judicious use of the special devices described in Item E in Paragraph 9 might be helpful for certain difficult TTC situations, but misuse or overuse of special devices or techniques might lessen their effectiveness.

CHAPTER 6I. CONTROL OF TRAFFIC THROUGH TRAFFIC INCIDENT MANAGEMENT AREAS

Section 6I.01 General

Support:

01 The National Incident Management System (NIMS) requires the use of the Incident Command System (ICS) at traffic incident management scenes.

02 A traffic incident is an emergency road user occurrence, a natural disaster, or other unplanned event that affects or impedes the normal flow of traffic.

03 A traffic incident management area is an area of a highway where temporary traffic controls are installed, as authorized by a public authority or the official having jurisdiction of the roadway, in response to a road user incident, natural disaster, hazardous material spill, or other unplanned incident. It is a type of TTC zone and 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.

04 Traffic incidents can be divided into three general classes of duration, each of which has unique traffic control characteristics and needs. These classes are:

A. Major—expected duration of more than 2 hours,
B. Intermediate—expected duration of 30 minutes to 2 hours, and
C. Minor—expected duration under 30 minutes.

05 The primary functions of TTC at a traffic incident management area are to inform road users of the incident and to provide guidance information on the path to follow through the incident area. Alerting road users and establishing a well defined path to guide road users through the incident area will serve to protect the incident responders and those involved in working at the incident scene and will aid in moving road users expeditiously past or around the traffic incident, will reduce the likelihood of secondary traffic crashes, and will 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.

Guidance:

06 *In order to reduce response time for traffic incidents, highway agencies, appropriate public safety agencies (law enforcement, fire and rescue, emergency communications, emergency medical, and other emergency management), and private sector responders (towing and recovery and hazardous materials contractors) should mutually plan for occurrences of traffic incidents along the major and heavily traveled highway and street system.*

07 *On-scene responder organizations should train their personnel in TTC practices for accomplishing their tasks in and near traffic and in the requirements for traffic incident management contained in this Manual. On-scene responders should take measures to move the incident off the traveled roadway or to provide for appropriate warning. All on-scene responders and news media personnel should constantly be aware of their visibility to oncoming traffic and wear high-visibility apparel.*

08 *Emergency vehicles should be safe-positioned (see definition in Section 1A.13) such that traffic flow through the incident scene is optimized. All emergency vehicles that subsequently arrive should be positioned in a manner that does not interfere with the established temporary traffic flow.*

09 *Responders arriving at a traffic incident should estimate the magnitude of the traffic incident, the expected time duration of the traffic incident, and the expected vehicle queue length, and then should set up the appropriate temporary traffic controls for these estimates.*

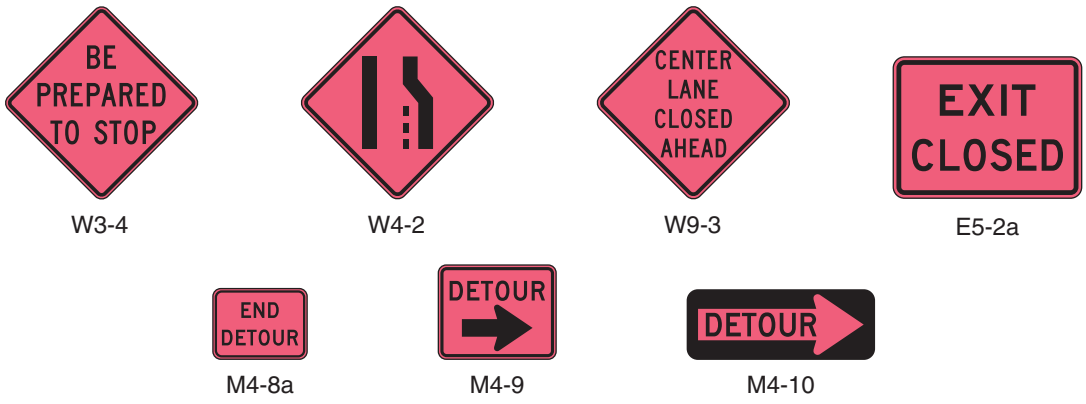
Option:

10 Warning and guide signs used for TTC traffic incident management situations may have a black legend and border on a fluorescent pink background (see Figure 6I-1).

