



Courtesy Jack Sullivan

Emergency Responder Safety Institute (www.respondersafety.com)

February: Traffic Incident Management & Responder Safety

Emergency responses to traffic incidents are rising and the main challenge is about how to safely manage those incidents in the best way to protect not only the emergency responders but also the victims of the initial incident and the motorists who are trying to pass by the scene. The secondary challenge is how to quickly clear the scene and resume normal traffic flow.

Statistics

In 2005 the Bureau of Labor Statistics (BLS) reported 390 workers of all occupations were struck and killed by vehicles on roadways. That number was up from the 378 fatalities reported in 2004. The BLS reports that there were 268 struck-by-vehicle incidents in 2009 and 277 similar incidents in 2010 and that struck-by vehicle incidents accounted for 6% of all fatal occupational injuries in 2009-2010. (Source - <http://www.bls.gov/news.release/cfoi.t01.htm>)

A 2001 NIOSH report indicated 26 firefighters struck and killed between 1990 and 1999 which at that time represented an 89% increase in those types of fatalities from 1995 to 2000. An NFPA report indicated that 36 firefighters were struck and killed by vehicles from 1989 to 1998. (Source: <http://www.cdc.gov/niosh/docs/2001-143/>). The NFPA annual Firefighter Fatality Reports also indicate that there have been 3 firefighters struck and killed by vehicles in 2005; 3 similar firefighter fatalities in 2006; 1 firefighter fatality in 2007; 4 firefighter fatalities in 2008; and 4 firefighters killed in 2009 when struck by vehicles. There is no formal process in place to track the total number of struck-by-vehicle incidents involving firefighter injuries, close calls and/or property damage.

You can obtain the most recent police-officer-specific data on LODDs from struck-by incidents here: <http://www.fbi.gov/ucr/ucr.htm#leoka>

According to those FBI reports from 1998 – 2007 there were 124 PD Officer LODD from struck-by incidents. The FBI reports that 6 officers were struck and killed by vehicles in 2009, and 13 police officers struck and killed by vehicles in 2008. Most fatal cases occurred while officers were on traffic stops or directing traffic at incident scenes.

Law Enforcement Officers Accidentally Killed
Circumstance at Scene of Incident, 1998–2007

Struck by vehicles - Total = 124

- Traffic stop, roadblock, etc. = 50 Line of Duty Deaths
- Directing traffic, assisting motorist, etc. = 74 Line of Duty Death

Core Elements of a comprehensive Roadway Incident Safety Program

Use the following list to evaluate the current program elements for your agency:

1) Roadway Incident Safety training for all personnel

- a. Initial orientation for new employees before they respond to any emergency
 - i. SOP/SOGs used as core competency
- b. Annual (minimum!) in-service training session for all personnel
 - i. Review SOP/SOGs
 - ii. Discuss strategies & tactics
 - iii. Lessons from previous incidents
 - iv. Tabletop exercises and scenarios
- c. All training in line with standard operating procedures and national standards, rules, regulations and “best practices”
- d. Periodic joint training sessions with other emergency responders (PD, EMS, etc.)
- e. Resources:
 - i. Emergency Responder Safety Institute - www.respondersafety.com
 - ii. FHWA On-scene Traffic Incident Management Operations
http://ops.fhwa.dot.gov/eto_tim_pse/about/onscene.htm
 - iii. I-95 Corridor Coalition Quick Clearance Toolbox
<http://i95coalition.org/i95/Training/QuickClearanceWorkshop/tabid/188/Default.aspx>

2) Roadway Incident Response Procedures (SOP/SOG)

