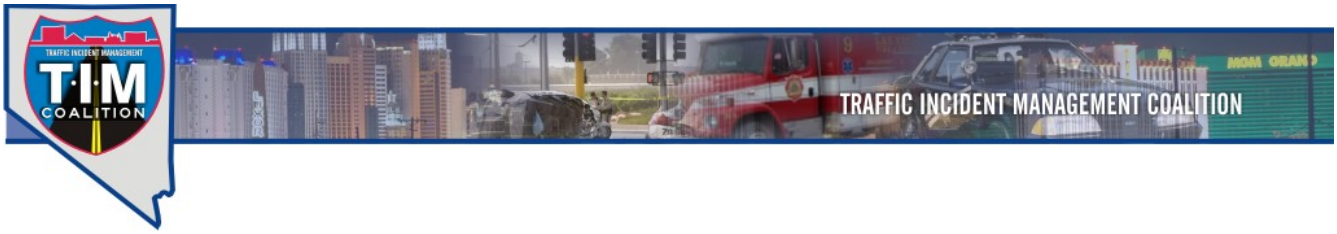


November 12, 2018

RE: Nevada Statewide Traffic Incident Management Guidelines

Dear Traffic Incident Management Partner(s):

In 2008, NDOT and the Department of Public Safety, Nevada Highway Patrol, established the southern Nevada TIM Coalition from transportation and public safety representatives to address the needs of traffic incident management (TIM) in southern Nevada. This group expanded in 2011 to include northern Nevada and, in 2013 federal guidelines for TIM were introduced through every day counts (EDC) SHRP2 TIM Training. In 2014 NDOT supported a new TIM Coalition program, and in 2015, the success of safe quick clearance motivated the expansion of TIM training along with Coalition meetings throughout the entire State of Nevada, including rural areas. We are pleased to present you with this Guideline document, "Nevada Traffic Incident Management (TIM) Guidelines."

Working in and near traffic is dangerous. Tragically, more and more incident responders are struck by traffic on our nation's highways each year, causing untold injuries and even death. Having a consistent multiagency approach with guidelines for incident management will help provide the safest possible work environment for all Nevada incident responders.

These guidelines are not to serve as a textbook, nor are they a substitute for technical knowledge, experience, or effective judgment. Because no two traffic incidents are alike, the guidelines are general in context. The Incident Commander (IC) on the scene of each incident or crash will require an individual assessment for the specific conditions present. This initial "scene size-up" assessment and corresponding actions require constant reevaluation to ensure that apparatus positioning and warning device placement are adequate and safe.

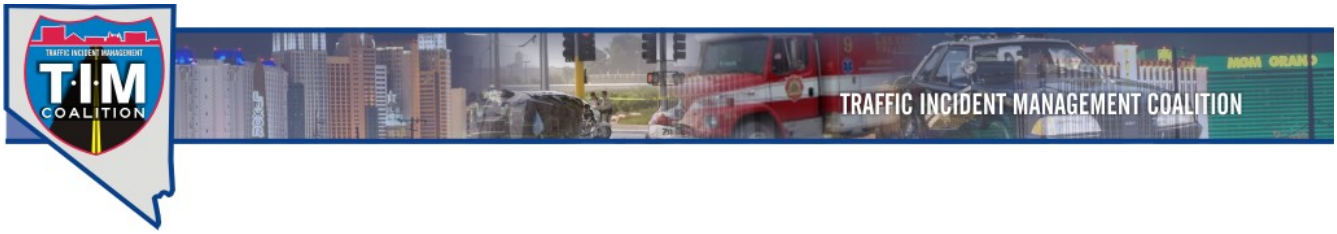
The guidelines found in this document will require ongoing review and updating as conditions, technology, and equipment change. As each agency applies these guidelines in the field, we encourage you to note any needed revisions and transmit them to the TIM Coalition.

We value your continued support and efforts in enhancing traffic incident management in Nevada and remain committed to keeping you and our motorists' safe on our highway system.

Sincerely,

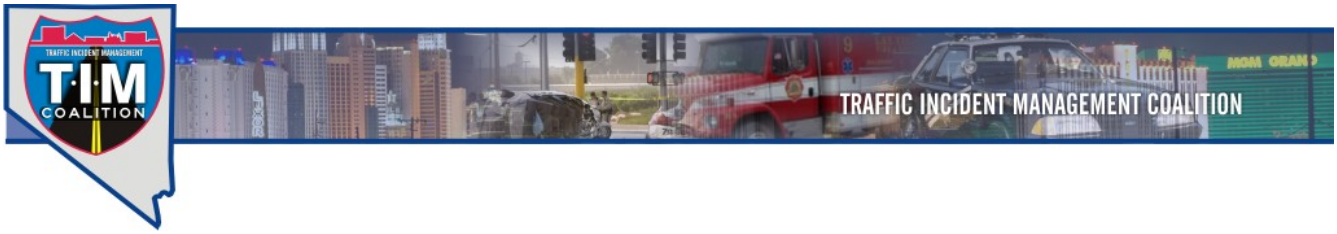
On behalf of the TIM Coalition(s)

Pat Gallagher and Rita Brohman



Revisions Table

Revisions	Chapter & Page	File Version	Date	Revision Author
Ver_1			Nov 11, 2018	NDOT TIM Coalition



Background

The Nevada Traffic Incident Management (TIM) Guidelines for TIM Coalitions were developed under the direction of Nevada's Traffic Incident Management Coalitions (NV-TIM). The NV-TIM is an organization initiated by the Nevada Department of Transportation (NDOT) to facilitate coordination, communication and cooperation between multiagency, multi-discipline incident responders to clear traffic incidents quickly while promoting the safety of responders and the motoring public.

Since 2014, the TIM Coalition's members, NHP, NDOT, towing, fire, and other responders, has educated 48.5% of incident responders throughout the state on the importance of quickly clearing traffic incidents, improving responder safety, and reducing the number of secondary crashes through training sessions, annual Safety Summit and other conferences, hands-on exercises, legislative changes, best practices sharing, and workshops. Through discussions and training sessions with numerous statewide responders, it was determined that Nevada needed to adopt common incident management practices and provide comprehensive guidelines that will become part of regional TIM Plans, to help uniformly train incident responders.

The following frightening statistics released by the National Traffic Incident Management Coalition (NTIMC) illustrate why incident responder safety is so crucial.

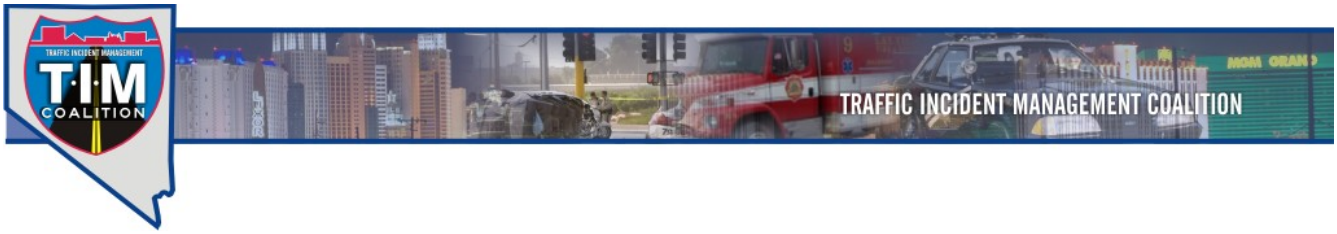
- Traffic incidents account for about one-quarter of all congestion on US roadways.
- For every minute that a freeway travel lane is blocked during a peak travel period, four minutes of travel delay results after the incident is cleared.
- Struck-by incidents, where passing motorists hit responders, are on the rise. In 2016, the National Institute for Occupational Safety and Health (NIOSH) reported 342 workers of all kinds were killed in struck-by incidents. That year, struck-by incidents accounted for 6.5 percent of the total number of occupational fatal injuries to first responders.
- The website www.respondersafety.com reports daily on all known struck-by incidents involving emergency responders. On the average, at least two emergency responders are struck each day in America. Since TIM Training begun in 2014, these numbers have dropped significantly. The average number of responders who are struck and killed each year while working in or near moving traffic:
    - Fire/Rescue and EMS: 4 per year
    - Law enforcement: 10 per year *(down from 12)*
    - Towing and recovery: 40-50 per year *(down from 60)*
      Highway personnel (DOT, Public Works, Freeway Service Patrol): 267 per year
- About 20 percent of all firefighter deaths are not related to firefighting at all, but rather occur due to vehicle-related incidents.

- According to FBI statistics, in 2016, an average of one US law enforcement officer was struck and killed each month by a passing vehicle. Recent numbers show that has lowered to 10.

NDOT and the Nevada TIM Coalitions intend these TIM Guidelines to explain how to implement effective traffic incident management strategies to ensure responder safety and quick clearance of traffic incidents. These Guidelines complement the Nevada Open Roads Policy[1] (ORP), which states public safety agencies shall re-open the roadway as soon as possible on an urgent basis with the highest priority given to responders and the public. Responder agencies throughout the state have signed an agreement to this policy, "Open Road Agreements" (ORA). The ORAs can be found at www.NVTIM.com

THESE GUIDELINES DO NOT REPLACE AGENCY STANDARD OPERATING PROCEDURES; RATHER, THEY PROVIDE INCIDENT MANAGEMENT PRINCIPLES THAT SHOULD BE LOCALLY ADOPTED TO IMPROVE RESPONDER SAFETY AND LESSEN THE LIKELIHOOD OF SECONDARY INCIDENTS.

[1] Full details on the Open Roads Policy can be found in Section 2.4.6.



Acknowledgments

NDOT and the Nevada TIM Coalitions would like to thank the following agencies/organizations for their time, dedication, and contributions to participating in TIM Coalitions, Nevada TIM training and the implementation of these Guidelines.

Association of General Contractors

AAA

AEM

American Ready Mix

Ames Construction

AMR

Arizona Department of Public Safety

Atlas Towing

Barrick

Big Valley Towing

Bureau of Land Management

Boulder Fire

CA Group, Inc.

Cal-Nevada Towing

CareFlight

Carlin Fire Department

Carlin Police Department

Clark County Coroner

Clark County Fire Department

Clark County Public Works

Clark County Office of Emergency Management

Carson City Sheriff's Office

Central Dispatch

Central Lyon Fire

Boulder Fire

Carson City

Carson City Fire

Carson City Police Department

City of Elko Fire

City of Henderson

City of Las Vegas

City of North Las Vegas

City of Reno

City of Sparks

City of Sparks Police Department

Citywide Towing

Clark County

Clark County Fire

Clark County Public Works

Clean Harbors Environmental

Coach USA

Community Ambulance

CORE Construction

D&S Towing

Denny's Auto

Department of Corrections

Department of Labor

Diversified

Department of Motor Vehicles

Double Barrel Environmental

Douglas County Sheriff

East Towing

Ed's Place Towing

Electric Vehicle Association

Elko Ambulance

Elko County Fire

Elko County Sheriff's Office

Elko County Ambulance

Elko County Fire

Elko Daily News

Elko Fire Department

Elko Police Department

Ely Fire Department

Ely Road Department

Ely Shoshone Tribune

Environmental Cleanup

Eureka Ambulance

Eureka County Sheriff

Eureka Fire Department

Ewing Brothers Towing

Farr West Engineering

FAST TMC

Fast Towing

Federal Highway Administration (FHWA)

Freeway Service Patrol

Garnett Interchange Project

Granite Construction

H2O Environmental

HAAS Alert

Henderson Fire

Henderson Police Department

HGH EMS

High Desert Tow

Humboldt Fire

Humboldt County Sheriff's Office

Humboldt-Toiyabe National Forest

Humbolt Sun

IME

Jackpot Fire Department

KGHM

Kiewit

Kimley-Horn

KOLO TV

KRJC

KTVN

Lander County Sheriff

Las Vegas Fire

Las Vegas Metropolitan Police Department

Las Vegas Paving

Logistical Solutions

Lostra Bros. Towing

Lovelock Fire Dept

Lovelock Police Department

Lund Volunteer Fire Department

McGill Fire

McGinley & Assoc.

Medic West

Melchert

Midway Gold

Mine Safety Health Assn.

National Guard

National Weather Service

Nevada County Sheriff's Office

Nevada Division of Forestry

Nevada Donor Network

Nevada Department of Transportation

Nevada Department of Wildlife

Nevada Division of Forestry

Nevada Energy

Nevada Highway Patrol

Nevada Operation Lifesaver

Newmont Mining

North Las Vegas Fire

North Las Vegas Office of Emergency Management

North Las Vegas Police Department

North Las Vegas Department of Public Works

National Oceanic and Atmospheric Administration (NOAA)

North Lyon Fire

Nevada Broadcast Association

Nye County EMS

Nye County Sheriff

Office of Traffic Safety

Pahrump Police Dept

Parsons

Patriot Environment

Pershing County Sheriff

PSS Industries

Quality Towing

Regional Emergency Medical Services Authority (REMSA)

Reno Dispatch

Reno Fire Department

Reno Police Department

Roadway Towing

Regional Transportation Commission (RTC)

Safety-Kleen

Sierra Nevada Construction

Sundance Media Group

Spring Creek Fire

Storey County Fire

Storey County Sheriff's Office

Summit Air Ambulance

Truckee Meadows Fire Protection District

Truckee Meadows Police Department

Truckee Meadows Water Authority

Utah Department of Transportation

Utah Highway Patrol

United Towing

University of Nevada – Las Vegas

University of Nevada – Reno

Union Pacific

United Road Towing

West Wendover Fire

West Wendover Police Department

W.G. Bender

Walker Towing

Washoe County Medical Examiner Office

Washoe County District Attorney

Washoe County Emergency Management

Washoe County Sherriff

Washoe County School District

White Pine County

White Pine County Fire/EMS

White Pine County Road Department

White Pine County School

White Pine County Sheriff's Office

Winnemucca Fire Department

Winnemucca Police Department

Winnemucca Publishing

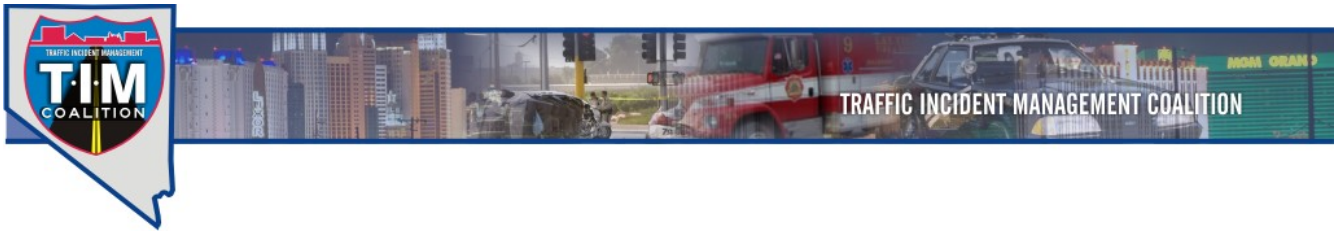
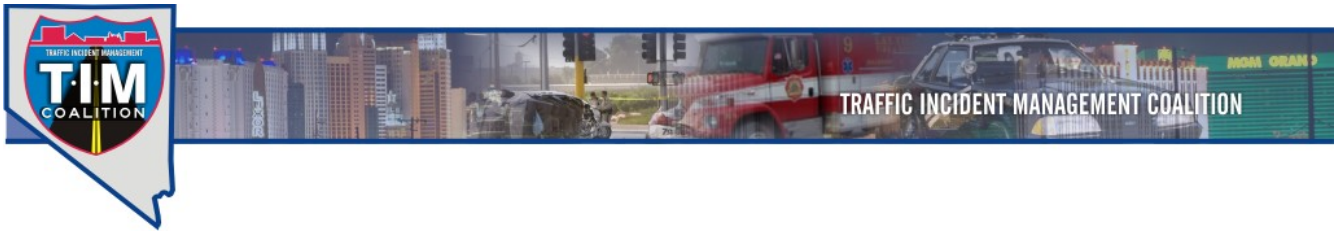


Table of Contents



List of Abbreviations

AAA – American Automobile Association

AASHTO – American Association of State Highway and Transportation Officials

AED – Automated External Defibrillator

AAR – After Action Review

AIS – Accident Investigation Site

ANSI – American National Standards Institute

CCTV – Closed Circuit Television

CFR – Code of Federal Regulations

CPR – Cardiopulmonary Resuscitation

DHS – Department of Homeland Security

DMS – Dynamic Message Sign

DOT – Department of Transportation

DPS – Department of Public Safety

EMS – Emergency Medical Services

EMT – Emergency Medical Technician

EOC – Emergency Operations Center

EPD – Environmental Protection Division

ERG – Emergency Response Guidebook

ETC– Estimated Time of Clearance

ETO – Emergency Transportation Operations

FHWA – Federal Highway Administration

IRP – Incident Response Plan

IRV – Incident Response Vehicle

NDOT – Nevada Department of Transportation

NHP – Nevada Highway Patrol

HAZMAT – Hazardous Material

HSPD – Homeland Security Presidential Directive

IAFC – International Association of Fire Chiefs

IAFF – International Association of Fire Fighters

IAP – Incident Action Plan

IC – Incident Commander

ICS - Incident Command System

ITS – Intelligent Transportation Systems

LZ – Helicopter Landing Zone

MCCD – Motor Carrier Compliance Division

MP – Mile Post

MSDS – Material Safety Data Sheet

MUTCD – Manual on Uniform Traffic Control Devices

NDOT – Nevada Department of Transportation

NDOT-MP – Nevada Department of Transportation Maintenance Personnel

NIMS – National Incident Management System

NIOSH – National Institute for Occupational Safety and Health

NROC – Northern Nevada Roadway Operations Center

NTIMC – National Traffic Incident Management Coalition

NUG – National Unified Goal

ORP – Open Roads Policy

ORA – Open Road Agreements

PA – Public Address System

PDMS – Portable Dynamic Message Sign

POC – Point of Contact

PSAP – Public Safety Answering Point

RP – Response Plan

ROC – Roadway Operation Center(s)

RTCSNV – Regional Transportation Commission of Southern Nevada

RTC – Regional Transportation Commission (northern Nevada)

SDS – Safety Data Sheet

TIM – Traffic Incident Management

TIMP – Traffic Incident Management Plans

TMC – Transportation Management Center

TIMA – Traffic Incident Management Area

TRAA – Towing and Recovery Association of America

TTC – Temporary Traffic Control

UC – Unified Command (part of the ICS)

WZ – Work Zone

1 INTRODUCTION

1.1 PURPOSE

The purpose of the Nevada Traffic Incident Management (TIM) Guidelines (Guidelines) is to establish standard recommendations for traffic incident management and operations. These Guidelines are not to serve as a textbook, nor are they a substitute for technical knowledge, experience, or effective judgment. This document provides standard guidelines to enhance motorist/responder safety by clearing scenes efficiently. No two traffic incidents are alike; each responder should assess each incident scene to determine unique conditions and challenges that may require responsive actions, situational awareness, and constant reevaluation to ensure safety. Situational awareness and the availability of equipment and personnel should guide the appropriate response during any incident.

1.2 INTENDED AUDIENCE

Any operator or incident responder that is involved in the incident management process—including incident detection, notification, response, and clearance—should follow the Guidelines. The intended audience includes the primary and support responders listed below.

Primary Responders:

- Law enforcement
- Fire and rescue personnel
- Nevada Department of Transportation (NDOT) personnel
- Local and State Department of Transportation or public works personnel
- Emergency Medical Services (EMS)
- Towing and recovery agency personnel
- 911 dispatch and Transportation Management Center (TMC) staff
- Coroner/medical examiner

Support Responders:

- Environmental Protection Division (EPD)
- HAZMAT mitigation agents
- Nevada Division of Emergency Management Agency personnel (Homeland Security)

1.3 REQUESTING REVISIONS

Due to the dynamic nature of traffic incident management, it is recognized and expected that periodic revisions to these Guidelines will be required. Emergency responders are encouraged to submit recommended changes as these Guidelines are applied in the field. A Revisions Request is provided in **Appendix A**. The notification/ request form is also available online at www.nvtim.com. The Revisions Table (i) will record all revisions made since the first version of the Guidelines.

2 NEVADA TRAFFIC INCIDENT MANAGEMENT

The Nevada TIM Guidelines provide recommendations and guidance for improving responders' safety during incident response. Various national and statewide initiatives, which are mentioned below, provided a foundational source of information to support these Guidelines.

2.1 FEDERAL HIGHWAY ADMINISTRATION (FHWA)

As part of the FHWA Emergency Transportation Operations (ETO) program, FHWA's Office of Transportation Operations has three major program areas: Traffic Incident Management, Traffic Management for Planned Special Events, and Emergency Transportation Operations for Disasters. The TIM program focuses on integrated interagency communications, on-scene traffic incident management operations, and regional and statewide programs and institutional coordination. Major initiatives include the TIM performance metrics; basic guidance for state and local TIM programs in promoting safe, quick clearance process and laws; and guidance on developing or improving service patrols.

2.2 NATIONAL INCIDENT MANAGEMENT SYSTEM (NIMS)

The Department of Homeland Security developed the National Incident Management System (NIMS) concept in 2004, following the Homeland Security Presidential Directive 5. NIMS training provides a systematic approach to enable all agencies with responsibilities to manage an incident together by establishing a common set of incident objectives and strategies. NIMS training supports the Incident Command System (ICS) to standardize on-scene response that promotes agency integration, coordinated responses, and common procedures.

2.3 NATIONAL TRAFFIC INCIDENT MANAGEMENT COALITION (NTIMC)

The National Traffic Incident Management Coalition (NTMIC), launched in 2004, is a coalition of various incident responder organizations, including the American Automobile Association (AAA), American Association of State Highway and Transportation Officials (AASHTO), International Association of Fire Fighters (IAFF), and International Association of Fire Chiefs (IAFC), to promote the safe and efficient management of traffic incidents. This coalition established the National Unified Goal (NUG) in association with the national and international traffic incident responder's organizations. The NUG is organized into three main objectives:

- Responder safety
- Safe and quick clearance

- Prompt and reliable incident communications

The NUG promotes these objectives though 18 strategies that include development of multijurisdictional and multi-disciplinary traffic incident management policies, procedures, and training. Additional details about the NUG can be found at www.NVTIM.com

2.4 EXISTING STATE OF NEVADA POLICIES, PROGRAMS, AND STATUTES

The State of Nevada has recognized Traffic Incident Management (TIM) in legal statutes through various policies and procedures that are intended to ensure safe, quick clearance of the scene and the safety of responders. Updated revisions that support TIM safe, quick clearance are listed below *(with emphasis added).*

2.4.1 NEVADA REVISED STATUTE 484B.433 : HOLD HARMLESS LAW

This law gives law enforcement authority to have towing companies remove vehicles/cargo from the roadway and provides exemptions.

1. Except as otherwise provided in subsection 2, whenever any law enforcement officer finds a vehicle standing upon a highway in violation of any of the provisions of chapters 484A to 484E, inclusive, of NRS, the officer may move the vehicle, or require the driver or person in charge of the vehicle to move it, to a position off the paved, improved or main-traveled part of the highway.

2. Whenever any law enforcement officer finds a vehicle, the cargo of a vehicle or other property unattended, disabled or spilled upon any highway, bridge or causeway, or in any tunnel, where the vehicle, cargo or property constitutes an obstruction to traffic, interferes with the normal flow of traffic or otherwise endangers public safety, the officer or the law enforcement agency employing the officer, in coordination with unified command, if applicable, may provide for the immediate removal of the vehicle, cargo or property to a position where the vehicle, cargo or property no longer constitutes an obstruction to traffic, interferes with the normal flow of traffic or otherwise endangers public safety.

4. Unless a different course of action is necessary to preserve evidence of a criminal offense, a law enforcement officer who wishes to have a vehicle or part of a vehicle removed from a highway pursuant to subsection 3 shall, in accordance with any applicable protocol such as a rotational schedule regarding the selection and use of towing services, cause the vehicle or part of a vehicle to be removed by a tow car operator. The tow car operator shall, to the extent practicable and using the shortest and most direct route, remove the vehicle or part of a vehicle to the garage of the tow car operator unless directed otherwise by the officer. The tow car operator is liable for any loss of or damage to the vehicle or its contents that occurs while the vehicle is in the possession or control of the tow car operator.

5. A person or entity, including a law enforcement officer, the law enforcement agency employing the law enforcement officer, unified command or a tow car operator who provides for the removal of a vehicle, the cargo of a vehicle or other property pursuant to subsection 2:

(a) Is not liable for any loss of or damage to the vehicle, the contents of the vehicle, the cargo or the property that is removed; and

(b) Must make a reasonable attempt, as soon as practicable, to notify the owner of the vehicle, cargo or property as to the location of the vehicle, cargo or property if the owner of the vehicle or property is not present at the time of removal and the owner of the vehicle, cargo or property is ascertainable by the officer.

6. All costs incurred under the provisions of subsection 2 must be borne by the owner of the vehicle, cargo or property.

2.4.2 NEVADA REVISED STATUTE 484E.020: MOVE IT LAW

This law provides that the driver's vehicle must be moved if it is able to be moved and is creating a hazard or obstructing traffic and must be moved out of the traffic lanes of the roadway to a safe location that does not create a hazard or obstruct traffic.

The driver of any vehicle involved in a crash resulting only in damage to a vehicle or other property which is driven or attended by any person shall:

1. Immediately stop his or her vehicle at the scene of the crash; and

2. If the driver's vehicle is creating a hazard or obstructing traffic and can be moved safely, move the vehicle or cause the vehicle to be moved out of the traffic lanes of the roadway to a safe location that does not create a hazard or obstruct traffic and, if applicable, safely fulfill the requirements of NRS 484E.030.

2.4.3 NEVADA REVISED STATUTE 484B.267: MOVE OVER LAWS

This law requires passing vehicles to slow down and/or safely move to an adjacent lane when approaching an authorized emergency vehicle (including towing, recovery, or maintenance vehicles) that is parked or otherwise stopped on or next to a multilane highway.

2. Upon approaching an authorized emergency vehicle or an official vehicle of a regulatory agency which is moving or preparing to move in any direction, including, without limitation, arriving at or leaving the scene of a crash or other incident, and making use of flashing lights meeting the requirements of subsection 3 of NRS 484A.480, the driver of any other vehicle shall, except when otherwise directed by a law enforcement officer:

(a) Decrease the speed of his or her vehicle to a speed that is reasonable and proper, pursuant to the criteria set forth in subsection 1 of NRS 484B.600;

(b) Proceed with caution;

(c) Be prepared to stop;

(d) If the authorized emergency vehicle or official vehicle of a regulatory agency is moving in the same direction of travel as the driver, not drive abreast of or overtake the authorized emergency vehicle or official vehicle of a regulatory agency;

(e) If possible, drive in a lane that is not adjacent to the lane in which the authorized emergency vehicle or official vehicle of a regulatory agency is moving, unless roadway, traffic, weather or other conditions make doing so unsafe or impossible; and

(f) If the authorized emergency vehicle or official vehicle of a regulatory agency:

(1) Approaches the driver's vehicle, proceed as required pursuant to subsection 1; or

(2) Stops, proceed as required pursuant to NRS 484B.607.

3. As used in this section, "preparing to move" means any indication that is visible to an approaching driver that an authorized emergency vehicle or an official vehicle of a regulatory agency is about to move, including, without limitation:

(a) A movement of the vehicle; or

(b) The use of hand signals by the driver of the vehicle.

2.4.4 NEVADA CODE NRS 484B.443: ABANDONED VEHICLE LAW

NRS 484B:443 states that law enforcement officers are authorized to remove certain vehicles and property: protocol for selection and use of towing services; duties and liability of person removing vehicle or property; responsibility for cost of removal.

1) Except as otherwise provided in subsection 2, whenever any law enforcement officer finds a vehicle standing upon a highway in violation of any of the provisions of chapters 484A to 484E, inclusive, of NRS, the officer may move the vehicle, or require the driver or person in charge of the vehicle to move it, to a position off the paved, improved or main-traveled part of the highway.

2) Whenever any law enforcement officer finds a vehicle, the cargo of a vehicle or other property unattended, disabled or spilled upon any highway, bridge or causeway, or in any tunnel, where the vehicle, cargo or property constitutes an obstruction to traffic, interferes with the normal flow of traffic or otherwise endangers public safety, the officer or the law enforcement agency employing the officer, in coordination with unified command, if applicable, may provide for the

immediate removal of the vehicle, cargo or property to a position where the vehicle, cargo or property no longer constitutes an obstruction to traffic, interferes with the normal flow of traffic or otherwise endangers public safety.

3) Except as otherwise provided in subsection 2, any law enforcement officer may, subject to the requirements of subsection 4, remove any vehicle or part of a vehicle found on the highway, or cause it to be removed, to a garage or other place of safekeeping if:
   a) The vehicle has been involved in a crash…
   b) The person driving or in the actual physical control of the vehicle is arrested for any alleged offense.
   c) The person in charge of the vehicle is unable to provide for its custody or removing within:
      i) Twenty-four hours after abandoning the vehicle on any freeway, United States Highway or other primary arterial highway.
      ii) Seventy-two hours after abandoning the vehicle on any other highway.

2.4.5 NEVADA TIM COALITIONS

There are currently six Nevada TIM Coalitions throughout the state of Nevada: two urban TIMs Northern Nevada TIM (Reno and surrounding area), Southern Nevada TIM (Las Vegas Valley), and four rural TIMs; Winnemucca, Elko, Ely, and Tonopah.

The Nevada Traffic Incident Management (TIM) Coalitions exist to coordinate and sustain an effective multi-agency, multi-disciplinary and multi-jurisdictional TIM program that improves safety by training together to insure safe, quick clearance of crashes. Early removal of vehicles, debris and injured parties has demonstrated a significant decline in secondary crashes and saves lives of first responders, incident victims and other motorists. Nevada TIM Coalitions provide a forum for discussions, incident After Action Reviews (AAR) debriefings, state and regional policies and procedures to enhance coordinated response time for safe, quick removal of incidents from the roadway. TIM meetings are open to TIM Coalition members bimonthly in urban areas and biannually in rural areas.

The number and need for TIM Coalitions is subject to change as needed and supported without modification to these Guidelines.

2.4.6 NEVADA OPEN ROADS POLICY AND OPEN ROADS AGREEMENT

The Nevada Open Roads Policy (ORP), **Appendix B**, was initiated by NDOT and the Department of Public Safety (DPS) and is signed by the Governor of the State of Nevada, 2017. It states that whenever a roadway or travel lane is closed or partially blocked by a collision or traffic incident that Law Enforcement, Transportation, and Local Public Safety agencies shall re-open the roadway as soon as possible on an urgent basis with the highest priority given to the safety of the public and responders.

The Open Road Agreements (ORAs), support the statewide ORP and, are available for signatures by all responder agencies throughout the State. A sample ORA can be found in **Appendix C.**

2.4.7 NEVADA TMC AND DISTRICT ROCS

NDOT operates the Northern Nevada Roadway Operations Center (NROC) in the reno area, providing traffic management capabilities for the Reno and surrounding areas. NDOT has other regional Roadway Operations Centers (ROCs) in each of the three districts. Each ROC is responsible for the 511 coverage of their region, but all have the ability to post 511 events to any region in the state.

NDOT contracts with the Regional Transportation Commission of Southern Nevada (RTCSNV) to manage the FAST TMC in Las Vegas that is a 62,300 square foot facility consisting of a 2-story transportation and communications center and the Southern Command for the Nevada Highway Patrol.

TMC/ROCs serve as the hub for the collection and dissemination of incident information and they play a critical role with incident detection and verification in both urban and rural areas.

2.4.8 511 TRAVELER INFORMATION

511 is a free, real time travel information line that can be accessed from any phone anywhere in Nevada. The service allows travelers who dial 5-1-1 to:

- Access information about accidents,
- Access construction data, closures, view scheduled roadway maintenance activities, etc.
- weather and other conditions on Nevada's state highways
- View real-time traffic and travel information seven days a week, 365 days a year.
- In addition, 511 Nevada broadcasts AMBER alerts and other statewide emergency messages.

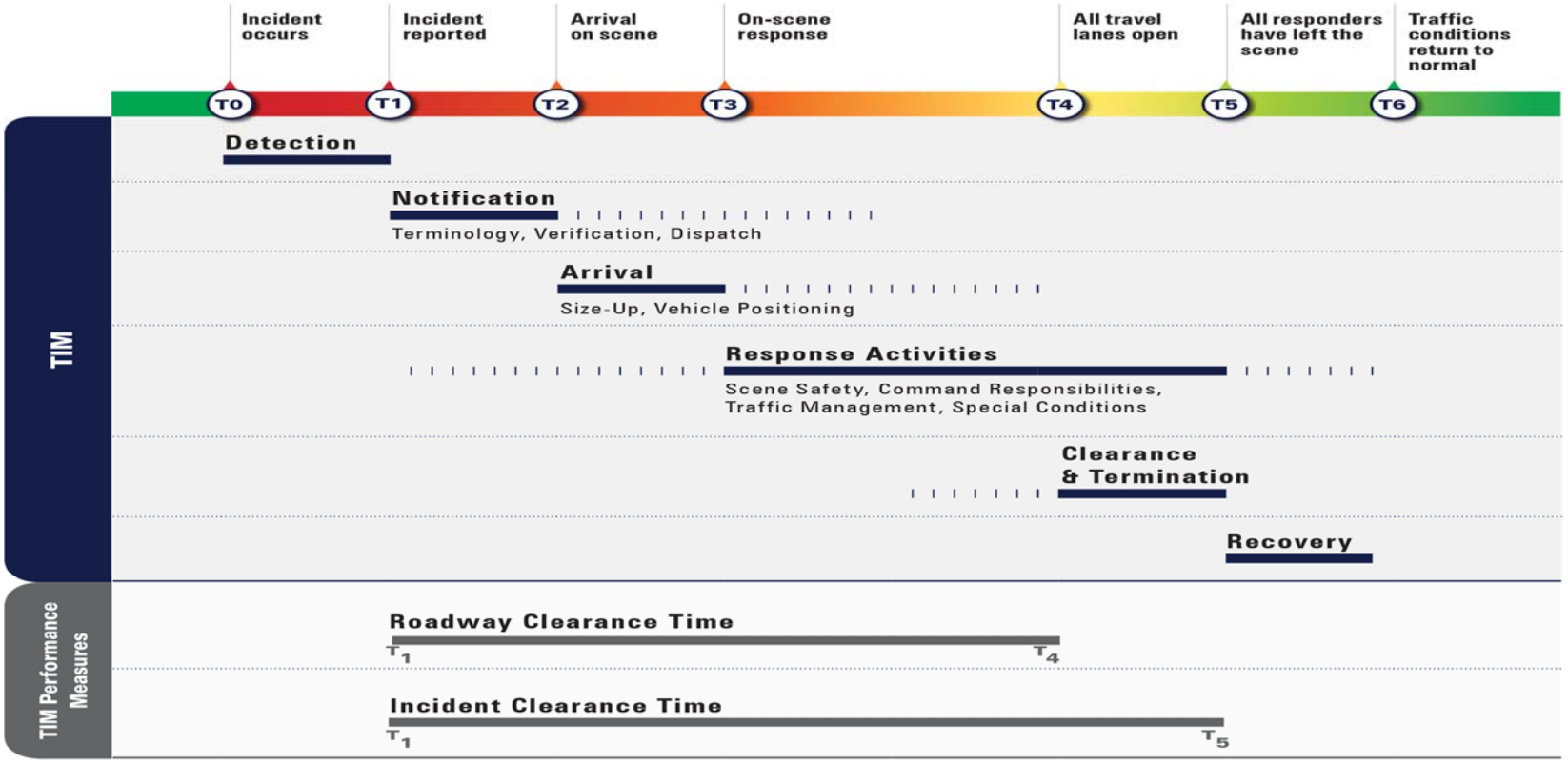
511 Nevada also provides a personalized traveler service (My511NV) to help motorists better navigate Nevada's highways. This is a free subscription-based service that allows a user to customize the traveler information that is important for them and to select specific event information along user-defined routes to be delivered to a subscribers' cell phone or e-mail accounts.

3 INCIDENT MANAGEMENT PROCESS

3.1 TRAFFIC INCIDENT TIMELINE

Nevada has adopted the national traffic incident management timeline, included below in Figure 1. NTIMC and Nevada statewide responders has defined two key measures for traffic incident management: roadway clearance and incident clearance. It is important that all responders understand the difference between these measures.

FIGURE 1: INCIDENT MANAGEMENT TIMELINE



3.1.1 DETECTION

Incident detection involves discovering and identifying the incident. Early detection is vital to ensure the safety of motorists, who are most vulnerable before additional help arrives. Passing motorists typically detect an incident and call 911 to notify law enforcement. Law enforcement can report it as an incident and the information is provided on the 511 system.

Responders involved in detection include law enforcement officers, TMC / ROC operators, and emergency response operators (Freeway Service Patrol or DOT maintenance).

VERIFICATION (T_2): A COMPONENT OF DETECTION INVOLVES CONFIRMING THE INCIDENT LOCATION AND DETAILS. IF TMC OR OTHER CCTV CAMERA COVERAGE IS AVAILABLE, OPERATORS SHOULD ASSIST WITH VERIFICATION. HOWEVER, IF CAMERA COVERAGE IS NOT AVAILABLE, MOTORISTS AND RESPONDERS ASSIST WITH VERIFICATION.

3.1.2 RESPONSE

The first component of response is notifying response agencies about the incident, using details collected during verification. Early notification is the key for a quick incident response. Following notification, response is reacting to an incident with appropriate and available technical, material, and human resources.

It is the responding agency's responsibility to assess and solicit required resources and determine the fastest possible route to the incident scene. The initial responder is responsible for:

- Deploying temporary traffic controls (TTC)
- Parking the response vehicle upstream to protect the incident scene
- Assuming the role of IC
- Providing necessary first aid to victims (without exceeding the responder's skill level)
- Assessing the need for additional responders or resources

Response is a major portion of the incident duration and is explained throughout the Guidelines in detail.

3.1.3 ROADWAY CLEARANCE

Roadway clearance occurs when all travel lanes are open. This is the primary performance measure for traffic incident management in Nevada. The State has adopted a goal to achieve roadway clearance in 30 minutes or less for minor incidents 60 minutes or less for intermediate incidents and, 2 hours or less for major incidents. These guidelines are reflected in the MUTCD as well.

