Work Zone Management Manual

for the District of Columbia

District Department of Transportation

District Department of Transportation
55 M Street, SE, Suite 400
Washington, DC 20003

January 2016

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INTRODUCTION

The District Department of Transportation (DDOT) has adopted the 2016 DDOT Work Zone Management Manual (WZMM) to provide uniform standards and specifications for the management of work zones in the District of Columbia. The standards and guidelines within the WZMM are standard for all DDOT contracts awarded by the Mayor of the District of Columbia, the Council of the District of Columbia, and/or the Contracting Officer. The drawings, requirements stated herein may be revised or amended from time to time, but only to the extent specified under a supplemental specification or special provision included in the specific contract.

These standards/guidelines shall further be the standard drawings and specifications for all the construction activities and material control within the public space of the District of Columbia. References by date and title shall be made to these specifications within plans or other Contract Documents as notification of their application to those documents.

Dawit Muluneh, P.E., Interim Chief Engineer
Infrastructure Project Management Administration

Jan 25th/16
Date

DISTRICT OF COLUMBIA
WORK ZONE MANAGEMENT MANUAL

STANDARDS AND GUIDELINES

FOR
TRAFFIC CONTROL IN WORK ZONES

DISTRICT DEPARTMENT OF TRANSPORTATION
55 M STREET, SE, SUITE 400
WASHINGTON, DC 20003

JANUARY 2016

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TABLE OF CONTENTS

WORK ZONE MANAGEMENT MANUAL

FOR THE DISTRICT OF COLUMBIA

PART ONE:

INTRODUCTION

District Department of Transportation

January 2016

DDOT WORK ZONE MANAGEMENT MANUAL

SECTION A - OVERVIEW

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A.1. Purpose

The safe and efficient flow of motorists, pedestrians and bicyclists through work zones is of major importance to transportation officials, the highway industry, and the traveling public. State and local transportation officials are aware of the potential economic impacts of work zones and recognize that prioritizing safety in work zones is essential.

The purpose of the Work Zone Management Manual (WZMM) is to provide guidance to practitioners in the implementation and management of work zones throughout the District of Columbia, as well as provide the basis for the developing various work zone related documents. This manual provides guidance related to employing the appropriate level and compliment of transportation management strategies in work zones, and clarifies the policies and procedures governing the closure of transportation facilities. The WZMM also addresses the increasing need to safely and efficiently accommodate pedestrians and bicyclists. Furthermore, this manual is intended to meet or exceed Federal Highway Administration (FHWA) requirements for developing transportation management plans and providing temporary traffic control.

The District Department of Transportation (DDOT) recognizes that applying temporary traffic control strategies in work zones at the appropriate levels helps to promote safety and minimize traveler delay. Additionally, the dynamic nature of work zones necessitates the consistent evaluation and modification of these traffic control strategies in order to accommodate the progressing sequence of construction.

DDOT is the agency primarily responsible for the planning, design, construction, and maintenance of the District of Columbia's multi-modal transportation network. While it is well-recognized that DDOT has many partners engaged in the design and implementation of work zones, the agency assumes the lead role in the development and application of temporary traffic control policies and design standards, as well as other related guidelines. The DDOT WZMM has been developed as a comprehensive guide that encompasses these policies and standards, as well as best practices for temporary traffic control design, implementation, and management.

FHWA continues to emphasize and promote the philosophy of minimizing the interference of construction with the movement of traffic while ensuring safety during all work zone-related efforts. Regulation 23 C.F.R. § 655.603 adopts the federal Manual on Uniform Traffic Control Devices (MUTCD) as the national standard for all traffic control devices installed on any street, highway, bikeway, or private road open to public travel. In addition, FHWA published the Work Zone Safety and Mobility Rule in the Federal Register on September 9, 2004. This Rule updated and broadened the former regulation 23 C.F.R. § 630, Subpart J to require a more comprehensive evaluation of the safety and mobility impacts of work zones throughout project development and the implementation of strategies to help manage these impacts during project delivery. Currently, all state and local governments that receive federal-aid funding are required to comply with the provisions of the rule.

Application of the Temporary Traffic Control Manual and WZMM Appendices

In the application of the TTCM and WZMM Appendices it is important to note that these standards are not intended to establish a legal requirement for the installation of temporary traffic control devices. Good engineering judgment must be used to implement the most appropriate traffic control strategies for a work zone, depending on the nature of the activity, location and duration of work, type of roadway, traffic volume and speed, and potential safety concerns. Thus, while the TTCM and WZMM Appendices provide

guidelines for the design and application of temporary traffic control devices, these specific components, as well as the complete WZMM, are not substitutes for sound engineering judgment.

It should be recognized that it is not feasible for the TTCM and WZMM Appendices to address every conceivable design situation. Therefore the objective of the TTCM and WZMM Appendices is to illustrate typical work zones and address common conditions encountered during roadway construction.

When circumstances occur that are not specifically covered in the WZMM, or which require modification of the instructions contained herein, the judgment of the key DDOT staff must be relied upon to meet the required objectives. When warranted, the appropriate DDOT Engineer should be consulted in the selection of the appropriate traffic control strategies.

Federal law requires that when a State or other non-FHWA federal agency manual or supplement is required, that manual or supplement is required by FHWA to be in substantial conformance with the federal MUTCD. Nothing contained within the TTCM or WZMM Appendices is intended to abridge or disclaim the Manual on Uniform Traffic Control Devices, but rather to augment and supplement the MUTCD to promote safety and efficiency for the traveling public.

The use of the terms *Standard, Guidance, Option,* and *Support* in the TTCM provides clarity regarding the applicability of these standards and allows for some latitude in making appropriate decisions regarding the implementation of temporary traffic control devices along the District's transportation facilities. The TTCM is organized in a manner similar to the federal MUTCD to differentiate between *Standards* that shall be satisfied for particular circumstances; *Guidance* that should be followed; *Options* that may be applicable; and *Support* that is primarily informational in nature.

A.2. A Vision for Safety

In response to the U.S. Department of Transportation's, Mayor's Challenge for Safer People and Safer Streets, the District of Columbia committed to the Vision Zero goal that by the year 2024, Washington, DC will reach zero fatalities and serious injuries to travelers of their transportation system through more effective use of data, education, enforcement and engineering.

Vision Zero acknowledges first that traffic deaths and severe injuries are preventable by establishing clear, accountable, measurable strategies to ensure safe mobility. Second, Vision Zero acknowledges that there are many factors that contribute to safe mobility -- including roadway design, speeds, enforcement, behaviors, technology, and policies -- and sets clear goals to achieve the shared goal of zero fatalities and severe injuries.

More than 20 District government agencies are engaged in the District's Vision Zero Initiative, including DDOT. As an agency, DDOT recognizes it bears substantial and core responsibilities for the construction, maintenance, and effective management of its roadway network. Acknowledging that protecting the safety of travelers must be the central goal of all transportation systems, DDOT recognizes that its part of "Vision Zero" starts with the need for a renewed commitment to achieving "proper designs" through the application of appropriate policy, clear "well defined" design standards, professional guidance, and training. DDOT recognizes the need to be increasingly supportive of all modes of travel and therefore seeks to address the needs of the changing diversity of what was historically a roadway system primarily for vehicles. In all cases, this means using appropriate design criteria that fit the context of the street and all

of its users. DDOT recognizes that to meet the District's Vision Zero Initiative, it must be aware of the need and be willing to go beyond minimum designs to make streets safer and more convenient for all road users.

A.3. Organization

This WZMM is organized in three significant Sections. *Figure 1* below emphasizes the relationship of the three primary sections of this manual.

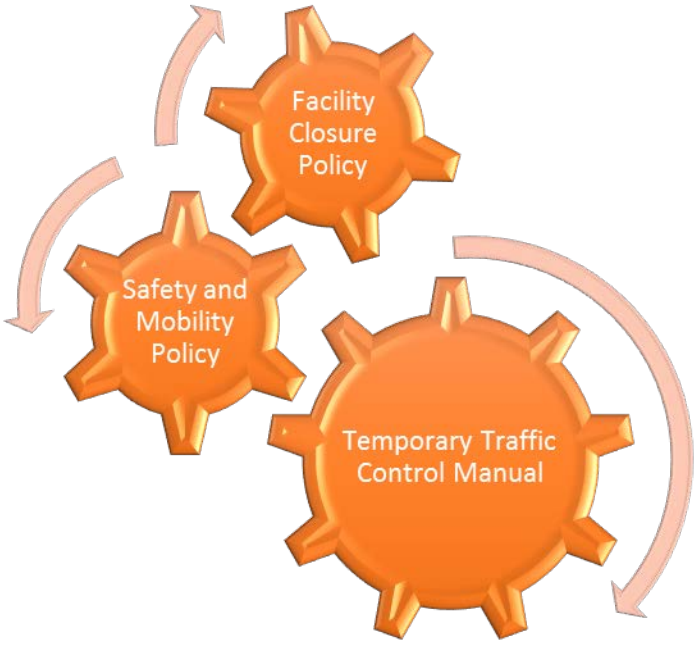

Figure 1: Work Zone Management Manual Relationships

While each section of the WZMM may stand apart as a separate document, one of the values of WZMM is the establishing of the relationships among these sections and how each contributes to the work zone management process. The following are brief summaries of these three major sections of the WZMM.

Section One: The Facility Closure Policy

DDOT recognizes that roadway construction has to be properly managed in order to minimize impacts to roadway users. The primary purpose of this section is to provide direction related to the closure of transportation facilities and adherence to the DDOT requirements for minimizing congestion and ensuring safety in and around work zones.

Section Two: The Safety and Mobility Policy

This section builds on the understanding that construction is anticipated to have some level of impact on the movement of traffic and safety; and provides specific guidance for assessing these related work zone impacts across the various stages of project development and construction. This section provides guidance for the development of proper management strategies to reduce these impacts.

Section Three: The Temporary Traffic Control Manual

This section provides guidance regarding the use of traffic control devices in the implementation work zone management strategies during construction, special events, and emergencies. Typical applications are also provided as templates for the implementation of these strategies for temporary traffic control.

Throughout this WZMM there is a general understanding that there cannot be a "one-size-fits-all" approach to work zone management practices. Rather, there is a general recognition that different projects have different needs. Therefore, careful consideration of safety for all roadway users, workers, and emergency responder and the efficiency of traffic flow must be integral elements of all work zone management practices.

The intended audience for this Manual is DDOT agency staff, including technical staff (planners, designers, and construction/traffic engineers, highway/safety engineers, etc.); management and executive-level staff responsible for policy and program direction; field staff responsible for building projects and managing work zones; and staff responsible for assessing performance in these areas. Non-agency staff that partner with DDOT, such as FHWA staff with oversight responsibilities, contractors, highway workers, and consultants will find this Manual useful.