Support:

11 While some traffic incidents might be anticipated and planned for, emergencies and disasters might pose more severe and unpredictable problems. The ability to quickly install proper temporary traffic controls might greatly reduce the effects of an incident, such as secondary crashes or excessive traffic delays. An essential part of fire, rescue, spill clean-up, highway agency, and enforcement 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. These operations might need corroborating legislative authority for the implementation and enforcement of appropriate road user regulations, parking controls, and speed zoning. It is desirable for these statutes to provide sufficient flexibility in the authority for, and implementation of, TTC to respond to the needs of changing conditions found in traffic incident management areas.

Figure 6I-1. Examples of Traffic Incident Management Area Signs



Option:

12 For traffic incidents, particularly those of an emergency nature, TTC devices on hand may be used for the initial response as long as they do not themselves create unnecessary additional hazards.

Section 6I.02 Major Traffic Incidents

Support:

01 Major traffic incidents are typically traffic incidents involving hazardous materials, fatal traffic crashes involving numerous vehicles, and other natural or man-made disasters. These traffic incidents typically involve closing all or part of a roadway facility for a period exceeding 2 hours.

Guidance:

02 *If the traffic incident is anticipated to last more than 24 hours, applicable procedures and devices set forth in other Chapters of Part 6 should be used.*

Support:

03 A road closure can be caused by a traffic incident such as a road user crash that blocks the traveled way. Road users are usually diverted through lane shifts or detoured around the traffic incident and back to the original roadway. A combination of traffic engineering and enforcement preparations is needed to determine the detour route, and to install, maintain or operate, and then to remove the necessary traffic control devices when the detour is terminated. Large trucks are a significant concern in such a detour, especially when detouring them from a controlled-access roadway onto local or arterial streets.

04 During traffic incidents, large trucks might need to follow a route separate from that of automobiles because of bridge, weight, clearance, or geometric restrictions. Also, vehicles carrying hazardous material might need to follow a different route from other vehicles.

05 Some traffic incidents such as hazardous material spills might require closure of an entire highway. Through road users must have adequate guidance around the traffic incident. Maintaining good public relations is desirable. The cooperation of the news media in publicizing the existence of, and reasons for, traffic incident management areas and their TTC can be of great assistance in keeping road users and the general public well informed.

06 The establishment, maintenance, and prompt removal of lane diversions can be effectively managed by interagency planning that includes representatives of highway and public safety agencies.

Guidance:

07 *All traffic control devices needed to set up the TTC at a traffic incident should be available so that they can be readily deployed for all major traffic incidents. The TTC should include the proper traffic diversions, tapered lane closures, and upstream warning devices to alert traffic approaching the queue and to encourage early diversion to an appropriate alternative route.*

08 *Attention should be paid to the upstream end of the traffic queue such that warning is given to road users approaching the back of the queue.*

09 *If manual traffic control is needed, it should be provided by qualified flaggers or uniformed law enforcement officers.*

Option:

10 If flaggers are used to provide traffic control for an incident management situation, the flaggers may use appropriate traffic control devices that are readily available or that can be brought to the traffic incident scene on short notice.

Guidance:

11 *When light sticks or flares are used to establish the initial traffic control at incident scenes, channelizing devices (see Section 6F.63) should be installed as soon thereafter as practical.*

Option:

12 The light sticks or flares may remain in place if they are being used to supplement the channelizing devices.

Guidance:

13 *The light sticks, flares, and channelizing devices should be removed after the incident is terminated.*

Section 6I.03 Intermediate Traffic Incidents

Support:

01 Intermediate traffic incidents typically affect travel lanes for a time period of 30 minutes to 2 hours, and usually require traffic control on the scene to divert road users past the blockage. Full roadway closures might be needed for short periods during traffic incident clearance to allow traffic incident responders to accomplish their tasks.

02 The establishment, maintenance, and prompt removal of lane diversions can be effectively managed by interagency planning that includes representatives of highway and public safety agencies.

Guidance:

03 *All traffic control devices needed to set up the TTC at a traffic incident should be available so that they can be readily deployed for intermediate traffic incidents. The TTC should include the proper traffic diversions, tapered lane closures, and upstream warning devices to alert traffic approaching the queue and to encourage early diversion to an appropriate alternative route.*

04 *Attention should be paid to the upstream end of the traffic queue such that warning is given to road users approaching the back of the queue.*

05 *If manual traffic control is needed, it should be provided by qualified flaggers or uniformed law enforcement officers.*

Option:

06 If flaggers are used to provide traffic control for an incident management situation, the flaggers may use appropriate traffic control devices that are readily available or that can be brought to the traffic incident scene on short notice.