Roadway clearance time is the time between the first recordable awareness of an incident by a responsible agency (T_1) and first confirmation that all travel lanes are open (T_4).

3.1.4 INCIDENT CLEARANCE

Incident clearance occurs when the last responder has left the incident scene. This is an important measure because even when all travel lanes are open (after roadway clearance), traffic will not recover and return to free flow while responders are still on-scene. Systematic improvements, such as exiting the highway to finish reports, should be made to reduce the incident clearance time because every minute on-scene is hazardous for emergency responders. A reduction in incident clearance times will improve responder safety by reducing the exposure of secondary incidents. Incident clearance time is the number of minutes between first recordable awareness of an incident (T_1) and confirming that all responders have left the scene (T_5).

3.1.5 TIME TO RETURN TO NORMAL FLOW

The time to return to normal flow is the period following an incident when traffic is proceeding at its standard or expected rate of speed for a particular segment of roadway.

3.2 INCIDENT TYPES/CLASSIFICATIONS

In Nevada, there are three types of incidents: major, intermediate, and minor.

3.2.1 MAJOR – 2 HOURS

The expected duration of a major incident is two hours (or more). Major traffic incidents are typically traffic incidents involving hazardous materials, fatal traffic crashes involving numerous vehicles, and or other natural or man-made disasters. These traffic incidents typically involve closing all or part of a roadway facility for a period up to or exceeding two hours. Examples include:

- Chain reaction crashes

- Crashes that require a significant medical response, a coroner response, and/or a crash reconstruction response (e.g., fatalities)
- Incidents involving advanced, prolonged environmental clean-up (e.g., incidents involving hazardous materials)
- Overturned tractor trailers
- Complex commercial vehicle incidents with large debris fields or cargo fires
- Structural damage
- Wildfires near the roadway
- Acts of terrorism

3.2.2 INTERMEDIATE – 60 MINUTES

Intermediate traffic incidents typically affect travel lanes for a time of 60 minutes or less. An intermediate crash may be identified for up to two 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 incident clearance to allow traffic incident responders to accomplish their tasks. Examples include:

- Major roadway debris
- Injury crash
- Overturned cars, RVs, or small trailers
- Multi-vehicle crashes
- Commercial carrier crashes

3.2.3 MINOR – 30 MINUTES

Minor traffic incidents are typically disabled vehicles and minor crashes that result in lane closures of less than 30 minutes. On-scene responders typically include law enforcement and towing companies, and occasionally NDOT service patrols. Examples include:

- Disabled vehicles in a travel lane or on the shoulder
- Minor crashes that can be moved or relocated to the shoulder
- Minor roadway debris

3.3 PRIORITIES AT AN INCIDENT SCENE

3.3.1 PRIORITY 1: LIFE SAFETY

The most important concern is the protection of emergency responders, incident victims, and the public. ***Safety must be the first priority throughout the incident.***

3.3.2 PRIORITY 2: INCIDENT STABILIZATION

To enhance operational safety, actions must be taken to stabilize the incident. This will help prevent secondary crashes, protect evidence, and provide time for safe, quick clearance.

- Prevention of Secondary Crashes: To minimize the risk of another motor vehicle crash involving response units and personnel, responders must properly warn approaching traffic that there is a hazard ahead, to slow down, and to use caution. Responders should utilize available traffic control devices and, if possible, position apparatus to divert traffic around the crash scene. Special attention should be paid to the end of the traffic queue; motorists approaching the end of a queue are unlikely to be aware of the crash ahead. This activity is called, "protecting the queue" and, is a priority for Nevada, especially in the rural areas where it is often difficult to see around road crossovers, around bends in the road, and other rugged terrain. Responders should contact dispatch with incident information for dissemination to travelers to reduce congestion and the potential for secondary incidents.
- Protection of Evidence: Responders will make every effort to minimize the impact of their presence on the crash scene. For example, responders should not cause damage to vehicles beyond what is necessary for extrication purposes or remove debris not in an actively flowing traffic lane until authorized. Crash scene investigators rely upon scene evidence to reconstruct the event. These reconstructions are often used to hold the involved persons accountable for their actions during potential criminal proceedings. Responders should understand that any crash is a potential crime scene and must be treated accordingly.
- Safe, Quick Clearance: At an incident, every responder's goal should be to clear the scene safely and quickly to restore traffic flow and limit the diversion of traffic to less desirable, more hazardous routes. It is important to note that Nevada's "Move It" law requires motorists involved in non-injury crashes to move drivable vehicles to a location where they will obstruct traffic as little as possible. (NRS 484E.020 is listed in these Guidelines on page 7). The priority of safe, quick clearance also aligns with the National Unified Goals for Traffic Incident Management.
- Protection of the Environment: For hazardous materials and/or potential hazardous materials scenes, responders with the proper personal protective equipment and training will strive to contain the spilled product while minimizing exposure.

3.3.3 PRIORITY 3: PROTECTION OF PROPERTY

Responders will attempt to protect or save property by limiting damage to vehicles to what is necessary to stabilize and remove trapped persons. Property salvage operations will also be conducted as soon as safely possible.

4 STAKEHOLDER RESPONSIBILITIES

Each stakeholder has different roles and responsibilities during the traffic incident management process. The sections below outline the responsibilities of each stakeholder in the traffic incident timeline.

TABLE 1: STAKEHOLDER RESPONSIBILITY

Stakeholders	Detection	Notification	Response	Roadway Clearance	Incident Clearance	After Action Review	Traveler Information
Law Enforcement	Yes	Yes	Yes	Yes	Yes	Yes	
Medical Examiner			Yes	Yes	Yes	Yes	
Crash and Homicide Investigator			Yes	Yes	Yes	Yes	
Fire and Rescue			Yes	Yes	Yes	Yes	
Emergency Medical Service			Yes	Yes	Yes	Yes	
Roadway Maintenance/ Public Works			Yes	Yes	Possible	Yes	Yes
Freeway Service Patrol	Possible	Possible	Yes	Yes	Yes	Yes	
Public Information Office/Media		Possible				Yes	Yes
Transportation Management Center	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Towing/Recovery	Possible	Possible	Yes	Yes	Yes	Yes	
HAZMAT Agency			Possible	Yes	Possible	Possible	
Emergency Management Division			Yes	Yes	Yes	Yes	Yes

4.1 LAW ENFORCEMENT

Law enforcement agencies are among the busiest stakeholders in a traffic incident since most incidents involve a vehicle crash. Law Enforcement play a major role in almost all of the traffic incident management processes, including detection, notification, response, roadway clearance, incident clearance, and After-Action Review (AAR) meetings. The responsibilities of law enforcement can vary depending on the type of incident or situation involved, but certain basic responsibilities apply to all incidents.

Law enforcement officers should perform the following:

- Upon notification, decide on an appropriate route to reach the incident that will provide the most expedient arrival and allow for immediate scene protection.
- After reaching the scene, conduct a quick "windshield size-up" of the scene and report to dispatch.
- Stabilize the situation by establishing scene security, providing emergency traffic management and, when appropriate, assisting the injured. It is usually not appropriate for law enforcement to assist injured when the scene has not been secured.
- Once the situation has been stabilized, make a more detailed assessment of the incident and communicate necessary information to both dispatch and other responding units or agencies, and request additional help as may be needed.
- For minor incidents, encourage and assist involved drivers in removing their vehicles from the travel lanes. In more serious incidents, assume the role of Incident Commander (IC), or establish a Unified Command (UC) to coordinate the response of multiple agencies.
- If a fatality is involved, notify the Coroner's Office or the County Medical Examiner (ME) and provide them with an estimated time to respond.
- If a traffic crash is involved, after other units or responder agencies have arrived, and a safe "work zone" has been established, conduct the appropriate level of crash investigation.
- If a traffic crash is not involved, work to assist other responders to return the roadway to a normal traffic flow condition as soon as possible.
- While the incident is being cleared and until the recovery process is complete, law enforcement should remain at the scene unless circumstances require otherwise.

These points are intended as a general outline for officers responding to traffic incidents, but they should not be considered to be the extent of law enforcement responsibilities. Each situation is different, and officers should thoroughly assess the incident to determine the most appropriate actions to take for that particular event.

Finally, law enforcement officers should participant in AAR meetings to analyze the response efforts, and to address any issues that are found. AAR debrief forms can be found in **Appendix D** for reference.

4.2 MEDICAL EXAMINERS / CORONER INVESTIGATIONS

Medical examiners should report to an incident scene when called by the on-scene law enforcement officer, or when a fatality is involved. Law enforcement will notify the office of the Medical Examiner within the first 30 minutes of being aware that a fatal crash has occurred. Medical examiners may participate in the response, clearance, and AAR process. During clearance, the medical examiner may authorize other agencies to move or remove victims from the incident scene after the appropriate investigation (i.e., pictures, etc.) has been done.

4.3 CRASH INVESTIGATORS

Incidents involving crashes with serious injuries and/or fatalities require more in-depth investigation by trained crash reconstruction personnel. A crash investigator must be summoned to the scene unless the initial or on-scene officer is a crash investigator.

Because these severe crashes are considered crime scenes rather than simply traffic incidents, responsibilities for crash investigators are somewhat different from those of the on-scene officers.

Crash investigators should perform the following:

- Immediately upon arrival on the scene, meet with the on-scene officer and IC to be briefed on the current situation.
- Assess the incident, determine what additional assistance may be needed, and develop a plan for the investigative process.
- Work with the IC and other agencies on-scene to safeguard potential evidence, and to modify the “work zone” to include the overall scene and evidence, as necessary.
- Prioritize the necessary activities to conduct tasks that require closure of travel lanes first.
- Document the scene following agency procedures (i.e. photographs, field sketch, etc.), evidence collection.
- Locate and measure all vehicle locations and evidence or mark these positions with paint so they can be documented at a later time.
- Collect and secure all short-lived evidence.
- Coordinate with other responders the restoration of traffic flow. Reduce the size and impact of the incident scene.
- Maintain communications with the IC on the needs and progress of the investigation so appropriate changes can be made to the overall incident management plan to expedite the scene recovery.

- Ensure that all on-scene information has been collected and/or documented and advise the IC that this portion of your investigation is complete so that the incident clearance and recovery can begin.
- Document, or have documented, the information concerning the drivers, passengers and any witnesses for follow-up.

As with the responsibilities for law enforcement in general, these are basic guidelines and are not intended to be the extent of the investigator's tasks. Some incidents may require more time to investigate than others, depending on the complexity of the crash, but the key to remember for quick scene clearance and recovery is communication.

It is imperative that the investigator(s) and IC maintain good communication throughout the event, so both can accomplish their tasks in the quickest and most efficient manner possible.

4.4 FIRE AND RESCUE

Fire and rescue personnel should respond to all highway incidents involving fire, injury, fatalities, spills, or HAZMAT. Fire and rescue personnel should be prepared to act as an IC and establish UC at the incident scene.

While fire and rescue agencies typically do not participate in detection, verification, and notification, these responders play a vital role in response. Fire and rescue agencies should respond promptly and safely to the incident scene and perform the following:

- Assess the scene thoroughly to determine estimated time duration.
- Establish a UC if one is not already in place.
- Establish a safe transition area and work zone utilizing proper blocking techniques and traffic cones to define the areas.
- Assess medical condition of motorists involved in crashes; coordinate activities to save lives, control hazards, and combat fires within agency capabilities.
- Make notifications as needed to further facilitate scene activities.
- Work with all agencies to ensure safe remediation and quick clearance of the roadway.
- Transfer command to remaining on scene agencies once fire activities are completed.

Fire and rescue personnel should coordinate with the UC system during clearance and perform the following roles:

- Assist with removing vehicles, debris, etc. when instructed by law enforcement.
- Handle (if equipped) or coordinate with HAZMAT response agencies to handle HAZMAT issues.

- Reposition fire and rescue vehicles to minimize lane blockage as soon as possible.

If fire and rescue agencies are responding to an incident involving fire, major spills, or HAZMAT, they should provide a continuous update on incident development and travel conditions when appropriate to all other responding agencies through UC, established at the scene.

Fire and rescue agencies play an important role in traffic management by assessing necessary lane closure for the rescue effort. Fire and rescue personnel should be trained in setting up Temporary Traffic Controls (TTC), and each fire apparatus should carry traffic cones, as outlined in US Fire Administration and NFPA guidelines. Personnel should coordinate with the on-scene UC system in determining proper vehicle positioning to act as a barrier for the approaching traffic and minimize the lane blockage. Unless more closures are necessary, the Lane Plus One approach should be utilized as a maximum.

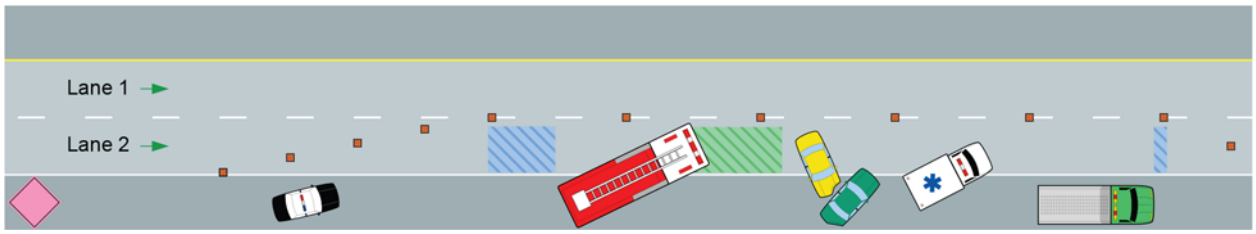
Fire and rescue personnel should participate in AAR meetings.

4.5 EMERGENCY MEDICAL SERVICE (EMS)

EMS responders may be a third-party agency or part of the fire and rescue department responding to a traffic incident. For the purpose of these Guidelines, the term EMS refers to the responders dedicated to assessment and/or transport of potential patients at an incident.

EMS typically does not participate in detection, verification or notification, but they play a vital role in response and clearance. EMS will respond to an incident as directed by a Public Safety Answering Point (PSAP) or when requested by IC. EMS transporting units or EMS supervisory units may assume the role of IC and/or participate in UC as appropriate.

EMS transport vehicles should never be utilized as a barrier for traffic control. For the safety of responders and the patients during assessment and loading, EMS transport units should be pulled ahead of the scene and other response vehicles as to have protection for assessing and loading patients.



Keeping proper patient care as a high priority, EMS personnel should provide only necessary medical treatment on the scene and move to the transport unit and then off the scene as soon as patient care allows.

As with all participating agencies, EMS personnel should participate in AAR meetings to ensure continued efforts at improving responses from all participants.

4.6 STATE/LOCAL TRANSPORTATION AGENCIES

The state or local transportation agency includes the Freeway Service Patrol (FSP) the Transportation Management Center (TMC), roadway maintenance, planners and designers, and traffic engineering personnel.

4.6.1 FREEWAY SERVICE PATROL/INCIDENT RESPONSE VEHICLES

Typical services provided by NDOT's Freeway Service Patrol (FSP) include changing tires, assisting in moving vehicles, providing jump-starts, providing gasoline, providing first aid or CPR, containing minor spills, and setting up temporary traffic control devices. The FSP provides service in the Las Vegas and Reno areas. NDOT also provides Incident Response Vehicles (IRV) for larger more complicated incidents.

4.6.2 NEVADA ROAD OPERATION CENTERS AND FAST TMC

NDOT operates the northern Nevada Road Operations Center (NROC), the traffic operations center in the Reno area, providing traffic management capabilities for Reno and surrounding areas. This facility also has statewide 511 management responsibilities.

In southern Nevada the FAST Road Operations Center (ROC) is shared with the NHP, and the NDOT. The FAST Transportation Management Center/Nevada ROC in southern Nevada is also home to the NHP Southern Command Dispatch Center. FAST TMC is staffed by dispatchers and operators from the Regional Transportation Commission of Southern Nevada and also has traffic specialists, engineers, and managers dedicated to incident management. FAST functions as a TMC for the southern Nevada region.

Additional ROCs and TMCs may exist throughout the state within local law enforcement, fire, and/or transportation agencies. Metro Police Department in Las Vegas Nevada manages their own facility. One of the TMC / ROC operator's primary role is to monitor and help law enforcement and

dispatchers coordinate the incident activities using traffic cameras, dynamic message signs (DMS), and 511 alert messages.

Operators for TMCs and ROCs continuously monitor the roadway system using CCTV cameras and are actively involved in the incident detection process. Operators receive reports of incidents by answering 511 calls from motorists and from 911 centers. The operators use traffic cameras to verify the incident detail and location. In case of a road-user phone call, they ask a series of questions to the callers to complete the verification process.

TMC personnel manage the response process by performing the following functions:

- Implementing response plans, including DMS messages for planned and unplanned events.
- Notifying high level NDOT and FSP personnel through incident paging.
- Coordinating with the on-scene responders to continuously update response plans and the Estimated Time of Clearance (ETC).

The TMC plays a major role in broadcasting traveler information by:

- Activating traveler information systems, such as DMS and posting updated information on the 511 system.
- Continuously updating traveler information as the incident evolves.

During an incident, TMC / ROC operators will:

- Continue with the response plans by updating all information until incident clears.
- Coordinate with TMCs/ROCs in neighboring states if the incident affects their highway system or if regional traffic diversions can be implemented for long duration incidents.

TMC personnel should close the response plan once the incident scene is cleared. When appropriate, TMC personnel should participate in AAR meetings.

4.6.3 ROADWAY MAINTENANCE

The role of NDOT Maintenance Personnel (NDOT-MP) is to provide a safe, efficient and sustainable highway system for its users. When requested, NDOT-MP will respond and deploy resources to major traffic incidents 24 hours a day, 7 days per week. Each NDOT District will develop and implement response procedures in urban areas to meet the goal of aiding within 30 minutes of notification during the assigned working hours of each maintenance yard and 60 minutes after hours. In rural areas this time may vary based on time of day. NDOT-MP will respond as expeditiously as is reasonably possible.

NDOT-MP, in coordination with UC, will upgrade temporary traffic controls (TTC) intermittently, as needed when the scene changes, and, determine detour routes and discuss clearance strategies.

NDOT-MP, in coordination with UC, will determine and deploy the necessary heavy equipment and manpower to reopen the roadway if there is a delay in clearing the travel lanes or if the task is beyond the capabilities of the wrecker service on scene. If cargo or spilled loads (non-hazardous) are involved, NDOT-MP will make every effort to assist in the relocation of materials in the shortest possible time, using whatever equipment necessary. All such materials or any vehicles relocated by NDOT will be moved the minimum distance necessary to eliminate traffic hazards.

NDOT-MP will assess any damage to state assets and notify parties responsible for the repair. NDOT-MP will document all NDOT hours and equipment used for traffic control, roadway clearance and debris clean up. NDOT-MP, when necessary, will place traffic control devices at the scene should any damaged vehicles or cargo remain on the shoulder adjacent to the travel lanes for removal at a later time.

NDOT-MP will continually work with all responders to ensure that the needs of motorists and state roadways are being met in the most professional, safe and efficient manner.

4.6.4 PLANNERS AND DESIGNERS

Planners and designers aid in traffic incident management by:

- Scheduling delivery and funding of construction projects with consideration of feasible route alternates.
- Designing projects with roadway operations, especially incident response and traffic incident management, in mind.
- Mainstream the development of Incident Response Plans (IRPs) as part of construction Traffic Management Plans (TMPs) that facilitate incident management during construction.
- Coordinating with agencies, consultants and contractors that are not typically involved in traffic incident management.

4.6.5 TRAFFIC ENGINEERING

Traffic engineers and managers play an important role in establishing the traffic incident management policies and procedures and may get involved in the following scenarios:

- Providing recommendations for Traffic Incident Management during the plan development process.
- Coordinating response with the roadway maintenance resource office.
- Arranging emergency procurement of additional resources for scene clearance and, to procure signs, or highway technology (rumble strips) to help avoid future crashes.
- Soliciting heavy-duty equipment at the incident scene.

- Assisting in emergency planning, such as evacuation, detour, and alternate route planning.

Traffic engineering personnel should participate in AAR meetings when they play a major role in traffic incident management.

4.7 PUBLIC INFORMATION OFFICES/MEDIA

In the event of incidents or scheduled events that generate heavy traffic congestion, communication of accurate, real-time information is essential. Many larger county agencies have a Public Information Officer (PIO) trained to manage communications regarding an incident within their jurisdiction. All media should be directed to the PIO to ensure that incident responders are able to complete their tasks at an incident as quickly as possible, and that incident information is conveyed according to community standards and local/state policies.

NDOT has one of the most established and integrated traffic management systems in the United States (US). While the ROC/TMC staff manages the essential messages for those on the roadways via messages on dynamic message signs (DMS) and the 511 systems, the media liaisons update the media via text, e-mail, phone, and social media networks, such as Facebook and Twitter.

Government agencies and incident responders provide updates to the media outlets, which assist in getting that information to the traveling public via traditional and new media. An “early warning system” may catch motorists before they end up in severe traffic congestion behind an incident, thus helping to prevent a secondary crash. This is especially important in densely populated areas.

The PIO, media liaison, or TMC / ROC supervisor decides how much information to provide to the media, especially with regard to a fatal crash. However, when traffic teams know a fatality is involved in an incident, they tend to provide more information to the public, including more intense warnings to avoid the accident area, and even alternate routes. The media may also want to send cameras to the incident scene, whereupon the PIO is essential for keeping them corralled.

While public information officer’s and local media personnel play a vital role in disseminating traveler information, they do not participate in response, clearance, and recovery processes. When they play a major role in the traffic incident management process, however, they should participate in AAR meetings.

4.8 TOWING AND RECOVERY

The safety of responders, crash victims, and motorists is a towing and recovery operator’s first priority. Towing and recovery vehicle operators are often on the road and may detect the incident first. In that situation, they should do a quick “windshield scene size-up”, then notify the 911

dispatch center with the information. They may play the role of IC until additional help arrives. At that time, the towing and recovery operator will turn the scene over to law enforcement or fire.

If towing and recovery is not IC, their first action taken should be to conduct a scene survey and immediately set up traffic control. A buffer and transition for approaching traffic:

- Protects accident victims, and
- Provides advance warning and traffic transition to prevent secondary accidents.

The towing and recovery companies throughout the state of Nevada are required to ensure that all tow operators are perficient in safe, quick clearance activities by attending 4-hour Nevada TIM Training. Towing and Recovery should dispatch required equipment to the incident scene promptly. The supervisor and tow truck operators should report to IC upon their arrival at the scene. Following an assessment of the situation, any additional equipment should be requested. The towing supervisor should report a plan of action to the IC or UC and with the approval of the incident command begin rigging for recovery.

Proper rigging and recovery techniques should be followed to ensure a safe recovery. Implement one lane up-righting of overturned vehicles and winching operations without obstructing travel lanes unnecessarily.

Towing and recovery truck operators play a major role in the clearance process in the following ways:

- Help remove crash vehicles and debris from the roadway.
- Contain and assist with clearing travel lanes of vehicle fluids.
- Clear debris from roadway.
- Assist in spill and leak mitigation.
- Transport uninjured crash victims to a safer location.
- Handle financial negotiations outside the incident scene and not while clearance activity is underway.
- Relocate crash vehicles from the roadway for off-loading cargo, if possible.
- Relocate crash vehicles from the roadway to off ramp or safe location for final hookup and rigging for tow to facility.

Towing and recovery operators may assist with setup of the temporary traffic control devices (TTCD) along the traffic incident management area, and they should remove TTCD as necessary.

After traffic has been restored to normal flow, set up and maintain traffic control devices for a planned event (up-righting, off-loading, rigging, waiting for non-rush hour traffic) on the shoulder of roadway, to provide warning to approaching motorists.

Finally, towing and recovery personnel should participate in AAR meetings.

4.9 HAZMAT MITIGATION AGENCIES

Upon discovery of a HAZMAT incident by on scene fire, law enforcement, or department of transportation for any agency (DOT), efforts should be made through contact with the responsible party (the carrier) to activate their hazardous materials mitigation contractor. While the local fire jurisdiction may assist with containment and mitigation of vehicle fluids or HAZMAT cargo leaks and spills, they only provide limited containment/public safety protection and not ultimate clean up. State Highways may contact the Nevada Department of Transportation (NDOT) project manager for the hazardous materials contractor.

Activation/notification to the responsible party's contractor as soon as possible will expedite their arrival and shorten the mitigation time. In the event that the responsible party does not have a mitigation contractor; discussion may occur through UC. Local fire, environmental, or in rural areas UC may include the mining companies for HAZMAT mitigation. Members of UC will have access to a database of contractors. Contacting the closest contactor will minimize delay or extended arrival times. The goal remains safe, quick clearance.

HAZMAT mitigation agencies may assume the role of IC and/or participate in UC. These agencies should minimize clean-up time to reduce the amount of HAZMAT exposure and its lingering effects. When they play a major role in traffic incident management, the HAZMAT agency should participate in AAR meetings.

4.10 EMERGENCY MANAGEMENT

The agency for the State's emergencies, disasters, and significant events is Nevada's Department of Public Safety Division of Emergency Management (DEM). Staff is on call 24/7/365 to assist local and tribal authorities in response to emergencies. In addition, they staff the State Emergency Operations Center (SEOC) when a disaster or emergency threatens the state, as well as prior to, during and after large scale events. Depending on the incident, when the SEOC is activated, it is staffed by DEM and representatives from the appropriate state agencies and volunteers, with responsibility for disaster response and recovery efforts.

The mission of the DEM is "coordinating preparedness, response, recovery, and mitigation resources through partnerships to sustain safe and livable communities for Nevada's residents and visitors."

5 RESPONDER SAFETY

A responder's job environment contains many potential hazards—not just traffic and HAZMAT, but also weather, fire, injury from debris, and shock. All responders must be familiar with vehicle and agency safety policies.

> WORKING ON A HIGHWAY OR NEAR MOVING TRAFFIC IS HAZARDOUS. RESPONDERS MUST BE EXTREMELY ALERT AND USE SOUND JUDGMENT TO PROTECT THEMSELVES, OTHER RESPONDERS, AND MOTORISTS. NEVER TURN YOUR BACK ON TRAFFIC.

5.1 GENERAL RESPONDER SAFETY

Safety is paramount and should always be a part of every responder's daily routine. Following are some specific safety guidelines. At an incident scene, all responders should:

- Position vehicles considering the safety of those at the scene.
- Park in a manner that provides maximum protection for responders outside of the vehicle by creating a buffer zone to separate responder vehicles from the disabled vehicle. If a responder's vehicle is struck by an errant motorist, the probability of injury to a responder or the victim is likely reduced.
- Turn front wheels away from traffic. Should your vehicle be struck, this may direct your vehicle away from the incident scene.
    - Call dispatch with "Windshield Size-up" before leaving the vehicle providing the exact location using as many of the following as possible:
        - Route #
        - Landmark
        - Direction
        - Before/After Exit #
        - Mile post (MP)
        - Town
        - County
        - Lane(s) blocked
        - Describe the nature of the incident by answering, "What do I see?"

  - Number and type of vehicles[2]
  - Extent of damage to vehicles
  - Possible injuries
- Evaluate each situation, determine what needs to be done to manage the situation, and take appropriate action.
- Maintain situational awareness. Being aware of what is happening helps responders understand how their actions may impact the safety of all responders and motorists. Before taking any action, responders should balance the risks and benefits.
- Consider weather conditions and sight distance when positioning vehicle and setting up traffic controls.
- Always think about safety.

5.2 PERSONAL SAFETY ITEMS

In addition to safety apparel, the following personal safety item guidelines will protect responders in and outside of their vehicles. To ensure safety, responders should:

- Use a seat belt.
- Wear gloves when changing tires or removing debris from the roadway.
- Wear disposable exam gloves if there is a possibility of contact with blood borne pathogens. Leather work gloves are not a substitute.
- Wear safety shoes, such as steel toe boots, to protect feet from falling objects or crushing injuries.
- Avoid loose or hanging clothing or personal items that may become snagged when working on disabled vehicles.

5.3 HIGH-VISIBILITY APPAREL/SAFETY VEST

All responders must wear approved high-visibility apparel at all times when working outside of the vehicle. "Part 634 - Worker Visibility," published by FHWA under Title 23 of the Code of Federal Regulations (CFR), requires all workers within the right-of-way of a Federal-aid highway to wear high-visibility clothing. This requirement applies to all emergency responders.

[2] TRAA has created a Vehicle Classification Guide so incident responders and dispatchers can use the federal vehicle class standards to correctly dispatch towing and recovery units. This guide is included in Appendix E.

Safety apparel must be conspicuous during both daytime and nighttime. To ensure the effectiveness of high-visibility apparel, responders should:

- Keep high-visibility apparel clean to maintain reflectivity and visibility.
- Replace high-visibility apparel when it is worn, heavily soiled, or faded.
- Wear high-visibility apparel on top of all other clothing, including jackets.

6 TEMPORARY TRAFFIC CONTROL AND SCENE SAFETY

A traffic incident management area (TIMA) is a type of temporary traffic control (TTC) zone established in response to a road user incident, natural disaster, hazardous material spill, or other unplanned incident.

Responders should, within 15 minutes of arriving on-scene, estimate:

- The magnitude of the incident including lane blockage.
- The expected duration.
- The expected queue length.

Responders should set up the appropriate TTCs for these estimates.

On-scene responders, IC / UC, should also reevaluate traffic control devices, scene safety, emergency vehicle positions, and traffic flow every 15 minutes and provide updated information to dispatch or the TMC / ROC.

6.1 SCENE SAFETY & WORK ZONE PARKING FOR LAW ENFORCEMENT

Law enforcement officers are often used to increase safety and visibility when construction is underway. The following is consistent with MUTCD Guidelines. Traffic control may already be set up by the construction crew before law enforcement arrives. Major considerations while in a work zone are:

1. **HIGH VISIBILITY** - be visible, using the same ANSI II / ANSI III requirements as if responding to a crash scene. Emergency lights on. Low intensity if possible.

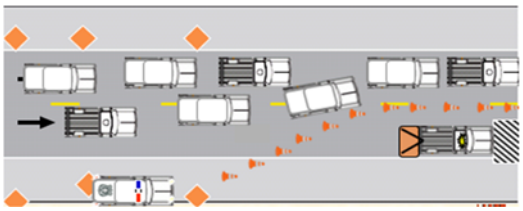
2. **GOOD POSITIONING** – watch traffic queue build ups, relocate your vehicle as necessary; try to stay ¼ mile to the rear of traffic queues when possible.
    a. Personnel out of the vehicle should be positioned on the shoulder when possible.
    b. Vehicle positioning should never be in the longitudinal buffer zone.

3. **BE ALERT!** Maintain visual contract with approaching traffic, never turn your back on traffic.

4. **COMMUNICATE** – if work zone conditions change, contact the construction or work zone point of contact. Let other traffic control workers, and flaggers, know what has occurred to change the conditions and discuss suggestions for relocating or adjusting position.

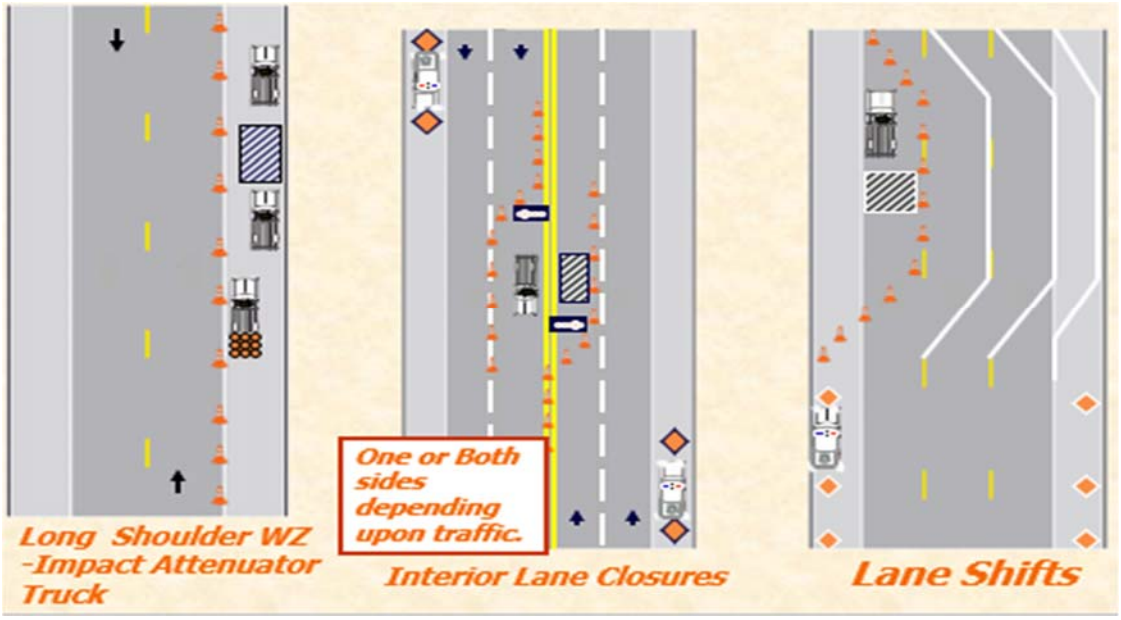
6.1.1 STATIONARY PRESENCE OF LAW ENFORCEMENT

Law enforcement officers should place their patrol vehicle on the shoulder, NOT in the buffer spaces. Relocate as needed based on traffic conditions. The preferable location is at least ¼ mile upstream, at the end of the traffic queue build up. Short distance queues may allow the officer to backup but only if it can be done safely. Examples for work zone (WZ) choices are provided below.



Stationary work zone patrol vehicle positioning varies by location and, speed of vehicles surrounding the work zone. Examples of common-sense choices are provided below. If there are situations where positioning is unclear, a unified decision can be determined through working with the Point of Contact (POC) at the WZ scene. ***Note*** Stationary WZ law enforcement positioning.

Stationary WZ law enforcement positioning



6.2 TEMPORARY TRAFFIC CONTROL AT A TIM AREA (TIMA)

Upon arrival at an incident scene, responders should work as quickly as possible to establish a TIMA.

TIMAs provide traffic control and advance warning, which are both necessary to maintain a safe working area at an incident scene. In the early stages of an incident, responders should use all equipment on hand to set up traffic control, while realizing that the TIMA will be expanded and/or enhanced as additional responders arrive and more resources become available. As the incident progresses, the scene may escalate (i.e., go from a one-lane closure to multiple lane closure) or de-escalate (i.e., go from a multiple lane closure to a one-lane or shoulder closure).

All TIMAs should conform to the standards established in Chapter 6I of the Manual on Uniform Traffic Control Devices (MUTCD). Chapter 6I provides guidance on the types of TTC devices that should be used at a TIMA based on the incident type.

For instance:

- For major and intermediate incidents, TTC zones 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, it is not generally possible or practical to set up a lane closure with traffic control devices. When a minor incident blocks a travel lane, it should be removed from that lane to the shoulder as quickly as possible.

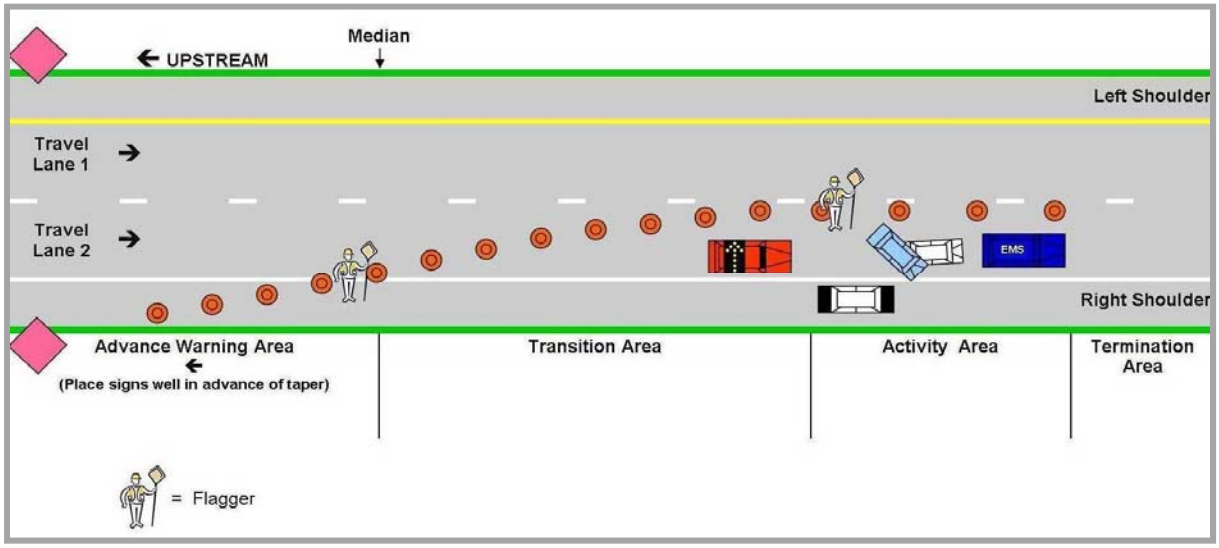
TTCs at a TIMA help move road users safely and quickly past or around an incident, reduce the likelihood of secondary traffic crashes, and keep motorists off the surrounding road system. TTCs include devices such as:

- Traffic cones
- Arrow panels
- Warning signs
- Manual traffic control (flagging).

Motorists have become accustomed to the traffic control measures that are used in work zones and are familiar with how to react to them. TIMAs and traffic control devices that differ from work zones may confuse drivers.

Figure 2 illustrates the components of a TIMA. The following sections discuss these components in greater detail. Please note that warning signs should be placed well in advance of the taper.

FIGURE 2: COMPONENTS OF A TIMA



6.3 SAFE VEHICLE PLACEMENT

Proper vehicle placement upon initial response establishes safe and effective traffic control. This guide describes TIMAs for the two primary types of traffic incidents:

- Non-blocking incidents, which involve a vehicle on the shoulder or off the road and only one or two responders, are the most common type of incident.
- Lane blocking incidents, where at least one lane of traffic is blocked, are more critical than non-blocking incidents because they directly affect approaching motorists.

TIMAs and TTCs apply to both non-blocking and lane blocking incidents. The more complex the incident, the more necessary and important TIMAs and TTCs become.

A typical incident may have one lane, or a shoulder blocked on arrival. Under many circumstances it will be necessary to close an additional travel lane to provide working room and a traffic buffer area for responders, primarily fire-rescue and EMS. Closing an additional lane is known as the "Lane Plus One" protocol. Travel lanes should be reopened as the incident clearance progresses.