DDOT WORK ZONE MANAGEMENT MANUAL

SECTION B - DEFINITIONS

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Accessible Pedestrian Signal - a device that communicates information about pedestrian signal timing in non-visual format such as audible tones, speech messages, and/or vibrating surfaces.

Accessible Pedestrian Signal Detector - a device designated to assist the pedestrian who has visual or physical disabilities in activating the pedestrian phase.

Active Grade Crossing Warning System - the flashing-light signals, with or without warning gates, together with the necessary control equipment used to inform road users of the approach or presence of rail traffic at grade crossings.

Advance Notice (24 Hours) (48 Hours) - One or two normal working days in advance as specified. Saturdays, Sundays, and holidays accepted.

Advisory Speed - a recommended speed for all vehicles operating on a section of highway and based on the highway design, operating characteristics, and conditions.

Alley - public passageway for vehicles, pedestrians, drainage purposes, or any combination thereof, which connects with a street and which usually affords a means of access to the rear of properties abutting streets or highways.

Altered Speed Zone - a speed limit, other than a statutory speed limit, that is based upon an engineering study.

Arterial - any U.S. or Interstate numbered route, controlled access highway, or other major radial or circumferential highway designated by the Council of the District of Columbia as a part of t e arterial system of streets or highways.

Average Annual Daily Traffic (AADT) - the total volume of traffic passing a point or segment of a highway facility in both directions for one year divided by the number of days in the year. Normally, periodic daily traffic volumes are adjusted for hours of the day counted, days of the week, and seasons of the year to arrive at average annual daily traffic.

Average Daily Traffic (ADT) - the average 24 hour volume, being the total volume during a stated period divided by the number of days in that period. Normally, this would be periodic daily traffic volumes over several days, not adjusted for days of the week or seasons of the year.

Awning, Canopy, or Covered Walkway - A temporary roof-like structure over a sidewalk café attached to, supported from, or contiguous to a restaurant. A temporary roof-like structure built to protect pedestrians from overhead work. Covered walkways should be provided where pedestrians are exposed to potential injury from falling objects.

Backplate - see Signal Backplate.

Barrier-Separated Lane - a preferential lane or other special purpose lane that is separated from the adjacent general-purpose lane(s) by a physical barrier.

Beacon - a highway traffic signal with one or more signal sections that operates in a flashing mode.

Bicycle - A manually powered vehicle consisting of a seat, two wheels, two pedals, and a handle bar."

Bicycle Facilities - a general term denoting improvements and provisions that accommodate or encourage bicycling, including parking and storage facilities, and shared roadways not specifically defined for bicycle use.

Bicycle Lane - a portion of a roadway that has been designated for preferential or exclusive use by bicyclists by pavement markings and, if used, signs.

Bikeway - a generic term for any road, street, path, or way that in some manner is specifically designated for bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.

Buffered Bicycle Lane - a buffered bicycle lane is a bicycle lane that is separated from the adjacent general purpose lane or parking lane by a pattern of standard longitudinal markings. The buffer area might include chevron or diagonal markings.

Buffer-Separated Lane - a preferential lane or other special purpose lane that is separated from the adjacent general-purpose lane(s) by a pattern of standard longitudinal pavement markings that is wider than a normal or wide lane line marking. The buffer area might include rumble strips, textured pavement, or channelizing devices such as tubular markers or traversable curbs, but does not include a physical barrier.

Buffer Space - an optional longitudinal or lateral distance separating vehicles or pedestrians from the work activity.

Central Business District, (CBD) - that area within the following boundaries (including sidewalks): Beginning at 23rd Street and Massachusetts Avenue, Northwest, then east along Massachusetts Avenue to Second Street, Northeast, then south on Second Street to D Street, Southeast, then west on D Street in a line crossing Virginia Avenue, Southwest, to 14th Street, Southwest, to Constitution Avenue, Northwest, then west on Constitution Avenue to 23rd Street, Northwest, then north on 23rd Street, Northwest, to Massachusetts Avenue, Northwest.

Center Line Markings - the yellow pavement marking line(s) that delineates the separation of traffic lanes that have opposite directions of travel on a roadway. These markings need not be at the geometrical center of the pavement.

Changeable Message Sign - a sign that is capable of displaying more than one message (one of which might be a “blank” display), changeable manually, by remote control, or by automatic control. Electronic-display changeable message signs are referred to as Dynamic Message Signs in the National Intelligent Transportation Systems (ITS) Architecture and are referred to as Variable Message Signs in the National Electrical Manufacturers Association (NEMA) standards publication"

Channelization - a series of traffic control devices erected to divert traffic around temporary obstructions or to guide traffic through restricted areas.

Channelizing Line Markings - a wide or double solid white line used to form islands where traffic in the same direction of travel is permitted on both sides of the island.

Circular Intersection- an intersection that has an island, generally circular in design, located in the center of the intersection where traffic passes to the right of the island. Circular intersections include roundabouts, rotaries, and traffic circles.

City - the District of Columbia.

City Streets - a public street administered by the City.

Civilian Crossing Guard - any person, other than a police office, authorized to direct or regular traffic.

Clear Zone - the total roadside border area, starting at the edge of the traveled way that is available for an errant driver to stop or regain control of a vehicle. This area might consist of a shoulder, a recoverable slope, and/or a non-recoverable, traversable slope with a clear run-out area at its toe.

Collector Highway - a term denoting a highway that in rural areas connects small towns and local highways to arterial highways, and in urban areas provides land access and traffic circulation within residential, commercial, and business areas and connects local highways to the arterial highways.

Collector Streets - All streets designated as collector streets on the current District of Columbia Functional Classification of Street Map, the latest copy of which is on file with the Office of Policy and Planning.

Control of Access Highway - A highway, street, or roadways with respect to which owners or occupants of abutting property or lands and other persons have no legal right of access to or from same, except at such points only and in such manner as may be determined by the Council of the District of Columbia.

Conventional Road - a street or highway other than a low-volume road (as defined in Section 5A.01), expressway, or freeway.

Countdown Pedestrian Signal - a signal face displaying interval countdown in order to inform pedestrians of the number of seconds remaining in the pedestrian change interval.

Counter-Flow Lane - a lane operating in a direction opposite to the normal flow of traffic designated for peak direction of travel during at least a portion of the day. Counter-flow lanes are usually separated from the off-peak direction lanes by tubular markers or other flexible channelizing devices, temporary lane separators, or movable or permanent barrier.

Crashworthy - a characteristic of a roadside appurtenance that has been successfully crash tested in accordance with a national standard such as the National Cooperative Highway Research Program Report 350, “Recommended Procedures for the Safety Performance Evaluation of Highway Features.” or the 2009 AASHTO "Manual for Assessing Safety Hardware (MASH)" report.

Crosswalk - (a) that part of a roadway at an intersection included within the connections of the lateral lines of the sidewalks on opposite sides of the highway measured from the curbs or in the absence of curbs, from the edges of the traversable roadway, and in the absence of a sidewalk on one side of the roadway, the part of a roadway included within the extension of the lateral lines of the sidewalk at right angles to the center line; (b) any portion of a roadway at an intersection or elsewhere distinctly indicated as a pedestrian crossing by pavement marking lines on the surface, which might be supplemented by contrasting pavement texture, style, or color.

Crosswalk Lines - white pavement marking lines that identify a crosswalk.

Daylight Hours (Daytime) - the hours from sunrise to sunsets

D.C. Building Code - Title 12 of the District of Columbia Municipal Regulations, “Building Code,” as amended.

D.C. Police Regulations - The "District of Columbia Police Regulations," as amended.

D.C. Vehicles and Traffic Code - DCMR Title 18 of the District of Columbia Municipal Regulations, "Vehicles and Traffic," as amended.

D.C. Public Space - DCMR Title 24 of the District of Columbia Municipal Regulations, "Vehicles and Traffic," as amended.

DDOT Engineer - a person of responsible charge per the code of District of Columbia, or their designee working under their supervision, who is responsible for design and maintenance of temporary traffic control in the city.

Deceleration rate - the constant and uniform rate, expressed in feet per second per second (ft/sec2), at which motor vehicles typically stop.

Delineator - a retroreflective device mounted on the roadway surface or at the side of the roadway in a series to indicate the alignment of the roadway, especially at night or in adverse weather.

Department - The District Department of Transportation.

Detectable - having a continuous edge within 6 inches of the surface so that pedestrians who have visual disabilities can sense its presence and receive usable guidance information.

Detector - a device used for determining the presence or passage of vehicles (motorcycles), bicycles or pedestrians.

Detour - the removal of traffic from one roadway or highway to an alternate roadway or highway under the following timeframes:

a) Short Term Detour—a signed detour that occupies a location for more than 2 hours within a single work period but not longer than three consecutive days.

b) Long Term Detour—a signed detour that occupies a location longer than three consecutive days, or on a periodic basis (less than 24 consecutive hours) longer than three days."

Director - The Director of the Department or the Director's designee

District - The District of Columbia.

District Forces - all employees and/or work crews of the District of Columbia doing work in the right-of-way.

District Project - a signed contract with the District Department of Transportation

Divided highway - a highway with separated roadbeds for traffic in opposing directions

Downstream - a term that refers to a location that is encountered by traffic subsequent to an upstream location as it flows in an "upstream to downstream" direction. For example, "the downstream end of a lane line separating the turn lane from a through lane on the approach to an intersection" is the end of the lane line that is closest to the intersection.

Downtown - The original commercial area between the Capitol and the White House bounded generally by North Capitol Street on the east, Pennsylvania Avenue, N.W. on the south, 23rd Street, N.W. on the west, and Massachusetts Avenue, N.W., on the north.

Dropped Lane - a through lane that becomes a mandatory turn lane on a conventional roadway, or a through lane that becomes a mandatory exit lane on a freeway or expressway. The end of an acceleration lane and reductions in the number of through lanes that do not involve a mandatory turn or exit are not considered dropped lanes.

Duration - Work duration is classified as follows:

a) Long-term stationary —work that occupies a location for a period greater than three days.

b) Intermediate-term stationary — work that occupies a location from overnight to three days.

c) Short-term stationary — daytime work that occupies a location between one and twelve hours.

d) Short duration —work that occupies a location between 6 and 15 minutes.

e) Moderate Duration — work that occupies a location between 16 and 60 minutes.

Edge Line Markings - white or yellow pavement marking lines that delineate the right or left edge(s) of a traveled way.

Engineering Judgment - the evaluation of available pertinent information, and the application of appropriate principles, provisions, and practices as contained in this Manual and other sources, for the purpose of deciding upon the applicability, design, operation, or installation of a traffic control device. Engineering judgment shall be exercised by an engineer, or by an individual working under the supervision of an engineer, through the application of procedures and criteria established by the engineer. Documentation of engineering judgment is not required.