- a. Standard Operating Procedure documented, authorized and published
 - i. Essential Components
 1. Terminology & Communications
 - a. Lane designations
 - b. Upstream/downstream
 - c. Block right/Block left
 - d. Unit designations
 - e. Tac channel ops, radio procedures
 2. Incident Command (NIMS & ICS)
 3. Safety of Personnel (PPE, work areas protected)
 4. Vehicle Placement (Proper blocking procedures, safe parking)
 5. Operations
 - a. Roadways
 - b. Highways (high-speeds!)
 - c. Bridges & Tunnels
- b. Compliance with NFPA 1500 (2007) Section 8.7 on Traffic Incidents
- c. Compliance with the Manual Of Uniform Traffic Control Devices (MUTCD) Chapter 6I – Control of Traffic through Traffic Incident Management Areas
- d. Resources:
 - i. SOP/SOG Template For Fire Department “Safe Positioning While Operating or Near Moving Traffic” - www.respondersafety.com or <http://tinyurl.com/5oz8nk>
 - ii. Source for NFPA 1500 (2007) – 8.7 Traffic Incidents - www.nfpa.org
 - iii. MUTCD Chap. 6I - <http://mutcd.fhwa.dot.gov/hlm/2009/part6/part6i.htm>

3) Proper PPE for all personnel

- a. OSHA compliant PPE Hazard Assessment documented (<http://tinyurl.com/59nkct>)
- b. NFPA compliant turnout gear (NFPA 1500, 1901, 1971)
- c. ANSI compliant high-visibility garments
- d. Resources:
 - i. <http://tinyurl.com/yzz4js> – OSHA 1910.132 – Personal Protective Equipment, General requirements
 - ii. <http://tinyurl.com/7s5dbw> – NFPA 1971: Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting
 - iii. <http://www.safetysupply.com/c/std107-2010.cfm> – ANSI 107 (2010) Standard
 - iv. <http://www.safetysupply.com/c/std207-2006.cfm> – ANSI 207 (2006) Standard (ANSI 207 is in a revision cycle as of September 2011)

4) Multi-agency & multi-jurisdictional cooperation, collaboration & communication;

- a. All responding agencies attend and participate regularly in local and/or regional Traffic Incident Management Committees (TIM Committees).
- b. Multi-agency planning and training on roadway incident response procedures on an ongoing basis
- c. Multi-agency review and critique of traffic incidents with the goal of improving strategies and tactics at future incidents
- d. Resources:
 - i. <http://tinyurl.com/76h7cf> - USFA & DOT Traffic Incident Management Systems
 - ii. <http://www.respondersafety.com/Training/Downloads.aspx>

5) Proper positioning of emergency vehicles & traffic control equipment at incidents

- a. Large fire apparatus parked at an angle upstream of the incident work area
- b. Front wheels turned away from incident scene and units properly chocked when parked
- c. Proper deployment of advance warning devices
 - i. Flares - <http://www.ncjrs.gov/App/Publications/abstract.aspx?ID=246237>
 - ii. MUTCD compliant high-visibility signs
 - iii. DOT cones – orange not lime-green
 - iv. Variable message signs
- d. Ambulances positioned downstream with the loading area doors angled away from moving traffic whenever possible
- e. All emergency equipment parked on one side of the road
- f. Effective placement of police cars for traffic control and scene safety
- g. Effective use of any available safety service patrol apparatus
- h. Resources:
 - i. <http://tinyurl.com/5oz8nk> - SOP/SOG Template For Your Fire Department “Safe Positioning While Operating or Near Moving Traffic”