6.3.1 NON-BLOCKING INCIDENTS

It is important to note that even though traffic lanes remain open, incidents on the shoulder or off the roadway can sometimes be more hazardous than lane blocking incidents. Traffic controls and advance warning are minimal, and passing motorists are less likely to slow down, Move-Over laws notwithstanding.

Figures 3 and 4 illustrate vehicle placement and traffic controls at non-blocking incidents.

The following are general guidelines for responders working alone on or along active roadways:

- Stay aware of oncoming traffic.
- Minimize the time spent standing or walking between your vehicle and other vehicles.
- Plan an escape path.

At the scene, responders should:

- Park well off the travel lane.
- Practice space safety. Park closely enough to read the license plate, but no closer than two to four car lengths. Exceptions should be limited.
- Avoid stopping in the glide path on the outside of a curve. Vehicles operated by inattentive drivers or at an unsafe speed may drift onto the shoulder.
- Check traffic before exiting the vehicle.
- Turn and look and use peripheral vision to monitor oncoming traffic for potential errant vehicles.

- Approach the incident vehicle on the side away from traffic. In most cases, this is the passenger's side of the vehicle. If the vehicle is on the left shoulder or median, approach the vehicle on the driver's side.
- Scan the interior of the vehicle while approaching it.

When providing traffic controls at a non-blocking incident, responders should:

- Use traffic cones and flares for responder safety as well as for traffic control.
- Use flares when necessary, making sure that there is no fuel spill. Do not use flares for illumination. Never kick a flare.
- Remove all flares and other materials when the incident is clear.

FIGURE 3: NON-BLOCKING INCIDENT WITH SINGLE RESPONDER

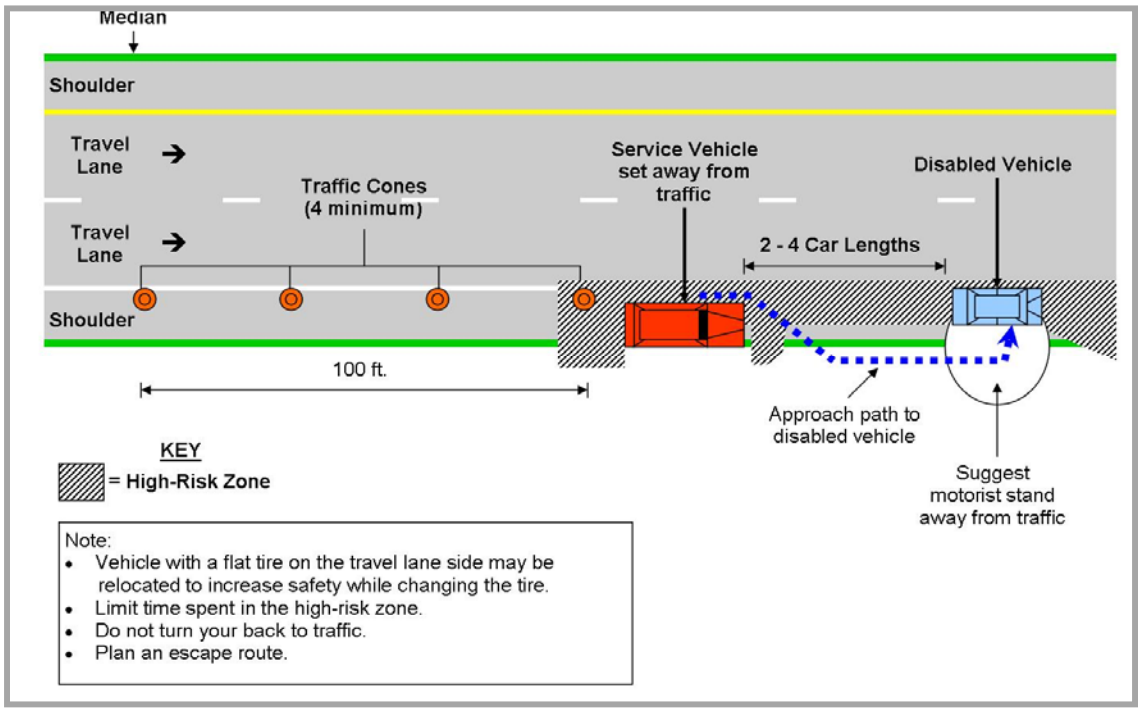
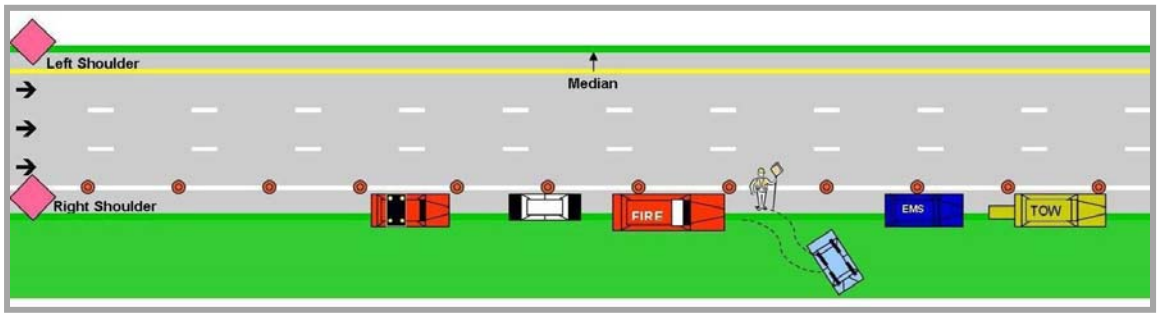


FIGURE 4: NON-BLOCKING INCIDENT WITH MULTIPLE RESPONDERS



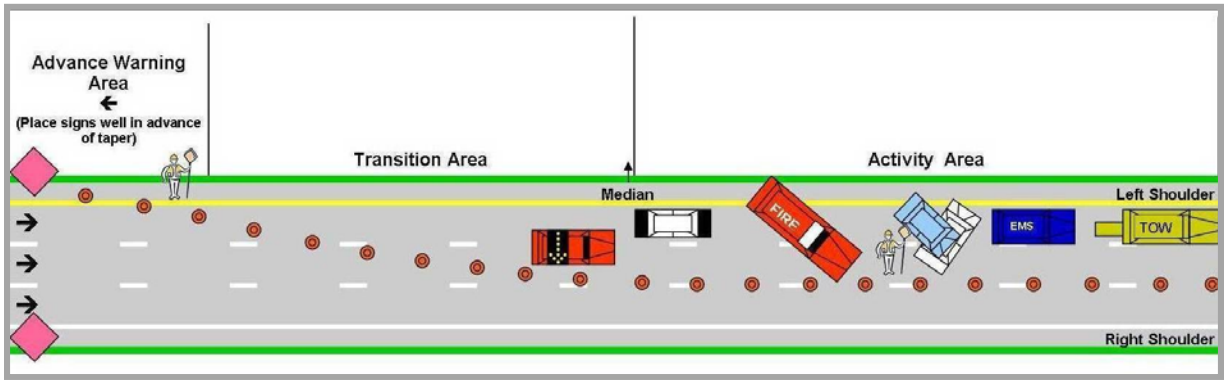
6.3.2 LANE BLOCKING INCIDENTS

The following are general guidelines for responders working at a lane blocking incident:

- Place the response vehicle in a visible location between the incident and approaching traffic. An arrow panel (when available) and traffic cones should be used to warn motorists and direct traffic around the scene.
- Consider repositioning the initial response vehicle to allow more room for emergency vehicles as additional resources arrive.
- Confer with other on-scene agencies, when appropriate, through the Incident Command structure to ensure that emergency vehicle placement is optimized for scene safety, on-scene operations, and traffic flow past the scene. Consider staging additional response vehicles off-site until needed.
- Take only as many lanes as needed, for only as long as needed.
- Take an extra lane (called Lane Plus One) where needed to provide a safe buffer against moving traffic. Open the lane when the extra buffer is no longer needed.
- Relocate the response vehicle as needed to best utilize the arrow panel once the traffic cones are in place.
- Continue to look for opportunities to improve traffic flow and scene safety.

Figures 2 (Components of a TIMA, Section 6.1) and 5 (Blocking Incident in Two Lanes) illustrate vehicle positioning and TTC device placement at lane-blocking incidents.

FIGURE 5: BLOCKING INCIDENT IN TWO LANES



6.4 ARROW PANEL USE AND TRAFFIC CONE PLACEMENT

An arrow panel is probably the most effective TTC device. Proper use of a vehicle-mounted arrow panel (or DMS, if so equipped) is essential for emergency TTC at an incident scene.

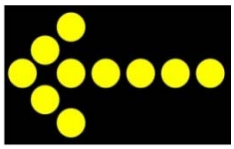
Traffic cones serve as effective traffic control devices, and they are also effective safety devices because they provide an audible warning when hit.

6.4.1 ARROW PANEL

The arrow panel, used in conjunction with traffic cones and other traffic control devices, provides positive guidance to direct approaching traffic away from a blocked travel lane at an incident scene. NDOT's FSP may be contacted to provide their vehicle arrow board panel when appropriate and available.

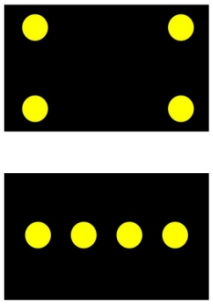
Use the arrow panel in Arrow mode, shown in Figure 6, only to indicate a blocked travel lane.

FIGURE 6: ARROW PANEL INDICATING A BLOCKED LANE



Use the arrow panel in Caution mode, shown in Figure 7, when on or near the shoulder of the roadway.

FIGURE 7: ARROW PANEL INDICATING CAUTION



6.4.2 TRAFFIC CONE PLACEMENT FOR LANE-BLOCKING INCIDENTS

The following are general guidelines for placing traffic cones at a lane blocking incident:

- Set out traffic cones in a taper to guide approaching traffic into available lanes to safely pass the incident.
- Start deploying cones at the rear of the response vehicle and work upstream.
- Reinforce and straighten traffic cone lines and tapers after their initial placement to increase effectiveness and maximize visibility of the cones.

- Do not turn away from traffic while placing or removing cones.
- Space cones equally, about 40 feet apart, but at least 25 feet apart initially. As an example, if 16 cones are available, use 12 cones for the lane closure taper, which should be approximately 400 feet minimum on high-speed roads, and four cones along the activity area to quickly make the scene safer.
- Place cones around response vehicles, and place at least one cone downstream past the incident to allow a parking spot for the ambulance or EMS vehicle.
- Use pavement markings as a distance reference to help with cone placement. Roadway skip line striping is typically in 40-foot segments (10-foot painted stripe and 30-foot gap).
- Increase the number of cones and the distance between cones as the speed of approaching traffic increases. This gives motorists more time to react, slow down, and merge. Full MUTCD TTC is the goal for intermediate and major incidents, so actions at the scene should be taken to approach this level of traffic control as additional resources arrive.
- Delineate traffic tapers with clean, retro reflectorized cones.
- Use only retro reflectorized cones when working at night.
- Use additional cones from other responding units as available.
- Improve traffic flow by moving the transition taper further upstream from the activity area as additional traffic controls are put in place.

ANY INCIDENT WITH LANE BLOCKAGE EXPECTED TO EXCEED 24 HOURS WARRANTS FULL WORK ZONE TCC.

6.5 SCENE LIGHTING

Proper illumination, or lighting, of the incident scene is vital. However, exercise care to ensure that scene lights are not blinding to traffic. When available, use vehicles with special lighting capabilities. Vehicle-mounted lighting setups that can be controlled remotely will allow responders to direct lights downward and minimize the amount of light that reaches motorists.

VEHICLE HEADLIGHTS THAT ARE NOT NEEDED FOR ILLUMINATION OR TO NOTIFY OTHER ROAD USERS OF AN INCIDENT RESPONSE VEHICLE IN AN UNEXPECTED LOCATION SHOULD BE TURNED OFF AS SOON AS THE SCENE HAS BEEN SECURED.

6.6 EMERGENCY LIGHT USE

The appropriate use of emergency lights—high-intensity rotating, flashing, wig-wag, or strobe lights—is essential.

Emergency lighting is most effective when a traffic incident blocks travel lanes and traffic control devices are not yet deployed. Once responders deploy emergency temporary traffic control and the scene has been secured, the emergency lighting should be reduced. Emergency lighting does not provide traffic control and is not considered a traffic control device.

Excessive or misdirected lighting can create confusion for approaching motorists and increase the chances for secondary crashes. Motorists approaching an incident from the opposite direction on a divided facility are often distracted by emergency vehicle lighting. When they slow down to look at the traffic incident as they pass, they pose a hazard to themselves and other travelers. The lingering effect of this distraction contributes to increased congestion and resulting delay.

The following guidelines will help responders practice disciplined use of emergency lighting:

- Once channelization with cones and advance warning are established, minimize the use of multiple response vehicle emergency lights.
- Once the travel lanes are cleared, minimize the use of emergency lights on the shoulder.
- Monitor and adjust emergency lighting during the incident to improve the visibility of traffic control devices and reduce onlooker delay.
- Use arrow panels instead of flashing lights to provide traffic control.

6.7 POSITIVE TRAFFIC CONTROL

At an incident scene, manual positive traffic control, also called flagging, reduces rubbernecking and helps keep traffic moving smoothly. When resources permit, the flagger function should assist in slowing and directing approaching traffic. Flaggers shall be outfitted with high-visibility safety apparel.

Stop/Slow paddles are the preferred hand-signaling device because they provide more positive guidance than red flags.[3] Figure 8 illustrates the flagging procedures for emergency situations.

When resources permit, a traffic spotter should monitor traffic and activate an emergency signal if a motorist's actions do not conform to established traffic control measures. A portable air horn or

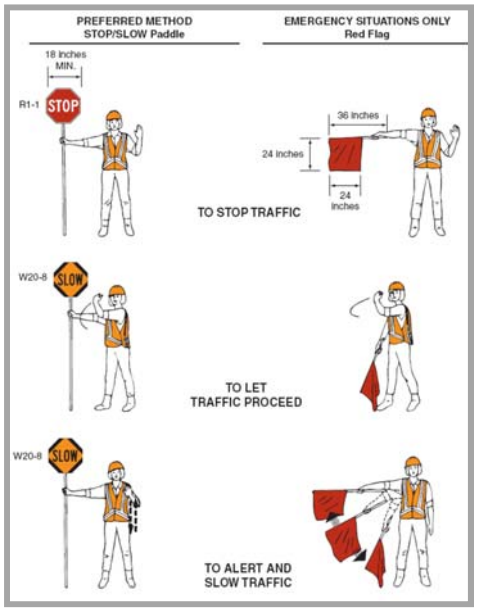
[3] MUTCD Chapter 6E. Flagger Control can be found in Appendix F for full guidance.

similar device is an ideal emergency signal. A portable radio is not recommended for this purpose since all responders on the scene are unlikely to be monitoring the same radio frequency.

Qualified flaggers should provide manual traffic control, but if necessary, any response personnel can provide it. The following are guidelines for effective positive traffic control:

- Do not use bystanders, good Samaritans, or other untrained personnel for traffic control duties.
- Give commands or directions to traffic in a clear, courteous, but firm tone.
- Accompany verbal commands to "stop," "slow down," and "proceed" with appropriate hand movements or the use of a Stop/Slow paddle or flag. Whistles can also be an effective tool.
- Stand at a safe location adjacent to the wrecked vehicles when providing positive traffic control in the activity area.
- Stand at a safe location near the beginning of the taper when providing positive traffic control in the transition taper area.
- Make eye contact with the drivers of approaching vehicles to encourage them to pay attention to their driving and not the incident. This will increase the flow of traffic past the incident scene, reducing delay.
- Avoid providing individualized directions to motorists as this can create more congestion by slowing traffic. The flagger's job is to keep traffic moving safely past the incident scene.

FIGURE 8: FLAGGER COMMANDS FOR EMERGENCY POSITIVE TRAFFIC CONTROL



6.8 ADVANCE WARNING AND QUEUE PROTECTION

Any incident creates a significant potential for the occurrence of a secondary incident, which is often more serious than the initial event. Incident responders play an important role in reducing these secondary incidents.

Vehicles approaching at high speeds will often encounter the stopped queue of traffic before arrow panels and scene emergency lighting are visible. These high-speed motorists do not expect stopped traffic and need appropriate warning.

An advance warning area established upstream of the incident:

- Warns oncoming traffic of the upcoming incident scene, and
- Promotes a reduction in travel speeds.

6.8.1 ADVANCE WARNING SIGNS

Special incident management advance warning signs placed by responders provide warning to approaching motorists. These signs should be a special fluorescent pink color with black lettering, such as "INCIDENT AHEAD" and "BE PREPARED TO STOP" (per MUTCD Chapter 6I). Examples of these signs are shown in Figure 9.

Since this will likely be approaching motorists' first warning of the incident, responders should take special care to place advance warning signs and/or response vehicles, using these guidelines:

- Incidents on the Interstate system or other high-speed divided roadways should have advance warning signs placed approximately 1,000 – 2,600 feet in advance of the beginning of the transition area.
- Warning signs on other roadways should be placed approximately 500 – 1,000 feet prior to the transition area.

All advance warning signs should be placed to provide enough warning to motorists to slow before reaching the traffic queue. Advance warning signs placed in urban areas may need to be placed at shorter distances to avoid sign clutter. Setting up a TIMA near a corner, hill, or other reduced visibility situation may require the location of the advance warning devices to be adjusted.

FIGURE 9: EXAMPLES OF TIMA ADVANCE WARNING SIGNS

Responders should coordinate with units who are either already on or arriving at the scene to place the advance warning signs or other devices, following these guidelines:

- Double back and place the advance warning signs once the immediate scene is secure if additional units are not available to assist.
- Place the signs well in advance of the queue. Relocate them as needed.
- Maintain continual communication with dispatch while on an incident scene so that traffic warning devices, such as DMS, can be updated with accurate information for approaching motorists.
- Obtain additional signs, if needed, from other response units and place them on both sides of the roadway well in advance of the scene.

6.8.2 PORTABLE DYNAMIC MESSAGE SIGNS

Portable Dynamic message signs are another tool for providing drivers advance warning.

Portable Dynamic message signs can be used for intermediate incidents and are strongly recommended for use during major incidents.

6.8.3 DYNAMIC MESSAGE SIGNS

Dynamic Message Signs (DMS) are permanent, structure-mounted, electronic signs.

DMS are remotely operated and can provide advance warning messages to motorists if an incident occurs downstream.

6.9 DISMANTLING THE INCIDENT SCENE

At each incident, responders need to develop a de-commit plan. Incident Command must monitor and control the dismantling of the scene and plan to remove personnel, apparatus, injured persons, bystanders, and vehicles safely from the scene. All debris must be cleared from the roadway so that it doesn't present an additional hazard.

Dismantle the scene backward from the termination area to the advance warning area.

The following are considerations to keep in mind while removing personnel and apparatus from the scene:

- Ambulance leaving scene with or without traffic control
- Dismantling safe incident space
- Blocking apparatus leaving the scene
- Beware of districted drivers when picking up traffic cones safely

Personnel must realize that conditions change as the incident terminates, and the following will likely occur:

- Safe area may no longer be intact.
- Frustrated drivers may increase speed to make up for lost time.
- Aggressive drivers may enter gaps in safe incident space.
- Vehicles (e.g., ambulances) leaving the scene may be too busy watching traffic to see personnel on scene.

When an incident scene has been cleared, the appropriate agency (generally the maintaining authority) should be notified that the roadway is open. Additionally, if dispatch, the TMC, or other agencies were notified of the incident, they also need to be notified that the incident is clear.

At the conclusion of an incident, responders should facilitate the safe removal of all components—including remaining responders, responder vehicles, and TTC devices—of the incident scene, using these guidelines:

- Notify all other responders that your unit is leaving the scene.
- Remove all debris from the travel lanes and shoulder.
- Remove traffic control devices in the upstream direction. Start at the termination area and work back to the advance warning area.
- Notify dispatch when the lanes are reopened.
- Be alert for impatient motorists. With the incident victims and vehicles removed, delayed drivers will not be as cautious and may not see you.
- Also make sure all on-scene responders are notified of lane openings and increased traffic flow coming their way.

6.10 HELICOPTER LANDING ZONES

In cases where incident victims need urgent or time-sensitive medical treatment, air ambulances or medical helicopters may be necessary. In preparation for their arrival, responders must designate a landing zone (LZ).

Ideally, a short-distance transport to a suitable site off of the highway should be considered for the safety of responders and for quicker roadway clearance. However, every incident is different. The on-scene medical controller or IC must promptly decide where to set up the LZ to expedite the victim's transport to an appropriate trauma center.

The following are guidelines for setting up an LZ:

- An LZ should be no less than 100' x 100' in size on flat terrain during the night, and no less than 50' x 50' during the day. The LZ should be clear of debris and loose soil and free of overhead obstructions, wires, or trees. Other responders and personnel should be at least another 100' from the landing zone.
- Ideally, the LZ is marked with appropriate strobe lights, light sticks, and even emergency vehicles. An ideal landing zone is a vacant, cleared, well-defined area. Traffic cones should not be used because rotor wash can potentially suck them into the main rotor. Do not use crime scene tape or rope to mark the LZ.

Responders should remember the following safety guidelines at an LZ:

- When communicating and directing the helicopter to the LZ, use the clock method based on the nose of the aircraft.
- Follow the direction of the flight crew for all movement around the aircraft. Only maneuver around the aircraft when escorted to and from the aircraft by a member of the flight crew.
- Approach the aircraft from the front or sides (from 9 o'clock to 3 o'clock), never from the rear, and always within full view of the pilot. Keep low when approaching the aircraft.
- Stay clear of the tail rotor.
- Do not run or smoke.
- Use eye and ear protection if available.

7 INCIDENT ACTIONS

This section provides typical incident scenarios and offers action items for responders to use as guidelines for effective scene management. The actions are addressed to patrolling responders, such as Freeway Service Patrol or Incident Response Vehicles. However, the principles apply to all responders.

7.1 ABANDONED VEHICLES

Abandoned vehicles left by motorists on roadway shoulders—especially on high-speed, access-controlled roadways—are a safety hazard and can restrict the response of emergency vehicles.

Law enforcement agencies with jurisdiction need to detect, check, and order the removal of abandoned vehicles. Any vehicle found in a location that is hazardous to traffic should be processed as an immediate tow. All other abandoned vehicles should be removed as soon as possible after the statutory time allowance has expired (depending on whether it is in an urban area of rural).

Any non-law enforcement agencies that do not have removal authority can assist in the handling of abandoned vehicles, using these guidelines:

- Check for the following scenarios without entering the vehicle:
    - Injured, sick, or incapacitated individuals
    - Anything suspicious in nature, such as a punched ignition, damaged door lock, or a broken window with glass debris still in the vehicle
- Notify dispatch of anything unusual.
- Advise dispatch if the vehicle is in a hazardous location. Dispatch can contact law enforcement for immediate or expedited removal of the vehicle.
- Tag or mark the rear window to notify other units and law enforcement that the vehicle has been checked. Tag the vehicle only if it is not an immediate hazard.
- Follow procedures for logging or notifying dispatch when tagging a vehicle.

Notify dispatch of previously tagged vehicles that have not been moved after the prescribed NRS 484B.433.3(c) timeframe has expired (1) 24 hours after abandoning the vehicle on any freeway, United State highway or other primary arterial highway, or, (2) 72 hours after abandoning the vehicle on any other highway.

7.2 DISABLED VEHICLES

Occupants of a vehicle that breaks down on any highway, especially a high-speed roadway, face substantial risks. Make every attempt to respond promptly to this type of incident and, when available, contact the freeway safety service patrol at *647. Quick response will help safeguard vehicle occupants who may be tempted to accept a ride from a stranger or walk alongside the roadway to seek assistance.

Once you observe or become aware of a motorist who needs assistance, you have a special obligation to help out. Within reason, you must adjust your direction of travel and respond to the incident with due caution but without delay.

- Stop to offer assistance when a motorist with a disabled vehicle is encountered unless en route to a higher priority call.
- Call dispatch and indicate your intention to turn around and offer assistance, if the disabled vehicle is in the opposite direction of travel.
- Notify dispatch of the location and basic description of the vehicle for follow up if you must pass a motorist for a higher priority incident.

If you are dispatched to a disabled vehicle and encounter another along the way, you may stop for a short time and check the problem. If you cannot provide immediate assistance for their need, advise the motorist that you will return after the other call is cleared.

7.2.1 RELOCATING VEHICLES FROM HAZARDOUS LOCATIONS

Safety is every responder's primary responsibility. If a vehicle is located in a hazardous location or is blocking a travel lane, make every effort to relocate the vehicle prior to rendering assistance.

- Determine if the vehicle should be relocated to a safer location before rendering assistance in:
  - Curves: Motorists tend to hug the inside of a curve or drift off the road on the outside. Make sure there is sufficient sight distance for traffic to see you.
  - Narrow left shoulders.
  - Locations where barrier walls or guardrails limit shoulder width and restrict an escape path.
- Take special care when performing activities such as a tire change on the traffic side of the vehicle. Consider relocating the vehicle unless it is more than six feet off the travel lane.

7.2.2 SAFE AND DAMAGE-FREE PUSH BUMPER USE

Using a response vehicle with a push bumper to relocate a disabled vehicle can be done safely and without damage by following some basic guidelines. Consider the location, weather, and traffic conditions. Contact dispatch to request assistance if you are concerned about highway traffic speeds, your safety, or the competence of the motorist. Do not relocate a vehicle if you suspect the driver is substance impaired.

A push bumper is designed to push a vehicle only for limited distances to reduce a safety hazard. Be prepared to explain to the motorist that you cannot push them down the highway, to an exit, or into a service station. Motorists may even ask you to push them to their home. Be polite but stay in control and remember that your role is to reduce the potential of a secondary incident. Usually, a suitable relocation site is nearby—just make sure you and the motorist agree on the location to which you will push the vehicle.

- Do not push a vehicle that has bumper misalignment, previous damage, or an obstruction such as a trailer hitch, tire carrier, or ladder. If possible, photograph the vehicle's bumper before and after pushing it.
- Do not push a vehicle if you cannot see ahead of it.
- Before you start to push:
    - Tell the driver what you want them to do.
    - Confirm that the driver understands you.
    - Advise exactly where you want the driver to go.
    - Remind the driver that steering, and braking will be hard but will work.
    - Advise the driver not to hit the brakes hard or abruptly.
    - Make sure the driver can hear your instructions. The driver side window should be open.
- Make sure the vehicle's:
    - Ignition key is in the on position.
    - Transmission is in neutral.
    - Parking brake is off.
- Approach the disabled vehicle to be pushed slowly. Make gentle contact.
- Check traffic.
- Advise the driver that you will start pushing.
- Push slowly, maintaining a shallow angle.
- Back off before the driver brakes.
- Advise the driver when to stop.
- Instruct the driver to set the parking brake and secure the vehicle.

7.2.3 BASIC ASSISTANCE TO MOTORISTS WITH MECHANICAL PROBLEMS

In some instances, you may need to provide basic assistance (e.g., changing tires, giving jump starts, or even providing a small quantity of fuel to reach the next fuel station) to get the motorist safely back on the road. Use the following guidelines when offering assistance to a motorist with a disabled vehicle.

Follow the guidelines in Section 6.2, Safe Vehicle Placement while making motorist assists.

- Contact dispatch prior to leaving your vehicle and provide the following information:
  - Exact location, including direction and a mile post or cross street.
  - Color of the vehicle.
  - Make of the vehicle.
  - License plate (tag) number.
  - Description of vehicle problem (e.g., disabled or abandoned).
- Approach on the non-traffic side. Walk past the passenger door and turn to face traffic. Clearly identify yourself and ask, “Are you okay?” and, “How may I help you?” Do not open the door; ask the driver to lower the window.
- Return to your vehicle if you plan to attempt repairs and place a minimum of four traffic cones behind your vehicle along the edge line, approximately 35 to 40 feet apart. (Use skip lines as a guide for spacing.)
- Move vehicles blocking a travel lane or in a hazardous location, such as on a narrow shoulder or at the end of a gore area, before providing assistance or repairs.
- Relocate the vehicle under its own power if possible or by pushing it to a safe location when possible. Follow the guidelines in section 7.2.2 for proper use of push bumpers.
- Contact dispatch and request back-up assistance if the safe relocation of a vehicle on a narrow shoulder is not possible. Use traffic cones and, if an arrow panel is not available, emergency lighting.
- Get as much information as you can from the driver when attempting to determine what is wrong mechanically with a stalled vehicle. Ask questions that include the following:
  - Has this ever happened before?
  - How did the vehicle act prior to stalling?
  - Do you know of any specific problems with the vehicle?
- Avoid any disassembly or removal of parts. Instead, confine repairs to readily apparent problems that can get the motorist underway. Attempt to limit your assistance to no more than 15 minutes.
- Direct the driver to have permanent repairs made promptly. Do not refer motorists to specific tow companies or repair shops. Give them options.

- Offer the motorist the opportunity to make a local cell phone call if attempted repairs are unsuccessful. If the motorist requests a tow truck or motor club, notify dispatch in accordance with agency practices.

7.2.4 RESPONSE FOR HYBRID VEHICLES

Hybrid vehicles are becoming more popular in the United States. Emergency Response Guides for the majority of auto brands and models can be found on the Internet. There are many types of Hybrid vehicles, including:

- Gas/Electric
- Hydrogen Fuel Cells
- All Electric (Plug ins)
- Multi Fuel Vehicles
- Hydraulic Hybrids

The eight steps below should be followed in order to safely respond to hybrid vehicles.

1. Stop, look, and listen. A hybrid may have gone to sleep. In this mode, you would not hear an engine running. For this reason, NEVER approach an accident vehicle from the front or rear—only from the side.
2. If you smell battery acid or propane gas, do not approach the vehicle without self-contained breathing apparatus (SCBA).
3. Chock the wheels.
4. Identify the vehicle.
5. Shift it out of gear or place it in park.
6. Turn off and remove the key (smart key Fobs should be at least 25 feet away from vehicle)
7. Be sure the ready light or auto stop light is off.
8. Set the park brake.
9. Disconnect—**do not cut**—the 12-volt battery. Avoid working in the front or rear of the vehicle as much as possible.
10. **Never cut** or touch the orange, blue, or yellow wires or connectors.

7.3 TRAFFIC CRASHES

Each agency responding to a traffic crash has its own roles and responsibilities. Depending on the severity of the crash, more resources may be deployed to the scene. The guidelines below are generalized and can be considered for use by any responder.

You may be the first to arrive at a vehicle crash. Your ability to quickly analyze the situation and take appropriate action to stabilize the scene and clear the incident is an important part of your job.

- If fire rescue and EMS have not yet arrived, park your vehicle in the blocked lane. If no lanes are blocked, park on the shoulder. After EMS arrives consider using a large vehicle to provide a wider safety buffer for the emergency personnel. This should follow the Lane Plus One procedure outlined in Section 6.2, Safe Vehicle Placement.
- Notify dispatch of:
  - Your exact location.
  - The lanes that are blocked.
  - The number of vehicles and general vehicle description.
  - The license tag number(s) of at least one of the involved vehicles.
- Approach each driver and determine if s/he can drive the vehicle to the shoulder.
- Call dispatch to request law enforcement and EMS if you see any apparent injuries, or if a driver or passenger indicates that s/he is injured. Provide dispatch with as much information as possible on the number and types of injuries.
- If the incident appears to be minor, ask each driver, “Do you want me to call EMS to transport you for treatment?” If no ambulance is needed, advise the driver that you will safely help move the vehicle off the road.
- Note: If this is an injury crash, law enforcement will need to complete an investigation. To aid the investigation, do not move any wrecked cars or debris until permitted.
- If the motorist is cooperative but doesn’t feel comfortable driving the car, offer to drive it off the road.
- Relocate the wrecked car with your vehicle if it is not drivable.
- The ideal location to relocate the vehicles to is off the roadway completely. If possible, utilize an AIS (accident investigation site) or a location near the exit ramp on a cross street or a frontage road.
- If the crash cannot be relocated, start setting up emergency TTC and facilitate the flow of traffic past the crash scene.

- Do not leave a lane-blocking incident unprotected.
- To reduce the duration of the incident and limit rubbernecking, leave the crash scene and park off the roadway system to write your final report. Turn off emergency lighting and look for a safe area to park such as a fast food parking lot to complete the report.
- Clean up all debris and mitigate fluid spills before opening a lane. However, do not move any debris until the investigating traffic officer gives approval.

7.3.1 WORKING WITH OTHER RESPONDERS

Responders at a traffic incident make up a team and depend on each other for assistance. You are a professional whose skills include making a scene safe and quickly establishing traffic control. Everyone on the responding team should focus on safely clearing the scene and opening the travel lanes as soon as possible.

Because you will be working with other responders assigned to your area, you should have the opportunity to form a close professional partnership. This partnership will ensure the effective and safe management of traffic incidents on your roadways.

The following are general suggested guidelines for effective teamwork:

- Check in with the IC and begin to set up your TTC. Position your vehicle to help move traffic safely past the scene.
- Ask other responders to position their vehicles within the coned off activity area.
- Adjust the cones to protect all of the emergency vehicles. Fire and EMS may want to keep one additional lane closed (Lane Plus One) as a buffer between moving traffic and their personnel.
- Talk to the IC about moving or repositioning some of the response vehicles to improve traffic flow once the injured have been treated. Be persuasive but not confrontational. In some cases, after a few minutes you may again suggest that response vehicles be repositioned to facilitate traffic flow.
- Be sensitive to law enforcement's job of investigating serious crashes, especially if there is potential for a fatality. Protect and preserve the scene as best you can to allow a complete investigation. If you are first on the scene, pay close attention to details, including who the drivers are. Try not to park on skid marks or other potential evidence.
- Allow law enforcement enough time to document the scene and begin the crash report. Offer your assistance and begin to sweep up debris and absorb spilled vehicle fluids, as permitted.
- Ask for authorization to reduce the number of blocked lanes and begin moving the vehicles from the travel lanes. (Vehicles from serious crashes with multiple injured or incidents with possible fatalities will need to remain in place until the crash investigation is sufficiently complete.)

- Work with tow operators to expedite the clearance of the vehicles, fluids, and crash debris. Tow operators are part of the response team. If a wrecker is not yet on scene, suggest to law enforcement that you will move the wreckage off the travel lanes.
- Always look for opportunities to expedite the clearance of the wrecked vehicles from the travel lanes.

7.3.2 RELOCATING CRASH VEHICLES PRIOR TO TOWING ARRIVAL

In many cases, the towing company may not arrive on-scene immediately. You can assist by relocating the vehicle(s) from the travel lanes for towing later.

Be aggressive in relocating wrecked vehicles from travel lanes to the extent permitted by your agency guidelines. Confer with the IC and begin to move the wrecked vehicles once injured persons are extricated and investigation is complete, using these guidelines:

- Relocate wrecked vehicles well off the travel lanes to the right side (in most cases). Place the vehicle in a position that gives the wrecker easy access.
- Consider relocating the vehicle to an exit ramp or a safe area out of sight of traffic.
- Drive the wrecked car off the road if it can be started.
- Relocate crash vehicles with your push bumper. Get assistance with traffic and push the wreckage from the road unless it is not safe to do so.
- Consider using a tow strap as an alternate method to relocate wrecked cars from travel lanes. This method works well if there is front end damage where locked wheels may prevent pushing.
- Look for and document any prior damage before relocating the vehicle.

7.3.3 VEHICLE FIRES

Smoke from vehicle fires can cause visibility issues that affect responders and passing motorists. It may be prudent to close traffic lanes adjacent to the fire; however, it is generally a good idea to maintain some traffic flow at the scene to facilitate the arrival of fire apparatus. In some cases, on arterial roadways, smoke may require closing both directions of traffic for a short period of time. Upon arrival at a vehicle fire:

- Notify dispatch and provide location and a vehicle description. If it is a commercial truck, look for and report any indication of hazardous materials, and look for placards and HAZMAT ID numbers.
- Assist the vehicle occupants and escort them to a safe area away from the fire.

- Secure the scene. Provide traffic control and, if possible, keep traffic flowing to expedite the arrival and parking of fire crews.
- Attempt to extinguish only small fires if safe to do so.
- Do not approach a completely involved vehicle. There is risk of a tire, bumper support, or the fuel tank exploding.
- Set up cones and other available temporary traffic controls.

7.3.4 TRUCK CRASHES

Major truck crashes can have serious impacts on highway traffic. You can assist in many ways to manage the scene and remove the wreckage and spilled loads from the roadway both quickly and safely.

Your initial role is to set up emergency temporary traffic controls, just as in other incidents. Your devices are short term and will need to be upgraded to comply with the MUTCD as more resources become available.

During a truck crash, all responders should strive to safely reduce the size of the scene and the number of lanes closed. This goal can be accomplished by the following:

- Take quick action to contain or absorb any spilled vehicle fluids.
- Relocate spilled non-hazardous cargo to open an additional lane. In some cases, an additional lane can be opened by moving spilled cargo by hand.
- Assist other responders to expedite reopening travel lanes. This assistance may include working with heavy-duty tow operators.
- Modify and upgrade the TTC devices to match the changing scene conditions.
- Stay alert to traffic and maintain a sense of urgency at the scene.
- Communicate frequently with dispatch with status reports from the scene.
- Discuss and coordinate the transfer of the traffic controls with the IC, other responding personnel, and dispatch.
- An on-scene responder should be assigned to facilitate traffic movement past the activity area to reduce rubbernecking. This traffic control does not have to be from law enforcement.

7.4 VEHICLE FLUID SPILL MITIGATION

Incidents occur in which vehicle fluids such as engine oil, radiator fluid, hydraulic fluid, brake fluid, and diesel fuel from a ruptured fuel tank spill into the roadway. The most frequent fluid at a commercial vehicle crash is diesel fuel. Prompt actions by an initial responder to contain or reduce the size of the spill will greatly reduce the impact and duration of the incident. It is important to

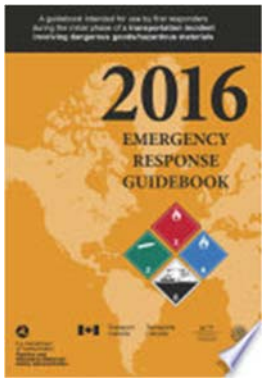
identify that the spilled fluid is not from a cargo tank. The following actions apply only to non-cargo spilled vehicle fluids.