Engineering Study - the comprehensive analysis and evaluation of available pertinent information, and the application of appropriate principles, engineering judgement, experience, education, discretion, provisions, and practices as contained in this Manual and other sources, for the purpose of deciding upon the applicability, design, operation, or installation of a traffic control device. An engineering study shall be performed by an engineer, or by an individual working under the supervision of an engineer, through the application of procedures and criteria established by the engineer. An engineering study shall be documented.

Flagger - a qualified (certified) person wearing an orange or yellow-green vest and hard hat using a STOP/SLOW paddle, stationed to assist with traffic control in restricted areas. All flaggers must be certified and have their certification card in their possession when flagging, and they also shall be equipped with electronic devices for communication. The MUTCD in Section 6E.02, High Visibility Safety Apparel, now states, "For daytime and nighttime activity, flaggers shall wear safety apparel meeting the requirements of the ISEA (International Safety Equipment Association) American National Standard for High Visibility Safety Apparel (See Section 1A.12 of the MUTCD) and labeled as meeting ANSI 107–2010 standard performance for class 2 risk exposure."

Flagger Control - temporary traffic control zone guidance to drivers by a flagger using control signaling devices (such as paddles and flags).

Flashing - an operation in which a light source, such as a traffic signal indication, is turned on and off repetitively.

Flashing Mode - a mode of operation in which at least one traffic signal indication in each vehicular signal face of a highway traffic signal is turned on and off repetitively.

Freeway - a divided highway with full control of access with the operation speed of at least 35 mph. "Freeway" is a highway in respect to which the owners of abutting lands have no right or easement of access to or from their abutting lands or in respect to which such owners have only limited or restricted right or easement of access".

Gate - an automatically-operated or manually-operated traffic control device that is used to physically obstruct road users such that they are discouraged from proceeding past a particular point on a roadway or pathway, or such that they are discouraged from entering a particular grade crossing, ramp, lane, roadway, or facility.

Grade Crossing - the general area where a highway and a railroad and/or light rail transit route cross at the same level, within which are included the tracks, highway, and traffic control devices for traffic traversing that area.

Guide Sign - a sign that shows route designations, destinations, directions, distances, services, points of interest, or other geographical, recreational, or cultural information.

Heavy truck - a single unit truck with three or more axles, a tractor-trailer, or a tractor semitrailer combination. Registered gross vehicular weight exceeds 5 tons

Highway - the entire width between the boundary lines of every publicly maintained way – in other words, the entire area within the right-of-way, where any part thereof is open to the use of the public for purposes of vehicular or pedestrian travel.

Highway-Rail Grade Crossing - the general area where a highway and a railroad cross at the same level, within which are included the railroad tracks, highway, and traffic control devices for highway traffic traversing that area.

Highway Traffic Signal - a power-operated traffic control device by which traffic is warned or directed to take some specific action. These devices do not include power-operated signs, steadily-illuminated pavement markers, warning lights (see Section 6F.83), or steady burning electric lamps.

Hours of Darkness (Night) (Nighttime) - the hours from sunset to sunrise.

Intersection - intersection is defined as follows:

a) The area embraced within the prolongation or connection of the lateral curb lines, or if none, the lateral boundary lines of the roadways of two highways that join one another at, or approximately at, right angles, or the area within which vehicles traveling on different highways that join at any other angle might come into conflict.

b) The junction of an alley or driveway with a roadway or highway shall not constitute an intersection, unless the roadway or highway at said junction is controlled by a traffic control device.

c) If a highway includes two roadways that are 30 feet or more apart (see definition of Median), then every crossing of each roadway of such divided highway by an intersecting highway shall be a separate intersection.

d) If both intersecting highways include two roadways that are 30 feet or more apart, then every crossing of any two roadways of such highways shall be a separate intersection.

e) At a location controlled by a traffic control signal, regardless of the distance between the separate intersections as defined in (c) and (d) above:

1. If a stop line, yield line, or crosswalk has not been designated on the roadway (within the median) between the separate intersections, the two intersections and the roadway (median) between them shall be considered as one intersection;

2. Where a stop line, yield line, or crosswalk is designated on the roadway on the intersection approach, the area within the crosswalk and/or beyond the designated stop line or yield line shall be part of the intersection; and

3. Where a crosswalk is designated on a roadway on the departure from the intersection, the intersection shall include the area extending to the far side of such crosswalk.

Interstate - a high-speed divided highway with control of access and designated by the U.S. Department of Transportation.

Lane Line Markings - white pavement marking lines that delineate the separation of traffic lanes that have the same direction of travel on a roadway.

LED -a light-emitting diode (LED) is a semiconductor device that emits visible light when an electric current passes through it, when it is used for traffic control devices in lieu of incandescent bulbs of fiber optics.

Legend - see Sign Legend.

Lens - see Signal Lens.

Light Rail Transit Traffic (Light Rail Transit Equipment) - every device in, upon, or by which any person or property can be transported on light rail transit tracks, including single-unit light rail transit cars (such as streetcars and trolleys) and assemblies of multiple light rail transit cars coupled together.

Limited Access - the regulated limitation of public access rights to and from properties abutting a highway facility. Limited access can be either of the following types:

Full Limited Access - provides access to selected public roads and prohibits crossings at grade and direct driveway connections.

Partial Limited Access - provides access to selected public roads, crossings at grade, and some private driveway connections.

Local Streets - all streets designated as local on the current District of Columbia Functional Classification of Streets Map, the latest copy of which is on file with the Office of Policy and Planning.

Longitudinal Markings - pavement markings that are generally placed parallel and adjacent to the flow of traffic such as lane lines, center lines, edge lines, channelizing lines, and others.

Louver - see Signal Louver.

Major Interchange - an interchange with another freeway or expressway, or an interchange with a high-volume multi-lane highway, principal urban arterial, or major rural route where the interchanging traffic is heavy or includes many road users unfamiliar with the area.

Major Shopping Center - a planned large high-volume shopping development with numerous retail establishments.

Major Street - the street normally carrying the higher volume of vehicular traffic.

M.A.S.H - The AASHTO Manual for Assessing Safety Hardware (MASH) is the new state of the practice for the crash testing of safety hardware devices for use on the National Highway System (NHS). It updates and replaces NCHRP Report 350.

Manual - The D.C. Temporary Traffic Control Manual

Manual for Assessing Safety Hardware (M.A.S.H.) - a national standard for crash testing of safety roadside appurtenances required after January 1, 2011.

Markings - all lines, words, or symbols, except signs, officially placed within the roadway to regulate, warn or guide traffic.

May - a permissive condition

Median - the area between two roadways of a divided highway measured from edge of traveled way to edge of traveled way. The median excludes turn lanes. The median width might be different between intersections, interchanges, and at opposite approaches of the same intersection.

Minor Interchange - an interchange where traffic is local and very light, such as interchanges with land service access roads. Where the sum of the exit volumes is estimated to be lower than 100 vehicles per day in the design year, the interchange is classified as local.

Minor Street - the street normally carrying the lower volume of vehicular traffic.

Mobile Operation - an operation that moves intermittently and will not occupy the immediate area for more than 15 minutes. The immediate area is defined as a 1,000+/- linear foot distance.

Multi-Lane - more than one lane moving in the same direction. A multi-lane street, highway, or roadway has a basic cross-section comprised of two or more through lanes in one or both directions. A multi-lane approach has two or more lanes moving toward the intersection, including turning lanes.

Night or Nighttime - is equivalent of “darkness” "Darkness" is any time from one-half hour after sunset to one-half hour before sunrise and any other time when visibility is not sufficient to render clearly discernible any person or vehicle on the highway at a distance of 1000 feet.

Non-motorized Traffic - bicycle and pedestrian component of traffic.

Object Marker - a device used to mark obstructions within or adjacent to the roadway.

Occupant - a person driving or riding in a car, truck, bus, or other vehicle.

Off-Peak Traffic Hours - all hours of the day and days of the week not defined as “peak traffic hours.”

Parking Area - a parking lot or parking garage that is separated from a roadway. Parallel or angle parking spaces along a roadway are not considered a parking area.

Parking Lane - a space reserved for parking of vehicles

Paved - a bituminous surface treatment, mixed bituminous concrete, or Portland cement concrete roadway surface that has both a structural (weight bearing) and a sealing purpose for the roadway.

Peak Traffic Hours - the hours of 7:00 a.m. to 9:30 a.m. and 4:00 p.m. to 6:30 p.m. Monday through Friday, except holidays.

Pedestrian - is a person who is afoot or who is using any of the following: (1) A means of conveyance propelled by human power other than a bicycle. (2) An electric personal assistive mobility device. (b) "Pedestrian" includes a person who is operating a self-propelled wheelchair, motorized tricycle, or motorized quadricycle and, by reason of physical disability, is otherwise unable to move about as a pedestrian.

Plaque - a traffic control device intended to communicate specific information to road users through a word, symbol, or arrow legend that is placed immediately adjacent to a sign to supplement the message on the sign. The difference between a plaque and a sign is that a plaque cannot be used alone. The designation for a plaque includes a “P” suffix.

Police Department - The Metropolitan Police Department

Portable Traffic Control Signal - a temporary traffic control signal that is designed so that it can be easily transported and reused at different locations.

Post-Mounted Sign - a sign that is placed to the side of the roadway such that no portion of the sign or its support is directly above the roadway or shoulder.

Posted Speed Limit - a speed limit determined by law or regulation and displayed on Speed Limit signs.

Principal Arterials - all streets designated as principal arterials on the current District of Columbia Functional Street Map, the latest copy of which is on file with the Office of Policy and planning.

Principal Legend - place names, street names, and route numbers placed on guide signs.

Private Road Open to Public Travel - private toll roads and roads (including any adjacent sidewalks that generally run parallel to the road) within shopping centers, airports, sports arenas, and other similar business and/or recreation facilities that are privately owned, but where the public is allowed to travel without access restrictions. Roads within private gated properties (except for gated toll roads) where access is restricted at all times, parking areas, driving aisles within parking areas, and private grade crossings shall not be included in this definition.

Property Line - the line or demarcation between privately-owned property fronting or abutting a street and the publicly owned property in such street.

Public Highway - a road, street, alley, or highway in the District open to the public as a matter of right for the purposes of vehicular traffic.

Public Road - any road, street, or similar facility under the jurisdiction of and maintained by a public agency and open to public travel.