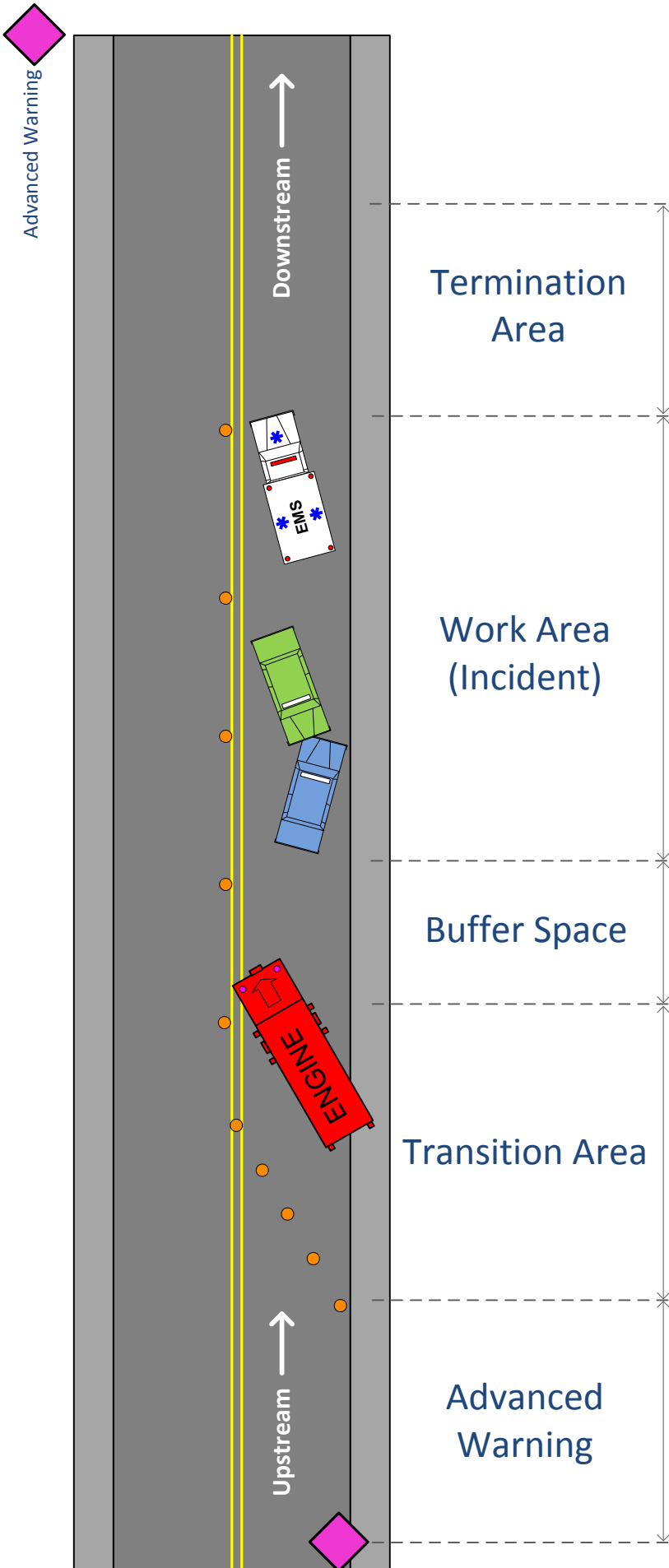
6) Emergency vehicle enhanced visibility design features.

- a. Emergency warning lights designed for on-scene protection
 - i. Effective lighting when unit parked at an angle
 - 1. Mounted high with 360 degree capability
 - 2. Side-mounted traffic control lights
- b. NFPA 1901 (2008) compliant high-visibility (reflective and florescent) chevrons on the rear of fire apparatus, road cones and PPE
- c. Resources:
 - i. <http://tinyurl.com/9hsd8l> - NFPA 1901: Standard for Automotive Fire Apparatus
 - ii. USFA Emergency Vehicle Visibility and Conspicuity Study - <http://www.usfa.dhs.gov/fireservice/research/safety/vehicle.shtm#f>
 - iii. USFA Study of Emergency Vehicle Warning Lighting <http://www.usfa.dhs.gov/fireservice/research/safety/vehicle.shtm#c>

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Temporary Traffic Control For 1st Responders



Estimated Stopping Distances

Speed	Distance (feet)
25 mph	155
35 mph	250
40 mph	305
45 mph	360
50 mph	425
55 mph	495
65 mph	645
70 mph	730

Advanced Warning

Road Type	Distance
Urban (low speed)	100 feet
Urban (high speed)	350 feet
Rural	500 feet
Highway	1000 feet

Estimating Distances

Distance between utility poles

Approx. 75 ft to 100 ft

Roadway skip lines

Line = 10 ft

break = 30 ft

Normal pace (step)

Approx. 3 ft

Example

Distance from Transition to Advanced Warning sign on a rural roadway with a typical speed of 50 mph:

Stopping dist = 425 ft Adv Warning = 500 ft

5 to 6 pole sections

12 skip lines

165 paces



**Entrance or
On Ramp**

**Left or Inside
Shoulder**

**Right or Outside
Shoulder**

**Left Lane
or Lane 1**

**Right Lane
or Lane 4**

**Left Center
or Lane 2**

**Right Center
or Lane 3**

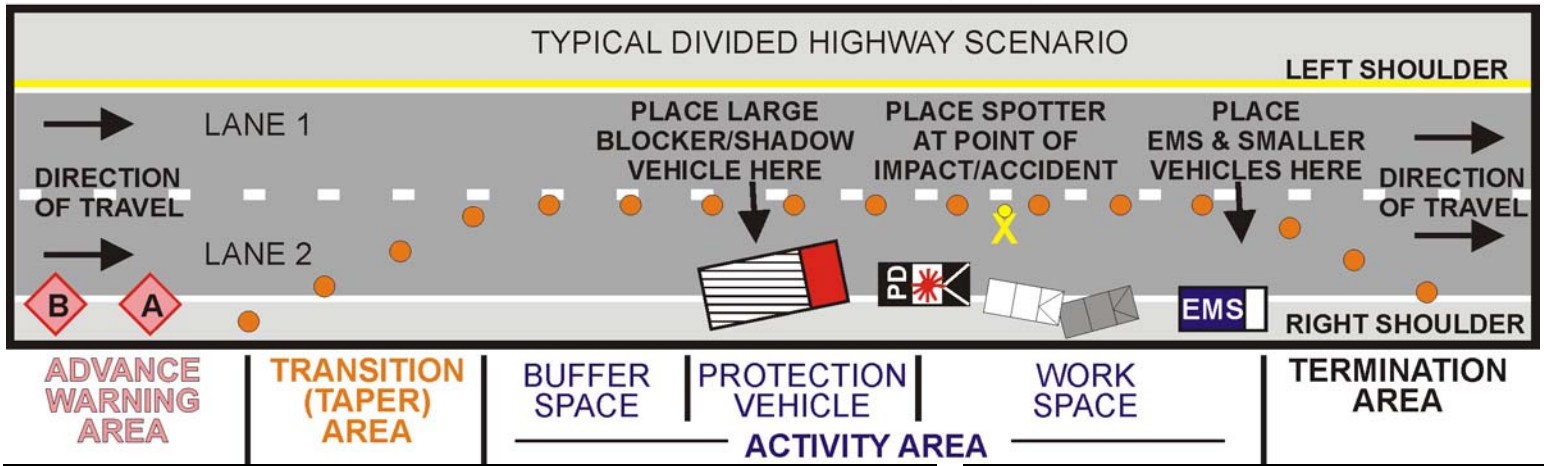
Photo by Ron Moore,
McKinney (TX) Fire Dept.



Highway Lane Designations and Terminology

Traffic incident responders use plain English where possible to identify incident location and lane designations. On roadways with 3 or less lanes, they are named left, center, and right when facing in the direction of traffic flow.

- When roadways have more than 3 lanes in any one direction, the lanes shall be identified and labeled with numbers, starting with the far left lane.
- When using lane numbers, the far left lane shall be called “Lane 1”. Each lane to the right is numbered sequentially 2 through n.
- Shoulders should be identified using “right/left” and/or “inside/outside” and the term “shoulder”; The left shoulder is the inside shoulder and the right shoulder is the outside shoulder. (i.e. inside (or left) shoulder, southbound interstate 75)
- Responders should also indicate the relative direction of travel (e.g. northbound or southbound) along with other incident location detail and any specific position assignments. For example an incoming unit might be told to safe park or “block upstream of the incident in Northbound (NB) Highway 75 Lane 3 and right shoulder”.
- Separated, high occupancy vehicle (HOV) or high occupancy toll (HOT), car pool, or bus only lanes that are physically separated shall be designated as HOV1 northbound (NB), HOV2, HOT1, HOT2, etc. as appropriate.
- The term “upstream” is defined as before the incident point or area. The term “downstream” is defined as past or beyond the incident point or area when facing in the direction of traffic flow.