NO ACTIONS BY RESPONDERS TO CONTAIN OR MITIGATE A VEHICLE FLUID SPILL SHIFTS LIABILITY FROM THE RESPONSIBLE PARTY.

- Identify the spill as a vehicle fluid, not cargo.
- Begin containing the vehicle fluid spill to keep it from spreading.
- Request assistance for large diesel fuel spills like saddle tank ruptures.
- Contain and limit the spill from spreading. Build a dike. Apply any available absorbents—even dirt from the roadside.
- Use available materials to try to reduce leaking vehicle fluids at the source.
- Seek assistance from the fire rescue personnel at the scene if you do not feel safe working with the fluids.
- Advise dispatch of the estimated number of gallons spilled. Dispatch will make proper notifications.
- For large spills beyond the on-scene resources, incident command should discuss the need for and request a maintenance crew, environmental, or clean-up contractor.

7.5 INCIDENTS INVOLVING HAZARDOUS MATERIALS

Commercial vehicle incidents are among the most challenging and dangerous tasks responders must manage. An incident involving hazardous material cargo is even more perilous.



While you should mitigate spills of vehicle fluids such as diesel fuel, you must address actual hazardous material cargo spills differently and with extreme caution.

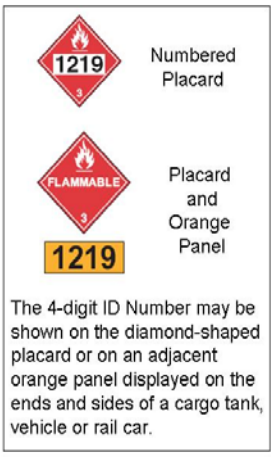
Familiarize yourself with the color and appearance of the material identification placards in the US DOT Emergency Response Guidebook.

At the scene of a truck crash where there is a spill or leak of an unidentified cargo, especially a placarded load, use the following guidance:

- Notify dispatch immediately.
- Approach the incident cautiously; do not rush in.

- Approach the incident from upwind.
- Stay clear of all spills, vapors, fumes, smoke, and any cargo that is the source of these potential hazards.
- Identify the cargo ID number indicated on the placards from a safe distance and update dispatch with the information.
- Check the driver and assist only if it is safe to approach.

FIGURE 10: EXAMPLE OF PLACARD AND PANEL WITH ID NUMBER



7.6 REMOVING DEBRIS NOT RESULTING FROM A TRAFFIC CRASH

Random or unexpected debris of any kind on a highway is a major concern and presents a real threat to motorists. Accidents frequently occur when drivers either stop suddenly or make abrupt lane changes to avoid striking debris. Debris is often kicked up by trucks, wind, or even mowers, and it can become a deadly projectile.

Removing debris from the travel lanes is a dangerous activity and requires appropriate caution. While there is no single safe way to remove debris from travel lanes, consider traffic volume, prevailing speed, sight distance, and time of day when determining how to remove the debris.

Debris on the shoulder has the potential to become a safety concern if a driver pulls off the roadway. Such debris can damage the driver's vehicle, or it could be thrown back into moving traffic. When removing debris from the roadway, a responder should:

- Notify dispatch of any debris. Provide the exact location, which lane(s) are affected, a general description, and whether you can remove the debris unassisted or if backup will be required.
- Pull well off the roadway and correctly position your vehicle.
- Use appropriate emergency lighting.

- Keep personal safety a top priority—safety vest and gloves are a must.
- Park upstream from the debris. This will keep debris that is struck by passing vehicles from being propelled into you or your vehicle.
- Point at the debris to help drivers avoid striking it if you are waiting on the shoulder for traffic to clear.
- Contact dispatch and request assistance if it is not possible to remove the debris safely. You may need to coordinate with police to create a rolling road block to approach the debris in some cases.
- Attempt to remove debris completely from the roadway system. If it cannot be removed, place it well off the travel lanes and shoulder to be picked up at a later time. Consider using a cone to mark the location. Notify dispatch for follow-up.
- After you report the debris, do not continue patrolling until you take action to remove it.
- Turn in any valuable items you find to your supervisor. Disposition of the items will be handled through established agency procedures.
- Use your PA system to notify the driver of a truck with the load spilling on the travel lanes. If the driver does not stop, contact dispatch and give the location, type of material being spilled, direction of travel, license number, and, if possible, the company name and any other pertinent information. Remember only law enforcement has the authority to make the truck pull over. Do not become involved in a pursuit.
- Stop and consider clean-up procedures if a spilled load is a hazard to traffic. Request assistance through dispatch if the location is unsafe or the amount of debris too great.

7.7 ROAD CLOSURES AND DETOURS

Major incidents with all travel lanes blocked for an extended period will likely require an emergency alternate route detour around the incident scene.

Emergency alternate route detours are generally pre-planned along the best available route. Large trucks are a concern on detours because of both their size and weight.

If no pre-established detour exists, work with the IC and other responders to close the roadway at an exit near the incident that provides a viable alternate route.

Implementing emergency alternate routes requires substantial additional resources. This includes local law enforcement and public works personnel, who can direct traffic and/or optimize traffic signals on the detour route. Agencies may use temporary detour signing and portable DMS to help motorists navigate back.

The alternate route should be monitored or patrolled for congestion levels, breakdowns, or problems with commercial vehicles making turns.

8 GLOSSARY OF TERMS

Activity Area – Section of the highway where incident response activities take place. The activity area is comprised of the upstream buffer space and the incident space.

Advance Warning Area – Section of highway where motorists are informed about the upcoming incident area.

Block – Positioning of an emergency vehicle to create a physical barrier between upstream traffic and the incident space.

Buffer Space – A lateral and/or longitudinal area that separates personnel and vehicles in the protected incident space from nearby moving traffic.

Crash Reconstruction – The process of recreating an accident, including the attempt to identify, based on the best available evidence, the events which led up to the occurrence of the accident, as well as the attempted re-enactment of the accident.

Downstream – Roadway or traffic flow beyond the incident space, when considered from the perspective of a passing motorist.

Emergency Medical Technician (EMT) – A person trained and certified to initiate the administration of emergency care for victims of trauma or acute illness before or during transportation of the victims to a health care facility via ambulance or aircraft.

Emergency Temporary Traffic Controls (TTC) - TTC devices, equipment, and personnel implemented in response to an unplanned traffic incident. Not to be confused with the full TTC imposed in response to highway maintenance, highway work zones or major events with longer durations.

Flagger – Personnel assigned to control stop and go traffic or direct traffic in conformance with the Manual on Uniform Traffic Control Devices (MUTCD).

Incident Command – Responsible for overall management of the incident and consists of the IC, either single or Unified Command, and any assigned supporting staff.

Incident Command Post – The field location where the primary tactical-level, on-scene incident command functions are performed.

Incident Command System (ICS) – A standardized, on-scene, all-hazard incident management concept that is based upon a flexible, scalable response organization providing a common framework within which people can work together effectively.

Incident Commander (IC) – The on-scene ranking officer, representing the agency with incident jurisdiction that performs the command function.

Incident Space – Physical area of the roadway within which the emergency responders perform their EMS, fire, law enforcement, and recovery tasks at a vehicle-related incident.

Initial Responder – The first responding person or unit to arrive at an incident scene.

Investigator – Law enforcement officer that examines crime scenes to gather and process physical evidence that may link suspects to the crime scenes.

Landing Zone (LZ) – A designated location where a helicopter may safely take off and land.

Lane Numbering Convention – Lanes are numbered starting with the left most lane as seen from the motorist's direction of travel (the lane nearest the median – often considered the fast lane) being Lane 1. Example for a 3-lane highway:

Lane 1 - left lane nearest the median

Lane 2 - middle lane

Lane 3 - right lane nearest the shoulder

Lane Plus One – The practice of first responders (Fire Rescue, EMS and others) to close an additional travel lane as a buffer space to work a crash scene or work zone.

Manual on Uniform Traffic Control Devices (MUTCD) – The national standard for traffic control devices. MUTCD Chapter 6I covers the use of traffic control devices at an incident scene.

National Incident Management System (NIMS) – A system mandated by Homeland Security Presidential Directive 5 that provides a consistent nationwide approach for governments, the private sector, and nongovernmental organizations to work effectively and efficiently together to prepare for, respond to, and recover from domestic incidents, regardless of cause, size, or complexity.

National Traffic Incident Management Coalition (NTIMC) – The NTIMC is a forum of national organizations representing EMS, fire, law enforcement, public safety communications, towing and recovery, and transportation communities working together to promote multi-disciplinary, multi-jurisdictional TIM programs and activities.

National Unified Goal (NUG) – Established by the NTIMC, the NUG defines three goals: 1) responder safety;2) safe, quick clearance; and 3) prompt, reliable, interoperable communications.

Open Roads Policy (ORP) – The Nevada Statewide Policy signed by the Governor, Director of The Department of Transportation, and, The Nevada Department of Public Safety. The ORP serves to inform incident responders of the urgent need to rapidly remove disabled or wrecked vehicles, spilled cargo, and debris that obstruct the normal flow of traffic.

Public Address (PA) System – An electronic amplification system used to reinforce a sound source.

Responders – All personnel who have a responsibility in managing an incident and mitigating its impacts.

Staging Area – Location established where available resources can be temporarily housed or parked while awaiting operational assignment.

Tapers – Used to move traffic out of or into the normal path through the use of a series of channelizing devices.

Termination Area – Area used to return motorists to their normal path. The termination area extends from the downstream end of the incident space to the last temporary traffic control device.

Traffic Control Device – All signs, signals, markings, and other devices used to regulate, warn, or guide traffic.

Traffic Homicide Investigator – A sworn law enforcement officer, who is assigned to investigate fatalities resulting from motor vehicle collisions.

Traffic Incident – A non-recurring event that causes a reduction of roadway capacity or an abnormal increase in demand.

Traffic Incident Management (TIM) - The systematic, planned, and coordinated use of human, institutional, mechanical, and technical resources to reduce the duration and impact of incidents, and improve the safety of motorists, crash victims, and incident responders.

Traffic Incident Management Area (TIMA) – Area of a highway where temporary traffic controls are imposed by authorized officials in response to an incident. A TIMA is a type of TTC Zone and extends from the first warning device to the last TTC device or to a point where vehicles return to the original lane alignment and are clear of the incident. The components of a TIMA include an advance warning area, a transition area, an activity area and a termination area.

Transition Area – The section of the highway where motorists are redirected out of their normal path. The transition area is the area in which approaching motorists should change their speed and position to comply with the emergency traffic control measures established at an incident scene.

Unified Command – (UC) An ICS application in which responding agencies and/or jurisdictions with responsibility for the incident work together to establish a common set of objectives and strategies.

Upstream – Roadway or traffic flow prior to the incident space, when considered from the perspective of a passing motorist.

Appendix A: Revisions Form

Nevada TIM Guidelines
ERROR/OMISSION NOTIFICATION AND REVISION REQUEST

Today's Date		**Date of Guidelines**	
Requestor Name		**Date Requested**	
Requestor Agency		**Version Number**	
Requestor Title			
Requestor Email			
Requestor Phone			

Change Request Section Number, Title and Page Number

Error/Omission Notification and/or Revision Request
1.
2.
3.

Reason for Notification / Revision
1.
2.
3.

Decision	
☐ Approved	☐ Rejected
☐ Approved with modifications	☐ Deferred
Date Change/ Version Number	

From available electronically from www.NVTIM.com

Appendix A

Appendix B: Open Roads Policy

Quick Clearance for Safety and Mobility

Whenever a roadway or travel lane is closed or partially blocked by a crash or traffic incident, Law Enforcement, Transportation and local public safety agencies shall re-open the roadway as soon as possible on an urgent basis. Safety of the public and responders is the highest priority and must be preserved.

State of Nevada
OPEN ROADS POLICY

This agreement by and between the Nevada Department of Transportation (NDOT) and the Nevada Department of Public Safety (DPS) supports the Nevada Statewide Joint Operations Policy Statement (JOPS) and, establishes a policy for DPS and NDOT personnel to expedite the removal of vehicles, cargo and debris to restore, in an urgent manner, the safe and orderly flow of traffic following a motor vehicle crash or incident on Nevada's roadways. This policy establishes a suggested benchmark for all Nevada traffic incident response agencies to adopt.

Whereas: public safety is the highest priority and must be maintained, especially if injuries or hazardous materials are involved. The quality of life in the state of Nevada is heavily dependent upon the free movement of people, vehicles and commerce. DPS and NDOT share the responsibility for achieving and maintaining the degree of order necessary to make this free movement possible. Both agencies have the responsibility to reduce the risk to responders, secondary crashes and delays associated with incidents, roadway maintenance, construction and enforcement.

The following operating standards are based on the philosophy that our roadways will not be closed or restricted any longer than is absolutely necessary.

Be it resolved: Roadways will be cleared of disabled vehicles, spilled cargo and debris as soon as it is safe to do so. It is understood that damage to vehicles or cargo may occur as a result of clearing the roadway on an urgent basis. While reasonable attempts to avoid such damage shall be taken, the highest priority is restoring traffic to normal conditions.

Department of Public Safety Responsibilities

Members of the DPS who respond to the scene of traffic incidents will make clearing the travel portion of the roadway a high priority. When an investigation is required, it will be conducted in the most expedient manner possible considering the severity of the incident. Non-critical portions of the investigation may be delayed, when appropriate, until lighter traffic conditions allow completion of those tasks. DPS will close only those lanes absolutely necessary to conduct the investigation safely.

DPS may coordinate with NDOT representatives to set up appropriate traffic control, establish alternate routes (when available), expedite the safe movement of traffic in the queue at the scene, and restore the roadway to normal flow as soon as possible.

Whenever practical, crashes on controlled-access roadways will be relocated to off-ramps, frontage roads, collector distributors, crash investigation sites, or other safe areas for completion of investigations. Tow trucks will be requested as soon as it is evident that they are needed to clear the roadway. DPS has reviewed and updated their Tow Rotation Contract to include provisions that require recognized competency levels in TIM training for all operators in the area of traffic incident management. The Contract also requires responding tow operators to select equipment that is appropriate in size, capacity and design capable of providing safe, quick clearance of roadway incidents.

DPS along with NDOT will use the most appropriate technologies and approved methods for expedient investigation of crashes or incident scenes without compromising the quality of investigation.

Department of Transportation Responsibilities

NDOT, when requested by DPS or other law enforcement or emergency agency, will respond and deploy resources to major traffic incidents 24 hours a day, 7 days per week. Each NDOT District will develop and implement notification and response procedures to meet the goal of providing initial traffic control within 30 minutes of notification in urban areas during normal working hours and 60 minutes after hours and on weekends. In rural Districts, NDOT and DPS agree to support local TIM Open Roads Agreements (ORA).

When appropriate resources are available, NDOT, in coordination with DPS, will: 1) upgrade scene safety by providing Intelligent Transportation System (ITS) devices (e.g. arrow boards, advanced warning signs, and DMS); 2) determine appropriate detour routes (when available); and/or 3) discuss incident clearance strategies on a scene by scene basis.

Pursuant to MUTCD guidelines, NDOT will provide fully compliant temporary work zone traffic controls at major incidents expected to exceed 24 hours to ensure a safe incident scene for all responders and the motoring public.

When requested by DPS, NDOT will deploy the necessary heavy equipment and resources to reopen the roadway if clearance of the travel lanes is being blocked, or if the task is beyond the capabilities of the tow service on scene. If cargo or spilled loads (non-hazardous) are involved, NDOT will make every effort to assist in the relocation of the materials in the shortest possible time, using available resources.

NDOT and DPS will continually work together to ensure that the needs of motorists on our highways are being met in the most professional, safe, and efficient manner.

THEREFORE, IT IS AGREED THAT:

Traffic incidents will be cleared from the Nevada roadways as soon as possible. It is the goal of all traffic incident response agencies that all incidents be cleared from the travel portion of the roadway within two hours or less.

DPS and NDOT will evaluate and continually update and modify operating policies, procedures, rules and standards to ensure that they are consistent with this Open Roads Policy (ORP).

DPS and NDOT will ensure that all management, operational and response personnel are aware of and trained in the procedures and intention of this ORP.

IT IS FURTHER AGREED THAT:

Both agencies will actively solicit and enlist other state, county, local public/private agencies or political subdivisions to endorse and become party to this Open Roads Policy of the State of Nevada through a local ORA.

In witness whereof, each party hereto has caused this document to be executed in its name and on its behalf by the duly authorized Chief Executives of these state agencies.

GOVERNOR OF THE STATE OF NEVADA

BRIAN SANDOVAL

SEAL OF NEVADA

NEVADA DEPT OF TRANSPORTATION	**NEVADA DEPT OF PUBLIC SAFETY**
Director, Rudy Malfabon	Director, James Wright
Date: 4-5-17	**Date:** 4-25-17

ENDORSED, AGREED AND EXECUTED THIS 25th DAY OF APRIL, 2017.

Appendix C: Nevada Open Roads Agreement

RENO FIRE DEPARTMENT

WHEREAS, the Nevada Open Roads Policy, signed on April 25, 2017 by the Nevada Department of Transportation and the Nevada Department of Public Safety (DPS), and the Governor of Nevada is the policy that suggests a new benchmark and standard for traffic incident response on Nevada roadways; and

WHEREAS, the Nevada Open Roads Policy states, in pertinent part, that public safety remains the highest priority during a traffic incident and that public safety agencies and traffic incident responders shall re-open the roadway as soon as possible on an urgent basis; and

WHEREAS, the Reno Fire Department will participate in the TIM Steering Committee as a core champion participating in TIM Coalition Meetings, completing training, and providing emergency response/incident command for fire suppression, hazardous material spills, rescue, and extraction of trapped crash victims, as well as assisting with scene safety and incident clearance in a manner to support safe, quick clearance policies.

WHEREAS, NDOT and the Traffic Incident Management Coalition (TIMs) provide training consistent with the Federal Highway Administration (FHWA) SHRP2 TIM Training and, the TIMs develop ongoing Nevada Traffic Incident Management guidelines as state-of-practice for traffic incident response, management, and clearance for Nevada roadways, and that these guidelines complement the Nevada Open Roads Policy.

NOW, THEREFORE, BE IT RESOLVED, that the Reno Fire Department agrees that clearing the travel portion of a roadway is a high priority and that roadways will not be closed or restricted any longer than is absolutely necessary ; and

BE IT FURTHER RESOLVED, that the Reno Fire Department will promote and advocate, where appropriate, the safe, quick clearance principles and practices recommended by the 2017 Nevada Traffic Incident Management Guidelines, before, during, and after a traffic incident; and

BE IT FURTHER RESOLVED, that the Reno Fire Department is committed to participating in continuous collaboration with other state and local agencies concerning intra and inter-disciplinary matters relevant to traffic incident management and safe, quick clearance, including but not limited to training, research, evaluation, and education; and

BE IT FURTHER RESOLVED that the Reno Fire Department hereby endorses and now becomes an Official Party to the Nevada Open Roads Policy.

Reno Fire Department

_____ **DATE:** _____

Chief Dave Cochran

Appendix C

Appendix D: After Action Review (AAR)Debrief Form

Incident Review Checklist

The After-Action Review (AAR) process. The form used for review is different depending on the agency leading the AAR. It is a learning tool that can evaluate a process or an incident with the goal of improving performance by unified agencies, sustaining strengths and correcting weaknesses. The process is simple. Participants that were involved in the incident are encouraged to provide input to the TIM Coalition on:

1. what was planned,
2. what actually happened,
3. why it happened, and
4. what can be done next time.

Questions to be answered by all agencies during or prior to the debriefing are listed below. It is very detailed and attempts to ensure that few issues are forgotten. It emphases WHAT happened, but the list does not cover WHY or what should be done NEXT TIME. Maybe it is assumed that the WHY and the NEXT TIME will be discussed if problems are identified. Agencies are asked to answer the questions that concern their agency's part in the incident. These questions become "food for thought" during the TIM Coalition debriefing.

Additionally, each agency may conduct their own debriefing and provide the results to the TIM for consideration.

Incident Review Checklist

1. Did we acknowledge the page only once?
2. Did we use the dispatch channel for only essential communications?
3. Did we drive appropriately and wear a seat belt when in route to the station?
4. Did everyone take/ wear appropriate PPE to the scene, given the nature of the incident?
5. Did we respond with the proper apparatus?
6. Did we take the most direct route to the scene?
7. Did we have enough members respond?
8. Did everyone respond to where they should respond to (station / scene)?
9. Did anyone have to ask for directions?
10. Did everyone wear a seatbelt?
11. Did we stop at all stop indicators, and yield at yield signs (at least until other traffic yielded to us)?

12. Did we stage and attempt to get an assignment / or assume command?
13. Did we do the 5-step communications process consistently?
14. Did we do what the IC said do?
15. Did we get on a tactical channel as assigned?
16. Did we wear appropriate PPE?
17. Did we maintain crew integrity?
18. Did we position our apparatus to operate at best advantage?
19. Did we apply the high idle?
20. Did we have water ready immediately when called for?
21. Did we get anyone hurt?
22. Did we do any unnecessary damage?
23. Did we operate inside the hazard zone only with a crew w/ PPE and an assignment?
24. Did we execute the basics flawlessly?
25. Did our command have a plan for EMS / Water Supply?
26. Did we release apparatus when it was not needed?
27. Did we top off fuel and water in our apparatus?
28. Did we clean and refuel our tools?
29. Did we refill our air bottles and clean our face pieces?
30. Did we leave our apparatus ready to respond to the next alarm?
31. Did we make a log entry and file a report?
32. Were we nice to our customers and/or host?
33. Did we do more than was expected of us?
34. Did we turn off the lights, turn the station heat down and lock the station?

Appendix D

Appendix E: TRAA Vehicle Classifications

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 includes 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.

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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Appendix F: MUTCD 6E. Flagger Control

CHAPTER 6E. FLAGGER CONTROL

Section 6E.01 Qualifications for Flaggers

Guidance:

01 *Because flaggers are responsible for public safety and make the greatest number of contacts with the public of all highway workers, they should be trained in safe traffic control practices and public contact techniques. Flaggers should be able to satisfactorily demonstrate the following abilities:*

- *A. Ability to receive and communicate specific instructions clearly, firmly, and courteously;*
- *B. Ability to move and maneuver quickly in order to avoid danger from errant vehicles;*
- *C. Ability to control signaling devices (such as paddles and flags) in order to provide clear and positive guidance to drivers approaching a TTC zone in frequently changing situations;*
- *D. Ability to understand and apply safe traffic control practices, sometimes in stressful or emergency situations; and*
- *E. Ability to recognize dangerous traffic situations and warn workers in sufficient time to avoid injury.*

Section 6E.02 High-Visibility Safety Apparel

Standard:

01 **For daytime and nighttime activity, flaggers 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 Apparel and Headwear" (see Section 1A.11) and labeled as meeting the ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. The apparel background (outer) material color shall be fluorescent orange-red, fluorescent yellow-green, or a combination of the two as defined in the ANSI standard. The retroreflective material shall be orange, yellow, white, silver, yellow-green, or a fluorescent version of these colors, and shall be visible at a minimum distance of 1,000 feet. The retroreflective safety apparel shall be designed to clearly identify the wearer as a person.**

Guidance:

02 *For nighttime activity, high-visibility safety apparel that meets the Performance Class 3 requirements of the ANSI/ISEA 107–2004 publication entitled "American National Standard for High-Visibility Apparel and Headwear" (see Section 1A.11) and labeled as meeting the ANSI 107-2004 standard performance for Class 3 risk exposure should be considered for flagger wear.*

Standard:

03 **When uniformed law enforcement officers are used to direct traffic within a TTC zone, they shall wear high-visibility safety apparel as described in this Section.**

Option:

04 In lieu of ANSI/ISEA 107-2004 apparel, 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) and labeled as ANSI 207-2006.

Section 6E.03 Hand-Signaling Devices

Guidance:

01 *The STOP/SLOW paddle should be the primary and preferred hand-signaling device because the STOP/SLOW paddle gives road users more positive guidance than red flags. Use of flags should be limited to emergency situations.*

Standard:

02 **The STOP/SLOW paddle shall have an octagonal shape on a rigid handle. STOP/SLOW paddles shall be at least 18 inches wide with letters at least 6 inches high. The STOP (R1-1) face shall have white letters and a white border on a red background. The SLOW (W20-8) face shall have black letters and a black border on an orange background. When used at night, the STOP/SLOW paddle shall be retroreflectorized.**

Guidance:

03 *The STOP/SLOW paddle should be fabricated from light semi-rigid material.*

Support:

04 The optimum method of displaying a STOP or SLOW message is to place the STOP/SLOW paddle on a rigid staff that is tall enough that when the end of the staff is resting on the ground, the message is high enough to be seen by approaching or stopped traffic.

Option:

05 The STOP/SLOW paddle may be modified to improve conspicuity by incorporating either white or red flashing lights on the STOP face, and either white or yellow flashing lights on the SLOW face. The flashing lights may be arranged in any of the following patterns:

A. Two white or red lights, one centered vertically above and one centered vertically below the STOP legend; and/or two white or yellow lights, one centered vertically above and one centered vertically below the SLOW legend;
B. Two white or red lights, one centered horizontally on each side of the STOP legend; and/or two white or yellow lights, one centered horizontally on each side of the SLOW legend;
C. One white or red light centered below the STOP legend; and/or one white or yellow light centered below the SLOW legend;
D. A series of eight or more small white or red lights no larger than 1/4 inch in diameter along the outer edge of the paddle, arranged in an octagonal pattern at the eight corners of the border of the STOP face; and/or a series of eight or more small white or yellow lights no larger than 1/4 inch in diameter along the outer edge of the paddle, arranged in a diamond pattern along the border of the SLOW face; or
E. A series of white lights forming the shapes of the letters in the legend.

Standard:

06 **If flashing lights are used on the STOP face of the paddle, their colors shall be all white or all red. If flashing lights are used on the SLOW face of the paddle, their colors shall be all white or all yellow.**

07 **If more than eight flashing lights are used, the lights shall be arranged such that they clearly convey the octagonal shape of the STOP face of the paddle and/or the diamond shape of the SLOW face of the paddle.**

08 **If flashing lights are used on the STOP/SLOW paddle, the flash rate shall be at least 50, but not more than 60, flashes per minute.**

09 **Flags, when used, shall be red or fluorescent orange/red in color, shall be a minimum of 24 inches square, and shall be securely fastened to a staff that is approximately 36 inches in length.**

Guidance:

10 *The free edge of a flag should be weighted so the flag will hang vertically, even in heavy winds.*

Standard:

11 **When used at nighttime, flags shall be retroreflectorized red.**

Option:

12 When flagging in an emergency situation at night in a non-illuminated flagger station, a flagger may use a flashlight with a red glow cone to supplement the STOP/SLOW paddle or flag.

Standard:

13 **When a flashlight is used for flagging in an emergency situation at night in a non-illuminated flagger station, the flagger shall hold the flashlight in the left hand, shall hold the paddle or flag in the right hand as shown in Figure 6E-3, and shall use the flashlight in the following manner to control approaching road users:**

A. To inform road users to stop, the flagger shall hold the flashlight with the left arm extended and pointed down toward the ground, and then shall slowly wave the flashlight in front of the body in a slow arc from left to right such that the arc reaches no farther than 45 degrees from vertical.
B. To inform road users to proceed, the flagger shall 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 shall not wave the flashlight.
C. To alert or slow traffic, the flagger shall point the flashlight toward oncoming traffic and quickly wave the flashlight in a figure eight motion.

Section 6E.04 Automated Flagger Assistance Devices

Support:

01 Automated Flagger Assistance Devices (AFADs) enable a flagger(s) to be positioned out of the lane of traffic and are used to control road users through temporary traffic control zones. These devices are designed to be remotely operated either by a single flagger at one end of the TTC zone or at a central location, or by separate flaggers near each device's location.

02 There are two types of AFADs:

A. An AFAD (see Section 6E.05) that uses a remotely controlled STOP/SLOW sign on either a trailer or a movable cart system to alternately control right-of-way.
B. An AFAD (see Section 6E.06) that uses remotely controlled red and yellow lenses and a gate arm to alternately control right-of-way.

03 AFADs might be appropriate for short-term and intermediate-term activities (see Section 6G.02). Typical applications include TTC activities such as, but not limited to:

A. Bridge maintenance;
B. Haul road crossings; and
C. Pavement patching.

Standard:

04 **AFADs shall only be used in situations where there is only one lane of approaching traffic in the direction to be controlled.**

05 **When used at night, the AFAD location shall be illuminated in accordance with Section 6E.08.**

Guidance:

06 *AFADs should not be used for long-term stationary work (see Section 6G.02).*

Standard:

07 **Because AFADs are not traffic control signals, they shall not be used as a substitute for or a replacement for a continuously operating temporary traffic control signal as described in Section 6F.84.**

08 **AFADs shall meet the crashworthy performance criteria contained in Section 6F.01.**

Guidance:

09 *If used, AFADs should be located in advance of one-lane, two-way tapers and downstream from the point where approaching traffic is to stop in response to the device.*

Standard:

10 **If used, AFADs shall be placed so that all of the signs and other items controlling traffic movement are readily visible to the driver of the initial approaching vehicle with advance warning signs alerting other approaching traffic to be prepared to stop.**

11 **If used, an AFAD shall be operated only by a flagger (see Section 6E.01) who has been trained on the operation of the AFAD. The flagger(s) operating the AFAD(s) shall not leave the AFAD(s) unattended at any time while the AFAD(s) is being used.**

12 **The use of AFADs shall conform to one of the following methods:**

A. An AFAD at each end of the TTC zone (Method 1), or
B. An AFAD at one end of the TTC zone and a flagger at the opposite end (Method 2).

13 **Except as provided in Paragraph 14, two flaggers shall be used when using either Method 1 or Method 2.**

Option:

14 A single flagger may simultaneously operate two AFADs (Method 1) or may operate a single AFAD on one end of the TTC zone while being the flagger at the opposite end of the TTC zone (Method 2) if both of the following conditions are present:

A. The flagger has an unobstructed view of the AFAD(s), and
B. The flagger has an unobstructed view of approaching traffic in both directions.

Guidance:

15 *When an AFAD is used, the advance warning signing should include a ROAD WORK AHEAD (W20-1) sign, a ONE LANE ROAD (W20-4) sign, and a BE PREPARED TO STOP (W3-4) sign.*

Standard:

16 **When the AFAD is not in use, the signs associated with the AFAD, both at the AFAD location and in advance, shall be removed or covered.**

Guidance:

17 *A State or local agency that elects to use AFADs should adopt a policy, based on engineering judgment, governing AFAD applications. The policy should also consider more detailed and/or more restrictive requirements for AFAD use, such as the following:*

A. Conditions applicable for the use of Method 1 and Method 2 AFAD operation,
B. Volume criteria,
C. Maximum distance between AFADs,

D. Conflicting lenses/indications monitoring requirements,
E. Fail safe procedures,
F. Additional signing and pavement markings,
G. Application consistency,
H. Larger signs or lenses to increase visibility, and
I. Use of backplates.

Section 6E.05 STOP/SLOW Automated Flagger Assistance Devices

Standard:

01 **A STOP/SLOW Automated Flagger Assistance Device (AFAD) (see Section 6E.04) shall include a STOP/SLOW sign that alternately displays the STOP (R1-1) face and the SLOW (W20-8) face of a STOP/SLOW paddle (see Figure 6E-1).**

02 **The AFAD's STOP/SLOW sign shall have an octagonal shape, shall be fabricated of rigid material, and shall be mounted with the bottom of the sign a minimum of 6 feet above the pavement on an appropriate support. The size of the STOP/SLOW sign shall be at least 24 x 24 inches with letters at least 8 inches high. The background of the STOP face shall be red with white letters and border. The background of the SLOW face shall be diamond shaped and orange with black letters and border. Both faces of the STOP/SLOW sign shall be retroreflectorized.**

03 **The AFAD's STOP/SLOW sign shall have a means to positively lock, engage, or otherwise maintain the sign assembly in a stable condition when set in the STOP or SLOW position.**

04 **The AFAD's STOP/SLOW sign shall be supplemented with active conspicuity devices by incorporating either:**

A. White or red flashing lights within the STOP face and white or yellow flashing lights within the SLOW face meeting the provisions contained in Section 6E.03; or
B. A Stop Beacon (see Section 4L.05) mounted a maximum of 24 inches above the STOP face and a Warning Beacon (see Section 4L.03) mounted a maximum of 24 inches above, below, or to the side of the SLOW face. The Stop Beacon shall not be flashed or illuminated when the SLOW face is displayed, and the Warning Beacon shall not be flashed or illuminated when the STOP face is displayed. Except for the mounting locations, the beacons shall comply with the provisions of Chapter 4L.

Option:

05 Type B warning light(s) (see Section 6F.83) may be used in lieu of the Warning Beacon during the display of the SLOW face of the AFAD's STOP/SLOW sign.

Standard:

06 **If Type B warning lights are used in lieu of a Warning Beacon, they shall flash continuously when the SLOW face is displayed and shall not be flashed or illuminated when the STOP face is displayed.**

Option:

07 The faces of the AFAD's STOP/SLOW sign may include louvers to improve the stability of the device in windy or other adverse environmental conditions.

Standard:

08 **If louvers are used, the louvers shall be designed such that the full sign face is visible to approaching traffic at a distance of 50 feet or greater.**

Guidance:

09 *The STOP/SLOW AFAD should include a gate arm that descends to a down position across the approach lane of traffic when the STOP face is displayed and then ascends to an upright position when the SLOW face is displayed.*

Option:

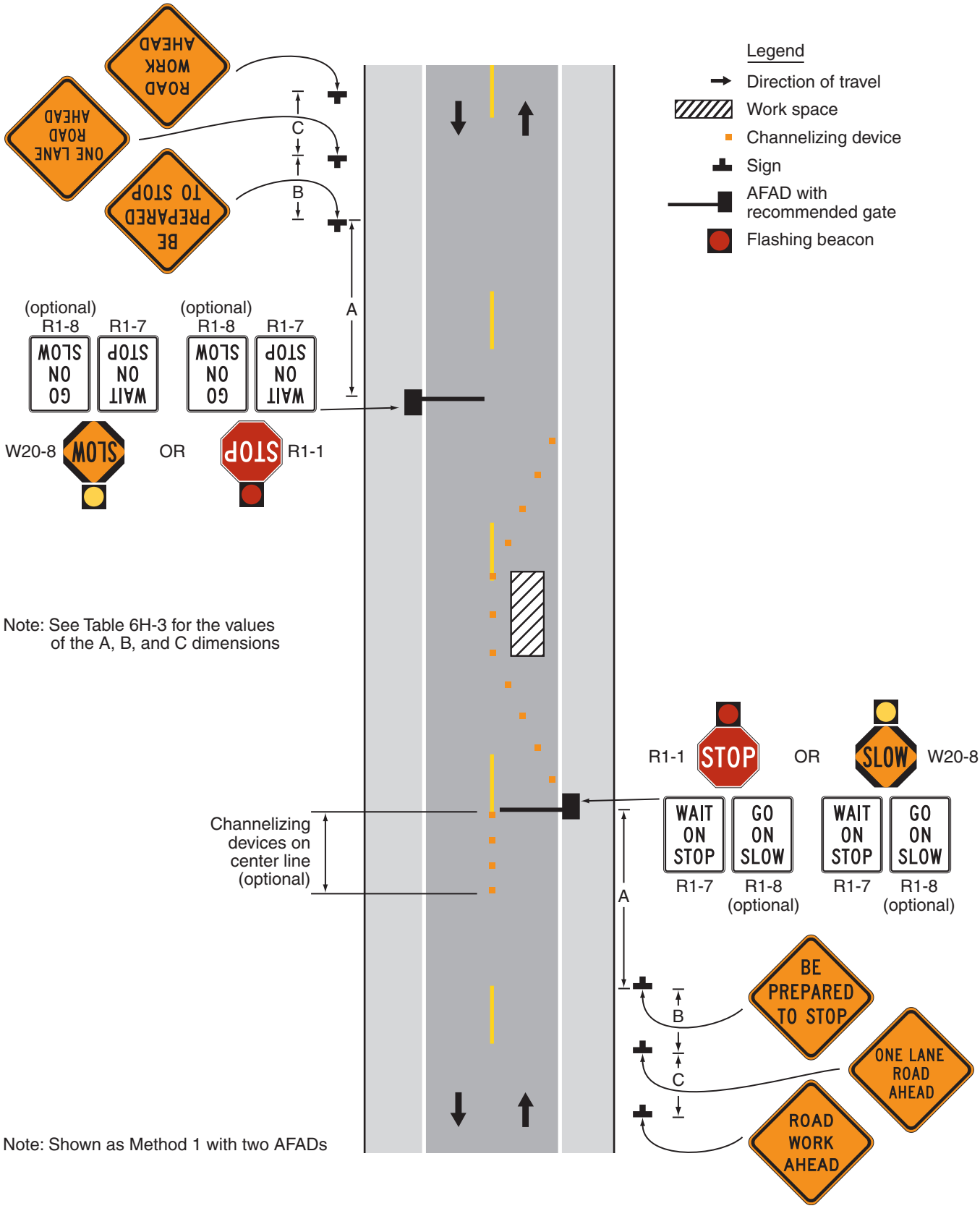
10 In lieu of a stationary STOP/SLOW sign with a separate gate arm, the STOP/SLOW sign may be attached to a mast arm that physically blocks the approach lane of traffic when the STOP face is displayed and then moves to a position that does not block the approach lane when the SLOW face is displayed.

Standard:

11 **Gate arms, if used, shall be fully retroreflectorized on both sides, and shall have vertical alternating red and white stripes at 16-inch intervals measured horizontally as shown in Figure 8C-1. When the arm is in the down position blocking the approach lane:**

A. The minimum vertical aspect of the arm and sheeting shall be 2 inches; and
B. The end of the arm shall reach at least to the center of the lane being controlled.