Public Space - all of the publicly-owned property or right-of-way between the property lines on a street, as such property lines are shown on the Department's records, including, but is not limited to, the roadway, tree spaces, parking spaces, and sidewalks

Raised Pavement Marker - a device mounted on or in a road surface that has a height generally not exceeding approximately 1 inch above the road surface for a permanent marker, or not exceeding approximately 2 inches above the road surface for a temporary flexible marker, and that is intended to be used as a positioning guide and/or to supplement or substitute for pavement markings.

Regulatory Sign - a sign that gives notice to road users of traffic laws or regulations.

Restriction (Street Restriction) (Traffic Restriction) - any reduction in the normal flow of vehicular or pedestrian traffic in the public right-of-way and/or any reduction of vehicular or pedestrian access to the public right-of-way, including any act or item that causes said reductions.

Retroreflectivity - a property of a surface that allows a large portion of the light coming from a point source to be returned directly back to a point near its origin.

Reversible Lane - a lane in which the direction of travel is reversed during certain hours in order to increase the capacity in the direction of the heavier traffic demand.

Right-of-Way [Assignment] - the permitting of vehicles and/or pedestrians to proceed in a lawful manner in preference to other vehicles or pedestrians by the display of a sign or signal indications.

Road - see Roadway.

Road User - a vehicle operator, bicyclist, or pedestrian, including persons with disabilities, within the highway or on a private road open to public travel.

Roadway - that portion of a highway improved, designed, or ordinarily used for vehicular travel and parking lanes, but exclusive of the sidewalk, berm, or shoulder even though such sidewalk, berm, or shoulder is used by persons riding bicycles or other human-powered vehicles. In the event a highway includes two or more separate roadways, the term roadway as used in this Manual shall refer to any such roadway separately, but not to all such roadways collectively.

Roundabout - a circular intersection with yield control at entry, which permits a vehicle on the circulatory roadway to proceed, and with deflection of the approaching vehicle counter-clockwise around a central island.

Rumble Strip - a series of intermittent, narrow, transverse areas of rough-textured, slightly raised, or depressed road surface that extend across the travel lane to alert road users to unusual traffic conditions or are located along the shoulder, along the roadway center line, or within islands formed by pavement markings to alert road users that they are leaving the travel lanes.

Rural Highway - a type of roadway normally characterized by lower volumes, higher speeds, fewer turning conflicts, and less conflict with pedestrians.

Safe-Positioned - the positioning of emergency vehicles at an incident in a manner that attempts to protect both the responders performing their duties and road users traveling through the incident scene, while minimizing, to the extent practical, disruption of the adjacent traffic flow.

School - a public or private educational institution recognized by the state education authority for one or more grades K through 12 or as otherwise defined by the State.

School Zone - a designated roadway segment approaching, adjacent to, and beyond school buildings or grounds, or along which school related activities occur.

Shared Roadway - a roadway that is officially designated and marked as a bicycle route, but which is open to motor vehicle travel and upon which no bicycle lane is designated.

Shared-Use Path - a bikeway outside the traveled way and physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent alignment. Shared-use paths are also used by pedestrians (including skaters, users of manual and motorized wheelchairs, and joggers) and other authorized motorized and non-motorized users.

Shadow Vehicle - shadow vehicles are moving trucks with attenuators spaced a short distance from a moving operation, giving physical protection to workers from traffic approaching from the rear.

Shoulder - the portion of the highway contiguous with the roadway for accommodations of pedestrians, bicyclists, stopped vehicles, for emergency use, and for lateral support of base and surface courses

Sidewalk - that portion of a street between the curb line, or the lateral line of a roadway, and the adjacent property line or on easements of private property that is paved or improved and intended for use by pedestrians. Sidewalk" is that portion of a highway, other than the roadway, set apart by curbs, barriers, markings or other delineation for pedestrian travel.

Sign - any traffic control device that is intended to communicate specific information to road users through a word, symbol, and/or arrow legend. Signs do not include highway traffic signals, pavement markings, delineators, or channelization devices.

Sign Assembly - a group of signs, located on the same support(s) that supplement one another in conveying information to road users.

Sign Illumination - either internal or external lighting that shows similar color by day or night. Street or highway lighting shall not be considered as meeting this definition.

Sign Legend - all word messages, logos, pictographs, and symbol and arrow designs that are intended to convey specific meanings. The border, if any, on a sign is not considered to be a part of the legend.

Sign Panel - a separate panel or piece of material containing a word, symbol, and/or arrow legend that is affixed to the face of a sign.

Signal Backplate - a thin strip of material that extends outward from and parallel to a signal face on all sides of a signal housing to provide a background for improved visibility of the signal indications

Signing - individual signs or a group of signs, not necessarily on the same support(s), that supplement one another in conveying information to road users.

Solid Waste Management Administration - The Sanitation Administration of the District of Columbia Department of Public Works.

Special Purpose Road - a low-volume, low-speed road that serves recreational areas or resource development activities.

Speed - speed is defined based on the following classifications:

(a) Average Speed—the summation of the instantaneous or spot-measured speeds at a specific location of vehicles divided by the number of vehicles observed.

(b) Design Speed—a selected speed used to determine the various geometric design features of a roadway.

(c) 85th-Percentile Speed—the speed at or below which 85 percent of the motor vehicles travel.

(d) Operating Speed—a speed at which a typical vehicle or the overall traffic operates. Operating speed might be defined with speed values such as the average, pace, or 85th-percentile speeds.

(e) Pace—the 10 mph speed range representing the speeds of the largest percentage of vehicles in the traffic stream."

Speed Limit - the maximum (or minimum) speed applicable to a section of highway as established by law or regulation.

Speed Zone - a section of highway with a speed limit that is established by law or regulation, but which might be different from a legislatively specified statutory speed limit.

Standard Specifications - The District Department of Transportation Standard Specifications for Highways and Structures (2005) as amended or updated by Supplemental Specifications.

Statutory Speed Limit - a speed limit established by legislative action that typically is applicable for a particular class of highways with specified design, functional, jurisdictional and/or location characteristics and that is not necessarily displayed on Speed Limit signs.

Stop Beacon - a beacon used to supplement a STOP sign, a DO NOT ENTER sign, or a WRONG WAY sign.

Stop Line - a solid white pavement marking line extending across approach lanes to indicate the point at which a stop is intended or required to be made.

Street - a public highway as shown on the record of the District, whether designated as a street, alley, avenue, freeway, road, drive, lane, place, boulevard, parkway, circle, or by any other term.

Streetcar - is a light rail transit device in, upon, or by which any person or property can be transported on light rail transit track, in single-unit light rail transit cars, or assemblies of multiple light rail transit **cars coupled together.**

Symbol - the approved design of a pictorial representation of a specific traffic control message for signs, pavement markings, traffic control signals, or other traffic control devices, as shown in the MUTCD

Temporary Traffic Control Signal - a traffic control signal that is installed for a limited time period.

Temporary Traffic Control Spotter - a certified flagger who watches and advises co-workers who are installing and removing temporary traffic control devices, traffic counting devices or removing debris from the roadway. A TTC Spotter may stop or slow traffic using a red flag and the correct flagger procedures

Temporary Traffic Control Zone - Highway segment located between the first and last advance warning traffic control devices where road user conditions are changed because of a work zone or incident by the use of temporary traffic control devices, flaggers, police, or other authorized personnel.

Termination Area – an area used for returning traffic to the normal path.

Traffic - pedestrians, bicyclists, ridden or herded animals, vehicles, streetcars, and other conveyances either singularly or together while using for purposes of travel any highway or private road open to public travel.

Traffic Control Device - signs, parking meters, traffic signals, barricades, and/or channelizing devices existing and/or temporary as defined and/or illustrated in this Manual and in the Manual on Uniform Traffic Control Devices (MUTCD) used to regulate, warn, or guide traffic, placed on, over, or adjacent to a street, highway, pedestrian facility, or bicycle path by authority of a public agency having jurisdiction.

Traffic Control Signal (Traffic Signal) - any device, whether manually, electrically, or mechanically operated, by which traffic is alternately directed to stop and proceed.

Traffic Lane - marked pathway, not less than 10 feet wide, for vehicle traffic on streets.

Traffic Monitoring Equipment Installations - devices placed below, on, above, or adjacent to a highway for observing traffic, collecting traffic data, or providing traffic information.

Traffic Services Administration (TSA) - administration of the District Department of Transportation responsible for administering traffic operations and safety.

Traffic Signal Shop - The traffic signal shop for DDOT

Traffic Space - pathway for routing traffic through the temporary traffic control zone

Traffic Spotter - a traffic spotter's primary function is to alert and assist motorists through temporary traffic control zones on low volume, and low speed collector and local road, and also in emergency situations only.

Train - one or more locomotives coupled, with or without cars, that operates on rails or tracks and to which all other traffic must yield the right-of-way by law at highway-rail grade crossings.

Transition Area - areas within the temporary traffic control zone where changes in lane-use patterns are implemented.

Traveled Way - the portion of the roadway for the movement of vehicles, exclusive of the shoulders, berms, sidewalks, and parking lanes.

Truck-Mounted Attenuator - Energy-absorbing device attached to the rear of trucks to reduce the severity of rear-end crashes.

Upstream - a term that refers to a location that is encountered by traffic prior to a downstream location as it flows in an "upstream to downstream" direction. For example, "the upstream end of a lane line separating

the turn lane from a through lane on the approach to an intersection" is the end of the line that is furthest from the intersection.

Urban Core ("DC Core") - primary focal point of Metropolitan Washington. Comprises major centers within the District of Columbia. Contains the major governmental, cultural and tourism activities of the region, as well as significant business and commercial activity. Center of the region's transit system. Pedestrian-oriented sidewalk network with an organized street grid/block configuration. It is roughly defined by Florida Avenue to the north, 4th Street NE to the east, the SE/SW freeway to the south, and the Potomac River to the west, including Georgetown.

Urban Street - a type of street normally characterized by relatively low speeds, wide ranges of traffic volumes, narrower lanes, frequent intersections and driveways, significant pedestrian traffic, and more businesses and houses.

Vehicle - every device in, upon, or by which any person or property can be transported or drawn upon a highway, except trains and light rail transit operating in exclusive or semi-exclusive alignments. Light rail transit equipment operating in a mixed-use alignment, to which other traffic is not required to yield the right-of-way by law, is a vehicle. A "vehicle" is a device by which any person or property may be propelled, moved, or drawn upon a highway, excepting a device moved exclusively by human power or used exclusively upon stationary rails or tracks.

Warning Beacon - a beacon used only to supplement an appropriate warning or regulatory sign or marker.

Warning Light - a portable, powered, yellow, lens-directed, enclosed light that is used in a temporary traffic control zone in either a steady burn or a flashing mode.

Warning Sign - a sign that gives notice to road users of a situation that might not be readily apparent.