INCIDENT MAGNITUDE		
MAGNITUDE	DURATION	STEPS TO TAKE
Minor	<30 Minutes	<ul style="list-style-type: none"> Notify TOC if incident is on roadway where a minor delay can create significant traffic impact Establish Advance Warning Area and other TTC Components as time/personnel permits
Intermediate	30 minutes - 2 hours	<ul style="list-style-type: none"> Notify Transportation Operations Center (TOC) Establish TTC Components Consider DOT Response
Major	2+hours	<ul style="list-style-type: none"> Notify Transportation Operations Center (TOC) Request DOT Response Early Establish Full Work Zone (Same as Non-Emergency)

ADVANCE WARNING AREA		TRANSITION AREA	
SPEED	SIGN DISTANCE	TAPER LENGTH	TYPICAL #CONES
40	A 350	320 ft.	8
55	A 750	660 ft.	16
65	A/B 1000/1500	780 ft.	18

RULES OF THUMB: 1. Travel lanes numbered from left-to-right. 2. Skip line is 10 ft. long with 30 ft. between skips. Taper cones at start of each skip line (40 ft.) 3. Length of Advance Warning Area = 8 x Roadway MPH. Use 12x factor for rural roads due to limited sight distance. Sign distance is from start of taper/transition.



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EMERGENCY RESPONDER CHECKLIST

*Safe and Effective Traffic Control is the Responsibility of On-Scene Responders:
Communicate-Coordinate-Cooperate*

INITIAL ACTION ITEMS: (Within first 15 minutes)

- Estimate magnitude/expected duration of incident
- Estimate vehicle queue (backup) length
- Establish Incident Command/Unified Command Post
 - o Assign Traffic Control Officer
- Identify the need for and request secondary response agencies: TOC, HazMat, Towing/Recovery, DPW, DOT, Accident Reconstruction, Medical Examiner, etc.
- Set-up appropriate TTC Components based on estimates. Upgrade TTC every 15 minutes.
- Set initial taper in direction of traffic travel
 - o Remove taper in opposite direction of traffic travel



VEHICLES:

- Limit number of responding vehicles
- Stage unnecessary vehicles off roadway
- Park ALL vehicles on same side of roadway
- Position apparatus to protect responders
- Minimize emergency lighting
- Create work area large enough to accommodate apparatus and responders SAFELY!

PERSONNEL:

- ALL responders Identifiable & in High Visibility Apparel
- Always: Be alert - Minimize exposure - Face traffic
- Place spotter at incident scene



CONSIDERATIONS:

- Time of the incident and amount of traffic congestion
- Can vehicles be moved from roadway? *Steer it. Clear it.*
- Can all lanes remain open?
 - o For Limited Access Highways:
 - 1 minute of lane closure = 1 mile of backup
- Determine emergency vehicle access route(s)
- Will closures create backups on other roadways?
- How quickly can lanes reopen? Minimize on-scene time.
 - o Post incident Recovery:
 - 1 minute of initial delay = 8 minutes to return to normal traffic
- How can we avoid secondary accidents?
- What can we do to make the scene SAFER?
- Update TOC periodically and as incident changes (escalation, termination, etc.)

Emergency Responder Safety Institute

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www.cvvfa.org

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COURTESY OF: www.nittec.org and www.tigerschmittendorf.com

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:

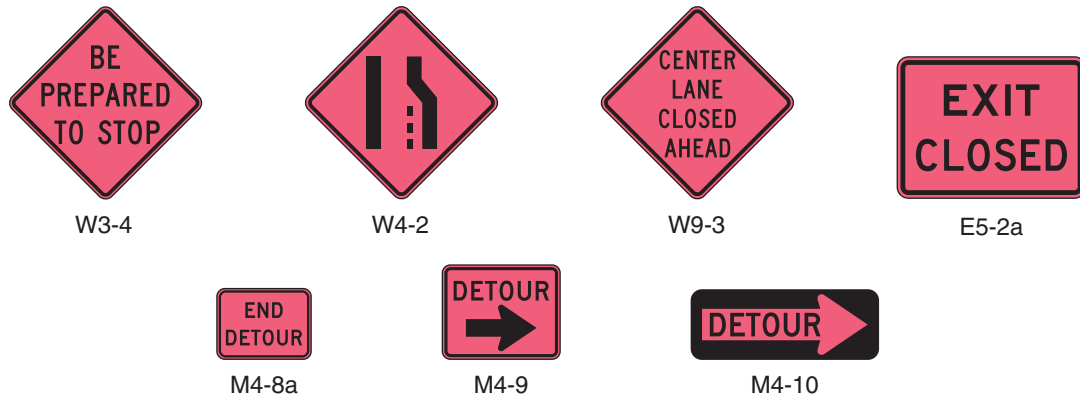
- 06 *In order to reduce response time for traffic incidents, highway agencies, appropriate public safety agencies (law enforcement, fire and rescue, emergency communications, emergency medical, and other emergency management), and private sector responders (towing and recovery and hazardous materials 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.*

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.

Roadway Incident Safety References and Resources

Compiled by Jack Sullivan CSP, CFPS – ResponderSafety@gmail.com

The **Emergency Responder Safety Institute (ERSI)**

<http://www.respondersafety.com>

ERSI Model Safe Parking SOP - Safe Positioning While Operating in or Near Moving Traffic
Available as a free download from <http://www.respondersafety.com/Training/Downloads.aspx>

ERSI Model SOG Cone & Flare Deployment at Roadway Incidents

<http://www.respondersafety.com/Training/Downloads.aspx>

The **Emergency Responder Safety Institute** - News and Incident Reports

<http://www.respondersafety.com/News.aspx>

NIOSH Safety and Health Topic: Highway Work Zone Safety

<http://www.cdc.gov/niosh/topics/highwayworkzones/>

National Law Enforcement Officers Memorial

Causes of Police Deaths (1995-2004)

<http://www.nleomf.org/facts/officer-fatalities-data/causes.html>

U.S. Department of Labor, Bureau of Labor Statistics, Census of Fatal Occupational Injuries.

www.bls.gov/iif/

United States Fire Administration - Emergency Vehicle Safety

<http://www.usfa.dhs.gov/fireservice/research/safety/vehicle.shtm>

United States Fire Administration - Roadway Operations Safety

<http://www.usfa.dhs.gov/fireservice/research/safety/roadway.shtm>

USFA/FHWA/IFSTA – “Traffic Incident Management” for fire and emergency service providers.

<http://www.usfa.dhs.gov/fireservice/research/safety/roadway.shtm#B>

Federal Highway Administration – Emergency Transportation Operations – Traffic Incident Management

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

Federal Highway Administration – Managing Travel for Planned Special Events

<http://ops.fhwa.dot.gov/publications/fhwaop04010/toc.htm>

National Fire Protection Association (NFPA)

Fire Apparatus standards available at – www.nfpa.org

American National Standard for High Visibility Public Safety Vests

(ANSI/ISEA 207-2006): <http://www.safetysafetyequipment.org/c/std207-2006.cfm>

American National Standard for High-Visibility Safety Apparel & Headwear

(ANSI/ISEA 107-2010): <http://www.safetysafetyequipment.org/c/std107-2010.cfm>

The Manual on Uniform Traffic Control Devices (MUTCD) 2009 Edition (12/2009)

http://mutcd.fhwa.dot.gov/kno_2009.htm

The Manual on Uniform Traffic Control Devices (MUTCD) 2009 Edition

Chapter 6-I. - Control of Traffic through Traffic Incident Management Areas

<http://mutcd.fhwa.dot.gov/htm/2009/part6/part6i.htm>

The Manual on Uniform Traffic Control Devices (MUTCD) 2009 Edition
Examples of Traffic Incident Management Area Signs
http://mutcd.fhwa.dot.gov/hdm/2009/part6/fig6i_01_longdesc.htm