Figure 6E-1. Example of the Use of a STOP/SLOW Automated Flagger Assistance Device (AFAD)



12 **A WAIT ON STOP (R1-7) sign (see Figure 6E-1) shall be displayed to road users approaching the AFAD.**

Option:

13 A GO ON SLOW (R1-8) sign (see Figure 6E-1) may also be displayed to road users approaching the AFAD.

Standard:

14 **The GO ON SLOW sign, if used, and the WAIT ON STOP sign shall be positioned on the same support structure as the AFAD or immediately adjacent to the AFAD such that they are in the same direct line of view of approaching traffic as the sign faces of the AFAD. Both signs shall have black legends and borders on white backgrounds. Each of these signs shall be rectangular in shape and each shall be at least 24 x 30 inches in size with letters at least 6 inches high.**

15 **To inform road users to stop, the AFAD shall display the STOP face and the red or white lights, if used, within the STOP face shall flash or the Stop Beacon shall flash. To inform road users to proceed, the AFAD shall display the SLOW face and the yellow or white lights, if used, within the SLOW face shall flash or the Warning Beacon or the Type B warning lights shall flash.**

16 **If STOP/SLOW AFADs are used to control traffic in a one-lane, two-way TTC zone, safeguards shall be incorporated to prevent the flagger(s) from simultaneously displaying the SLOW face at each end of the TTC zone. Additionally, the flagger(s) shall not display the AFAD's SLOW face until all oncoming vehicles have cleared the one-lane portion of the TTC zone.**

Section 6E.06 Red/Yellow Lens Automated Flagger Assistance Devices

Standard:

01 **A Red/Yellow Lens Automated Flagger Assistance Device (AFAD) (see Section 6E.04) shall alternately display a steadily illuminated CIRCULAR RED lens and a flashing CIRCULAR YELLOW lens to control traffic without the need for a flagger in the immediate vicinity of the AFAD or on the roadway (see Figure 6E-2).**

02 **Red/Yellow Lens AFADs shall have at least one set of CIRCULAR RED and CIRCULAR YELLOW lenses that are 12 inches in diameter. Unless otherwise provided in this Section, the lenses and their arrangement, CIRCULAR RED on top and CIRCULAR YELLOW below, shall comply with the applicable provisions for traffic signal indications in Part 4. If the set of lenses is post-mounted, the bottom of the housing (including brackets) shall be at least 7 feet above the pavement. If the set of lenses is located over any portion of the highway that can be used by motor vehicles, the bottom of the housing (including brackets) shall be at least 15 feet above the pavement.**

Option:

03 Additional sets of CIRCULAR RED and CIRCULAR YELLOW lenses, located over the roadway or on the left-hand side of the approach and operated in unison with the primary set, may be used to improve visibility and/or conspicuity of the AFAD.

Standard:

04 **A Red/Yellow Lens AFAD shall include a gate arm that descends to a down position across the approach lane of traffic when the steady CIRCULAR RED lens is illuminated and then ascends to an upright position when the flashing CIRCULAR YELLOW lens is illuminated. The gate arm shall be fully retroreflectorized on both sides, and shall have vertical alternating red and white stripes at 16-inch intervals measured horizontally as shown in Figure 8C-1. When the arm is in the down position blocking the approach lane:**

A. The minimum vertical aspect of the arm and sheeting shall be 2 inches; and

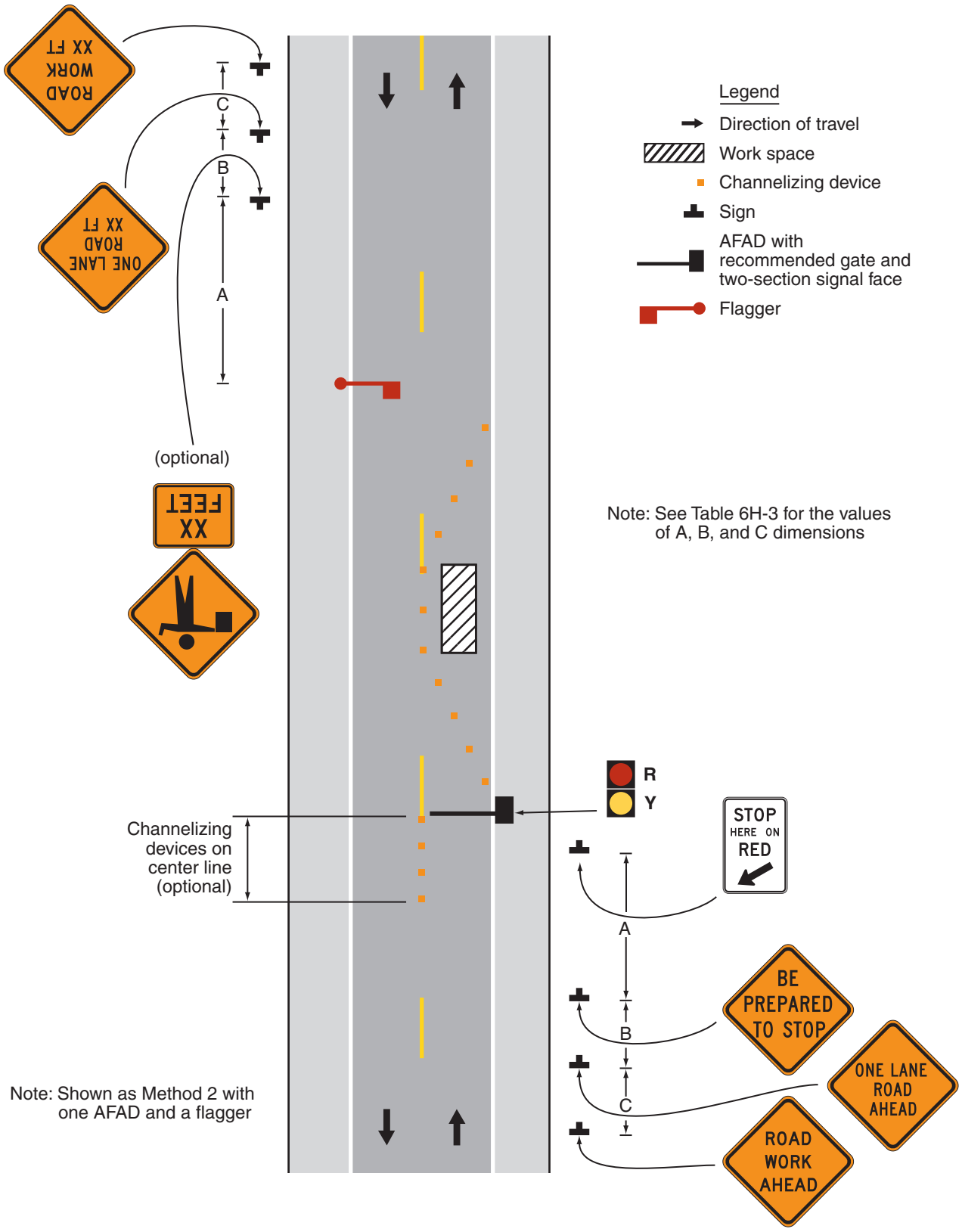
B. The end of the arm shall reach at least to the center of the lane being controlled.

05 **A Stop Here On Red (R10-6 or R10-6a) sign (see Section 2B.53) shall be installed on the right-hand side of the approach at the point at which drivers are expected to stop when the steady CIRCULAR RED lens is illuminated (see Figure 6E-2).**

06 **To inform road users to stop, the AFAD shall display a steadily illuminated CIRCULAR RED lens and the gate arm shall be in the down position. To inform road users to proceed, the AFAD shall display a flashing CIRCULAR YELLOW lens and the gate arm shall be in the upright position.**

07 **If Red/Yellow Lens AFADs are used to control traffic in a one-lane, two-way TTC zone, safeguards shall be incorporated to prevent the flagger(s) from actuating a simultaneous display of a flashing CIRCULAR YELLOW lens at each end of the TTC zone. Additionally, the flagger shall not actuate the AFAD's display of the flashing CIRCULAR YELLOW lens until all oncoming vehicles have cleared the one-lane portion of the TTC zone.**

Figure 6E-2. Example of the Use of a Red/Yellow Lens Automated Flagger Assistance Device (AFAD)



08 **A change interval shall be provided as the transition between the display of the flashing CIRCULAR YELLOW indication and the display of the steady CIRCULAR RED indication. During the change interval, the CIRCULAR YELLOW lens shall be steadily illuminated. The gate arm shall remain in the upright position during the display of the steadily illuminated CIRCULAR YELLOW change interval.**

09 **A change interval shall not be provided between the display of the steady CIRCULAR RED indication and the display of the flashing CIRCULAR YELLOW indication.**

Guidance:

10 *The steadily illuminated CIRCULAR YELLOW change interval should have a duration of at least 5 seconds, unless a different duration, within the range of durations recommended by Section 4D.26, is justified by engineering judgment.*

Section 6E.07 Flagger Procedures

Support:

01 The use of paddles and flags by flaggers is illustrated in Figure 6E-3.

Standard:

02 **Flaggers shall use a STOP/SLOW paddle, a flag, or an Automated Flagger Assistance Device (AFAD) to control road users approaching a TTC zone. The use of hand movements alone without a paddle, flag, or AFAD to control road users shall be prohibited except for law enforcement personnel or emergency responders at incident scenes as described in Section 6I.01.**

03 **The following methods of signaling with paddles shall be used:**

- **A. To stop road users, the flagger shall face road users and aim the STOP paddle face toward road users in a stationary position with the arm extended horizontally away from the body. The free arm shall be held with the palm of the hand above shoulder level toward approaching traffic.**
- **B. To direct stopped road users to proceed, the flagger shall face road users with the SLOW paddle face aimed toward road users in a stationary position with the arm extended horizontally away from the body. The flagger shall motion with the free hand for road users to proceed.**
- **C. To alert or slow traffic, the flagger shall face road users with the SLOW paddle face aimed toward road users in a stationary position with the arm extended horizontally away from the body.**

Option:

04 To further alert or slow traffic, the flagger holding the SLOW paddle face toward road users may motion up and down with the free hand, palm down.

Standard:

05 **The following methods of signaling with a flag shall be used:**

- **A. To stop road users, the flagger shall face road users and extend the flag staff horizontally across the road users' lane in a stationary position so that the full area of the flag is visibly hanging below the staff. The free arm shall be held with the palm of the hand above shoulder level toward approaching traffic.**
- **B. To direct stopped road users to proceed, the flagger shall face road users with the flag and arm lowered from the view of the road users, and shall motion with the free hand for road users to proceed. Flags shall not be used to signal road users to proceed.**
- **C. To alert or slow traffic, the flagger shall face road users and slowly wave the flag in a sweeping motion of the extended arm from shoulder level to straight down without raising the arm above a horizontal position. The flagger shall keep the free hand down.**

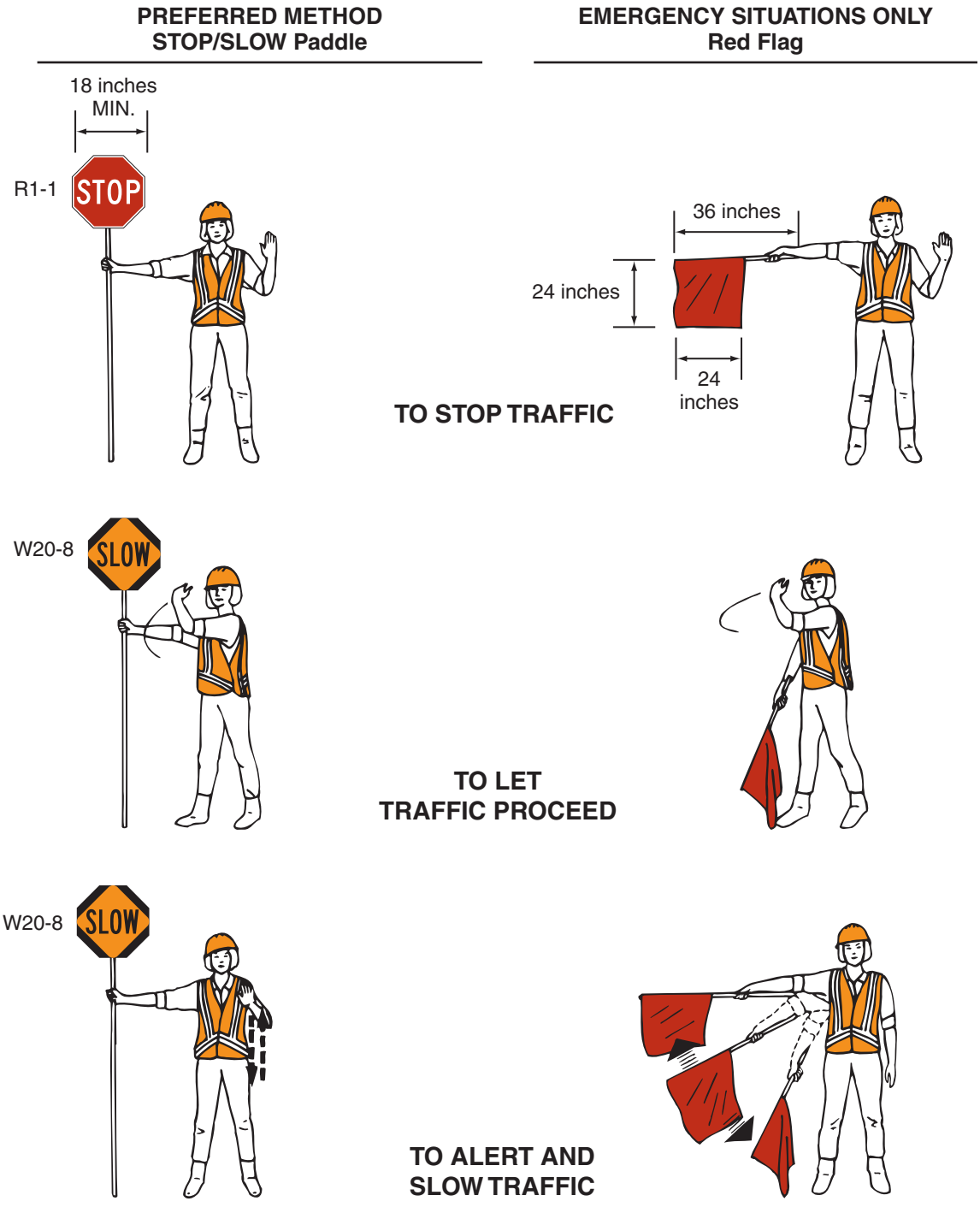
Guidance:

06 *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. The flagger also should be visible to other road users. The flagger should be stationed sufficiently in advance of the workers 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 workers, work vehicles, or equipment.*

Option:

07 At spot lane closures where adequate sight distance is available for the reasonably safe handling of traffic, the use of one flagger may be sufficient.

Figure 6E-3. Use of Hand-Signaling Devices by Flaggers



Guidance:

08 *When a single flagger is used, the flagger should be stationed on the shoulder opposite the spot lane closure or work space, or in a position where good visibility and traffic control can be maintained at all times.*

Section 6E.08 Flagger Stations

Standard:

01 **Flagger stations shall be located such that approaching road users will have sufficient distance to stop at an intended stopping point.**

Option:

02 The distances shown in Table 6E-1, which provides information regarding the stopping sight distance as a function of speed, may be used for the location of a flagger station. These distances may be increased for downgrades and other conditions that affect stopping distance.

Guidance:

03 *Flagger stations should be located such that an errant vehicle has additional space to stop without entering the work space. The flagger should identify an escape route that can be used to avoid being struck by an errant vehicle.*

Standard:

04 **Except in emergency situations, flagger stations shall be preceded by an advance warning sign or signs. Except in emergency situations, flagger stations shall be illuminated at night.**

Table 6E-1. Stopping Sight Distance as a Function of Speed

Speed*	Distance
20 mph	115 feet
25 mph	155 feet
30 mph	200 feet
35 mph	250 feet
40 mph	305 feet
45 mph	360 feet
50 mph	425 feet
55 mph	495 feet
60 mph	570 feet
65 mph	645 feet
70 mph	730 feet
75 mph	820 feet

* Posted speed, off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed

Appendix G: MUTCD 6I Control of Traffic through TIM Areas

CHAPTER 6F. TEMPORARY TRAFFIC CONTROL ZONE DEVICES

Section 6F.01 Types of Devices

Guidance:

01 *The design and application of TTC devices used in TTC zones should consider the needs of all road users (motorists, bicyclists, and pedestrians), including those with disabilities.*

Support:

02 FHWA policy requires that all roadside appurtenances such as traffic barriers, barrier terminals and crash cushions, bridge railings, sign and light pole supports, and work zone hardware used on the National Highway System meet the crashworthy performance criteria contained in the National Cooperative Highway Research Program (NCHRP) Report 350, "Recommended Procedures for the Safety Performance Evaluation of Highway Features." The FHWA website at "http://safety.fhwa.dot.gov/programs/roadside_hardware.htm" identifies all such hardware and includes copies of FHWA acceptance letters for each of them. In the case of proprietary items, links are provided to manufacturers' websites as a source of detailed information on specific devices. The website also contains an "Ask the Experts" section where questions on roadside design issues can be addressed.

03 Various Sections of the MUTCD require certain traffic control devices, their supports, and/or related appurtenances to be crashworthy. Such MUTCD crashworthiness provisions apply to all streets, highways, and private roads open to public travel. Also, State Departments of Transportation and local agencies might have expanded the NCHRP Report 350 crashworthy criteria to apply to certain other roadside appurtenances.

04 Crashworthiness and crash testing information on devices described in Part 6 are found in AASHTO's "Roadside Design Guide" (see Section 1A.11).

05 As defined in Section 1A.13, "crashworthy" is a characteristic of a roadside appurtenance that has been successfully crash tested in accordance with a national standard such as the NCHRP Report 350, "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

Standard:

06 **Traffic control devices shall be defined as all signs, signals, markings, and other devices used to regulate, warn, or guide road users, placed on, over, or adjacent to a street, highway, private roads open to public travel (see definition in Section 1A.13), pedestrian facility, or bikeway by authority of a public body or official having jurisdiction.**

07 **All traffic control devices used for construction, maintenance, utility, or incident management operations on a street, highway, or private road open to public travel (see definition in Section 1A.13) shall comply with the applicable provisions of this Manual.**

Section 6F.02 General Characteristics of Signs

Support:

01 TTC zone signs convey both general and specific messages by means of words, symbols, and/or arrows and have the same three categories as all road user signs: regulatory, warning, and guide.

Standard:

02 **The colors for regulatory signs shall follow the Standards for regulatory signs in Table 2A-5 and Chapter 2B. Warning signs in TTC zones shall have a black legend and border on an orange background, except for the Grade Crossing Advance Warning (W10-1) sign which shall have a black legend and border on a yellow background, and except for signs that are required or recommended in Parts 2 or 7 to have fluorescent yellow-green backgrounds. Colors for guide signs shall follow the Standards in Table 2A-5 and Chapter 2D, except for guide signs as otherwise provided in Section 6F.55.**

Option:

03 Where the color orange is required, the fluorescent orange color may also be used.

Support:

04 The fluorescent version of orange provides higher conspicuity than standard orange, especially during twilight.

Option:

05 Existing warning signs that are still applicable may remain in place.

06 In order to maintain the systematic use of yellow or fluorescent yellow-green backgrounds for pedestrian, bicycle, and school warning signs in a jurisdiction, the yellow or fluorescent yellow-green background for pedestrian, bicycle, and school warning signs may be used in TTC zones.

07 Standard orange flags or flashing warning lights may be used in conjunction with signs.

Standard:

08 **When standard orange flags or flashing warning lights are used in conjunction with signs, they shall not block the sign face.**

09 **Except as provided in Section 2A.11, the sizes for TTC signs and plaques shall be as shown in Table 6F-1. The sizes in the minimum column shall only be used on local streets or roadways where the 85th-percentile speed or posted speed limit is less than 35 mph.**

Option:

10 The dimensions of signs and plaques shown in Table 6F-1 may be increased wherever necessary for greater legibility or emphasis.

Standard:

11 **Deviations from standard sizes as prescribed in this Manual shall be in 6-inch increments.**

Support:

12 Sign design details are contained in the "Standard Highway Signs and Markings" book (see Section 1A.11).

13 Section 2A.06 contains additional information regarding the design of signs, including an Option allowing the development of special word message signs if a standard word message or symbol sign is not available to convey the necessary regulatory, warning, or guidance information.

Standard:

14 **All signs used at night shall be either retroreflective with a material that has a smooth, sealed outer surface or illuminated to show the same shape and similar color both day and night.**

15 **The requirement for sign illumination shall not be considered to be satisfied by street, highway, or strobe lighting.**

Option:

16 Sign illumination may be either internal or external.

17 Signs may be made of rigid or flexible material.

Section 6F.03 Sign Placement

Guidance:

01 *Signs should be located on the right-hand side of the roadway unless otherwise provided in this Manual.*

Option:

02 Where special emphasis is needed, signs may be placed on both the left-hand and right-hand sides of the roadway. Signs mounted on portable supports may be placed within the roadway itself. Signs may also be mounted on or above barricades.

Support:

03 The provisions of this Section regarding mounting height apply unless otherwise provided for a particular sign elsewhere in this Manual.

Standard:

04 **The minimum height, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement, of signs installed at the side of the road in rural areas shall be 5 feet (see Figure 6F-1).**

05 **The minimum height, measured vertically from the bottom of the sign to the top of the curb, or in the absence of curb, measured vertically from the bottom of the sign to the elevation of the near edge of the traveled way, of signs installed at the side of the road in business, commercial, or residential areas where parking or pedestrian movements are likely to occur, or where the view of the sign might be obstructed, shall be 7 feet (see Figure 6F-1).**

06 **The minimum height, measured vertically from the bottom of the sign to the sidewalk, of signs installed above sidewalks shall be 7 feet.**

Option:

07 The height to the bottom of a secondary sign mounted below another sign may be 1 foot less than the height provided in Paragraphs 4 through 6.

Guidance:

08 *Neither portable nor permanent sign supports should be located on sidewalks, bicycle facilities, or areas designated for pedestrian or bicycle traffic. If the bottom of a secondary sign that is mounted below another sign is mounted lower than 7 feet above a pedestrian sidewalk or pathway (see Section 6D.02), the secondary sign should not project more than 4 inches into the pedestrian facility.*

Table 6F-1. Temporary Traffic Control Zone Sign and Plaque Sizes (Sheet 1 of 3)

Sign or Plaque	Sign Designation	Section	Conventional Road	Freeway or Expressway	Minimum
Stop	R1-1	6F.06	30 x 30*	—	—
Stop (on Stop/Slow Paddle)	R1-1	6E.03	18 x 18	—	—
Yield	R1-2	6F.06	36 x 36 x 36*	—	30 x 30 x 30
To Oncoming Traffic (plaque)	R1-2aP	6F.06	36 x 30	48 x 36	24 x 1 8
Wait on Stop	R1-7	6E.05	24 x 30	24 x 30	—
Go on Slow	R1-8	6E.05	24 x 30	24 x 30	—
Speed Limit	R2-1	6F.12	24 x 30*	36 x 48	—
Fines Higher (plaque)	R2-6P	6F.12	24 x 18	36 x 24	—
Fines Double (plaque)	R2-6aP	6F.12	24 x 18	36 x 24	—
$XX Fine (plaque)	R2-6bP	6F.12	24 x 18	36 x 24	—
Begin Higher Fines Zone	R2-10	6F.12	24 x 30	36 x 48	—
End Higher Fines Zone	R2-11	6F.12	24 x 30	36 x 48	—
End Work Site Speed Limit	R2-Y12	6F.12	24 x 36	36 x 54	—
Movement Prohibition	R3-1,2,3,4,18,27	6F.06	24 x 24*	36 x 36	—
Mandatory Movement (1 lane)	R3-5	6F.06	30 x 36	—	—
Optional Movement (1 lane)	R3-6	6F.06	30 x 36	—	—
Right (Left) Lane Must Turn Right (Left)	R3-7	6F.06	30 x 30*	—	—
Advance Intersection Lane Control	R3-8	6F.06	Varies x 30	—	—
Do Not Pass	R4-1	6F.06	24 x 30	36 x 48	—
Pass With Care	R4-2	6F.06	24 x 30	36 x 48	—
Keep Right	R4-7	6F.06	24 x 30	36 x 48	—
Narrow Keep Right	R4-7c	6F.06	18 x 30	—	—
Stay in Lane	R4-9	6F.11	24 x 30	36 x 48	—
Do Not Enter	R5-1	6F.06	30 x 30*	36 x 36	—
Wrong Way	R5-1a	6F.06	36 x 24*	42 x 30	—
One Way	R6-1	6F.06	36 x 12*	54 x 18	—
One Way	R6-2	6F.06	24 x 30*	36 x 48	—
No Parking (symbol)	R8-3	6F.06	24 x 24	36 x 36	—
Pedestrian Crosswalk	R9-8	6F.13	36 x 18	—	—
Sidewalk Closed	R9-9	6F.14	24 x 12	—	—
Sidewalk Closed, Use Other Side	R9-10	6F.14	24 x 12	—	—
Sidewalk Closed Ahead, Cross Here	R9-11	6F.14	24 x 18	—	—
Sidewalk Closed, Cross Here	R9-11a	6F.14	24 x 12	—	—
Road Closed	R11-2	6F.08	48 x 30	—	—
Road Closed - Local Traffic Only	R11-3a,3b,4	6F.09	60 x 30	—	—
Weight Limit	R12-1,2	6F.10	24 x 30	36 x 48	—
Weight Limit (with symbols)	R12-5	6F.10	24 x 36	36 x 48	—
Turn and Curve Signs	W1-1,2,3,4	6F.1 6	36 x 36	48 x 48	30 x 30
Reverse Curve (2 or more lanes)	W1-4b,4c	6F.48	36 x 36	48 x 48	30 x 30
One-Direction Large Arrow	W1-6	6F.16	48 x 24	60 x 30	—
Chevron Alignment	W1-8	6F.16	18 x 24	30 x 36	—
Stop Ahead	W3-1	6F.16	36 x 36	48 x 48	30 x 30
Yield Ahead	W3-2	6F.16	36 x 36	48 x 48	30 x 30
Signal Ahead	W3-3	6F.16	36 x 36	48 x 48	30 x 30
Be Prepared to Stop	W3-4	6F.16	36 x 36	48 x 48	30 x 30
Reduced Speed Limit Ahead	W3-5	6F.16	36 x 36	48 x 48	30 x 30

Table 6F-1. Temporary Traffic Control Zone Sign and Plaque Sizes (Sheet 2 of 3)

Sign or Plaque	Sign Designation	Section	Conventional Road	Freeway or Expressway	Minimum
XX MPH Speed Zone Ahead	W3-5a	6F.16	36 x 36	48 x 48	30 x 30
Merging Traffic	W4-1,5	6F.16	36 x 36	48 x 48	36 x 36
Lane Ends	W4-2	6F.24	36 x 36	48 x 48	30 x 30
Added Lane	W4-3,6	6F.16	36 x 36	48 x 48	30 x 30
No Merge Area (plaque)	W4-5P	6F.16	18 x 24	24 x 30	—
Road Narrows	W5-1	6F.16	36 x 36	48 x 48	30 x 30
Narrow Bridge	W5-2	6F.16	36 x 36	48 x 48	30 x 30
One Lane Bridge	W5-3	6F.16	36 x 36	48 x 48	30 x 30
Ramp Narrows	W5-4	6F.26	36 x 36	48 x 48	30 x 30
Divided Highway	W6-1	6F.16	36 x 36	48 x 48	30 x 30
Divided Highway Ends	W6-2	6F.16	36 x 36	48 x 48	30 x 30
Two-Way Traffic	W6-3	6F.32	36 x 36	48 x 48	30 x 30
Two-Way Traffic	W6-4	6F.76	12 x 18	12 x 18	—
Hill (symbol)	W7-1	6F.16	36 x 36	48 x 48	30 x 30
Next XX Miles (plaque)	W7-3aP	6F.53	24 x 18	36 x 30	—
Bump	W8-1	6F.16	36 x 36	48 x 48	30 x 30
Dip	W8-2	6F.16	36 x 36	48 x 48	30 x 30
Pavement Ends	W8-3	6F.16	36 x 36	48 x 48	30 x 30
Soft Shoulder	W8-4	6F.44	36 x 36	48 x 48	30 x 30
Slippery When Wet	W8-5	6F.16	36 x 36	48 x 48	30 x 30
Truck Crossing	W8-6	6F.36	36 x 36	48 x 48	30 x 30
Loose Gravel	W8-7	6F.16	36 x 36	48 x 48	30 x 30
Rough Road	W8-8	6F.16	36 x 36	48 x 48	30 x 30
Low Shoulder	W8-9	6F.44	36 x 36	48 x 48	30 x 30
Uneven Lanes	W8-11	6F.45	36 x 36	48 x 48	30 x 30
No Center Line	W8-12	6F.47	36 x 36	48 x 48	30 x 30
Fallen Rocks	W8-14	6F.16	36 x 36	48 x 48	30 x 30
Grooved Pavement	W8-15	6F.16	36 x 36	48 x 48	30 x 30
Motorcycle (plaque)	W8-15P	6F.54	24 x 18	30 x 24	—
Shoulder Drop Off (symbol)	W8-17	6F.44	36 x 36	48 x 48	30 x 30
Shoulder Drop-Off (plaque)	W8-17P	6F.44	24 x 18	30 x 24	—
Road May Flood	W8-18	6F.16	36 x 36	48 x 48	24 x 24
No Shoulder	W8-23	6F.16	36 x 36	48 x 48	30 x 30
Steel Plate Ahead	W8-24	6F.46	36 x 36	48 x 48	30 x 30
Shoulder Ends	W8-25	6F.16	36 x 36	48 x 48	30 x 30
Lane Ends	W9-1,2	6F.16	36 x 36	48 x 48	30 x 30
Center Lane Closed Ahead	W9-3	6F.23	36 x 36	48 x 48	30 x 30
Grade Crossing Advance Warning	W10-1	6F.16	36 dia.	—	—
Truck	W11-10	6F.36	36 x 36	48 x 48	30 x 30
Double Arrow	W12-1	6F.16	30 x 30	—	—
Low Clearance	W12-2	6F.16	36 x 36	48 x 48	30 x 30
Advisory Speed (plaque)	W13-1P	6F.52	24 x 24	30 x 30	18 x 18
On Ramp (plaque)	W13-4P	6F.25	36 x 36	36 x 36	—
No Passing Zone (pennant)	W14-3	6F.16	48 x 48 x 36	64 x 64 x 48	40 x 40 x 30
XX Feet (plaque)	W16-2P	6F.16	24 x 18	30 x 24	—
Road Work (with distance)	W20-1	6F.18	36 x 36	48 x 48	30 x 30

Table 6F-1. Temporary Traffic Control Zone Sign and Plaque Sizes (Sheet 3 of 3)

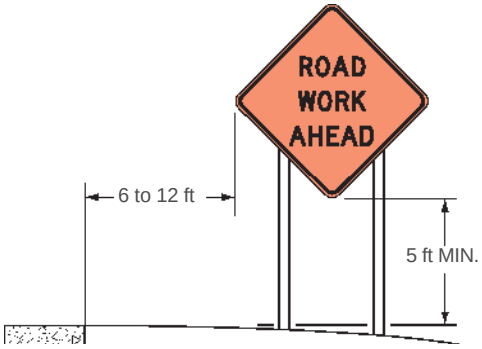
Sign or Plaque	Sign Designation	Section	Conventional Road	Freeway or Expressway	Minimum
Detour (with distance)	W20-2	6F.19	36 x 36	48 x 48	30 x 30
Road (Street) Closed (with distance)	W20-3	6F.20	36 x 36	48 x 48	30 x 30
One Lane Road (with distance)	W20-4	6F.21	36 x 36	48 x 48	30 x 30
Lane(s) Closed (with distance)	W20-5,5a	6F.22	36 x 36	48 x 48	30 x 30
Flagger (symbol)	W20-7	6F.31	36 x 36	48 x 48	30 x 30
Flagger	W20-7a	6F.31	36 x 36	48 x 48	30 x 30
Slow (on Stop/Slow Paddle)	W20-8	6E.03	18 x 18	—	—
Workers	W21-1,1a	6F.33	36 x 36	48 x 48	30 x 30
Fresh Oil (Tar)	W21-2	6F.34	36 x 36	48 x 48	30 x 30
Road Machinery Ahead	W21-3	6F.35	36 x 36	48 x 48	30 x 30
Slow Moving Vehicle	W21-4	6G.06	36 x 18	—	—
Shoulder Work	W21 -5	6F.37	36 x 36	48 x 48	30 x 30
Shoulder Closed	W21-5a	6F.37	36 x 36	48 x 48	30 x 30
Shoulder Closed (with distance)	W21-5b	6F.37	36 x 36	48 x 48	30 x 30
Survey Crew	W21-6	6F.38	36 x 36	48 x 48	30 x 30
Utility Work Ahead	W21-7	6F.39	36 x 36	48 x 48	30 x 30
Mowing Ahead	W21-8	6G.06	36 x 36	48 x 48	30 x 30
Blasting Zone Ahead	W22-1	6F.41	36 x 36	48 x 48	30 x 30
Turn Off 2-Way Radio and Cell Phone	W22-2	6F.42	42 x 36	42 x 36	—
End Blasting Zone	W22-3	6F.43	42 x 36	42 x 36	36 x 30
Slow Traffic Ahead	W23-1	6F.27	48 x 24	48 x 24	—
New Traffic Pattern Ahead	W23-2	6F.30	36 x 36	48 x 48	30 x 30
Double Reverse Curve (1 lane)	W24-1	6F.49	36 x 36	48 x 48	30 x 30
Double Reverse Curve (2 lanes)	W24-1a	6F.49	36 x 36	48 x 48	30 x 30
Double Reverse Curve (3 lanes)	W24-1b	6F.49	36 x 36	48 x 48	30 x 30
All Lanes	W24-1cP	6F.49	24 x 24	30 x 30	—
Road Work Next XX Miles	G20-1	6F.56	36 x 18	48 x 24	—
End Road Work	G20-2	6F.57	36 x 18	48 x 24	—
Pilot Car Follow Me	G20-4	6F.58	36 x 18	—	—
Work Site (plaque)	XG20-5P	6F.12	24 x 18	36 x 24	—
Exit Open	E5-2	6F.28	48 x 36	48 x 36	—
Exit Closed	E5-2a	6F.28	48 x 36	48 x 36	—
Exit Only	E5-3	6F.29	48 x 36	48 x 36	—
Detour	M4-8	6F.59	24 x 12	30 x 15	—
End Detour	M4-8a	6F.59	24 x 18	24 x 18	—
End	M4-8b	6F.59	24 x 12	24 x 12	—
Detour	M4-9	6F.59	30 x 24	48 x 36	—
Bike/Pedestrian Detour	M4-9a	6F.59	30 x 24	—	—
Pedestrian Detour	M4-9b	6F.59	30 x 24	—	—
Bike Detour	M4-9c	6F.59	30 x 24	—	—
Detour	M4-10	6F.59	48 x 18	—	—
Speeding Max $1000 Reckless Driving Max 8 yrs	XW2-6	6F.12	78 x 42	78 x 42	60 x 36
Speeding Max $1000	XW2-6a	6F.12	36 x 36	48 x 48	30 x 30
Reckless Driving Max 8 Yrs	XW2-6b	6F.12	36 x 36	48 x 48	30 x 30
Watch For Stopped Traffic	XW3-4a	6F.16	36 x 36	48 x 48	30 x 30
Overhead Sign Installation	XW3-4s	6F.16	60 x 24	60 x 24	60 x 24
Road Construction Ahead	XW20-1a	6F.18	36 x 36	48 x 48	30 x 30
Exit Open	XE5-2	6F.28	36 x 36	48 x 48	30 x 30
Exit Closed	XE5-2a	6F.28	36 x 36	48 x 48	30 x 30
Right Lane Exit Only	XE5-3	6F.29	36 x 36	48 x 48	30 x 30

*See Table 2B-1 for minimum size required for signs facing traffic on multi-lane conventional roads

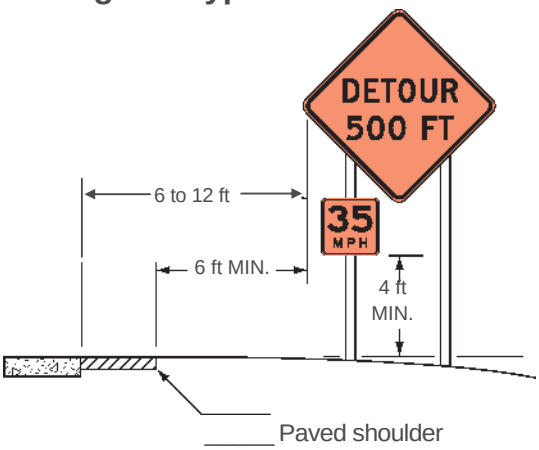
Notes: 1. Larger signs may be used wherever necessary for greater legibility or emphasis

2. Dimensions are shown in inches and are shown as width x height

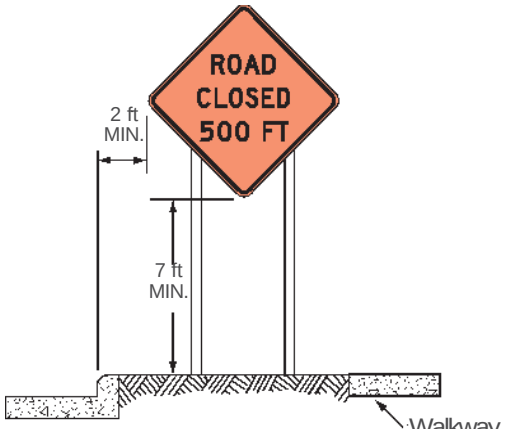
Figure 6F-1. Height and Lateral Location of Signs—Typical Installations



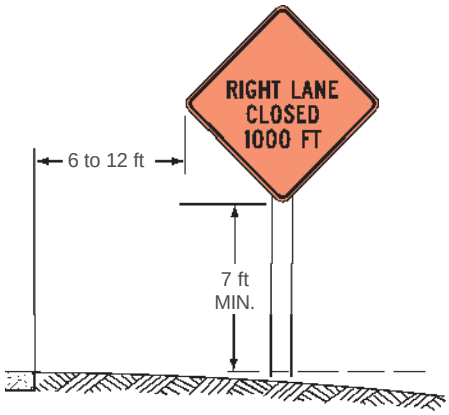
A - RURAL AREA



B - RURAL AREA WITH ADVISORY SPEED PLAQUE



C - BUSINESS, COMMERCIAL, OR RESIDENTIAL AREA



D - BUSINESS, COMMERCIAL, OR RESIDENTIAL AREA (WITHOUT CURB)

Standard:

09 **Where it has been determined that the accommodation of pedestrians with disabilities is necessary, signs shall be mounted and placed in accordance with Section 4.4 of the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)" (see Section 1A.11).**

10 **Signs mounted on barricades and barricade/sign combinations shall be crashworthy.**

Guidance:

11 *Except as provided in Paragraph 12, signs mounted on portable sign supports that do not meet the minimum mounting heights provided in Paragraphs 4 through 6 should not be used for a duration of more than 7 days.*

Option:

12 The R9-8 through R9-11a series, R11 series, W1-6 through W1-8 series, M4-10, E5-1, or other similar type signs (see Figures 6F-3, 6F-4, and 6F-5) may be used on portable sign supports that do not meet the minimum mounting heights provided in Paragraphs 4 through 6 for longer than 3 days.