Warrant - a warrant describes a threshold condition based upon average or normal conditions that, if found to be satisfied as part of an engineering study, shall result in analysis of other traffic conditions or factors to determine whether a traffic control device or other improvement is justified. Warrants are not a substitute for engineering judgment. The fact that a warrant for a particular traffic control device is met is not conclusive justification for the installation of the device.

Weekdays - the day of the week starting at 5:00 a.m. on Monday and ending at 10:00 p.m. on Friday, except holidays.

Weekends - the days of the week starting at 10 p.m. on Friday and ending at 5:00 a.m. on Monday.

Wheelchair - a chair on wheels, designated for, and used primarily by, a handicapped person.

Worker - a person on foot whose duties place him or her within the right-of-way of a street, highway, or pathway, such as street, highway, or pathway construction and maintenance forces, survey crews, utility crews, responders to incidents within the street, highway, or pathway right-of-way, and law enforcement personnel when directing traffic, investigating crashes, and handling lane closures, obstructed roadways, and disasters within the right-of-way of a street, highway, or pathway.

Work Area - The work space or public space set aside for workers, equipment, and material storage.

Work Zone - a work zone is an area on or above a highway, roadway, pedestrian facility or shared-use path with construction, maintenance, permit or utility work activities.

Wrong-Way Arrow - a slender, elongated, white pavement marking arrow placed upstream from the ramp terminus to indicate the correct direction of traffic flow. Wrong-way arrows are intended primarily to warn wrong-way road users that they are going in the wrong direction.

Yield Line - a row of solid white isosceles triangles pointing toward approaching vehicles extending across approach lanes to indicate the point at which the yield is intended or required to be made.

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DDOT WORK ZONE MANAGEMENT MANUAL

SECTION C - ACRONYMS / ABBREVIATIONS

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AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
ADAAG	Americans with Disabilities Accessibility Guidelines
ADT	Average Daily Traffic
AFAD	Automated Flagger Assistance Device
AHS	Automated Highway System
AMIS	Automated Management Information System
ANSI	American Nation Standards Institute
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials
ATMS	Advanced Traffic Management System
ATSSA	American Traffic Safety Services Association
CFR	Code of Federal Regulations
CMS	Changeable Message Sign
dBA	A-weighted decibel
DDOT	District Department of Transportation
EPA	Environmental Protection Agency
ETC	Electronic Toll Collection
EV	Electric Vehicle
FEMS	Fire and Emergency Medical Services
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HCM	Highway Capacity Manual
HDM	Highway Design Manual
HOT	High Occupancy Tolls

HOTM	FHWA's Office of Transportation Management
HOTO	FHWA's Office of Transportation Operations
HOV	High-occupancy Vehicle
ICS	Incident Command System
IIM-LD	Location and Design Division Instructional and Informational Memorandum
ILEV	Inherently low emission vehicle
IMSA	International Municipal Signal Association
IPMA	Infrastructure Project management Division
IPMA, DPMD	Design and Project Management Division
ISEA	International Safety Equipment Association
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation Systems
LED	Light Emitting Diode
LP	Liquid Petroleum
MASH	Manual for Accessing Safety Hardware
MOT	Maintenance of Traffic
MOTAA	Maintenance of Traffic Alternative Analysis
MPD	Metropolitan Police Department
MPH or mph	Miles per hour
MUTCD	Manual on Uniform Traffic Control Devices
NCHRP	National Cooperative Highway Research Program
NIMS	National Incident Management System
NPS	National Park Service
ORT	Open-road Tolling
PCMS	Portable Changeable Message Sign
PE	Project Engineer
PM	Project manager

PI&O	Public Information and Outreach
PPSA	Policy, Planning and Sustainability Administration
PRT	Perception-response time
PTSA	Progressive Transportation Services Administration
RPM	Raised Pavement Marker
RRPM	Raised Retroreflective Pavement Marker
RV	Recreational Vehicle
SHSM	Standard Highway Signs and Marking Books
SHSP	Strategic highway Safety Plan
TCDC	Traffic control design specialist
TCP	Traffic control plan
TDD	Telecommunication devices for the deaf
TED	Traffic Engineering Division Memorandum
TMC	Transportation Control Measure
TIMC	Traffic incident management control
TMP	Transportation Management Plan
TO	Transportation Operations
TOA	Transportation Operations Administration
TOC	Transportation Operations Center
TRB	Transportation Research Board
TRPM	Temporary Raised Pavement Marker
TSO	Traffic Safety Officer
TTC	Temporary Traffic Control
TTCM	Temporary Traffic Control Manual
U.S.	United States
U.S.C	United States Codes
USDOT	Unites States Department of Transportation

UVC	Uniform Vehicle Code
VPH or vph	Vehicles per Hour
WMATA	Washington Metropolitan Area Transit Authority
WZCT	Work Zone Coordination Team
WZTC	Work Zone Traffic Control

WORK ZONE MANAGEMENT MANUAL

FOR THE DISTRICT OF COLUMBIA

PART TWO:

WORK ZONE SAFETY & MOBILITY POLICY

District Department of Transportation

January 2016

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

A. INTRODUCTION

A.1. Policy Statement

The District Department of Transportation (DDOT) is committed to reducing congestion in and around work zones without compromising the safety of workers or the public. This policy provides guidance for assessing the potential impact of work zones on the safety and mobility of the traveling public. This policy addresses all stages of Federal-Aid Highway-funded projects and provides guidance on the development of proper management strategies to reduce work zone impacts.

This policy applies to all Federal-Aid Highway and locally funded projects within the District of Columbia performed on:

- Interstates
- Other freeways and expressways
- Principal arterials
- Minor arterials, collectors, and local roadways

A.2. Background

The Federal Register published the Final Rule on Work Zone Safety and Mobility on September 9, 2004. The "Final Rule", provided in **Appendix 1A**, updates and broadens the former regulation 23 C.F.R. § 630, Subpart J. The new regulation requires a more comprehensive evaluation of the safety and mobility impacts of work zones throughout the project development process, and also requires the implementation of suitable strategies to help manage these impacts during project delivery.

After The "Final Rule" was published in 2004, all state and local governments receiving federal-aid funding were required to comply with the provisions of the rule no later than October 12, 2007. DDOT developed its own Guidelines and Standards for Temporary Traffic Control in 2006, which, when combined with federal policy, was intended to significantly improve the safety of road users and workers. This new policy, created in 2015 to better reflect DDOT's preferred work zone evaluation process, is based on lessons learned during the first eight (8) years of implementation. This policy also incorporates new tools developed as part of the Citywide Work Zone Project Management System. This policy must be linked to other SAFETEA-LU requirements such as the district-based Strategic Highway Safety Plan (SHSP).

A.3. Key Definitions

Maintenance of Traffic Alternatives Analysis (MOTAA) - The intent of an MOTAA is to identify and compare benefits as well as potential functional faults of work zone alternatives. The analysis is performed for each detailed design alternative. It should address the benefits and concerns related to work zone options and include the design team's recommendation on the preferred strategy for maintenance of traffic (MOT) for each detailed design alternative. Refer to *Section B.6* for further detail related to performing an MOTAA.

Public Information and Outreach (PI) Strategies – The PI component of a Transportation Management Plan (TMP) consists of strategies that address communication with the public and concerned stakeholders, before and during the project. This component may include (but is not limited to) public awareness

strategies and motorist information strategies, such as brochures, websites, radio, changeable message sign (CMS) messages, pre-trip information, and transit information.

Reconstruction Project - Any project involving the removal and replacement of pavement or a bridge deck.

Significant Project - Generally, a significant project is one that, alone or in combination with other concurrent projects nearby, is anticipated to cause sustained work zone impacts greater than what is considered tolerable. Refer to *Section B.2* for further detail on criteria for significant projects.

Temporary Traffic Control (TTC) / Traffic Control Plan (TCP) - A TCP addresses traffic operations and safety through a work zone. The TCP will follow DDOT Standards and Guidance for the layout and placement of traffic control devices, signs, and related equipment for the project. The degree of detail in the TCP will depend on the project complexity and the extent of the interface between all modes of traffic and construction activity.

Transportation Management Plan (TMP) - A TMP details work zone impact management strategies and how they will be implemented. For all projects, The "Final Rule" requires that the TMP must include a Temporary Traffic Control (TTC) plan that addresses traffic safety and control throughout the work zone. If a project is expected to be significant, the TMP for that project should also contain both transportation operations and public information components. These elements are integrated into a single document that demonstrates an understanding of site-specific issues and project requirements.

Transportation Operations (TO) Strategies – The TO component of a TMP consists of strategies that address sustained operations and transportation management within the area of the work zone impacts. This component may include travel demand management strategies, traffic signal timing changes, Intelligent Transportation Systems (ITS) strategies, safety strategies and enforcement strategies. These strategies are incorporated within the traffic control plans and the contract documents.

A.4. Goals and Objectives

The goals and objectives of this policy are to:

- Improve safety and efficiency for travelers and workers in work zones.
- Continue working towards the goals of the Vision Zero Initiative to achieve zero fatalities and serious injuries for travelers of DDOT's transportation system by 2024, through more effective use of data, education, enforcement, and engineering.
- Ensure that the appropriate levels of maintenance of traffic (MOT) analyses are performed for all projects in the District.
- Integrate tools developed as part of the Citywide Work Zone Project Management System.
- Ensure that a TMP report of appropriate scale and scope is developed, documented and implemented during all stages of the project life.
- Enhance efforts to address safety and mobility on current and future projects.
- Promote a commitment to implementing the requirements of FHWA's Work Zone Safety and Mobility Policy.

A.5. Roles and Responsibilities

The target audience for this document includes anyone involved in the planning, designing, constructing, and monitoring of Federal-Aid Highway Projects in the District of Columbia. Several key roles have been identified that generally represent the various entities within DDOT administration. The use of "general" roles allows for the document to sustain a potential reorganization of agency administrations, as well as their roles. These "general" terms also acknowledge that DDOT or a designated contractor could potentially assume some of these roles. These roles include:

- TMP Team
- Transportation Facilities Design and Construction
- Transportation Systems Management
- Transportation Planning & Policy
- Communications
- Construction Project Management
- Construction
- Law Enforcement / Emergency Responders
- Approval Contacts

The following guidance is provided to ensure that each project team member understands their expected contributions toward the overall consideration of work zone safety and mobility in the development, review or implementation of the TMP. By working together as a multi-disciplinary team, each team member's expertise can be drawn upon to help make decisions regarding how to best design and build projects, while managing the impacts of the work zone. Team members functioning in the various roles detailed below will coordinate with some or all of the other teams, as appropriate, to confirm that all safety and mobility concerns are addressed in a timely manner. All team members should be provided the opportunity to review the TMP at each stage of development. The intent of this guidance is not to provide a comprehensive list of roles and responsibilities, but rather provide an overview detailing the expectations involved with each role.