Guidance:

07 *When light sticks or flares are used to establish the initial traffic control at incident scenes, channelizing devices (see Section 6F.63) should be installed as soon thereafter as practical.*

Option:

08 The light sticks or flares may remain in place if they are being used to supplement the channelizing devices.

Guidance:

09 *The light sticks, flares, and channelizing devices should be removed after the incident is terminated.*

Section 6I.04 Minor Traffic Incidents

Support:

01 Minor traffic incidents are typically disabled vehicles and minor crashes that result in lane closures of less than 30 minutes. On-scene responders are typically law enforcement and towing companies, and occasionally highway agency service patrol vehicles.

02 Diversion of traffic into other lanes is often not needed or is needed only briefly. It is not generally possible or practical to set up a lane closure with traffic control devices for a minor traffic incident. Traffic control is the responsibility of on-scene responders.

Guidance:

03 *When a minor traffic incident blocks a travel lane, it should be removed from that lane to the shoulder as quickly as possible.*

Section 6I.05 Use of Emergency-Vehicle Lighting

Support:

01 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, for the safety of emergency responders and persons involved in the traffic incident, as well as road users approaching the traffic incident. Emergency-vehicle lighting, however, provides warning only and provides no effective traffic control. The use of too many lights at an incident scene can be distracting and can create confusion for approaching road users, especially at night. Road users approaching the traffic incident from the opposite direction on a divided facility are often distracted by emergency-vehicle lighting and slow their vehicles to look at the traffic incident posing a hazard to themselves and others traveling in their direction.

02 The use of emergency-vehicle lighting can be reduced if good traffic control has been established at a traffic incident scene. This is especially true for major traffic incidents that might involve a number of emergency vehicles. If good traffic control is established through placement of advanced warning signs and traffic control devices to divert or detour traffic, then public safety agencies can perform their tasks on scene with minimal emergency-vehicle lighting.

Guidance:

03 *Public safety agencies should examine their policies on the use of emergency-vehicle lighting, especially after a traffic incident scene is secured, with the intent of reducing the use of this lighting as much as possible while not endangering those at the scene. Special consideration should be given to reducing or extinguishing forward facing emergency-vehicle lighting, especially on divided roadways, to reduce distractions to oncoming road users.*

04 *Because the glare from floodlights or vehicle headlights can impair the nighttime vision of approaching road users, any floodlights or vehicle headlights that are not needed for illumination, or to provide notice to other road users of an incident response vehicle being in an unexpected location, should be turned off at night.*

CHAPTER 6I. CONTROL OF TRAFFIC THROUGH TRAFFIC INCIDENT MANAGEMENT AREAS

Section 6I.01 General

Support:

A traffic incident is an emergency road user occurrence, a natural disaster, or a special event that affects or impedes the normal flow of traffic.

A traffic incident management area is an area of a highway where temporary traffic controls are imposed by authorized officials in response to a road user incident, natural disaster, or special event. It extends from the first warning sign or emergency warning lights on a vehicle to the last temporary traffic control device or to a point where vehicles return to the original lane alignment and are clear of the traffic incident.

Traffic incidents can be divided into three general classes of duration, each of which has unique traffic control characteristics and needs. These classes are:

A. Major—expected duration of more than 2 hours;

B. Intermediate—expected duration of 30 minutes to 2 hours; and

C. Minor—expected duration under 30 minutes.

The primary functions of temporary traffic control at a traffic incident management area are to move road users safely and expeditiously past or around the traffic incident, and to reduce the likelihood of secondary crashes. Examples include a stalled vehicle blocking a lane, a road user crash blocking the traveled way, a hazardous material spill along a highway, flood and severe storm damage, a planned visit by a dignitary, or a major sporting event.

Guidance:

In order to reduce response time for traffic incidents, highway agencies, appropriate public safety agencies (law enforcement, fire and rescue, emergency communications, emergency medical, and other emergency management), and private sector responders (towing and recovery and hazardous materials contractors) should mutually plan for occurrences of traffic incidents along the major and heavily traveled highway and street system. Special events should be planned for and coordinated in advance.