Support:

13 Methods of mounting signs other than on posts are illustrated in Figure 6F-2.

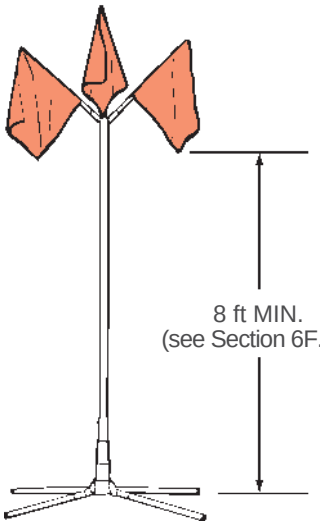
Guidance:`

14 *Signs mounted on Type 3 Barricades should not cover more than 50 percent of the top two rails or 33 percent of the total area of the three rails.*

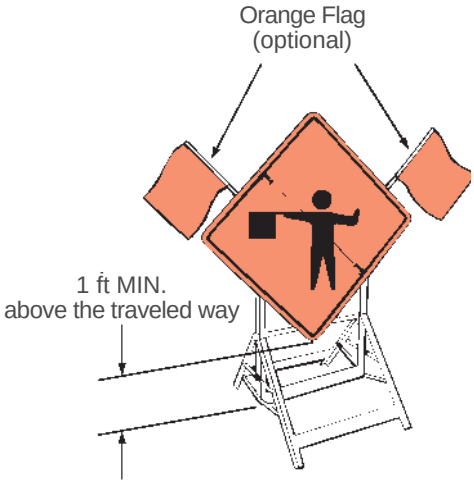
Standard:

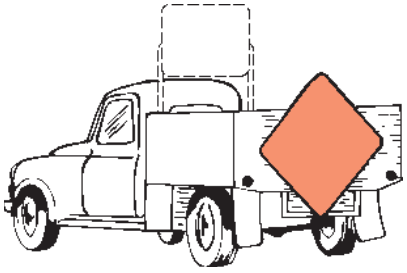
15 **Sign supports shall be crashworthy. Where large signs having an area exceeding 50 square feet are installed on multiple breakaway posts, the clearance from the ground to the bottom of the sign shall be at least 7 feet.**

Figure 6F-2. Methods of Mounting Signs Other Than on Posts

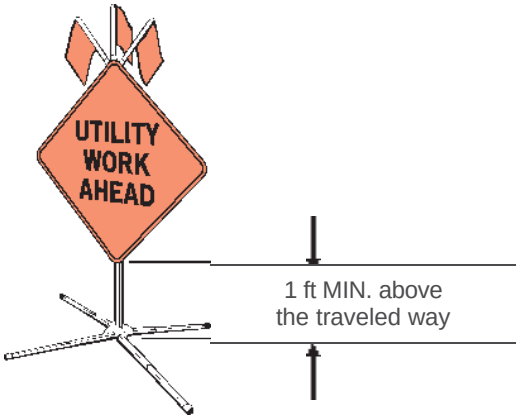


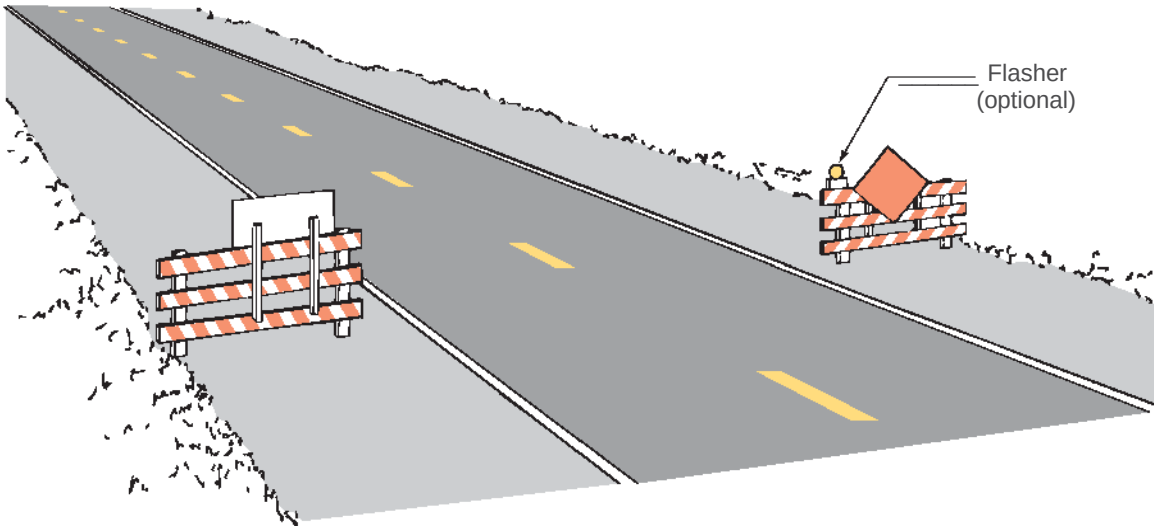
High-Level Warning Device
(Flag Tree)





PORTABLE AND TEMPORARY MOUNTINGS





BARRICADES

16 **The bottom of a sign mounted on a barricade, or other portable support, shall be at least 1 foot above the traveled way.**

Option:

17 For mobile operations, a sign may be mounted on a work vehicle, a shadow vehicle, or a trailer stationed in advance of the TTC zone or moving along with it.

Support:

18 If alterations are made to specific traffic control device supports that have been successfully crash tested in accordance with NCHRP Report 350, the altered supports might not be considered to be crashworthy.

Section 6F.04 Sign Maintenance

Guidance:

01 *Signs should be properly maintained for cleanliness, visibility, and correct positioning.*

02 *Signs that have lost significant legibility should be promptly replaced.*

Support:

03 Section 2A.08 contains information regarding the retroreflectivity of signs, including the signs that are used in TTC zones.

Section 6F.05 Regulatory Sign Authority

Support:

01 Regulatory signs such as those shown in Figure 6F-3 inform road users of traffic laws or regulations and indicate the applicability of legal requirements that would not otherwise be apparent.

Standard:

02 **Regulatory signs shall be authorized by the public agency or official having jurisdiction and shall conform with Chapter 2B.**

Section 6F.06 Regulatory Sign Design

Standard:

01 **TTC regulatory signs shall comply with the Standards for regulatory signs presented in Part 2 and in the FHWA's "Standard Highway Signs and Markings" book (see Section 1A.11).**

Support:

02 Regulatory signs are generally rectangular with a black legend and border on a white background. Exceptions include the STOP, YIELD, DO NOT ENTER, WRONG WAY, and ONE WAY signs.

Option:

03 The ONE WAY sign may be either a horizontal or vertical rectangular sign.

Section 6F.07 Regulatory Sign Applications

Standard:

01 **If a TTC zone requires regulatory measures different from those existing, the existing permanent regulatory devices shall be removed or covered and superseded by the appropriate temporary regulatory signs. This change shall be made in compliance with applicable ordinances or statutes of the jurisdiction.**

Section 6F.08 ROAD (STREET) CLOSED Sign (R11-2)

Guidance:

01 *The ROAD (STREET) CLOSED (R11-2) sign (see Figure 6F-3) should be used when the roadway is closed to all road users except contractors' equipment or officially authorized vehicles. The R11-2 sign should be accompanied by appropriate warning and detour signing.*

Option:

02 The words BRIDGE OUT (or BRIDGE CLOSED) may be substituted for ROAD (STREET) CLOSED where applicable.

Guidance:

03 *The ROAD (STREET) CLOSED sign should be installed at or near the center of the roadway on or above a Type 3 Barricade that closes the roadway (see Section 6F.68).*

Figure 6F-3. Regulatory Signs and Plaques in Temporary Traffic Control Zones (Sheet 1 of 2)

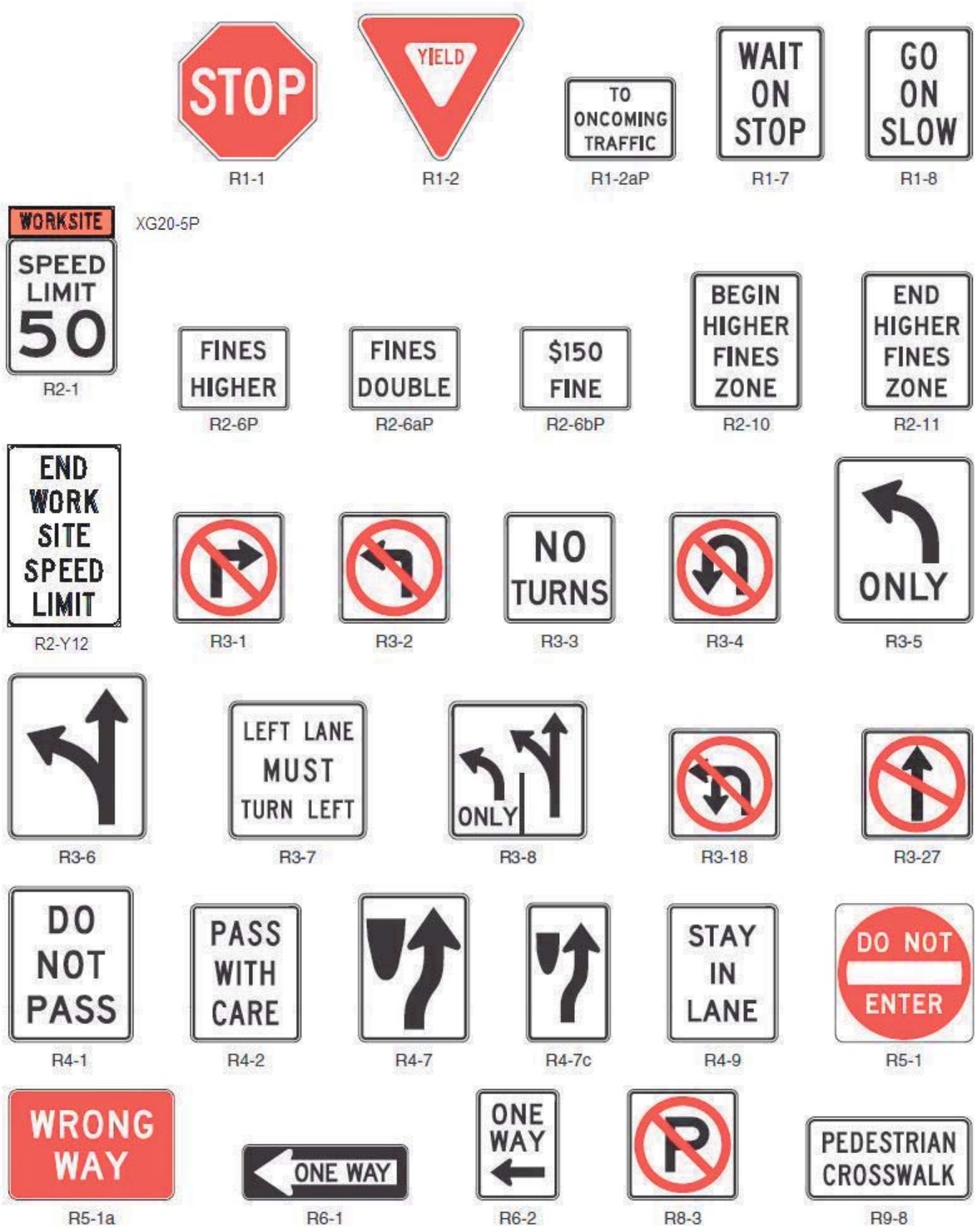
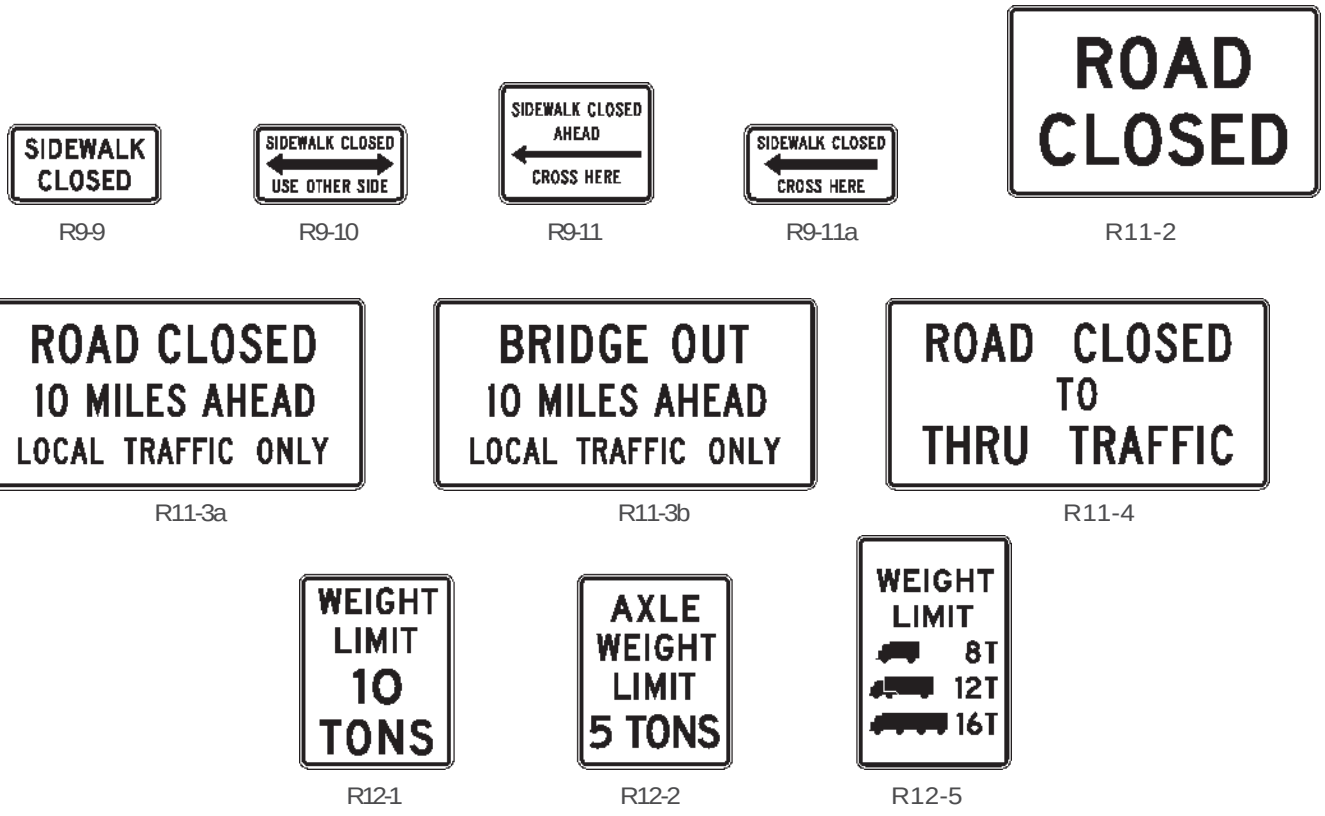


Figure 6F-3. Regulatory Signs and Plaques in Temporary Traffic Control Zones (Sheet 2 of 2)



Standard:

04 **The ROAD (STREET) CLOSED sign shall not be used where road user flow is maintained through the TTC zone with a reduced number of lanes on the existing roadway or where the actual closure is some distance beyond the sign.**

Section 6F.09 Local Traffic Only Signs (R11-3a, R11-4)

Guidance:

01 *The Local Traffic Only signs (see Figure 6F-3) should be used where road user flow detours to avoid a closure some distance beyond the sign, but where local road users can use the roadway to the point of closure. These signs should be accompanied by appropriate warning and detour signing.*

02 *In rural applications, the Local Traffic Only sign should have the legend ROAD CLOSED XX MILES AHEAD, LOCAL TRAFFIC ONLY (R11-3a).*

Option:

03 In urban areas, the legend ROAD (STREET) CLOSED TO THRU TRAFFIC (R11-4) or ROAD CLOSED, LOCAL TRAFFIC ONLY may be used.

04 In urban areas, a word message that includes the name of an intersecting street name or well-known destination may be substituted for the words XX MILES AHEAD on the R1 1-3a sign where applicable.

05 The words BRIDGE OUT (or BRIDGE CLOSED) may be substituted for the words ROAD (STREET) CLOSED on the R11-3a or R11-4 sign where applicable.

Section 6F.10 Weight Limit Signs (R12-1, R12-2, R12-5)

Standard:

01 A **Weight Limit sign (see Figure 6F-3), which shows the gross weight or axle weight that is permitted on the roadway or bridge, shall be consistent with State or local regulations and shall not be installed without the approval of the authority having jurisdiction over the highway**.

02 **When weight restrictions are imposed because of the activity in a TTC zone, a marked detour shall be provided for vehicles weighing more than the posted limit.**

Section 6F.11 STAY IN LANE Sign (R4-9)

Option:

01 A STAY IN LANE (R4-9) sign (see Figure 6F-3) may be used where a multi-lane shift has been incorporated as part of the TTC on a highway to direct road users around road work that occupies part of the roadway on a multi-lane highway.

Section 6F.12 Work Zone and Higher Fines Signs and Plaques

Option:

01 A WORK SITE (XG20-5P) plaque (see Figure 6F-3) may be mounted above a Speed Limit sign to emphasize that a reduced speed limit is in effect within a TTC zone. An END WORK SITE SPEED LIMIT (R2-Y12) sign (see Figure 6F-3) may be installed at the downstream end of the reduced speed limit zone.

Guidance:

02 *A BEGIN HIGHER FINES ZONE (R2-10) sign (see Figure 6F-3) should be installed at the upstream end of a work zone where increased fines are imposed for traffic violations, and an END HIGHER FINES ZONE (R2-11) sign (see Figure 6F-3) should be installed at the downstream end of the work zone.*

Option:

03 Alternate legends such as BEGIN (or END) DOUBLE FINES ZONE may also be used for the R2-10 and R2-11 signs.

04 A FINES HIGHER, FINES DOUBLE, or $XX FINE plaque (see Section 2B.17 and Figure 6F-3) may be mounted below the Speed Limit sign if increased fines are imposed for traffic violations within the TTC zone.

05 Individual signs and plaques for work zone speed limits and higher fines may be combined into a single sign or may be displayed as an assembly of signs and plaques.

Standard:

06 **Sign XW2-6, or signs XW2-6a and XW2-6b shall be posted on a highway work zone by:**

1. **the Indiana Department of Transportation;**
2. **a political subdivision; or**
3. **a contractor of:**
   a. **the Indiana Department of Transportation; or**
   b. **a political subdivision;**

that is working at the highway work zone ahead of the first Road Work/Construction warning sign distance C (see Table 6H-3).

07 **Signs XW2-6a and XW2-6b are only for use in series where the right-of-way does not accommodate the larger signs or for moving operations where construction signs are set and removed daily for changing work locations.**

08 **Signs XW2-6, XW2-6a, and XW2-6b are not required for work zones of a short duration.**

Section 6F.13 PEDESTRIAN CROSSWALK Sign (R9-8)

Option:

01 The PEDESTRIAN CROSSWALK (R9-8) sign (see Figure 6F-3) may be used to indicate where a temporary crosswalk has been established.

Standard:

02 **If a temporary crosswalk is established, it shall be accessible to pedestrians with disabilities in accordance with Section 6D.02.**

Section 6F.14 SIDEWALK CLOSED Signs (R9-9, R9-10, R9-11, R9-11a)

Guidance:

01 *SIDEWALK CLOSED signs (see Figure 6F-3) should be used where pedestrian flow is restricted. Bicycle/Pedestrian Detour (M4-9a) signs or Pedestrian Detour (M4-9b) signs should be used where pedestrian flow is rerouted (see Section 6F.59).*

02 *The SIDEWALK CLOSED (R9-9) sign should be installed at the beginning of the closed sidewalk, at the intersections preceding the closed sidewalk, and elsewhere along the closed sidewalk as needed.*

03 *The SIDEWALK CLOSED, (ARROW) USE OTHER SIDE (R9-10) sign should be installed at the beginning of the restricted sidewalk when a parallel sidewalk exists on the other side of the roadway.*

04 *The SIDEWALK CLOSED AHEAD, (ARROW) CROSS HERE (R9-11) sign should be used to indicate to pedestrians that sidewalks beyond the sign are closed and to direct them to open crosswalks, sidewalks, or other travel paths.*

05 *The SIDEWALK CLOSED, (ARROW) CROSS HERE (R9-11a) sign should be installed just beyond the point to which pedestrians are being redirected.*

Support:

06 These signs are typically mounted on a detectable barricade to encourage compliance and to communicate with pedestrians that the sidewalk is closed. Printed signs are not useful to many pedestrians with visual disabilities. A barrier or barricade detectable by a person with a visual disability is sufficient to indicate that a sidewalk is closed. If the barrier is continuous with detectable channelizing devices for an alternate route, accessible signing might not be necessary. An audible information device is needed when the detectable barricade or barrier for an alternate channelized route is not continuous.

Section 6F.15 Special Regulatory Signs

Option:

01 Special regulatory signs may be used based on engineering judgment consistent with regulatory requirements.

Guidance:

02 *Special regulatory signs should comply with the general requirements of color, shape, and alphabet size and series. The sign message should be brief, legible, and clear.*

Section 6F.16 Warning Sign Function, Design, and Application

Support:

01 TTC zone warning signs (see Figure 6F-4) notify road users of specific situations or conditions on or adjacent to a roadway that might not otherwise be apparent.

Standard:

02 **TTC warning signs shall comply with the Standards for warning signs presented in Part 2 and in FHWA's "Standard Highway Signs and Markings" book (see Section 1A.11). Except as provided in Paragraph 3, TTC warning signs shall be diamond-shaped with a black legend and border on an orange background, except for the W10-1 sign which shall have a black legend and border on a yellow background, and except for signs that are required or recommended in Parts 2 or 7 to have fluorescent yellow-green backgrounds.**

Option:

03 Warning signs used for TTC incident management situations may have a black legend and border on a fluorescent pink background.

04 Mounting or space considerations may justify a change from the standard diamond shape.

05 In emergencies, available warning signs having yellow backgrounds may be used if signs with orange or fluorescent pink backgrounds are not at hand.

Guidance:

06 *Where roadway or road user conditions require greater emphasis, larger than standard size warning signs should be used, with the symbol or legend enlarged approximately in proportion to the outside dimensions.*

07 *Where any part of the roadway is obstructed or closed by work activities or incidents, advance warning signs should be installed to alert road users well in advance of these obstructions or restrictions.*

08 *Where road users include pedestrians, the provision of supplemental audible information or detectable barriers or barricades should be considered for people with visual disabilities.*

Support:

09 Detectable barriers or barricades communicate very clearly to pedestrians who have visual disabilities that they can no longer proceed in the direction that they are traveling.

Option:

10 Advance warning signs may be used singly or in combination.

11 Where distances are not displayed on warning signs as part of the message, a supplemental plaque with the distance legend may be mounted immediately below the sign on the same support.

Section 6F.17 Position of Advance Warning Signs

Guidance:

01 *Where highway conditions permit, warning signs should be placed in advance of the TTC zone at varying distances depending on roadway type, condition, and posted speed. Table 6C-1 contains information regarding the spacing of advance warning signs. Where a series of two or more advance warning signs is used, the closest sign to the TTC zone should be placed approximately 100 feet for low-speed urban streets to 1,000 feet or more for freeways and expressways.*

02 *Where multiple advance warning signs are needed on the approach to a TTC zone, the ROAD WORK AHEAD (W20-1) sign should be the first advance warning sign encountered by road users.*

Support:

03 Various conditions, such as limited sight distance or obstructions that might require a driver to reduce speed or stop, might require additional advance warning signs.

Option:

04 As an alternative to a specific distance on advance warning signs, the word AHEAD may be used.

Figure 6F-4. Warning Signs and Plaques in Temporary Traffic Control Zones
(Sheet 1 of 3)

Figure 6F-4. Warning Signs and Plaques in Temporary Traffic Control Zones
(Sheet 2 of 3)

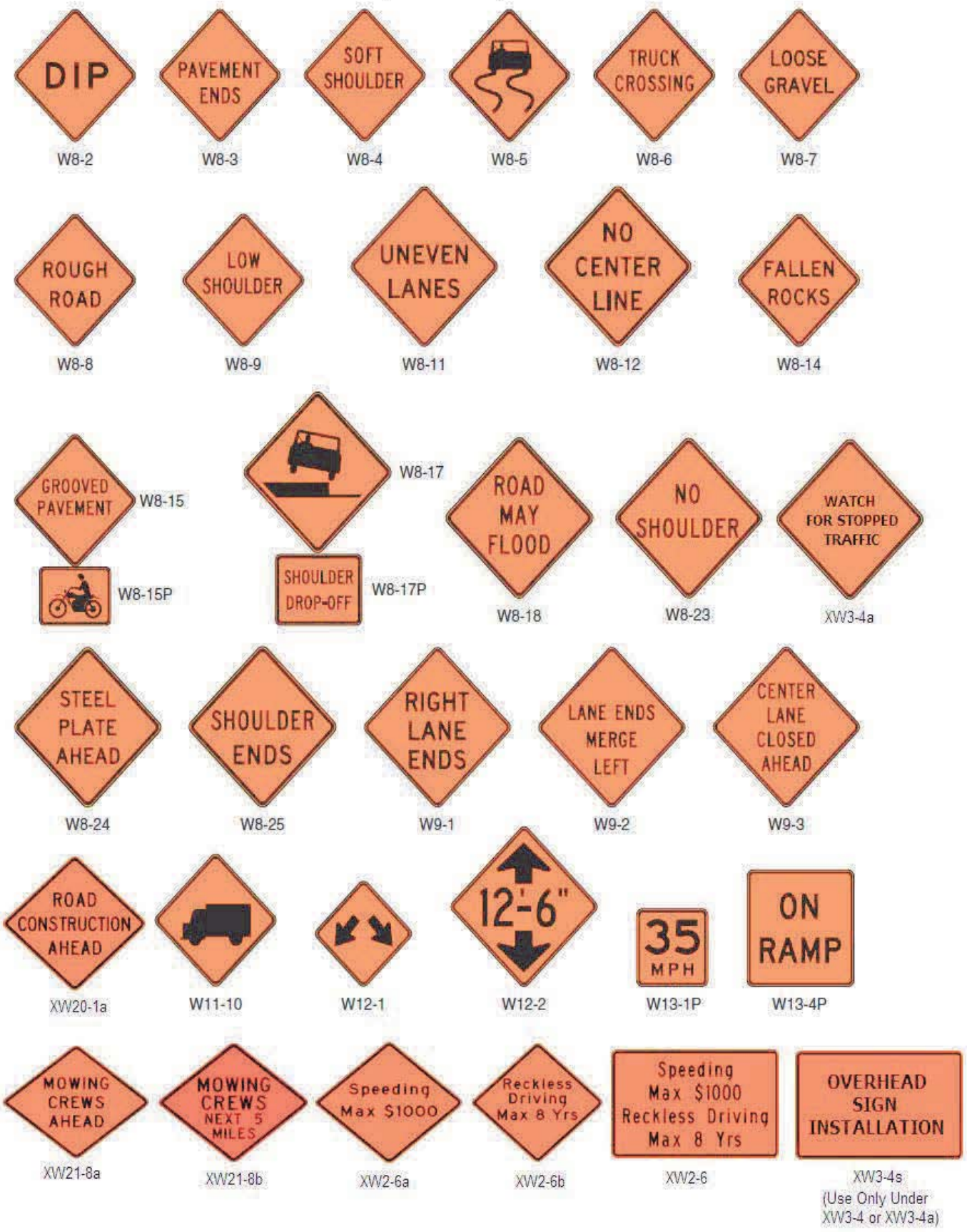
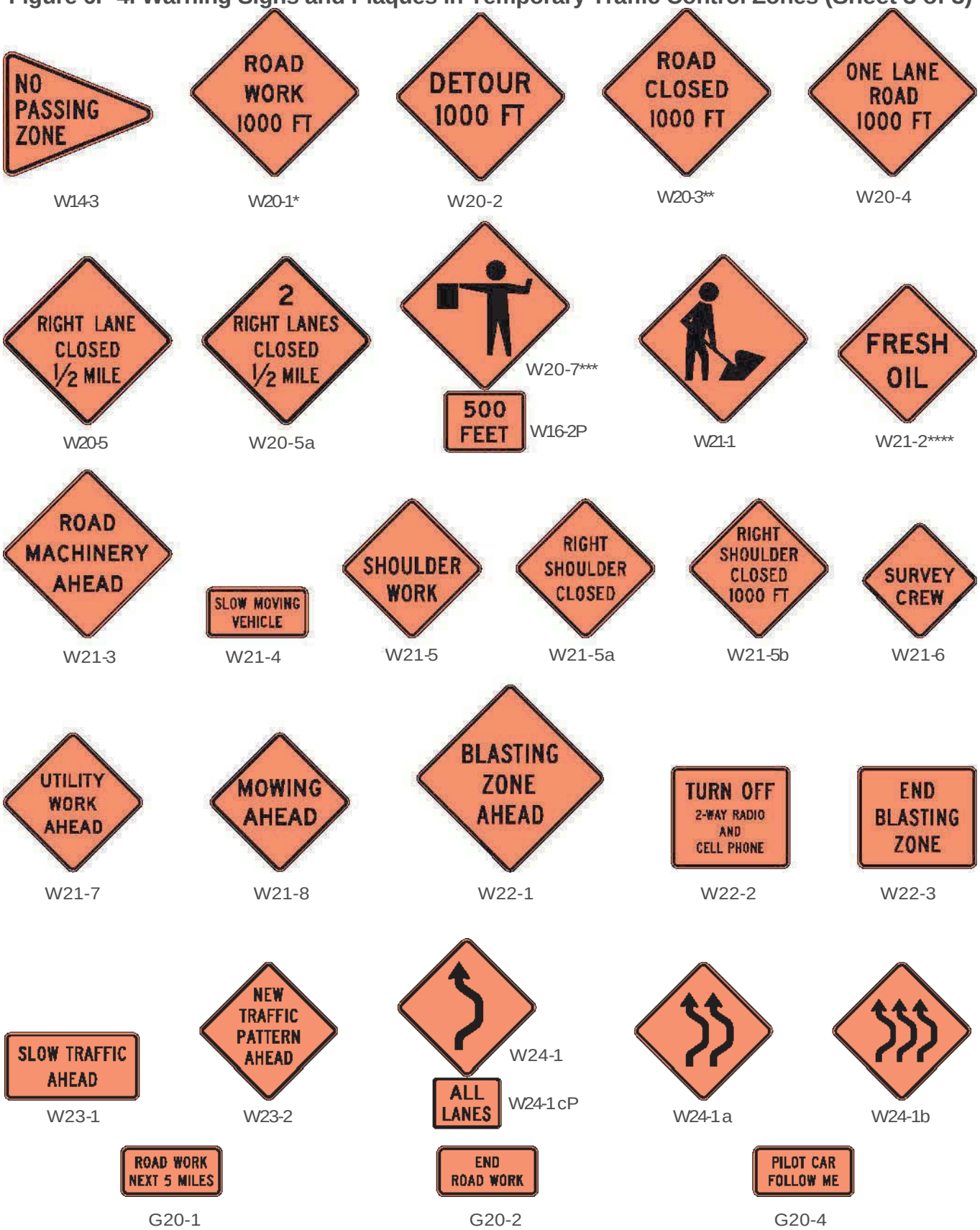


Figure 6F-4. Warning Signs and Plaques in Temporary Traffic Control Zones (Sheet 3 of 3)



* An optional STREET WORK word message sign is shown in the "Standard Highway Signs and Markings" book.
** An optional STREET CLOSED word message sign is shown in the "Standard Highway Signs and Markings" book.
*** An optional FLAGGER (W20-7a) word message sign is shown in the "Standard Highway Signs and Markings" book.
**** An optional FRESH TAR word message sign is show in the "Standard Highway Signs and Markings" book.

Support:

05 At TTC zones on lightly-traveled roads, all of the advance warning signs prescribed for major construction might not be needed.

Option:

06 Utility work, maintenance, or minor construction can occur within the TTC zone limits of a major construction project, and additional warning signs may be needed.

Guidance:

07 *Utility, maintenance, and minor construction signing and TTC should be coordinated with appropriate authorities so that road users are not confused or misled by the additional TTC devices.*

Section 6F.18 ROAD (STREET) WORK Sign (W20-1)

Guidance:

01 *The ROAD (STREET) WORK (W20-1) sign (see Figure 6F-4), which serves as a general warning of obstructions or restrictions, should be located in advance of the work space or any detour, on the road where the work is taking place.*

02 *Where traffic can enter a TTC zone from a crossroad or a major (high-volume) driveway, an advance warning sign should be used on the crossroad or major driveway.*

Standard:

03 **The ROAD (STREET) WORK (W20-1) sign shall have the legend ROAD (STREET) WORK, XX FEET, XX MILES, or AHEAD.**

Option:

04 The words, or word, ROAD CONSTRUCTION, or CONSTRUCTION, may be substituted for the words ROAD WORK on any temporary traffic control sign.

Section 6F.19 DETOUR Sign (W20-2)

Guidance:

01 *The DETOUR (W20-2) sign (see Figure 6F-4) should be used in advance of a road user detour over a different roadway or route.*

Standard:

02 **The DETOUR sign shall have the legend DETOUR, XX FEET, XX MILES, or AHEAD.**

Section 6F.20 ROAD (STREET) CLOSED Sign (W20-3)

Guidance:

01 *The ROAD (STREET) CLOSED (W20-3) sign (see Figure 6F-4) should be used in advance of the point where a highway is closed to all road users, or to all but local road users.*

Standard:

02 **The ROAD (STREET) CLOSED sign shall have the legend ROAD (STREET) CLOSED, XX FEET, XX MILES, or AHEAD.**

Section 6F.21 ONE LANE ROAD Sign (W20-4)

Standard:

01 **The ONE LANE ROAD (W20-4) sign (see Figure 6F-4) shall be used only in advance of that point where motor vehicle traffic in both directions must use a common single lane (see Section 6C.10). It shall have the legend ONE LANE ROAD, XX FEET, XX MILES, or AHEAD.**

Section 6F.22 Lane(s) Closed Signs (W20-5, W20-5a)

Standard:

01 **The Lane(s) Closed sign (see Figure 6F-4) shall be used in advance of that point where one or more through lanes of a multi-lane roadway are closed.**

02 **For a single lane closure, the Lane Closed (W20-5) sign (see Figure 6F-4) shall have the legend RIGHT (LEFT) LANE CLOSED, XX FEET, XX MILES, or AHEAD. Where two adjacent lanes are closed, the W20-5a sign (see Figure 6F-4) shall have the legend XX RIGHT (LEFT) LANES CLOSED, XX FEET, XX MILES, or AHEAD.**

Section 6F.23 CENTER LANE CLOSED AHEAD Sign (W9-3)

Guidance:

01 *The CENTER LANE CLOSED AHEAD (W9-3) sign (see Figure 6F-4) should be used in advance of that point where work occupies the center lane(s) and approaching motor vehicle traffic is directed to the right or left of the work zone in the center lane.*

Section 6F.24 Lane Ends Sign (W4-2)

Option:

01 The Lane Ends (W4-2) symbol sign (see Figure 6F-4) may be used to warn drivers of the reduction in the number of lanes for moving motor vehicle traffic in the direction of travel on a multi-lane roadway.

Section 6F.25 ON RAMP Plaque (W13-4P)

Guidance:

01 *When work is being done on a ramp, but the ramp remains open, the ON RAMP (W13-4P) plaque (see Figure 6F-4) should be used to supplement the advance ROAD WORK sign.*

Section 6F.26 RAMP NARROWS Sign (W5-4)

Guidance:

01 *The RAMP NARROWS (W5-4) sign (see Figure 6F-4) should be used in advance of the point where work on a ramp reduces the normal width of the ramp along a part or all of the ramp.*

Section 6F.27 SLOW TRAFFIC AHEAD Sign (W23-1)

Option:

01 The SLOW TRAFFIC AHEAD (W23-1) sign (see Figure 6F-4) may be used on a shadow vehicle, usually mounted on the rear of the most upstream shadow vehicle, along with other appropriate signs for mobile operations to warn of slow moving work vehicles. A ROAD WORK (W20-1) sign may also be used with the SLOW TRAFFIC AHEAD sign.

Section 6F.28 EXIT OPEN and EXIT CLOSED Signs (E5-2, E5-2a)

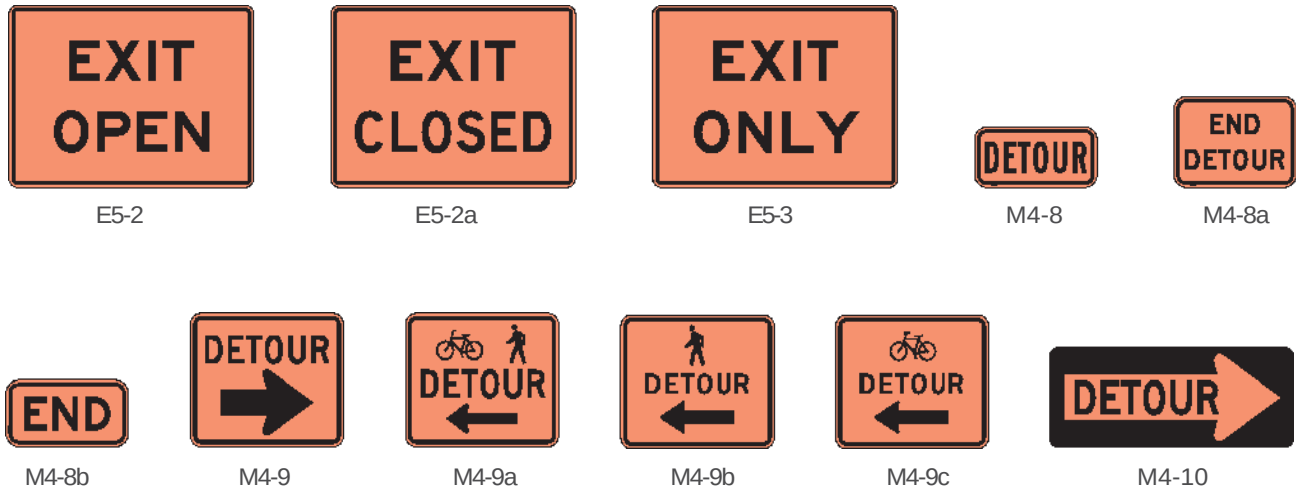
Option:

01 An EXIT OPEN (E5-2) or EXIT CLOSED (E5-2a) sign (see Figure 6F-5) may be used to supplement other warning signs where work is being conducted in the vicinity of an exit ramp and where the exit maneuver for vehicular traffic using the ramp is different from the normal condition.