TMP Team

The anticipated traffic impacts will dictate the extent and nature of the TMP team's responsibilities. Throughout TMP development, implementation, and assessment, the TMP team responsibilities may include all or part of the following functions. These responsibilities are not limited to one entity or person, but should be assumed by the entire team. Additional details regarding how to compile an appropriate TMP Team are included in *Section B.4* of this policy. These responsibilities include:

- Collect data (e.g., volume data, speed data)
- Conduct analyses (e.g., work zone impacts on residences and businesses)
- Review design and temporary traffic control alternatives, as well as the suitability of alternate routes (e.g., geometrics, capacity, safety, structural integrity) associated with any of the alternatives

- Review on-site and off-site traffic operational measures (e.g., traffic signal modifications, parking restrictions)
- Review the sequence of construction, construction staging and scheduling alternatives
- Determine the cost-effectiveness of various options and improvements
- Coordinate with local officials, businesses, and local associations
- Coordinate the project duration and design with other projects within the impacted area, along the corridor, and within the region
- Review design and TMP changes made by the designer to ensure they meet the TMP objectives
- Review proposed changes made by the contractor or project engineer during construction
- Evaluate and prepare a report on the lessons learned at the various stages of developing and implementing the TMP after construction

Transportation Facilities Design and Construction

The DDOT administration or a designated private entity tasked with overseeing the design and construction of transportation facilities within the District will ensure:

- Proper consideration of work zone safety and mobility impacts during the project planning process. This will be accomplished by providing:
  - Preliminary identification of work zone impacts and consideration of these impacts in choosing the preferred alternative.
  - Proposed work zone-impact management strategies.
  - Project budgets that reflect the expected efforts for developing and implementing the TMP.
- Proper design and presentation of all aspects of the TMP during all stages of the project life cycle. Responsibilities include:
  - Coordinating development of the TMP, including organizing TMP team meetings, managing TMP documentation efforts.
  - Ensuring compliance of the TMP with DDOT work zone management policies and guidelines.
  - Developing Temporary TCPs.
  - Developing a consultant scope of work (as needed) that properly reflects the efforts to develop a TMP.
  - Providing input to the TMP in areas of expertise, such as bridge or highway design-related construction staging options.
- Projects can be constructed according to the plans by providing input and/or reviewing each project regarding:
  - Access to the work area and storage for construction equipment and materials for the contractor
  - Time frame for completion of construction

  - Sequence of construction
  - Innovative, accelerated or unusual construction methods
  - Constructability

- **Safe traffic operations** through the project's work zone by:
  - Providing input on work zone design and operation, including lane widths, number of required through and turning lanes, traffic volumes and truck percentages, traffic growth factors, available detour routes, time restrictions, temporary reduced speed limits, and access requirements.
  - Providing traffic input/support/review/comment on all TMP Team activities.
  - Identifying significant projects during the early planning stages and developing the TMP.
  - Coordinating with Public Information (PI) Officers to provide necessary information for the level of and outreach for the public information efforts necessary on a project.
  - Ensuring all proposed lane closures comply with DDOT standards and specifications for highways and structures.
  - Ensuring all proposed lane closure impacts are considered acceptable based on the traffic impacts analysis.
  - Coordinating and monitoring all projects that may affect traffic flow on roadways within the District or neighboring jurisdictions.
  - Reviewing and obtaining approval of the Chief Engineer or designee for any modifications made by the Project Manager / Construction Project Engineer or the Contractor to the TMP or TCP during construction.
  - Complying with DDOT policies for the provision of pedestrian/ bicycle accommodations and American with Disabilities Act (ADA) requirements in work zones.
- Independent routine work zone inspections are performed on a regular basis to ensure the consistent performance of inspections and compliance by the Construction Project Management team.
- Adequate monitoring of TMP mitigation strategies for both oversight and evaluation purposes.
- Post-project TMP evaluation is completed.
- The TMP process is updated and refined every two years.

The DDOT administration or private entity tasked with transportation facilities design and construction oversight is also responsible for setting work zone policies and guidelines, identifying and communicating issues related to the design and use of temporary traffic control devices, as well as the set-up, maintenance, general appearance and functionality of work zones. Under circumstances where a private entity is tasked with this role, DDOT oversight of the private entity will remain a critical component. Proper design and presentation of all aspects of the TMP will be ensured by providing:

- Summary of the accident history.
- Support and guidance for major projects, as requested.
- Input to the TMP Team, when requested.
- Guidance on work zone analysis procedures.

Transportation Systems Management:

The designated DDOT entity or contractor that is responsible for transportation management throughout the District will ensure the safe movement of all modes of traffic through work zones by:

- Providing available traffic analysis software models for signalized intersection networks, as requested by the consultant.
- Providing potential work zone-impact management strategies, provided that Intelligent Transportation Systems (ITS) elements are involved in the project.
- Developing all parts of the TMP related to ITS, if applicable.
- Providing the Design and Project Management Division with guidance, review, comment, and approval on the implementation of work zone ITS elements and traffic signal retiming (if applicable) for temporary TCP.
- Participating in TMP monitoring and post-project evaluation.

Transportation Planning & Policy:

The designated DDOT entity or contractor that administers the development of strategic planning and policy-making related to the District's transportation network will be responsible for:

- Reviewing the TMP at all stages and ensuring it is compliant with all related standards, ordinances and other appropriate legislation
- Proposing potential work zone-impact management strategies during the planning stages.
- Participating in TMP monitoring during construction, as well as the post-project evaluation.

Communications

The DDOT Office of the Director, which consists of various functional areas including the Office of Communications, will ensure that the proper information is communicated to the appropriate community members, stakeholders, emergency and public safety departments, businesses and organizations by providing:

- A process for disseminating incident management information.
- The need for and types of public information campaigns and public meetings to inform the public on various aspects of the construction project.
- Review and comment on the public information and outreach component of the TMP.
- Participation in TMP monitoring and post-project evaluation.

Construction Project Management

The Project Manager (PM) / Construction Project Engineer (PE) will assess and manage projects during construction to ensure appropriate action is taken to manage work zone impacts. Responsibilities of the PM/PE are to:

- Proactively oversee the implementation of the TMP and other safety and mobility aspects of the project.
- Routinely verify all contractor personnel are trained in traffic control to a level commensurate with their responsibilities.
- Work with the contractor to ensure travel lane and other transportation facility closures occur as planned according to the TCP, and are communicated to the public according to the PI plan.
- Ensure work zones are neat, orderly and effective for the safety of highway workers and motorists.
- Perform quality control and assurance of the work zone to promote consistency and ensure compliance with contract documents, policies and guidelines to compliment routine work zone inspections performed by designated Construction Project Management staff.
- Recommend traffic control improvements to address field conditions and improve traffic flow, visibility and worker and traveler safety.
- Provide the Office of Communications with regular updates on all major project changes (traffic shifts, closures, etc.).

A PM/PE is also responsible for:

- Oversee the routine inspection of designated work zones (either by random assessment or as determined by the Project Engineer) performed by designated Construction Project Management staff.
- Taking appropriate measures to identify and facilitate the correction of work zone deficiencies.
- Maintaining proficient knowledgeable of current work zone standards, specifications, and policies by taking appropriate training courses and obtaining and renewing work zone certifications, as needed.
- Coordinating inspections and follow-up issues with appropriate DDOT staff and contractors.
- Participating in bi-monthly meetings and semi-annual group inspections to review and communicate inspection issues and experiences to other inspectors, for the purpose of developing and encouraging statewide uniformity of inspection ratings.
- Compiling work zone audit results on an annual basis and submit them to the administration responsible for Transportation Facilities Design & Construction (i.e., IPMA) for inclusion in DDOT's performance assessments, which is a means to evaluate the department's goals.

- When a PM/PE is not available, a qualified designee can be appointed to accomplish the latter responsibilities for the PM/PE.

Construction

The designated DDOT entity or contractor performing the construction of a particular project has responsibilities include:

- Prioritizing TMP implementation and work zone safety as a critical element for project success.
- Designating a trained person at the project level (i.e., Traffic Safety Officer) who has the primary responsibility, with sufficient authority, for implementing the TMP and other safety and mobility aspects of the temporary traffic control plan.
- Submitting lane and transportation facility closure requests and reporting active closures with supporting information.
- Ensuring work zones are neat, orderly and effective for the safety of highway workers and motorists.
- Performing quality control of work zones to promote consistency and ensure compliance with contract documents, policies and guidelines.
- Properly documenting and disseminating information related to work zone crashes to the Program Manager and Chief Engineer or designee.
- Recommending traffic control modifications to the PM/PE to address field conditions and to improve traffic flow and the safety of workers and the travelling public.
- Collecting data as required by DDOT for TMP post-project evaluation.

Law Enforcement / Emergency Response

Law enforcement responsibilities are to:

- Provide active and passive enforcement of laws, as requested and needed, to promote safety and mobility in the work zone.
- Identify unsafe conditions and communicate perceived work zone deficiencies to the PM/PE as soon as practical.
- Take appropriate measures to clear work zone incidents as quickly as possible.
- Properly document work zone crashes and incidents.

Approval Contacts

The DDOT Chief Engineer or designee is responsible for the final approval of the TMP. All members of the TMP team should be provided the opportunity to review and comment on the document. The Project Engineer (PE), Transportation Engineer (TE), and American Traffic Safety Services Association (ATSSA) Traffic Control Design Specialist (TCDS) will be responsible for making sure these comments have been sufficiently addressed before approving the TMP.

B. PROJECT-LEVEL PROCESSES AND PROCEDURES

The life cycle of all projects includes three (3) primary stages, which support the work zone policy implementation:

1. Planning/Design/Pre-construction Stage (*Sections B.1* through *Section B.9*)
2. Construction Stage (*Section B.10*)
3. Post-Construction Stage (*Section B.11*)

B.1. Compilation of Project Material

The Project Manager, who is responsible for each project stage, will compile project material such as:

- Project scope and limits
- Information regarding existing geometric and traffic characteristics
- Crash data and trends
- Local community and business issues
- Preliminary cost estimates for strategy implementation (when available)
- Information from adjacent projects to evaluate the combined/cumulative impacts
- Existing cultural resources and right-of-way maps
- Construction phasing/staging approaches and plans
- Environmental impact study, if available

B.2. Identification of Significant Projects

According to the Final Rule on Work Zone Safety and Mobility (23 C.F.R. § 630, Subpart J), "a significant project is one that, alone or in combination with other concurrent nearby projects is anticipated to cause sustained work zone impacts that are greater than what is considered tolerable based on [District] policy and/or engineering judgment." Section 630.1004 defines "work zone impacts" as "work zone-induced deviations from the normal range of transportation system safety and mobility." Factors that should be considered in determining the extent of impact include:

- Road Classification
- Area Type (i.e., CBD)
- Traffic Characteristics
- Crash Experience
- Type of Work
- Time-of-Day (or Night)
- Regional Significance
- Project Complexity

DDOT has developed a process for determining the level of significance of a project, which corresponds to the type of TMP that is required. This is discussed in *Section B.3*. The level of significance should be determined as early as possible in the project delivery and development process by DDOT in cooperation with FHWA.