The first responders arriving at a traffic incident should, within 15 minutes of arrival on-scene, estimate the magnitude on the traffic incident and an expected length of traffic incident duration and then should set up the traffic controls appropriate for the expected traffic incident duration.

Figure 6I-1. Examples of Traffic Incident Management Area Signs

W4-2

W9-3

W20-7b

M4-8a

E5-2a

M4-9

M4-10

Option:

Warning and guide signs used for temporary traffic control traffic incident management situations may have a black legend and border on a fluorescent coral background (see Figure 6I-1).

Support:

While some traffic incidents might be anticipated and planned for, emergencies and disasters might pose more severe and unpredictable problems. The ability to quickly install proper temporary traffic controls might greatly reduce the effects of an emergency. An essential part of fire, rescue, spill clean-up, and enforcement activities is the proper control of road users through the traffic incident management area in order to protect responders while providing safe traffic flow. These operations might need corroborating legislative authority for the implementation and enforcement of appropriate road user regulations, parking controls, and speed zoning. It is desirable for these statutes to provide sufficient flexibility in the authority for, and implementation of, temporary traffic control to respond to the needs of changing conditions found in traffic incident management areas.

Option:

For unexpected traffic incidents, particularly those of an emergency nature, temporary traffic control devices on hand may be used for the initial response as long as they do not themselves create unnecessary additional hazards.

Section 6I.02 Major Traffic Incidents

Support:

Major traffic incidents are typically traffic incidents involving hazardous materials, fatal crashes involving numerous vehicles, and other natural or man-made disasters. These traffic incidents typically involve closing all or part of a roadway facility.

Guidance:

If the traffic incident is anticipated to last more than 24 hours, applicable procedures and devices set forth in Part 6 should be used.

Support:

A short-term road closure can be caused by a traffic incident such as a road user crash that blocks the traveled way. Road users are usually diverted through lane shifts or detoured around the traffic incident and back to the original roadway. A combination of traffic engineering and enforcement preparations is needed to determine the detour route, and to install, maintain or operate, and then to remove the necessary traffic control devices when the detour is terminated. Large trucks are a significant concern in such a detour, especially when detouring them from a controlled-access roadway onto local or arterial streets.

During traffic incidents, large trucks might need to follow a route separate from that of automobiles because of bridge, weight, clearance, or geometric restrictions. Also, vehicles carrying hazardous material might need to follow a different route from other vehicles.

Some traffic incidents such as hazardous material spills might require closure of an entire highway. Through road users must have adequate guidance around the traffic incident. Maintaining good public relations is desirable. The cooperation of the news media in publicizing the existence of, and reasons for, traffic incident management areas and their temporary traffic control can be of great assistance in keeping road users and the general public well informed.

The establishment, maintenance, and prompt removal of lane diversions can be effectively managed by inter-agency planning that includes representatives of highway and public safety agencies.

Guidance:

All traffic control devices needed to set up the temporary traffic control at the traffic incident with the proper traffic diversions, tapered lane closures, and upstream warning devices to alert approaching traffic of the end of a queue should be available so that they can be readily deployed for all major traffic incidents.

Traffic control should be provided by qualified flaggers using appropriate traffic control devices that are readily available or that can be brought to the traffic incident scene on short notice.

Attention should be paid to the end of the traffic queue such that warning is given to road users approaching the end of the queue.

The channelizing devices discussed in Section 6F.55 should be used whenever possible if a roadway is expected to be closed for more than 3 days.

When flares are used to initiate temporary traffic control at traffic incidents or for short-term temporary traffic control, more permanent traffic control devices should replace them as soon as practical. Both the flare and its supporting device should be removed from the roadway.

Section 6I.03 Intermediate Traffic Incidents

Support:

Intermediate traffic incidents are typically vehicle crashes, usually blocking travel lanes, and usually require traffic control on the scene to divert road users past the blockage. Full roadway closures might be needed for short periods during traffic incident clearance to allow traffic incident responders to accomplish their tasks. However, detours from the facility affected by the traffic incident to another facility are seldom implemented for intermediate incidents.

The establishment, maintenance, and prompt removal of lane diversions can be effectively managed by inter-agency planning that includes representatives of highway and public safety agencies.