Guidance:

02 *When an exit ramp is closed, an EXIT CLOSED sign panel with a black legend and border on an orange background should be placed diagonally across the interchange/intersection guide signs.*

Figure 6F-5. Exit Open and Closed and Detour Signs



Section 6F.29 EXIT ONLY Sign (E5-3)

Option:

01 An EXIT ONLY (E5-3) sign (see Figure 6F-5) may be used to supplement other warning signs where work is being conducted in the vicinity of an exit ramp and where the exit maneuver for vehicular traffic using the ramp is different from the normal condition.

Section 6F.30 NEW TRAFFIC PATTERN AHEAD Sign (W23-2)

Option:

01 A NEW TRAFFIC PATTERN AHEAD (W23-2) sign (see Figure 6F-4) may be used on the approach to an intersection or along a section of roadway to provide advance warning of a change in traffic patterns, such as revised lane usage, roadway geometry, or signal phasing.

Guidance:

02 *To retain its effectiveness, the W23-2 sign should be displayed for up to 2 weeks, and then it should be covered or removed until it is needed again.*

Section 6F.31 Flagger Signs (W20-7, W20-7a)

Guidance:

01 *The Flagger (W20-7) symbol sign (see Figure 6F-4) should be used in advance of any point where a flagger is stationed to control road users.*

Option:

02 A distance legend may be displayed on a supplemental plaque below the Flagger sign. The sign may be used with appropriate legends or in conjunction with other warning signs, such as the BE PREPARED TO STOP (W3-4) sign (see Figure 6F-4).

03 The FLAGGER (W20-7a) word message sign with distance legends may be substituted for the Flagger (W20-7) symbol sign.

Section 6F.32 Two-Way Traffic Sign (W6-3)

Guidance:

01 *When one roadway of a normally divided highway is closed, with two-way vehicular traffic maintained on the other roadway, the Two-Way Traffic (W6-3) sign (see Figure 6F-4) should be used at the beginning of the two-way vehicular traffic section and at intervals to remind road users of opposing vehicular traffic.*

Section 6F.33 Workers Signs (W21-1, W21-1a)

Option:

01 A Workers (W21-1) symbol sign (see Figure 6F-4) may be used to alert road users of workers in or near the roadway.

Guidance:

02 *In the absence of other warning devices, a Workers symbol sign should be used when workers are in the roadway.*

Option:

03 The WORKERS (W21-1a) word message sign may be used as an alternate to the Workers (W21-1) symbol sign.

Section 6F.34 FRESH OIL (TAR) Sign (W21-2)

Guidance:

01 *The FRESH OIL (TAR) (W21-2) sign (see Figure 6F-4) should be used to warn road users of the surface treatment.*

Section 6F.35 ROAD MACHINERY AHEAD Sign (W21-3)

Option:

01 The ROAD MACHINERY AHEAD (W21-3) sign (see Figure 6F-4) may be used to warn of machinery operating in or adjacent to the roadway.

Section 6F.36 Motorized Traffic Signs (W8-6, W11-10)

Option:

01 Motorized Traffic (W8-6, W11-10) signs may be used to alert road users to locations where unexpected travel on the roadway or entries into or departures from the roadway by construction vehicles might occur. The TRUCK CROSSING (W8-6) word message sign may be used as an alternate to the Truck Crossing (W11-10) symbol sign (see Figure 6F-4) where there is an established construction vehicle crossing of the roadway.

Support:

02 These locations might be relatively confined or might occur randomly over a segment of roadway.

Section 6F.37 Shoulder Work Signs (W21-5, W21-5a, W21-5b)

Support:

01 Shoulder Work signs (see Figure 6F-4) warn of maintenance, reconstruction, or utility operations on the highway shoulder where the roadway is unobstructed.

Standard:

02 **The Shoulder Work sign shall have the legend SHOULDER WORK (W21-5), RIGHT (LEFT) SHOULDER CLOSED (W21-5a), or RIGHT (LEFT) SHOULDER CLOSED XX FT or AHEAD (W21-5b).**

Option:

03 The Shoulder Work sign may be used in advance of the point on a non-limited access highway where there is shoulder work. It may be used singly or in combination with a ROAD WORK NEXT XX MILES or ROAD WORK AHEAD sign.

Guidance:

04 *On freeways and expressways, the RIGHT (LEFT) SHOULDER CLOSED XX FT or AHEAD (W21-5b) sign followed by RIGHT (LEFT) SHOULDER CLOSED (W21-5a) sign should be used in advance of the point where the shoulder work occurs and should be preceded by a ROAD WORK AHEAD sign.*

Section 6F.38 SURVEY CREW Sign (W21-6)

Guidance:

01 *The SURVEY CREW (W21-6) sign (see Figure 6F-4) should be used to warn of surveying crews working in or adjacent to the roadway.*

Section 6F.39 UTILITY WORK Sign (W21-7)

Option:

01 The UTILITY WORK (W21-7) sign (see Figure 6F-4) may be used as an alternate to the ROAD (STREET) WORK (W20-1) sign for utility operations on or adjacent to a highway.

Support:

02 Typical examples of where the UTILITY WORK sign is used appear in Figures 6H-4, 6H-6, 6H-10, 6H-15, 6H-18, 6H-21, 6H-22, 6H-26, and 6H-33.

Standard:

03 **The UTILITY WORK sign shall carry the legend UTILITY WORK, XX FEET, XX MILES, or AHEAD.**

Section 6F.40 Signs for Blasting Areas

Support:

01 Radio-Frequency (RF) energy can cause the premature firing of electric detonators (blasting caps) used in TTC zones.

Standard:

02 **Road users shall be warned to turn off mobile radio transmitters and cellular telephones where blasting operations occur. A sequence of signs shall be prominently displayed to direct operators of mobile radio equipment, including cellular telephones, to turn off transmitters in a blasting area. These signs shall be covered or removed when there are no explosives in the area or the area is otherwise secured.**

Section 6F.41 BLASTING ZONE AHEAD Sign (W22-1)

Standard:

01 **The BLASTING ZONE AHEAD (W22-1) sign (see Figure 6F-4) shall be used in advance of any TTC zone where explosives are being used. The TURN OFF 2-WAY RADIO AND CELL PHONE and END BLASTING ZONE signs shall be used in sequence with this sign.**

Section 6F.42 TURN OFF 2-WAY RADIO AND CELL PHONE Sign (W22-2)

Standard:

01 **The TURN OFF 2-WAY RADIO AND CELL PHONE (W22-2) sign (see Figure 6F-4) shall follow the BLASTING ZONE AHEAD sign and shall be placed at least 1,000 feet before the beginning of the blasting zone.**

Section 6F.43 END BLASTING ZONE Sign (W22-3)

Standard:

01 **The END BLASTING ZONE (W22-3) sign (see Figure 6F-4) shall be placed a minimum of 1,000 feet past the blasting zone.**

Option:

02 The END BLASTING ZONE sign may be placed either with or preceding the END ROAD WORK sign.

Section 6F.44 Shoulder Signs and Plaque (W8-4, W8-9, W8-17, and W8-17P)

Option:

01 The SOFT SHOULDER (W8-4) sign (see Figure 6F-4) may be used to warn of a soft shoulder condition.

02 The LOW SHOULDER (W8-9) sign (see Figure 6F-4) may be used to warn of a shoulder condition where there is an elevation difference of 3 inches or less between the shoulder and the travel lane.

Guidance:

03 *The Shoulder Drop Off (W8 -17) sign (see Figure 6F-4) should be used when an unprotected shoulder drop-off, adjacent to the travel lane, exceeds 3 inches in depth for a continuous length along the roadway, based on engineering judgment.*

Option:

04 A SHOULDER DROP-OFF (W8-17P) supplemental plaque (see Figure 6F-4) may be mounted below the W8-17 sign.

Section 6F.45 UNEVEN LANES Sign (W8-11)

Guidance:

01 *The UNEVEN LANES (W8-11) sign (see Figure 6F-4) should be used during operations that create a difference in elevation between adjacent lanes that are open to travel.*

Section 6F.46 STEEL PLATE AHEAD Sign (W8-24)

Option:

01 A STEEL PLATE AHEAD (W8-24) sign (see Figure 6F-4) may be used to warn road users that the presence of a temporary steel plate(s) might make the road surface uneven and might create slippery conditions during wet weather.

Section 6F.47 NO CENTER LINE Sign (W8-12)

Guidance:

01 *The NO CENTER LINE (W8-12) sign (see Figure 6F-4) should be used when the work obliterates the center line pavement markings. This sign should be placed at the beginning of the TTC zone and repeated at 2-mile intervals in long TTC zones.*

Support:

02 Section 6F.78 contains information regarding temporary markings.

Section 6F.48 Reverse Curve Signs (W1-4 Series)

Guidance:

01 *In order to give road users advance notice of a lane shift, a Reverse Curve (W1-4, W1-4b, or W1-4c) sign (see Figure 6F-4) should be used when a lane (or lanes) is being shifted to the left or right. If the design speed of the curves is 30 mph or less, a Reverse Turn (W1-3) sign should be used.*

Standard:

02 **If a Reverse Curve (or Turn) sign is used, the direction of the reverse curve (or turn) shall be appropriately illustrated. Except as provided in Paragraph 3, the number of lanes illustrated on the sign shall be the same as the number of through lanes available to road users.**

Option:

03 Where two or more lanes are being shifted, a W1-4 (or W1-3) sign with an ALL LANES (W24-1cP) plaque (see Figure 6F-4) may be used instead of a sign that illustrates the number of lanes.

04 Where more than three lanes are being shifted, the Reverse Curve (or Turn) sign may be rectangular.

Section 6F.49 Double Reverse Curve Signs (W24-1 Series)

Option:

01 The Double Reverse Curve (W24-1, W24-1a, or W24-1b) sign (see Figure 6F-4) may be used where the tangent distance between two reverse curves is less than 600 feet, thus making it difficult for a second Reverse Curve (W1-4 series) sign to be placed between the curves. If the design speed of the curves is 30 mph or less, Double Reverse Turn signs should be used.

Standard:

02 **If a Double Reverse Curve (or Turn) sign is used, the direction of the double reverse curve (or turn) shall be appropriately illustrated. Except as provided in Paragraph 3, the number of lanes illustrated on the sign shall be the same as the number of through lanes available to road users.**

Option:

03 Where two or more lanes are being shifted, a W24-1 (or Double Reverse Turn sign showing one lane) sign with an ALL LANES (W24-1cP) plaque (see Figure 6F-4) may be used instead of a sign that illustrates the number of lanes.

04 Where more than three lanes are being shifted, the Double Reverse Curve (or Turn) sign may be rectangular.

Section 6F.50 Other Warning Signs

Option:

01 Advance warning signs may be used by themselves or with other advance warning signs.

02 Besides the warning signs specifically related to TTC zones, several other warning signs in Part 2 may apply in TTC zones.

Standard:

03 **Except as provided in Section 6F.02, other warning signs that are used in TTC zones shall have black legends and borders on an orange background.**

Section 6F.51 Special Warning Signs

Option:

01 Special warning signs may be used based on engineering judgment.

Guidance:

02 *Special warning signs should comply with the general requirements of color, shape, and alphabet size and series. The sign message should be brief, legible, and clear.*

Section 6F.52 Advisory Speed Plaque (W13-1P)

Option:

01 In combination with a warning sign, an Advisory Speed (W13-1P) plaque (see Figure 6F-4) may be used to indicate a recommended speed through the TTC zone.

Standard:

02 **The Advisory Speed plaque shall not be used in conjunction with any sign other than a warning sign, nor shall it be used alone. When used with orange TTC zone signs, this plaque shall have a black legend and border on an orange background. The sign shall be at least 24 x 24 inches in size when used with a sign that is 36 x 36 inches or larger. Except in emergencies, an Advisory Speed plaque shall not be mounted until the recommended speed is determined by the highway agency.**

Section 6F.53 Supplementary Distance Plaque (W7-3aP)

Option:

01 In combination with a warning sign, a Supplementary Distance (W7-3aP) plaque (see Figure 6F-4) with the legend NEXT XX MILES may be used to indicate the length of highway over which a work activity is being conducted, or over which a condition exists in the TTC zone.

02 In long TTC zones, Supplementary Distance plaques with the legend NEXT XX MILES may be placed in combination with warning signs at regular intervals within the zone to indicate the remaining length of highway over which the TTC work activity or condition exists.

Standard:

03 **The Supplementary Distance plaque with the legend NEXT XX MILES shall not be used in conjunction with any sign other than a warning sign, nor shall it be used alone. When used with orange TTC zone signs, this plaque shall have a black legend and border on an orange background. The sign shall be at least 30 x 24 inches in size when used with a sign that is 36 x 36 inches or larger.**

Guidance:

04 *When used in TTC zones, the Supplementary Distance plaque with the legend NEXT XX MILES should be placed below the initial warning sign designating that, within the approaching zone, a temporary work activity or condition exists.*

Section 6F.54 Motorcycle Plaque (W8-15P)

Option:

01 A Motorcycle (W8-15P) plaque (see Figure 6F-4) may be mounted below a LOOSE GRAVEL (W8-7) sign, a GROOVED PAVEMENT (W8-15) sign, a METAL BRIDGE DECK (W8-16) sign, or a STEEL PLATE AHEAD (W8-24) sign if the warning is intended to be directed primarily to motorcyclists.

Section 6F.55 Guide Signs

Support:

01 Guide signs along highways provide road users with information to help them along their way through the TTC zone. The design of guide signs is presented in Part 2.

Guidance:

02 *The following guide signs should be used in TTC zones as needed:*

A. Standard route markings, where temporary route changes are necessary,

B. Directional signs and street name signs, and

C. Special guide signs relating to the condition or work being done.

Standard:

03 **If additional temporary guide signs are used in TTC zones, they shall have a black legend and border on an orange background.**

Option:

04 Guide signs used in TTC incident management situations may have a black legend and border on a fluorescent pink background.

05 When directional signs and street name signs are used in conjunction with detour routing, these signs may have a black legend and border on an orange background.

06 When permanent directional signs or permanent street name signs are used in conjunction with detour signing, they may have a white legend on a green background.

Section 6F.56 ROAD WORK NEXT XX MILES Sign (G20-1)

Guidance:

01 *The ROAD WORK NEXT XX MILES (G20-1) sign (see Figure 6F-4) should be installed in advance of TTC zones that are more than 2 miles in length.*

Option:

02 The ROAD WORK NEXT XX MILES sign may be mounted on a Type 3 Barricade. The sign may also be used for TTC zones of shorter length.

Standard:

03 **The distance displayed on the ROAD WORK NEXT XX MILES sign shall be stated to the nearest whole mile.**

Section 6F.57 END ROAD WORK Sign (G20-2)

Guidance:

01 *When used, the END ROAD WORK (G20-2) sign (see Figure 6F-4) should be placed near the downstream end of the termination area, as determined by engineering judgment.*

Option:

02 The END ROAD WORK sign may be installed on the back of a warning sign facing the opposite direction of road users or on the back of a Type 3 Barricade.

Section 6F.58 PILOT CAR FOLLOW ME Sign (G20-4)

Standard:

01 **The PILOT CAR FOLLOW ME (G20-4) sign (see Figure 6F-4) shall be mounted in a conspicuous position on the rear of a vehicle used for guiding one-way vehicular traffic through or around a TTC zone (see Section 6C.13).**

Section 6F.59 Detour Signs (M4-8, M4-8a, M4-8b, M4-9, M4-9a, M4-9b, M4-9c, and M4-10)

Standard:

01 **Each detour shall be adequately marked with standard temporary route signs and destination signs.**

Option:

02 Detour signs in TTC incident management situations may have a black legend and border on a fluorescent pink background.

03 The Detour Arrow (M4-10) sign (see Figure 6F-5) may be used where a detour route has been established.

04 The DETOUR (M4-8) sign (see Figure 6F-5) may be mounted at the top of a route sign assembly to mark a temporary route that detours from a highway, bypasses a section closed by a TTC zone, and rejoins the highway beyond the TTC zone.

Guidance:

05 *The Detour Arrow (M4-10) sign should normally be mounted just below the ROAD CLOSED (R11-2, R11-3a, or R11-4) sign. The Detour Arrow sign should include a horizontal arrow pointed to the right or left as required.*

06 *The DETOUR (M4-9) sign (see Figure 6F-5) should be used for unnumbered highways, for emergency situations, for periods of short durations, or where, over relatively short distances, road users are guided along the detour and back to the desired highway without route signs.*

07 *A Street Name sign should be placed above, or the street name should be incorporated into, a DETOUR (M4-9) sign to indicate the name of the street being detoured.*

Option:

08 The END DETOUR (M4-8a) or END (M4-8b) sign (see Figure 6F-5) may be used to indicate that the detour has ended.

Guidance:

09 *When the END DETOUR sign is used on a numbered highway, the sign should be mounted above a route sign after the downstream end of the detour.*

10 *The Pedestrian/Bicycle Detour (M4-9a) sign (see Figure 6F-5) should be used where a pedestrian/bicycle detour route has been established because of the closing of a pedestrian/bicycle facility to through traffic.*

Standard:

11 **If used, the Pedestrian/Bicycle Detour sign shall have an arrow pointing in the appropriate direction.**

Option:

12 The arrow on a Pedestrian/Bicycle Detour sign may be on the sign face or on a supplemental plaque.

13 The Pedestrian Detour (M4-9b) sign or Bicycle Detour (M4-9c) sign (see Figure 6F-5) may be used where a pedestrian or bicycle detour route (not both) has been established because of the closing of the pedestrian or bicycle facility to through traffic.

Section 6F.60 Portable Changeable Message Signs

Support:

01 Portable changeable message signs (PCMS) are TTC devices installed for temporary use with the flexibility to display a variety of messages. In most cases, portable changeable message signs follow the same provisions for design and application as those given for changeable message signs in Chapter 2L. The information in this Section describes situations where the provisions for portable changeable message signs differ from those given in Chapter 2L.

02 Portable changeable message signs are used most frequently on high-density urban freeways, but have applications on all types of highways where highway alignment, road user routing problems, or other pertinent conditions require advance warning and information.

03 Portable changeable message signs have a wide variety of applications in TTC zones including: roadway, lane, or ramp closures; incident management; width restriction information; speed control or reductions; advisories on work scheduling; road user management and diversion; warning of adverse conditions or special events; and other operational control.

04 The primary purpose of portable changeable message signs in TTC zones is to advise the road user of unexpected situations. Portable changeable message signs are particularly useful as they are capable of:

A. Conveying complex messages,
B. Displaying real time information about conditions ahead, and
C. Providing information to assist road users in making decisions prior to the point where actions must be taken.

05 Some typical applications include the following:

A. Where the speed of vehicular traffic is expected to drop substantially;
B. Where significant queuing and delays are expected;
C. Where adverse environmental conditions are present;
D. Where there are changes in alignment or surface conditions;
E. Where advance notice of ramp, lane, or roadway closures is needed;
F. Where crash or incident management is needed; and/or
G. Where changes in the road user pattern occur.

Guidance:

06 *The components of a portable changeable message sign should include: a message sign, control systems, a power source, and mounting and transporting equipment. The front face of the sign should be covered with a protective material.*

Standard:

07 **Portable changeable message signs shall comply with the applicable design and application principles established in Chapter 2A. Portable changeable message signs shall display only traffic operational, regulatory, warning, and guidance information, and shall not be used for advertising messages.**

Support:

08 Section 2L.02 contains information regarding overly simplistic or vague messages that is also applicable to portable changeable message signs.

Standard:

09 **The colors used for legends on portable changeable message signs shall comply with those shown in Table 2A-5.**

Support:

10 Section 2L.04 contains information regarding the luminance, luminance contrast, and contrast orientation that is also applicable to portable changeable message signs.

Guidance:

11 *Portable changeable message signs should be visible from 1/2 mile under both day and night conditions.*

Support:

12 Section 2B.13 contains information regarding the design of portable changeable message signs that are used to display speed limits that change based on operational conditions, or are used to display the speed at which approaching drivers are traveling.

Guidance:

13 *A portable changeable message sign should be limited to three lines of eight characters per line or should consist of a full matrix display.*

14 *Except as provided in Paragraph 15, the letter height used for portable changeable message sign messages should be a minimum of 18 inches.*

Option:

15 For portable changeable message signs mounted on service patrol trucks or other incident response vehicles, a letter height as short as 10 inches may be used. Shorter letter sizes may also be used on a portable changeable message sign used on low speed facilities provided that the message is legible from at least 650 feet.

16 The portable changeable message sign may vary in size.

Guidance:

17 *Messages on a portable changeable message sign should consist of no more than two phases, and a phase should consist of no more than three lines of text. Each phase should be capable of being understood by itself, regardless of the order in which it is read. Messages should be centered within each line of legend. If more than one portable changeable message sign is simultaneously legible to road users, then only one of the signs should display a sequential message at any given time.*

Support:

18 Road users have difficulties in reading messages displayed in more than two phases on a typical three-line portable changeable message sign.

Standard:

19 **Techniques of message display such as animation, rapid flashing, dissolving, exploding, scrolling, travelling horizontally or vertically across the face of the sign, or other dynamic elements shall not be used.**

Guidance:

20 *When a message is divided into two phases, the display time for each phase should be at least 2 seconds, and the sum of the display times for both of the phases should be a maximum of 8 seconds.*

21 *All messages should be designed with consideration given to the principles provided in this Section and also taking into account the following:*

A. The message should be as brief as possible and should contain three thoughts (with each thought preferably shown on its own line) that convey:
   1. The problem or situation that the road user will encounter ahead,
   2. The location of or distance to the problem or situation, and
   3. The recommended driver action.

B. If more than two phases are needed to display a message, additional portable changeable message signs should be used. When multiple portable changeable message signs are needed, they should be placed on the same side of the roadway and they should be separated from each other by a distance of at least 1,000 feet on freeways and expressways, and by a distance of at least 500 feet on other types of highways.

Standard:

22 **When the word messages shown in Tables 1A-1 or 1A-2 need to be abbreviated on a portable changeable message sign, the provisions described in Section 1A.15 shall be followed.**

23 **In order to maintain legibility, portable changeable message signs shall automatically adjust their brightness under varying light conditions.**

24 **The control system shall include a display screen upon which messages can be reviewed before being displayed on the message sign. The control system shall be capable of maintaining memory when power is unavailable.**

25 **Portable changeable message signs shall be equipped with a power source and a battery back-up to provide continuous operation when failure of the primary power source occurs.**

26 **The mounting of portable changeable message signs on a trailer, a large truck, or a service patrol truck shall be such that the bottom of the message sign shall be a minimum of 7 feet above the roadway in urban areas and 5 feet above the roadway in rural areas when it is in the operating mode.**

Guidance:

27 *Portable changeable message signs should be used as a supplement to and not as a substitute for conventional signs and pavement markings.*

28 *When portable changeable message signs are used for route diversion, they should be placed far enough in advance of the diversion to allow road users ample opportunity to perform necessary lane changes, to adjust their speed, or to exit the affected highway.*

29 *Portable changeable message signs should be sited and aligned to provide maximum legibility and to allow time for road users to respond appropriately to the portable changeable message sign message.*

30 *Portable changeable message signs should be placed off the shoulder of the roadway and behind a traffic barrier, if practical. Where a traffic barrier is not available to shield the portable changeable message sign, it should be placed off the shoulder and outside of the clear zone. If a portable changeable message sign has to be placed on the shoulder of the roadway or within the clear zone, it should be delineated with retroreflective TTC devices.*

31 *When portable changeable message signs are used in TTC zones, they should display only TTC messages.*

32 *When portable changeable message signs are not being used to display TTC messages, they should be relocated such that they are outside of the clear zone or shielded behind a traffic barrier and turned away from traffic. If relocation or shielding is not practical, they should be delineated with retroreflective TTC devices.*

33 *Portable changeable message sign trailers should be delineated on a permanent basis by affixing retroreflective material, known as conspicuity material, in a continuous line on the face of the trailer as seen by oncoming road users.*

Section 6F.61 Arrow Boards

Standard:

01 **An arrow board shall be a sign with a matrix of elements capable of either flashing or sequential displays. This sign shall provide additional warning and directional information to assist in merging and controlling road users through or around a TTC zone.**

Guidance:

02 *An arrow board in the arrow or chevron mode should be used to advise approaching traffic of a lane closure along major multi-lane roadways in situations involving heavy traffic volumes, high speeds, and/or limited sight distances, or at other locations and under other conditions where road users are less likely to expect such lane closures.*

03 *If used, an arrow board should be used in combination with appropriate signs, channelizing devices, or other TTC devices.*

04 *An arrow board should be placed on the shoulder of the roadway or, if practical, farther from the traveled lane. It should be delineated with retroreflective TTC devices. When an arrow board is not being used, it should be removed; if not removed, it should be shielded; or if the previous two options are not feasible, it should be delineated with retroreflective TTC devices.*

Standard:

05 **Arrow boards shall meet the minimum size, legibility distance, number of elements, and other specifications shown in Figure 6F-6.**

Support:

06 Type A arrow boards are appropriate for use on low-speed urban streets. Type B arrow boards are appropriate for intermediate-speed facilities and for maintenance or mobile operations on high-speed roadways. Type C arrow boards are intended to be used on high-speed, high-volume motor vehicle traffic control projects. Type D arrow boards are intended for use on vehicles authorized by the State or local agency.

Standard:

07 **Type A, B, and C arrow boards shall have solid rectangular appearances. A Type D arrow board shall conform to the shape of the arrow.**

08 **All arrow boards shall be finished in non-reflective black. The arrow board shall be mounted on a vehicle, a trailer, or other suitable support.**

Guidance:

09 *The minimum mounting height, measured vertically from the bottom of the board to the roadway below it or to the elevation of the near edge of the roadway, of an arrow board should be 7 feet , except on vehicle-mounted arrow boards, which should be as high as practical.*

10 *A vehicle-mounted arrow board should be provided with remote controls.*

Standard:

11 **Arrow board elements shall be capable of at least a 50 percent dimming from full brilliance. The dimmed mode shall be used for nighttime operation of arrow boards.**

Guidance:

12 *Full brilliance should be used for daytime operation of arrow boards.*

Standard:

13 **The arrow board shall have suitable elements capable of the various operating modes. The color presented by the elements shall be yellow.**

Guidance:

14 *If an arrow board consisting of a bulb matrix is used, the elements should be recess-mounted or equipped with an upper hood of not less than 180 degrees.*

Figure 6F-6. Advance Warning Arrow Board Display Specifications

Operating Mode	Display (Type C arrow board illustrated)
1. At least one of the three following modes shall be provided:	(right arrow shown; left is similar)
Flashing Arrow	 Merge Right
Sequential Arrow	 Merge Right
Sequential Chevron	 Merge Right
2. The following mode shall be provided: Flashing Double Arrow	 Merge Right or Left
3. At least one of the following modes shall be provided: Flashing Caution or Alternating Diamond Caution	 Flashing Caution or Flashing Caution or Alternating Diamond Caution

Arrow Board Type	Minimum Size	Minimum Legibility Distance	Minimum Number of Elements
A	48 x 24 inches	1/2 mile	12
B	60 x 30 inches	3/4 mile	13
C	96 x 48 inches	1 mile	15
D	None*	1/2 mile	12

*Length of arrow equals 48 inches, width of arrowhead equals 24 inches

Standard:

15 **The minimum element on-time shall be 50 percent for the flashing mode, with equal intervals of 25 percent for each sequential phase. The flashing rate shall be not less than 25 or more than 40 flashes per minute.**

16 **An arrow board shall have the following three mode selections:**

A. A Flashing Arrow, Sequential Arrow, or Sequential Chevron mode;
B. A flashing Double Arrow mode; and
C. A flashing Caution or Alternating Diamond mode.

17 **An arrow board in the arrow or chevron mode shall be used only for stationary or moving lane closures on multi-lane roadways.**

18 **For shoulder work, blocking the shoulder, for roadside work near the shoulder, or for temporarily closing one lane on a two-lane, two-way roadway, an arrow board shall be used only in the caution mode.**

Guidance:

19 *For a stationary lane closure, the arrow board should be located on the shoulder at the beginning of the merging taper.*

20 *Where the shoulder is narrow, the arrow board should be located in the closed lane.*

Standard:

21 **When arrow boards are used to close multiple lanes, a separate arrow board shall be used for each closed lane.**

Guidance:

22 *When arrow boards are used to close multiple lanes, if the first arrow board is placed on the shoulder, the second arrow board should be placed in the first closed lane at the upstream end of the second merging taper (see Figure 6H-37). When the first arrow board is placed in the first closed lane, the second arrow board should be placed in the second closed lane at the downstream end of the second merging taper.*

23 *For mobile operations where a lane is closed, the arrow board should be located to provide adequate separation from the work operation to allow for appropriate reaction by approaching drivers.*

Standard:

24 **A vehicle displaying an arrow board shall be equipped with high-intensity rotating, flashing, oscillating, or strobe lights.**

25 **Arrow boards shall only be used to indicate a lane closure. Arrow boards shall not be used to indicate a lane shift.**

Option:

26 A portable changeable message sign may be used to simulate an arrow board display.

Section 6F.62 High-Level Warning Devices (Flag Trees)

Option:

01 A high-level warning device (flag tree) may supplement other TTC devices in TTC zones.

Support:

02 A high-level warning device is designed to be seen over the top of typical passenger cars. A typical high-level warning device is shown in Figure 6F-2.

Standard:

03 **A high-level warning device shall consist of a minimum of two flags with or without a Type B high-intensity flashing warning light. The distance from the roadway to the bottom of the lens of the light and to the lowest point of the flag material shall be not less than 8 feet. The flag shall be 16 inches square or larger and shall be orange or fluorescent red-orange in color.**

Option:

04 An appropriate warning sign may be mounted below the flags.

Support:

05 High-level warning devices are most commonly used in high-density road user situations to warn road users of short-term operations.

Section 6F.63 Channelizing Devices

Standard:

01 **Designs of various channelizing devices shall be as shown in Figure 6F–7. All channelizing devices shall be crashworthy.**

Support:

02 The function of channelizing devices is to warn road users of conditions created by work activities in or near the roadway and to guide road users. Channelizing devices include cones, tubular markers, vertical panels, drums, barricades, and longitudinal channelizing devices.

03 Channelizing devices provide for smooth and gradual vehicular traffic flow from one lane to another, onto a bypass or detour, or into a narrower traveled way. They are also used to channelize vehicular traffic away from the work space, pavement drop-offs, pedestrian or shared-use paths, or opposing directions of vehicular traffic.

Standard:

04 **Devices used to channelize pedestrians shall be detectable to users of long canes and visible to persons having low vision.**

05 **Where channelizing devices are used to channelize pedestrians, there shall be continuous detectable bottom and top surfaces to be detectable to users of long canes. The bottom of the bottom surface shall be no higher than 2 inches above the ground. The top of the top surface shall be no lower than 32 inches above the ground.**

Option:

06 A gap not exceeding 2 inches between the bottom rail and the ground surface may be used to facilitate drainage.

Guidance:

07 *Where multiple channelizing devices are aligned to form a continuous pedestrian channelizer, connection points should be smooth to optimize long-cane and hand trailing.*

08 *The spacing between cones, tubular markers, vertical panels, drums, and barricades should not exceed a distance in feet equal to 1.0 times the speed limit in mph when used for taper channelization, and a distance in feet equal to 2.0 times the speed limit in mph when used for tangent channelization.*

09 *When channelizing devices have the potential of leading vehicular traffic out of the intended vehicular traffic space as shown in Figure 6H-39, the channelizing devices should be extended a distance in feet of 2.0 times the speed limit in mph beyond the downstream end of the transition area.*

Option:

10 Warning lights (see Section 6F.83) may be added to channelizing devices in areas with frequent fog, snow, or severe roadway curvature, or where visual distractions are present.

Standard:

11 **Warning lights shall flash when placed on channelizing devices used alone or in a cluster to warn of a condition. Except for the sequential flashing warning lights discussed in Paragraphs 12 and 13, warning lights placed on channelizing devices used in a series to channelize road users shall be steady-burn.**

Option:

12 A series of sequential flashing warning lights may be placed on channelizing devices that form a merging taper in order to increase driver detection and recognition of the merging taper.

Standard:

13 **When used, the successive flashing of the sequential warning lights shall occur from the upstream end of the merging taper to the downstream end of the merging taper in order to identify the desired vehicle path. Each warning light in the sequence shall be flashed at a rate of not less than 55 nor more than 75 times per minute.**

14 **The retroreflective material used on channelizing devices shall have a smooth, sealed outer surface that will display a similar color day or night.**

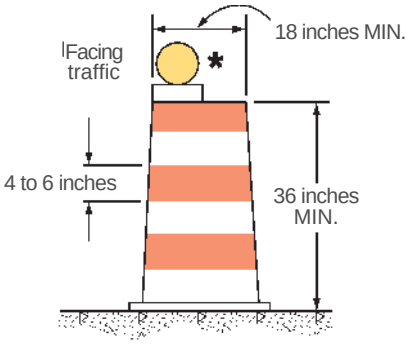
Option:

15 The name and telephone number of the highway agency, contractor, or supplier may be displayed on the non-retroreflective surface of all types of channelizing devices.

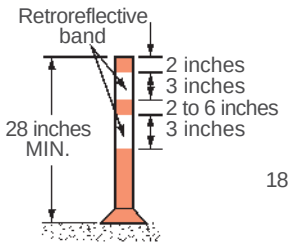
Standard:

16 **The letters and numbers of the name and telephone number shall be non-retroreflective and not over 2 inches in height.**

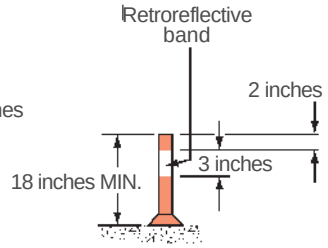
Figure 6F-7. Channelizing Devices



DRUM

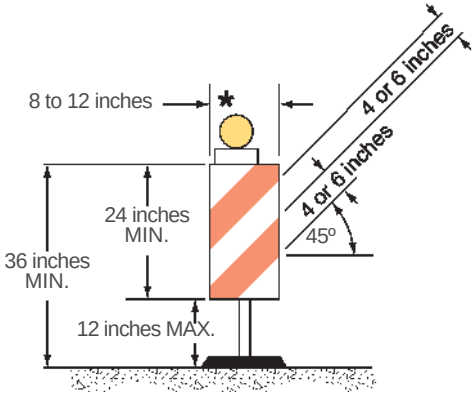


Night and/or freeway
High-speed roadway
(≥45 mph)

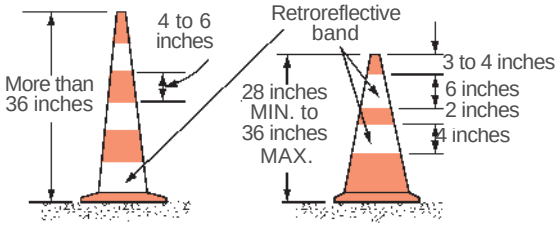


Day and low-speed
roadway (≤40 mph)

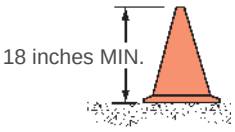
TUBULAR MARKERS



VERTICAL PANEL

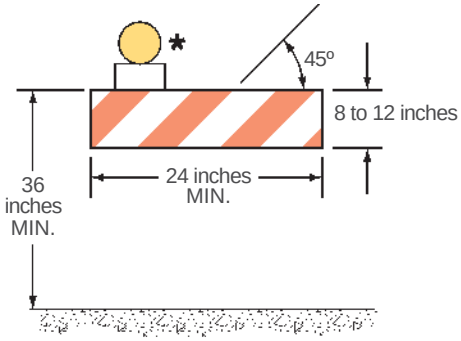


Night and/or freeway
High-speed roadway
(≥45 mph)

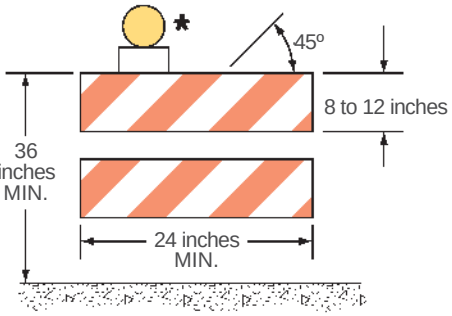


Day and low-speed
roadway (≤40 mph)

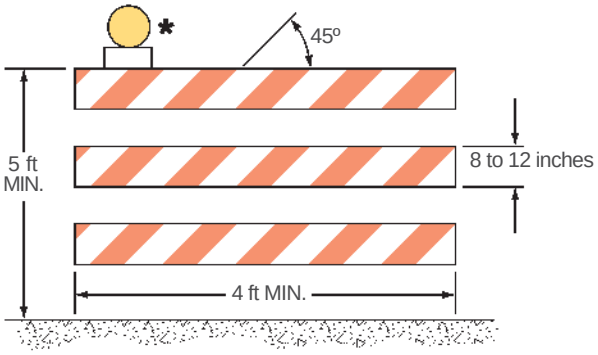
CONES



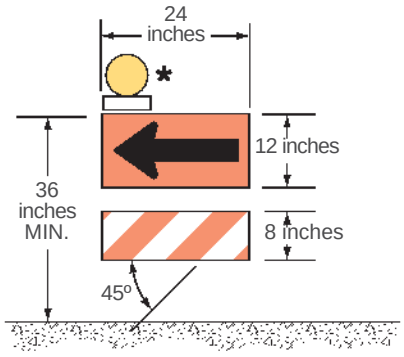
TYPE 1 BARRICADE **



TYPE 2 BARRICADE **



TYPE 3 BARRICADE **



DIRECTION INDICATOR BARRICADE **

* Warning lights (optional)

** Rail stripe widths shall be 6 inches, except that 4-inch wide stripes may be used if rail lengths are less than 36 inches. The sides of barricades facing traffic shall have retroreflective rail faces.