The following projects are considered to be significant:

- All projects on Interstates, Freeways, and Expressways that occupy a location for more than three days with either intermittent or continuous lane closures.
- Federal-Aid highway-funded reconstruction projects on all principal arterial roads (refer to *Section A.3* for the definition of "reconstruction project").
- Projects determined by DDOT to significantly impact roadways that have a relatively high ADT, pedestrian activity, and/or crash rates, or are otherwise deemed areas of high priority by DDOT.
- All projects that impact any number of DDOT's current Critical Corridors, which were recently identified in 2013 as part of the development of DDOT's Citywide Transportation Plan. These "critical corridors", which are anticipated to change over time are shown in *Figure 1.*

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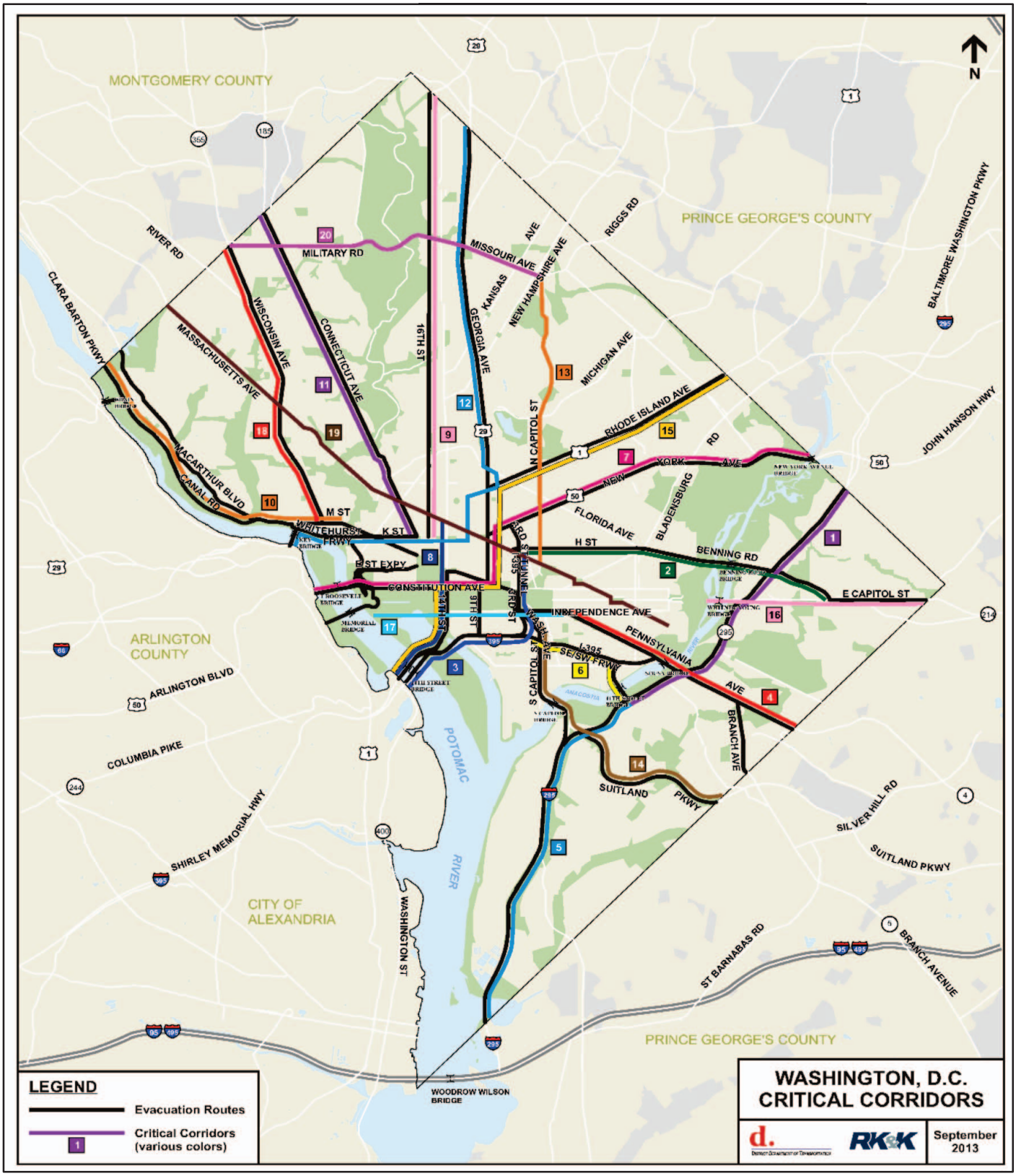

Figure 1. District of Columbia Critical Corridors (2013)

Washington D.C. Critical Corridor Limits				
	Corridors	Limit 1	Limit 2	Length
1	DC 295	I-695	DC Line	4.3 mi
2	Benning Rd SE / Benning Rd NE / H Street SE	Massachusetts Ave NW	E. Capitol St NE	4.3 mi
3	I-395 / 3rd St Tunnel	DC Line at Potomac River	Massachusetts Ave NW	3.1 mi
4	Pennsylvania Ave SE	2nd St NE / Independence Ave SE	DC Line	3.5 mi
5	I-295	DC Line	I-695	5.0 mi
6	I-695	I-395	I-295	1.8 mi
7	US 50 *	DC Line at Potomac River	DC Line	7.8 mi
8	14th St SW / 14th St NW	DC Line at Potomac River	Massachusetts Ave NW	2.4 mi
9	16th St NW	DC Line	K St NW	6.2 mi
10	Clara Barton Pkwy / Canal Road NW / M St NW	DC Line	Pennsylvania Ave NW	4.3 mi
11	Connecticut Ave NW	DC Line	K St NW	4.9 mi
12	US 29 **	DC Line at Potomac River	DC Line	8.5 mi
13	N. Capitol St NW / N. Capitol St NE	Missouri Ave NW	Massachusetts Ave NW	4.1 mi
14	Suitland Pkwy / S. Capitol St SE / Washington Ave SW	Independence Ave SE	DC Line	4.5 mi
15	US 1 ***	DC Line at Potomac River	DC Line	7.0 mi
16	E. Capitol St NE / E. Capitol St SE	Whitney Young Memorial Bridge	DC Line	2.9 mi
17	Independence Ave SW / Independence Ave SE	23rd St SW	Pennsylvania Ave SE	2.5 mi
18	Wisconsin Ave NW	DC Line	M St NW	4.1 mi
19	Massachusetts Ave NW / Massachusetts Ave NE / Massachusetts Ave SE	DC Line	19th St SE	8.3 mi
20	Military Rd NW / Missouri Rd NW	DC Line	N. Capitol St NW	4.3 mi

* US 50: New York Ave NW, 6th St NW, Constitution Ave NW

** US 29: Georgia Ave NW, Florida Ave NW, 6th St NW, Rhode Island Ave nW, 11th St NW, K St NW, Whitehurst Freeway

*** US 1: Rhode Island Ave NE, 6th Ave NW, Constitution Ave NW, 14th St NW

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The following are key questions that will help provide greater context in understanding the importance of identifying significant projects. They also provide background regarding the process for performing the appropriate level of engagement and analysis to identify work zone impacts, preceding the implementation of the applicable level of TMP measures:

What is the purpose of identifying significant projects?

Considering work zone impacts at the systems-planning level (either on a network-wide basis or corridor basis) can have several positive effects. For example, in cost estimation and budgeting for projects, an understanding of the expected level of work zone impacts for the project will help in deciding what transportation management strategies are likely and to what extent a public information campaign is required. Further, the analysis of the cumulative impacts of concurrent road projects will help better schedule construction activities, thereby minimizing the impacts on road users, businesses, and other affected parties.

When should significant projects be identified?

Significant projects should be identified as early as possible, typically during the planning phase of the project. However, the project's "significant" status should be reevaluated during subsequent phases, as more information becomes available.

What happens when a project is identified as a significant project?

As discussed in *Section B.3*, a TMP must be developed for all projects. However, if the project is identified as "significant", the TMP must include a temporary TCP, as well as transportation operations and public information strategies to manage work zone impacts. In addition to work zone impact management strategies, the TMP may also include contingency plans, incident management plans, detailed roles and responsibilities, and implementation costs. These items are discussed in detail in later sections of this document.

Are there exceptions to the rule on significant projects?

DDOT may request an exception to the requirements from the FHWA Division Office for projects classified as significant, that in the judgment of DDOT do not cause sustained work zone impacts. Qualitative or quantitative analyses methods (or a combination of both) should be used to illustrate that the specific project or categories of projects will not cause sustained work zone impacts. For Federal-Aid projects, approval for exceptions from the FHWA Area Engineer is recommended no later than at the 30% design point.