Evaluation of Chemical and Electric Flares (US Dept of Justice)
<http://www.ncjrs.gov/App/Publications/abstract.aspx?ID=246237>

NIOSH - Building Safer Highway Work Zones: Measures to Prevent Worker Injuries
From Vehicles and Equipment (DHHS/NIOSH Pub. No. 2001-128):
<http://www.cdc.gov/niosh/docs/2001-128/>

NIOSH - Traffic Hazards to Fire Fighters While Working Along Roadways
<http://www.cdc.gov/niosh/docs/2001-143/>

NIOSH Firefighter Fatality Investigations and Prevention Program
Investigations Involving "Struck-By" Incidents:
<http://www.cdc.gov/niosh/fire/>

NIOSH Report 99F-27 - August 5, 1999 Incident in Oklahoma
2 Career firefighters were struck on an interstate; one was killed.
Available on the internet: <http://www.cdc.gov/niosh/fire/reports/face9927.html>

NIOSH Report 99F-38 - September 27, 1999 Incident in South Carolina
Firefighter dies after being struck by a tractor trailer truck.
Available on the internet: <http://www.cdc.gov/niosh/fire/reports/face9938.html>

NIOSH Report F2003-37 - Oct 27, 2003 Incident in Minnesota
Assistant chief is struck and killed at road construction site
Available on the internet: <http://www.cdc.gov/niosh/fire/reports/face200337.html>

NIOSH Report F2003-16 - Feb 23, 2003 Incident in New Jersey
Fire police captain dies from injury-related complications after being struck by motor vehicle
Available on the internet: <http://www.cdc.gov/niosh/fire/reports/face200316.html>

NIOSH Report F2003-13 - Mar 18, 2003 Incident in Texas
Firefighter killed while walking across an Interstate highway
Available on the internet: <http://www.cdc.gov/niosh/fire/reports/face200313.html>

NIOSH Report F2002-38 - Jul 01, 2002 Incident in Minnesota
Fire captain killed, two fire fighters and police officer injured when struck by a motor vehicle
Available on the internet: <http://www.cdc.gov/niosh/fire/reports/face200238.html>

NIOSH Report F2002-35 - Jun 08, 2002 Incident in Florida
Off-duty career fire fighter dies and another fire fighter is injured after being struck by a truck
Available on the internet: <http://www.cdc.gov/niosh/fire/reports/face200235.html>

NIOSH Report F2002-18 - Apr 11, 2002 Incident in Kansas
Fire chief dies after being struck by a fire truck at a motor-vehicle incident
Available on the internet: <http://www.cdc.gov/niosh/fire/reports/face200218.html>

NIOSH Report F2007-26 – July 27, 2007 Incident in Illinois
Fire Fighter Dies When Struck By a Bus While Working Along an Interstate Highway
Available on the internet: <http://www.cdc.gov/niosh/fire/reports/face200726.html>

NIOSH Report F2010-06 - Feb 12, 2010 Incident in Pennsylvania
Fire Police Captain Dies After Being Struck by a Motor Vehicle at a Controlled Roadway
Available on the internet: <http://www.cdc.gov/niosh/fire/reports/face201006.html>

International Association of Chiefs of Police - Traffic Incident Management (TIM)
<http://www.theiacp.org/Technology/LEITSTechnology/TrafficIncidentManagement/tabid/891/Default.aspx>

I-95 Corridor Coalition Incident Management Core Competencies Online Training
<http://www.i95vim.com/>

I-95 Corridor Coalition Incident Management Clearinghouse
<http://www.i95coalition.org/i95/Library/IncidentMgmtClearinghouse/tabid/86/Default.aspx>

The I-95 Corridor Coalition Quick Clearance Toolkit
<http://www.i95coalition.org/i95/Library/IncidentMgmtClearinghouse/tabid/86/agentType/View/PropertyID/89/Default.aspx>

Improving Apparatus Response and Roadway Operations Safety in the Career Fire Service
by the Div. of Occupational Health, Safety and Medicine of the International Assoc. of Fire Fighters (IAFF)
<http://www.iaff.org/hs/EVSP/home.html>