Guidance:

All traffic control devices needed to set up the temporary traffic control at the traffic incident with the proper traffic diversions, tapered lane closures, and upstream warning devices to alert approaching traffic of the end of a queue should be available so that they can be readily deployed for intermediate traffic incidents.

Traffic control should be provided by qualified flaggers using appropriate traffic control devices that are readily available or that can be brought to the traffic incident scene on short notice.

Attention should be paid to the end of the traffic queue such that warning is given to road users approaching the end of the queue.

When flares are used to initiate temporary traffic control at traffic incidents or for short-term temporary traffic control, more permanent traffic devices should replace them as soon as practical. Both the flare and its supporting device should be removed from the roadway.

Section 6I.04 Minor Traffic Incidents

Support:

Minor traffic incidents are typically disabled vehicles and minor crashes. On-scene response generally consists of only law enforcement and towing companies.

Diversion of traffic into other lanes is often not needed or is needed only briefly. It is not generally possible or practical to set up a lane diversion with traffic control devices. Traffic control is the responsibility of on-scene responders.

Guidance:

On-scene responders should be trained in safe practices for accomplishing their tasks in and near traffic. Responders should always be aware of their visibility to oncoming traffic and take measures to move the traffic incident as far off the traveled roadway as possible or to provide for appropriate warning.

When a minor traffic incident blocks a travel lane, it should be removed from that lane to the shoulder as quickly as possible.

Section 6I.05 Use of Emergency-Vehicle Lighting (Flashing or Rotating Beacons or Strobes)

Support:

The use of emergency-vehicle lighting is essential, especially in the initial stages of a traffic incident, for the safety of emergency responders and persons involved in the traffic incident, as well as road users approaching the traffic incident. Emergency-vehicle lighting, however, provides warning only and provides no effective traffic control. It is often confusing to road users, especially at night. Road users approaching the traffic incident from the opposite direction on a divided facility are often distracted by emergency-vehicle lighting and slow their vehicles to look at the traffic incident posing a hazard to themselves and others traveling in their direction.

The use of emergency-vehicle lighting can be reduced if good traffic control has been established at a traffic incident scene. This is especially true for major traffic incidents that might involve a number of emergency vehicles. If good traffic control is established through placement of advanced warning signs and traffic control devices to divert or detour traffic, then public safety agencies can perform their tasks on scene with minimal emergency-vehicle lighting.

Guidance:

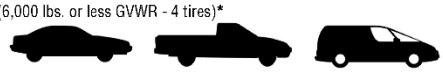
Public safety agencies should examine their policies on the use of emergency-vehicle lighting, especially after a traffic incident scene is secured, with the aim of reducing the use of this lighting as much as possible while not endangering those at the scene. Special consideration should be given to reducing or extinguishing forward facing emergency-vehicle lighting, especially on divided roadways, to reduce distractions to on-coming road users.

Appendix B

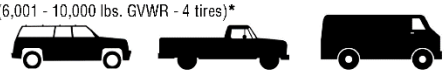
TRAA Vehicle Identification Quick Reference Guide

LAW ENFORCEMENT VEHICLE IDENTIFICATION GUIDE

CLASS 1 - LIGHT-DUTY
(6,000 lbs. or less GVWR - 4 tires)*



CLASS 2 - LIGHT-DUTY
(6,001 - 10,000 lbs. GVWR - 4 tires)*



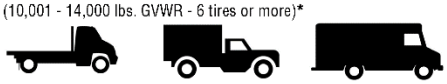
Class 1 through 2 include passenger cars, light trucks and mini vans, full size pickups, sport utility vehicles, full size vans

CLASS 1 AND 2 - LIGHT-DUTY TOW
Gross Vehicle Weight Rating (6,000 to 10,000 lbs.)
Passenger cars, small SUVs and pickup trucks

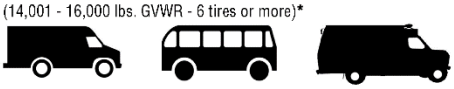
- ☐ Year, make and model?
- ☐ Number of occupants?
- ☐ Full-size pickup or van?
- ☐ Is it loaded?
- ☐ 4x4 or AWD?
- ☐ Keys?
- ☐ Trailer?
- ☐ What is the load?

VEHICLES IN THESE CLASSES USUALLY HAVE FOUR TIRES.