Guidance:

17 *Particular attention should be given to maintaining the channelizing devices to keep them clean, visible, and properly positioned at all times.*

Standard:

18 **Devices that are damaged or have lost a significant amount of their retroreflectivity and effectiveness shall be replaced.**

Section 6F.64 Cones

Standard:

01 **Cones (see Figure 6F-7) shall be predominantly orange and shall be made of a material that can be struck without causing damage to the impacting vehicle. For daytime and low-speed roadways, cones shall be not less than 18 inches in height. When cones are used on freeways and other high-speed highways or at night on all highways, or when more conspicuous guidance is needed, cones shall be a minimum of 28 inches in height.**

02 **For nighttime use, cones shall be retroreflectorized or equipped with lighting devices for maximum visibility. Retroreflectorization of cones that are 28 to 36 inches in height shall 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.**

03 **Retroreflectorization of cones that are more than 36 inches in height shall be provided by horizontal, circumferential, alternating orange and white retroreflective stripes that are 4 to 6 inches wide. Each cone shall have a minimum of two orange and two white stripes with the top stripe being orange. Any non-retroreflective spaces between the orange and white stripes shall not exceed 3 inches in width.**

Option:

04 Traffic cones may be used to channelize road users, divide opposing vehicular traffic lanes, divide lanes when two or more lanes are kept open in the same direction, and delineate short duration maintenance and utility work.

Guidance:

05 *Steps should be taken to minimize the possibility of cones being blown over or displaced by wind or moving vehicular traffic.*

Option:

06 Cones may be doubled up to increase their weight.

Support:

07 Some cones are constructed with bases that can be filled with ballast. Others have specially weighted bases, or weight such as sandbag rings that can be dropped over the cones and onto the base to provide added stability.

Guidance:

08 *Ballast should be kept to the minimum amount needed.*

Section 6F.65 Tubular Markers

Standard:

01 **Tubular markers (see Figure 6F-7) shall be predominantly orange and shall be not less than 18 inches high and 2 inches wide facing road users. They shall be made of a material that can be struck without causing damage to the impacting vehicle.**

02 **Tubular markers shall be a minimum of 28 inches in height when they are used on freeways and other high-speed highways, on all highways during nighttime, or whenever more conspicuous guidance is needed.**

03 **For nighttime use, tubular markers shall be retroreflectorized. Retroreflectorization of tubular markers that have a height of less than 42 inches shall be provided by two 3-inch wide white bands placed a maximum of 2 inches from the top with a maximum of 6 inches between the bands. Retroreflectorization of tubular markers that have a height of 42 inches or more shall be provided by four 4- to 6-inch wide alternating orange and white stripes with the top stripe being orange.**

Guidance:

04 *Tubular markers have less visible area than other devices and should be used only where space restrictions do not allow for the use of other more visible devices.*

05 *Tubular markers should be stabilized by affixing them to the pavement, by using weighted bases, or weights such as sandbag rings that can be dropped over the tubular markers and onto the base to provide added stability. Ballast should be kept to the minimum amount needed.*

Option:

06 Tubular markers may be used effectively to divide opposing lanes of road users, divide vehicular traffic lanes when two or more lanes of moving vehicular traffic are kept open in the same direction, and to delineate the edge of a pavement drop off where space limitations do not allow the use of larger devices.

Standard:

07 **A tubular marker shall be attached to the pavement to display the minimum 2-inch width to the approaching road users.**

Section 6F.66 Vertical Panels

Standard:

01 **Vertical panels (see Figure 6F-7) shall have retroreflective striped material that is 8 to 12 inches in width and at least 24 inches in height. They shall have alternating diagonal orange and white retroreflective stripes sloping downward at an angle of 45 degrees in the direction vehicular traffic is to pass.**

02 **Where the height of the retroreflective material on the vertical panel is 36 inches or more, a stripe width of 6 inches shall be used.**

Option:

03 Where the height of the retroreflective material on the vertical panel is less than 36 inches, a stripe width of 4 inches may be used.

04 Where space is limited, vertical panels may be used to channelize vehicular traffic, divide opposing lanes, or replace barricades.

Section 6F.67 Drums

Standard:

01 **Drums (see Figure 6F-7) used for road user warning or channelization shall be constructed of lightweight, deformable materials. They shall be a minimum of 36 inches in height and have at least an 18-inch minimum width regardless of orientation. Metal drums shall not be used. The markings on drums shall be horizontal, circumferential, alternating orange and white retroreflective stripes 4 to 6 inches wide. Each drum shall have a minimum of two orange and two white stripes with the top stripe being orange. Any non-retroreflectorized spaces between the horizontal orange and white stripes shall not exceed 3 inches wide. Drums shall have closed tops that will not allow collection of construction debris or other debris.**

Support:

02 Drums are highly visible, have good target value, give the appearance of being formidable obstacles and, therefore, command the respect of road users. They are portable enough to be shifted from place to place within a TTC zone in order to accommodate changing conditions, but are generally used in situations where they will remain in place for a prolonged period of time.

Option:

03 Although drums are most commonly used to channelize or delineate road user flow, they may also be used alone or in groups to mark specific locations.

Guidance:

04 *Drums should not be weighted with sand, water, or any material to the extent that would make them hazardous to road users or workers when struck. Drums used in regions susceptible to freezing should have drain holes in the bottom so that water will not accumulate and freeze causing a hazard if struck by a road user.*

Standard:

05 **Ballast shall not be placed on the top of a drum.**

Section 6F.68 Type 1, 2, or 3 Barricades

Support:

01 A barricade is a portable or fixed device having from one to three rails with appropriate markings and is used to control road users by closing, restricting, or delineating all or a portion of the right-of-way.

02 As shown in Figure 6F-7, barricades are classified as Type 1, Type 2, or Type 3.

Standard:

03 **Stripes on barricade rails shall be alternating orange and white retroreflective stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Except as provided in Paragraph 4, the stripes shall be 6 inches wide.**

Option:

04 When rail lengths are less than 36 inches, 4-inch wide stripes may be used.

Standard:

05 **The minimum length for Type 1 and Type 2 Barricades shall be 24 inches, and the minimum length for Type 3 Barricades shall be 48 inches. Each barricade rail shall be 8 to 12 inches wide. Barricades used on freeways, expressways, and other high-speed roadways shall have a minimum of 270 square inches of retroreflective area facing road users.**

Guidance:

06 *Where barricades extend entirely across a roadway, the stripes should slope downward in the direction toward which road users must turn.*

07 *Where both right and left turns are provided, the barricade stripes should slope downward in both directions from the center of the barricade or barricades.*

08 *Where no turns are intended, the stripes should be positioned to slope downward toward the center of the barricade or barricades.*

09 *Barricade rails should be supported in a manner that will allow them to be seen by the road user, and in a manner that provides a stable support that is not easily blown over or displaced.*

10 *The width of the existing pedestrian facility should be provided for the temporary facility if practical. Traffic control devices and other construction materials and features should not intrude into the usable width of the sidewalk, temporary pathway, or other pedestrian facility. When it is not possible to maintain a minimum width of 60 inches throughout the entire length of the pedestrian pathway, a 60 x 60-inch passing space should be provided at least every 200 feet to allow individuals in wheelchairs to pass.*

11 *Barricade rail supports should not project into pedestrian circulation routes more than 4 inches from the support between 27 and 80 inches from the surface as described in Section 4.4.1 of the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG) (see Section 1A.11).*

Option:

12 For Type 1 Barricades, the support may include other unstriped horizontal rails necessary to provide stability.

Guidance:

13 *On high-speed expressways or in other situations where barricades may be susceptible to overturning in the wind, ballasting should be used.*

Option:

14 Sandbags may be placed on the lower parts of the frame or the stays of barricades to provide the required ballast.

Support:

15 Type 1 or Type 2 Barricades are intended for use in situations where road user flow is maintained through the TTC zone.

Option:

16 Barricades may be used alone or in groups to mark a specific condition or they may be used in a series for channelizing road users.

17 Type 1 Barricades may be used on conventional roads or urban streets.

Guidance:

18 *Type 2 or Type 3 Barricades should be used on freeways and expressways or other high-speed roadways. Type 3 Barricades should be used to close or partially close a road.*

Option:

19 Type 3 Barricades used at a road closure may be placed completely across a roadway or from curb to curb.

Guidance:

20 *Where provision is made for access of authorized equipment and vehicles, the responsibility for Type 3 Barricades should be assigned to a person who will provide proper closure at the end of each work day.*

Support:

21 When a highway is legally closed but access must still be allowed for local road users, barricades usually are not extended completely across the roadway.

Standard:

22 **A sign shall be installed with the appropriate legend concerning permissible use by local road users (see Section 6F.09). Adequate visibility of the barricades from both directions shall be provided.**

Option:

23 Signs may be installed on barricades (see Section 6F.03).

Section 6F.69 Direction Indicator Barricades

Standard:

01 **The Direction Indicator Barricade (see Figure 6F-7) shall consist of a One-Direction Large Arrow (W1-6) sign mounted above a diagonal striped, horizontally aligned, retroreflective rail.**

02 **The One-Direction Large Arrow (W1-6) sign shall be black on an orange background. The stripes on the bottom rail shall be alternating orange and white retroreflective stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. The stripes shall be 4 inches wide. The One-Direction Large Arrow (W1-6) sign shall be 24 x 12 inches. The bottom rail shall have a length of 24 inches and a height of 8 inches.**

Option:

03 The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.

Guidance:

04 *If used, Direction Indicator Barricades should be used in series to direct the driver through the transition and into the intended travel lane.*

Section 6F.70 Temporary Traffic Barriers as Channelizing Devices

Support:

01 Temporary traffic barriers are not TTC devices in themselves; however, when placed in a position identical to a line of channelizing devices and marked and/or equipped with appropriate channelization features to provide guidance and warning both day and night, they serve as TTC devices.

Standard:

02 **Temporary traffic barriers serving as TTC devices shall comply with requirements for such devices as set forth throughout Part 6.**

03 **Temporary traffic barriers (see Section 6F.85) shall not be used solely to channelize road users, but also to protect the work space. If used to channelize vehicular traffic, the temporary traffic barrier shall be supplemented with delineation, pavement markings, or channelizing devices for improved daytime and nighttime visibility.**

Guidance:

04 *Temporary traffic barriers should not be used for a merging taper except in low-speed urban areas.*

05 *When it is necessary to use a temporary traffic barrier for a merging taper in low-speed urban areas or for a constricted/restricted TTC zone, the taper length should be designed to optimize road user operations considering the available geometric conditions.*

Standard:

06 **When it is necessary to use a temporary traffic barrier for a merging taper in low-speed urban areas or for a constricted/restricted TTC zone, the taper shall be delineated.**

Guidance:

07 *When used for channelization, temporary traffic barriers should be of a light color for increased visibility.*

Section 6F.71 Longitudinal Channelizing Devices

Support:

01 Longitudinal channelizing devices are lightweight, deformable devices that are highly visible, have good target value, and can be connected together.

Standard:

02 **If used singly as Type 1, 2, or 3 barricades, longitudinal channelizing devices shall comply with the general size, color, stripe pattern, retroreflectivity, and placement characteristics established for the devices described in this Chapter.**

Guidance:

03 *If used to channelize vehicular traffic at night, longitudinal channelizing devices should be supplemented with retroreflective material or delineation for improved nighttime visibility.*

Option:

04 Longitudinal channelizing devices may be used instead of a line of cones, drums, or barricades.

05 Longitudinal channelizing devices may be hollow and filled with water as a ballast.

06 Longitudinal channelizing devices may be used for pedestrian traffic control.

Standard:

07 **If used for pedestrian traffic control, longitudinal channelizing devices shall be interlocked to delineate or channelize flow. The interlocking devices shall not have gaps that allow pedestrians to stray from the channelizing path.**

Guidance:

08 *Longitudinal channelizing devices have not met the crashworthy requirements for temporary traffic barriers and should not be used to shield obstacles or provide positive protection for pedestrians or workers.*

Section 6F.72 Temporary Lane Separators

Option:

01 Temporary lane separators may be used to channelize road users, to divide opposing vehicular traffic lanes, to divide lanes when two or more lanes are open in the same direction, and to provide continuous pedestrian channelization.

Standard:

02 **Temporary lane separators shall be crashworthy. Temporary lane separators shall have a maximum height of 4 inches and a maximum width of 1 foot, and shall have sloping sides in order to facilitate crossover by emergency vehicles.**

Option:

03 Temporary lane separators may be supplemented with any of the approved channelizing devices contained in this Chapter, such as tubular markers, vertical panels, and opposing traffic lane dividers.

Standard:

04 **If appropriate channelizing devices are used to supplement a temporary lane separator, the channelizing devices shall be retroreflectorized to provide nighttime visibility. If channelizing devices are not used, the temporary lane separator shall contain retroreflectorization to enhance its visibility.**

Guidance:

05 *A temporary lane separator should be stabilized by affixing it to the pavement in a manner suitable to its design, while allowing the unit to be shifted from place to place within the TTC zone in order to accommodate changing conditions.*

Standard:

06 **At pedestrian crossing locations, temporary lane separators shall have an opening or be shortened to provide a pathway that is at least 60 inches wide for crossing pedestrians.**

Section 6F.73 Other Channelizing Devices

Option:

01 Channelizing devices other than those described in this Chapter may be used in special situations based on an engineering study.

Guidance:

02 *Other channelizing devices should comply with the general size, color, stripe pattern, retroreflection, and placement characteristics established for the devices described in this Chapter.*

Section 6F.74 Detectable Edging for Pedestrians

Support:

01 Individual channelizing devices, tape or rope used to connect individual devices, other discontinuous barriers and devices, and pavement markings are not detectable by persons with visual disabilities and are incapable of providing detectable path guidance on temporary or realigned sidewalks or other pedestrian facilities.

Guidance:

02 *When it is determined that a facility should be accessible to and detectable by pedestrians with visual disabilities, a continuously detectable edging should be provided throughout the length of the facility such that it can be followed by pedestrians using long canes for guidance. This edging should protrude at least 6 inches above the surface of the sidewalk or pathway, with the bottom of the edging a maximum of 2 inches above the surface. This edging should be continuous throughout the length of the facility except for gaps at locations where pedestrians or vehicles will be turning or crossing. This edging should consist of a prefabricated or formed in-place curbing or other continuous device that is placed along the edge of the sidewalk or walkway. This edging should be firmly attached to the ground or to other devices. Adjacent sections of this edging should be interconnected such that the edging is not displaced by pedestrian or vehicular traffic or work operations, and such that it does not constitute a hazard to pedestrians, workers, or other road users.*

Support:

03 Examples of detectable edging for pedestrians include:

A. Prefabricated lightweight sections of plastic, metal, or other suitable materials that are interconnected and fixed in place to form a continuous edge.
B. Prefabricated lightweight sections of plastic, metal, or other suitable materials that are interconnected, fixed in place, and placed at ground level to provide a continuous connection between channelizing devices located at intervals along the edge of the sidewalk or walkway.
C. Sections of lumber interconnected and fixed in place to form a continuous edge.
D. Formed-in-place asphalt or concrete curb.
E. Prefabricated concrete curb sections that are interconnected and fixed in place to form a continuous edge.
F. Continuous temporary traffic barrier or longitudinal channelizing barricades placed along the edge of the sidewalk or walkway that provides a pedestrian edging at ground level.
G. Chain link or other fencing equipped with a continuous bottom rail.

Guidance:

04 *Detectable pedestrian edging should be orange, white, or yellow and should match the color of the adjacent channelizing devices or traffic control devices, if any are present.*

Section 6F.75 Temporary Raised Islands

Standard:

01 **Temporary raised islands shall be used only in combination with pavement striping and other suitable channelizing devices.**

Option:

02 A temporary raised island may be used to separate vehicular traffic flows in two-lane, two-way operations on roadways having a vehicular traffic volume range of 4,000 to 15,000 average daily traffic (ADT) and on freeways having a vehicular traffic volume range of 22,000 ADT to 60,000 ADT.

03 Temporary raised islands also may be used in other than two-lane, two-way operations where physical separation of vehicular traffic from the TTC zone is not required.

Guidance:

04 *Temporary raised islands should have the basic dimensions of 4 inches high by at least 12 inches wide and have rounded or chamfered corners.*

05 *The temporary raised islands should not be designed in such a manner that they would cause a motorist to lose control of the vehicle if the vehicle inadvertently strikes the temporary raised island. If struck, pieces of the island should not be dislodged to the extent that they could penetrate the occupant compartment or involve other vehicles.*

Standard:

06 **At pedestrian crossing locations, temporary raised islands shall have an opening or be shortened to provide at least a 60-inch wide pathway for the crossing pedestrian.**

Section 6F.76 Opposing Traffic Lane Divider and Sign (W6-4)

Support:

01 Opposing traffic lane dividers are delineation devices used as center lane dividers to separate opposing vehicular traffic on a two-lane, two-way operation.

Standard:

02 **Opposing traffic lane dividers shall not be placed across pedestrian crossings.**

03 **The Opposing Traffic Lane Divider (W6-4) sign (see Figure 6F-4) shall be an upright, retroreflective orange-colored sign placed on a flexible support and sized at least 12 inches wide by 18 inches high.**

Section 6F.77 Pavement Markings

Support:

01 Pavement markings are installed or existing markings are maintained or enhanced in TTC zones to provide road users with a clearly defined path for travel through the TTC zone in day, night, and twilight periods under both wet and dry pavement conditions.

Guidance:

02 *The work should be planned and staged to provide for the placement and removal of the pavement markings in a way that minimizes the disruption to traffic flow approaching and through the TTC zone during the placement and removal process.*

Standard:

03 **Existing pavement markings shall be maintained in all long-term stationary (see Section 6G.02) TTC zones in accordance with Chapters 3A and 3B, except as otherwise provided for temporary pavement markings in Section 6F.78. Pavement markings shall match the alignment of the markings in place at both ends of the TTC zone. Pavement markings shall be placed along the entire length of any paved detour or temporary roadway prior to the detour or roadway being opened to road users.**

04 **For long-term stationary operations, pavement markings in the temporary traveled way that are no longer applicable shall be removed or obliterated as soon as practical. Pavement marking obliteration shall remove the non-applicable pavement marking material, and the obliteration method shall minimize pavement scarring. Painting over existing pavement markings with black paint or spraying with asphalt shall not be accepted as a substitute for removal or obliteration.**

Option:

05 Removable, non-reflective, preformed tape that is approximately the same color as the pavement surface may be used where markings need to be covered temporarily.

Section 6F.78 Temporary Markings

Support:

01 Temporary markings are those pavement markings or devices that are placed within TTC zones to provide road users with a clearly defined path of travel through the TTC zone when the permanent markings are either removed or obliterated during the work activities. Temporary markings are typically needed during the reconstruction of a road while it is open to traffic, such as overlays or surface treatments or where lanes are temporarily shifted on pavement that is to remain in place.

Guidance:

02 *Unless justified based on engineering judgment, temporary pavement markings should not remain in place for more than 14 days after the application of the pavement surface treatment or the construction of the final pavement surface on new roadways or over existing pavements.*

03 *The temporary use of edge lines, channelizing lines, lane-reduction transitions, gore markings, and other longitudinal markings, and the various non-longitudinal markings (such as stop lines, railroad crossings, crosswalks, words, symbols, or arrows) should be in accordance with the State's or highway agency's policy.*

Standard:

04 **Warning signs, channelizing devices, and delineation shall be used to indicate required road user paths in TTC zones where it is not possible to provide a clear path by pavement markings.**

05 **Except as otherwise provided in this Section, all temporary pavement markings for no-passing zones shall comply with the requirements of Chapters 3A and 3B. All temporary broken-line pavement markings shall use the same cycle length as permanent markings and shall have line segments that are at least 2 feet long.**

Guidance:

06 *All pavement markings and devices used to delineate road user paths should be reviewed during daytime and nighttime periods.*

Option:

07 Half-cycle lengths with a minimum of 2-foot stripes may be used on roadways with severe curvature (see Section 3A.06) for broken line center lines in passing zones and for lane lines.

08 For temporary situations of 14 days or less, for a two- or three-lane road, no-passing zones may be identified by using DO NOT PASS (R4-1), PASS WITH CARE (R4-2), and NO PASSING ZONE (W14-3) signs (see Sections 2B.28, 2B.29, and 2C.45) rather than pavement markings. Also, DO NOT PASS, PASS WITH CARE, and NO PASSING ZONE signs may be used instead of pavement markings on roads with low volumes for longer periods in accordance with the State's or highway agency's policy.

Guidance:

09 *If used, the DO NOT PASS, PASS WITH CARE, and NO PASSING ZONE signs should be placed in accordance with Sections 2B.28, 2B.29, and 2C.45.*

10 *If used, the NO CENTER LINE sign should be placed in accordance with Section 6F.47.*

Section 6F.79 Temporary Raised Pavement Markers

Option:

01 Retroreflective or internally illuminated raised pavement markers, or non-retroreflective raised pavement markers supplemented by retroreflective or internally illuminated markers, may be substituted for markings of other types in TTC zones.

Standard:

02 **If used, the color and pattern of the raised pavement markers shall simulate the color and pattern of the markings for which they substitute.**

03 **If temporary raised pavement markers are used to substitute for broken line segments, a group of at least three retroreflective markers shall be equally spaced at no greater than N/8 (see Section 3B.14). The value of N for a broken or dotted line shall equal the length of one line segment plus one gap.**

04 **If temporary raised pavement markers are used to substitute for solid lines, the markers shall be equally spaced at no greater than N/4, with retroreflective or internally illuminated units at a spacing no greater than N/2. The value of N referenced for solid lines shall equal the N for the broken or dotted lines that might be adjacent to or might extend the solid lines (see Section 3B.11).**

Option:

05 Temporary raised pavement markers may be used to substitute for broken line segments by using at least two retroreflective markers placed at each end of a segment of 2 to 5 feet in length, using the same cycle length as permanent markings.

Guidance:

06 *Temporary raised pavement markers used on 2- to 5-foot segments to substitute for broken line segments should not be in place for more than 14 days unless justified by engineering judgment.*

07 *Raised pavement markers should be considered for use along surfaced detours or temporary roadways, and other changed or new travel-lane alignments.*

Option:

08 Retroreflective or internally illuminated raised pavement markers, or non-retroreflective raised pavement markers supplemented by retroreflective or internally illuminated markers, may also be used in TTC zones to supplement markings as prescribed in Chapters 3A and 3B.

Section 6F.80 Delineators

Standard:

01 **When used, delineators shall combine with or supplement other TTC devices. They shall be mounted on crashworthy supports so that the reflecting unit is approximately 4 feet above the near roadway edge. The standard color for delineators used along both sides of two-way streets and highways and the right-hand side of one-way roadways shall be white. Delineators used along the left-hand side of one-way roadways shall be yellow.**

Guidance:

02 *Spacing along roadway curves should be as set forth in Section 3F.04 and should be such that several delineators are constantly visible to the driver.*

Option:

03 Delineators may be used in TTC zones to indicate the alignment of the roadway and to outline the required vehicle path through the TTC zone.

Section 6F.81 Lighting Devices

Guidance:

01 *Lighting devices should be provided in TTC zones based on engineering judgment.*

02 *When used to supplement channelization, the maximum spacing for warning lights should be identical to the channelizing device spacing requirements.*

Option:

03 Lighting devices may be used to supplement retroreflectorized signs, barriers, and channelizing devices.

04 During normal daytime maintenance operations, the functions of flashing warning beacons may be provided by high-intensity rotating, flashing, oscillating, or strobe lights on a maintenance vehicle.

Standard:

05 **Although vehicle hazard warning lights are permitted to be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights, they shall not be used instead of high-intensity rotating, flashing, oscillating, or strobe lights.**

Section 6F.82 Floodlights

Support:

01 Utility, maintenance, or construction activities on highways are frequently conducted during nighttime periods when vehicular traffic volumes are lower. Large construction projects are sometimes operated on a double-shift basis requiring night work (see Section 6G.19).

Guidance:

02 *When nighttime work is being performed, floodlights should be used to illuminate the work area, equipment crossings, and other areas.*

Standard:

03 **Except in emergency situations, flagger stations shall be illuminated at night.**

04 **Floodlighting shall not produce a disabling glare condition for approaching road users, flaggers, or workers.**

Guidance:

05 *The adequacy of the floodlight placement and elimination of potential glare should be determined by driving through and observing the floodlighted area from each direction on all approaching roadways after the initial floodlight setup, at night, and periodically.*

Support:

06 Desired illumination levels vary depending upon the nature of the task involved. An average horizontal luminance of 5 foot candles can be adequate for general activities. Tasks requiring high levels of precision and extreme care can require an average horizontal luminance of 20 foot candles.

Section 6F.83 Warning Lights

Support:

01 Type A, Type B, Type C, and Type D 360-degree warning lights are portable, powered, yellow, lens-directed, enclosed lights.

Standard:

02 **Warning lights shall be in accordance with the current ITE "Purchase Specification for Flashing and Steady-Burn Warning Lights" (see Section 1A.11).**

03 **When warning lights are used, they shall be mounted on signs or channelizing devices in a manner that, if hit by an errant vehicle, they will not be likely to penetrate the windshield.**

Guidance:

04 *The maximum spacing for warning lights should be identical to the channelizing device spacing requirements.*

Support:

05 The light weight and portability of warning lights are advantages that make these devices useful as supplements to the retroreflectorization on signs and channelizing devices. The flashing lights are effective in attracting road users' attention.

Option:

06 Warning lights may be used in either a steady-burn or flashing mode.

Standard:

07 **Except for the sequential flashing warning lights that are described in Paragraphs 8 and 9, flashing warning lights shall not be used for delineation, as a series of flashers fails to identify the desired vehicle path.**

Option:

08 A series of sequential flashing warning lights may be placed on channelizing devices that form a merging taper in order to increase driver detection and recognition of the merging taper.

Standard:

09 **If a series of sequential flashing warning lights is used, the successive flashing of the lights shall occur from the upstream end of the merging taper to the downstream end of the merging taper in order to identify the desired vehicle path. Each flashing warning light in the sequence shall be flashed at a rate of not less than 55 or more than 75 times per minute.**

10 **Type A Low-Intensity Flashing warning lights, Type C Steady-Burn warning lights, and Type D 360-degree Steady-Burn warning lights shall be maintained so as to be capable of being visible on a clear night from a distance of 3,000 feet. Type B High-Intensity Flashing warning lights shall be maintained so as to be capable of being visible on a sunny day when viewed without the sun directly on or behind the device from a distance of 1,000 feet.**

11 **Warning lights shall have a minimum mounting height of 30 inches to the bottom of the lens.**

Support:

12 Type A Low-Intensity Flashing warning lights are used to warn road users during nighttime hours that they are approaching or proceeding in a potentially hazardous area.

Option:

13 Type A warning lights may be mounted on channelizing devices.

Support:

14 Type B High-Intensity Flashing warning lights are used to warn road users during both daylight and nighttime hours that they are approaching a potentially hazardous area.

Option:

15 Type B warning lights are designed to operate 24 hours per day and may be mounted on advance warning signs or on independent supports.

16 Type C Steady-Burn warning lights and Type D 360-degree Steady-Burn warning lights may be used during nighttime hours to delineate the edge of the traveled way.

Guidance:

17 *When used to delineate a curve, Type C and Type D 360-degree warning lights should only be used on devices on the outside of the curve, and not on the inside of the curve.*

Section 6F.84 Temporary Traffic Control Signals

Standard:

01 **Temporary traffic control signals (see Section 4D.32) used to control road user movements through TTC zones and in other TTC situations shall comply with the applicable provisions of Part 4.**

02 **Temporary traffic control signals shall not be mounted on trailers or lightweight portable supports**

Support:

03 Temporary traffic control signals are typically used in TTC zones such as temporary haul road crossings; temporary one-way operations along a one-lane, two-way highway; temporary one-way operations on bridges, reversible lanes, and intersections.

Standard:

04 **A temporary traffic control signal that is used to control traffic through a one-lane, two-way section of roadway shall comply with the provisions of Section 4H.02.**

Guidance:

05 *Where pedestrian traffic is detoured to a temporary traffic control signal, engineering judgment should be used to determine if pedestrian signals or accessible pedestrian signals (see Section 4E.09) are needed for crossing along an alternate route.*

06 *When temporary traffic control signals are used, conflict monitors typical of traditional traffic control signal operations should be used.*

Guidance:

07 *Temporary traffic control signals should only be used in situations where temporary traffic control signals are preferable to other means of traffic control, such as changing the work staging or work zone size to eliminate one-way vehicular traffic movements, using flaggers to control one-way or crossing movements, using STOP or YIELD signs, and using warning devices alone.*

Support:

08 Factors related to the design and application of temporary traffic control signals include the following:

A. Safety and road user needs;
B. Work staging and operations;
C. The feasibility of using other TTC strategies (for example, flaggers, providing space for two lanes, or detouring road users, including bicyclists and pedestrians);
D. Sight distance restrictions;
E. Human factors considerations (for example, lack of driver familiarity with temporary traffic control signals);
F. Road-user volumes including roadway and intersection capacity;
G. Affected side streets and driveways;
H. Vehicle speeds;
I. The placement of other TTC devices;
J. Parking;
K. Turning restrictions;
L. Pedestrians;
M. The nature of adjacent land uses (such as residential or commercial);
N. Legal authority;
O. Signal phasing and timing requirements;
P. Full-time or part-time operation;
Q. Actuated, fixed-time, or manual operation;
R. Power failures or other emergencies;
S. Inspection and maintenance needs;
T. Need for detailed placement, timing, and operation records; and
U. Operation by contractors or by others.

09 Although temporary traffic control signals can be mounted on trailers or lightweight portable supports, fixed supports offer superior resistance to displacement or damage by severe weather, vehicle impact, and vandalism.

Guidance:

10 *Other TTC devices should be used to supplement temporary traffic control signals, including warning and regulatory signs, pavement markings, and channelizing devices.*

11 *Temporary traffic control signals not in use should be covered or removed.*

12 *If a temporary traffic control signal is located within 1/2 mile of an adjacent traffic control signal, consideration should be given to interconnected operation.*

Standard:

13 **Temporary traffic control signals shall not be located within 200 feet of a grade crossing unless the temporary traffic control signal is provided with preemption in accordance with Section 4D.27, or unless a uniformed officer or flagger is provided at the crossing to prevent vehicles from stopping within the crossing.**

Section 6F.85 Temporary Traffic Barriers

Support:

01 Temporary traffic barriers, including shifting portable or movable barriers, are devices designed to help prevent penetration by vehicles while minimizing injuries to vehicle occupants, and to protect workers, bicyclists, and pedestrians.

02 The four primary functions of temporary traffic barriers are:

A. To keep vehicular traffic from entering work areas, such as excavations or material storage sites;
B. To separate workers, bicyclists, and pedestrians from motor vehicle traffic;
C. To separate opposing directions of vehicular traffic; and
D. To separate vehicular traffic, bicyclists, and pedestrians from the work area such as false work for bridges and other exposed objects.

Option:

03 Temporary traffic barriers may be used to separate two-way vehicular traffic.

Guidance:

04 *Because the protective requirements of a TTC situation have priority in determining the need for temporary traffic barriers, their use should be based on an engineering study.*

Standard:

05 **Temporary traffic barriers shall be supplemented with standard delineation, pavement markings, or channelizing devices for improved daytime and nighttime visibility if they are used to channelize vehicular traffic. The delineation color shall match the applicable pavement marking color.**

06 **Temporary traffic barriers, including their end treatments, shall be crashworthy. In order to mitigate the effect of striking the upstream end of a temporary traffic barrier, the end shall be installed in accordance with AASHTO's "Roadside Design Guide" (see Section 1A.11) by flaring until the end is outside the acceptable clear zone or by providing crashworthy end treatments.**

Option:

07 Warning lights or steady-burn lamps may be mounted on temporary traffic barrier installations.

Support:

08 Movable barriers are capable of being repositioned laterally using a transfer vehicle that travels along the barrier. Movable barriers enable short-term closures to be installed and removed on long-term projects. Providing a barrier-protected work space for short-term closures and providing unbalanced flow to accommodate changes in the direction of peak-period traffic flows are two of the advantages of using movable barriers.

09 Figure 6H-45 shows a temporary reversible lane using movable barriers. The notable feature of the movable barrier is that in both Phase A and Phase B, the lanes used by opposing traffic are separated by a barrier.

10 Figure 6H-34 shows an exterior lane closure using a temporary traffic barrier. Notes 7 though 9 address the option of using a movable barrier. By using a movable barrier, the barrier can be positioned to close the lane during the off-peak periods and can be relocated to open the lane during peak periods to accommodate peak traffic flows. With one pass of the transfer vehicle, the barrier can be moved out of the lane and onto the shoulder. Furthermore, if so desired, with a second pass of the transfer vehicle, the barrier could be moved to the roadside beyond the shoulder.

11 More specific information on the use of temporary traffic barriers is contained in Chapters 8 and 9 of AASHTO's "Roadside Design Guide" (see Section 1A.11).

Section 6F.86 Crash Cushions

Support:

01 Crash cushions are systems that mitigate the effects of errant vehicles that strike obstacles, either by smoothly decelerating the vehicle to a stop when hit head-on, or by redirecting the errant vehicle. The two types of crash cushions that are used in TTC zones are stationary crash cushions and truck-mounted attenuators. Crash cushions in TTC zones help protect the drivers from the exposed ends of barriers, fixed objects, shadow vehicles, and other obstacles. Specific information on the use of crash cushions can be found in AASHTO's "Roadside Design Guide" (see Section 1A.11).

Standard:

02 **Crash cushions shall be crashworthy. They shall also be designed for each application to stop or redirect errant vehicles under prescribed conditions. Crash cushions shall be periodically inspected to verify that they have not been hit or damaged. Damaged crash cushions shall be promptly repaired or r eplaced to maintain their crashworthiness.**

Support:

03 Stationary crash cushions are used in the same manner as permanent highway installations to protect drivers from the exposed ends of barriers, fixed objects, and other obstacles.

Standard:

04 **Stationary crash cushions shall be designed for the specific application intended.**

05 **Truck-mounted attenuators shall be energy-absorbing devices attached to the rear of shadow trailers or trucks. If used, the shadow vehicle with the attenuator shall be located in advance of the work area, workers, or equipment to reduce the severity of rear-end crashes from errant vehicles.**

Support:

06 Trucks or trailers are often used as shadow vehicles to protect workers or work equipment from errant vehicles. These shadow vehicles are normally equipped with flashing arrows, changeable message signs, and/or high-intensity rotating, flashing, oscillating, or strobe lights located properly in advance of the workers and/or equipment that they are protecting. However, these shadow vehicles might themselves cause injuries to occupants of the errant vehicles if they are not equipped with truck-mounted attenuators.

Guidance:

07 *The shadow truck should be positioned a sufficient distance in advance of the workers or equipment being protected so that there will be sufficient distance, but not so much so that errant vehicles will travel around the shadow truck and strike the protected workers and/or equipment.*

Support:

08 Chapter 9 of AASHTO's "Roadside Design Guide" (see Section 1A.11) contains additional information regarding the use of shadow vehicles.

Guidance:

09 *If used, the truck-mounted attenuator should be used in accordance with the manufacturer's specifications.*

Section 6F.87 Rumble Strips

Support:

01 Transverse rumble strips consist of intermittent, narrow, transverse areas of rough-textured or slightly raised or depressed road surface that extend across the travel lanes to alert drivers to unusual vehicular traffic conditions. Through noise and vibration they attract the driver's attention to such features as unexpected changes in alignment and to conditions requiring a stop.

02 Longitudinal rumble strips consist of a series of rough-textured or slightly raised or depressed road surfaces located along the shoulder to alert road users that they are leaving the travel lanes.

Standard:

03 **If it is desirable to use a color other than the color of the pavement for a longitudinal rumble strip, the color of the rumble strip shall be the same color as the longitudinal line the rumble strip supplements.**

04 **If the color of a transverse rumble strip used within a travel lane is not the color of the pavement, the color of the rumble strip shall be white, black, or orange.**

Option:

05 Intervals between transverse rumble strips may be reduced as the distance to the approached conditions is diminished in order to convey an impression that a closure speed is too fast and/or that an action is imminent. A sign warning drivers of the onset of rumble strips may be placed in advance of any transverse rumble strip installation.

Guidance:

06 *Transverse rumble strips should be placed transverse to vehicular traffic movement. They should not adversely affect overall pavement skid resistance under wet or dry conditions.*

07 *In urban areas, even though a closer spacing might be warranted, transverse rumble strips should be designed in a manner that does not promote unnecessary braking or erratic steering maneuvers by road users.*

08 *Transverse rumble strips should not be placed on sharp horizontal or vertical curves.*

09 *Rumble strips should not be placed through pedestrian crossings or on bicycle routes.*

10 *Transverse rumble strips should not be placed on roadways used by bicyclists unless a minimum clear path of 4 feet is provided at each edge of the roadway or on each paved shoulder as described in AASHTO's "Guide to the Development of Bicycle Facilities (see Section 1A.11).*

11 *Longitudinal rumble strips should not be placed on the shoulder of a roadway that is used by bicyclists unless a minimum clear path of 4 feet is also provided on the shoulder.*

Section 6F.88 Screens

Support:

01 Screens are used to block the road users' view of activities that can be distracting. Screens might improve safety and motor vehicle traffic flow where volumes approach the roadway capacity because they discourage gawking and reduce headlight glare from oncoming motor vehicle traffic.

Guidance:

02 *Screens should not be mounted where they could adversely restrict road user visibility and sight distance and adversely affect the reasonably safe operation of vehicles.*

Option:

03 Screens may be mounted on the top of temporary traffic barriers that separate two-way motor vehicle traffic.

Guidance:

04 *Design of screens should be in accordance with Chapter 9 of AASHTO's "Roadside Design Guide" (see Section 1A.11).*