CLASS 3 - LIGHT- OR MEDIUM-DUTY
(10,001 - 14,000 lbs. GVWR - 6 tires or more)*



CLASS 4 - MEDIUM-DUTY
(14,001 - 16,000 lbs. GVWR - 6 tires or more)*



CLASS 5 - MEDIUM-DUTY
(16,001 - 19,500 lbs. GVWR - 6 tires or more)*

CLASS 6 - MEDIUM-DUTY
(19,501 - 26,000 lbs. GVWR - 6 tires or more)*

Class 3 through 6 include a range of mid-sized to larger vehicles including delivery trucks, utility vehicles, motor homes, package parcel trucks, ambulances, small dump trucks, landscape vehicles, small flatbed and stake-type trucks, refrigerated and box trucks, small and medium-duty buses (school and local transit buses.)

CLASS 3, 4, 5 & 6 - LIGHT- OR MEDIUM-DUTY TOW
Gross Vehicle Weight Rating (10,001 up to 26,000 lbs.)

- ☐ Year, make and model?
- ☐ Body type – pickup truck, box truck, flatbed, step van
- ☐ What is the load and is it damaged?
- ☐ Pickup, van, shuttle bus or motor home?
- ☐ Number of occupants?
- ☐ Keys?
- ☐ Vehicle description is critical to determine the proper tow vehicle

VEHICLES IN THESE CLASSES USUALLY HAVE SIX TIRES.

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CLASS 7 - HEAVY-DUTY
(26,001 - 33,000 lbs. GVWR - 6 tires or more)*

CLASS 8 - HEAVY-DUTY
(33,001 lbs. and over GVWR - 10 tires or more)*

Class 7 and 8 include a range of heavier vehicles including large delivery trucks, motor coaches, all tractor-trailer combinations, refuse trucks, construction vehicles, etc.

CLASS 7 AND 8 - HEAVY-DUTY TOW
Gross Vehicle Weight Rating
(Class 7 - 26,001 to 33,000 lbs.)
(Class 8 - 33,001 and up to state limit)

- ☐ Year, make and model?
- ☐ Bus or motor home?
- ☐ Number of occupants?
- ☐ Two or three axle truck or tractor-trailer?
- ☐ What is the load and is it damaged?
- ☐ Keys?

STRAIGHT TRUCKS, BUSES OR MOTOR HOMES IN THESE CLASSES WILL USUALLY HAVE SIX TO TEN TIRES. TRACTOR AND TRAILER COMBINATIONS WILL HAVE FOURTEEN OR MORE TIRES.

MOTORCYCLES - LIGHT-DUTY TOW
Sports motorcycle – off road/basic street type
Performance motorcycle – "racing" model type
Touring motorcycle – large, heavy road touring type
Custom or 3-wheel motorcycle

TRAILERS - LIGHT-, MEDIUM- OR HEAVY-DUTY TOW

- ☐ Is it a truck and trailer to tow or just a trailer to tow?
- ☐ Number of axles and what is it hauling or is it designed to haul?
- ☐ Type of load or weight of load?
- ☐ If a tow, does the trailer have a ball, pintle or a fifth wheel hitch?

MOTOR HOMES - LIGHT-, MEDIUM- OR HEAVY-DUTY TOW
Class C – usually built on a van or pickup type truck chassis
Class A – usually built on a medium to large truck or bus chassis

LOCATION:
All locations are considered to be on the right hand shoulder unless advised the incident is in a lane of travel, in the center divider or off the road.
Locations should always be given so the tow truck can access the scene safely.
Freeway locations should always be given going in one direction, such as southbound south of a specific landmark or intersection.

REASON FOR THE TOW: Service call, storage, wreck or recovery
Service call: Specify the reason, fuel, tire, etc.
Tow: Specify the reason
Storage: Arrest or impound tow

- ☐ Is the vehicle stripped, burned, flat tires or no wheels?

Wreck: Condition of the vehicle

- ☐ Is the vehicle/truck overturned?
- ☐ Are lanes blocked?
- ☐ Is the vehicle off the road? ☐ How far?
- ☐ Any special problems at the scene or special equipment needed?

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*** Note:** The Gross Vehicle Weight Rating (GVWR) of the vehicle to be towed or recovered can be found on the identification label on the vehicle's driver's side doorframe. The number of pounds listed on the label can then be compared with the DOT Classification Vehicle Type Chart for the correct DOT class.