Examples of Significant DDOT Projects include:

- 3rd St Tunnel
- 11th Street Bridge Project
- 16th Street Bridge
- Anacostia Riverwalk Trail [K.A.G.]
- Barney Circle Reconstruction
- Benning Rd & H St NE Streetcar Project
- DC Power Line Undergrounding
- DC Waters Clean Rivers Project
- Frederick Douglas Memorial Bridge
- Georgia Avenue Revitalization
- New York Avenue Bridge
- Penn & Potomac Ave SE Intersection

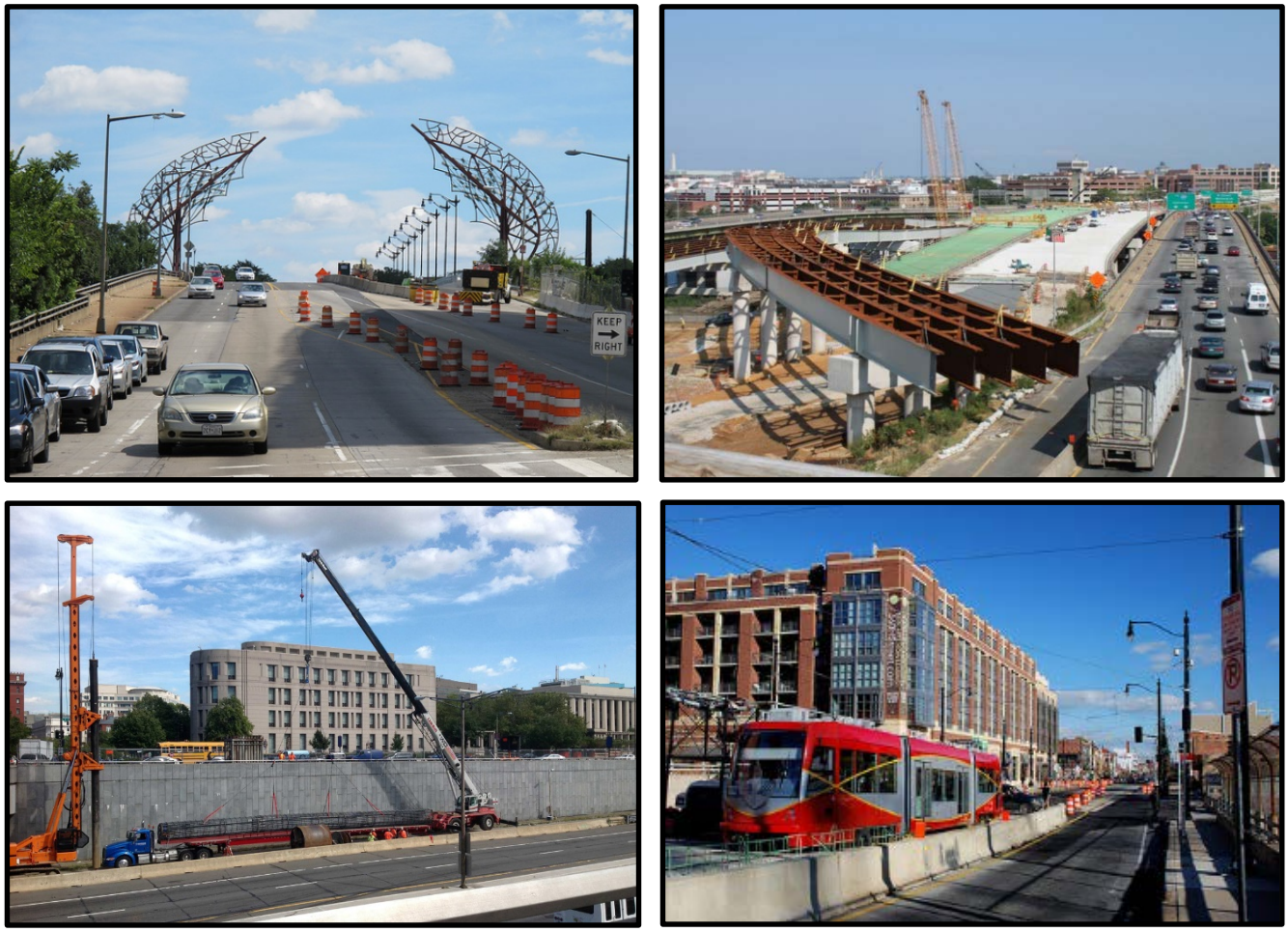

Figure 2. Examples of recent DDOT Significant Projects [New York Avenue Bridge Project (Top Left), 11th Street Bridge Project (Top Right), 3rd Street Tunnel Project (Bottom Left), H Street and Benning Road Streetcar Project (Bottom Right)].

B.3. Determining Appropriate Level of TMP Required

A TMP is required for all projects in the District of Columbia, independent of whether the project is determined to be "significant." The level of TMP required will vary based on the level of anticipated impacts. DDOT defines three types of TMPs. A "Type C" TMP is the most complex, and is required for all significant projects, while a "Type A" TMP is the most basic and should only be prepared for minor projects with minimal anticipated impacts. A "Type B" TMP is an intermediate level TMP for non-significant projects that would still be expected to impact the traveling public if mitigation strategies were not implemented. Additional details regarding these three TMP types are provided later in this section.

Figure 3 shows a simplfiied representation of the process for determining the type of TMP required, based on the project significance and the need to integrate transportation operations and public outreach strategies. In addition to this process, DDOT also reserves the right to evaluate each project on a case-by-case basis.

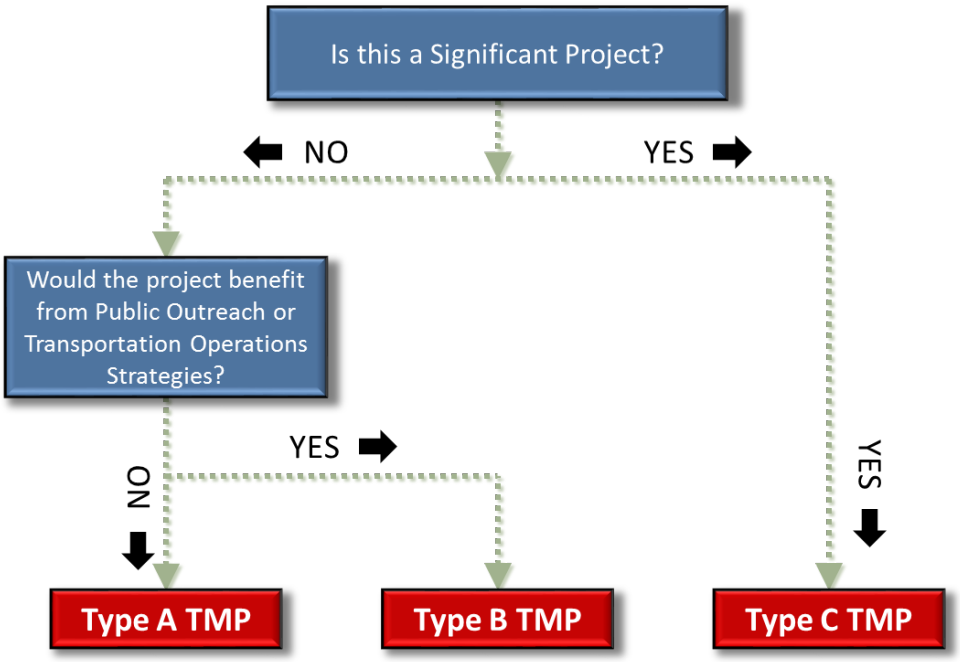

Figure 3. TMP Level Determination Process

The types of TMPs also differ in terms of recommended levels of implementation of temporary traffic control, transportation operations, and public information, as summarized in *Table 1*.

Table 1. TMP Level Implementation

STRATEGY CATEGORIES	*TMP Types*		
	Type A	*Type B*	*Type C*
Temporary Traffic Control (TTC)	Full	Full	Full
Transportation Operations (TO)	Minimal	Partial	Full
Public Information (PI)	Minimal	Partial	Full

It is important to identify the type of TMP required as early as possible, as funds must be allocated in the cost estimate for developing the TMP at this stage of the project. The design budget should be increased to reflect efforts required to develop the scope of TMP identified. If a consultant develops the TMP, then the consultant scope of work and budget should reflect the necessary effort.

The degree of TO and PI components required for a Type B TMP depends on the level of anticipated work zone impacts. A preliminary work zone impact analysis can be performed to determine the traffic impacts during construction. Additionally, when multiple projects are planned in the same corridor or on corridors within the same traffic area, it may be necessary to develop a corridor or regional TMP.

Type A TMP – Basic (TCP required)

"Type A" TMPs are typically developed for construction or maintenance projects that have minimal disruption to the traveling public and to the adjacent businesses and community. "Type A" TMPs are appropriate for projects that are not considered to be "significant". These projects typically only require the development of a TCP as part of the development of the TMP. "Type A" TMPs may also consist of the combination of sequencing special provisions, references to detailed drawings, and potentially small-scale public information strategies.

Type B TMP – Intermediate (TCP required, TO and/or PI optional)

"Type B" TMPs are likely to be used for construction or maintenance projects that are anticipated to have more than a minimal disruption, but have not been identified as significant projects. "Type B" TMPs provide more detailed mitigation strategies. In addition to a TCP, "Type B" TMPs should also include a preliminary work zone impact analysis, and some level of traffic operations (TO) and/or public information (PI) strategies, as applicable. Developing TMP implementation cost estimates should also be considered.

Type C TMP – Major (TCP, TO, and PI required)

Type C TMPs are required for all significant projects. These projects typically have a moderate to high degree of impact on travelers and the local areas, with considerable public interest. Type C TMPs include a TCP plan, as well as a complete summary report that outlines the PI and TO components. In addition, Type C TMPs may also contain cost estimates, coordination strategies between stakeholders, secondary mitigation strategies, analysis of potential impacts on detour routes, and analysis of the potential impacts of the management strategies. The incorporation of these additional items may help DDOT develop and implement a TMP that effectively manages the work zone impacts of the project, and serves the needs of DDOT, the traveling public, workers, and other affected parties. An exception to using a Type C TMP for significant project is when the project is not expected to cause sustained work zone impacts. This exception must be formally approved by FHWA.

In summary, if a project is identified as significant, a Type C TMP is required. If a project is not classified as significant, the project will still require a TMP (Type A or Type B), which may require some degree of TO and/or PI components.

B.4. Identifying TMP Stakeholders

The DDOT project manager is responsible for compiling the TMP Team to include all appropriate stakeholders based on project needs. Stakeholders provide project input by identifying project elements, events, or safety/mobility concerns that should be evaluated in the TMP. Finalizing the list of stakeholders depends on the project type, extent and duration of construction, and length of the work zone, as well as the work zone geography and environment. The list of stakeholders may be updated throughout the construction process. The stakeholders may include:

- DDOT Administrations
- Other District Agencies (e.g., FEMS, DCPS)
- Washington Metropolitan Area Transit Authority (WMATA)
- Railroad Agencies/Operators
- Freight Operators
- Metropolitan Washington Council of Governments (MWCOG)
- National Utility Contractors Association (NUCA, local representative)
- District of Columbia Building Industry Association (DCBIA, local representative)
- Utilities
- Metropolitan Police Department (and other emergency service providers, as deemed necessary)
- Business Representatives
- School Representatives
- Community Groups
- Citizens' Interest Groups
- NPS
- AOC
- ANCs/elected officials
- State Department
- FHWA
- Other state's DOT

It is incumbent on the DDOT Project Manager to include all necessary stakeholders from the project scoping stage, as well as any stakeholders added during the various steps of TMP development.

B.5. Work Zone Impact Assessments

A queue/delay analysis should be conducted for significant projects to develop strategies to minimize the work zone severity and duration of mobility impacts on the traveling public. A vehicle is considered a part of a queue if its average operating speed is approximately 10 mph or less. Discretion is required by DDOT personnel during both the analysis portion and field evaluation of the implemented work zone in determining what constitutes a queue. Mainline queue lengths should be used as the criteria to determine the impact of proposed work zones. A variety of software tools exist that can be used to quantify anticipated queues during construction. These include Quickzone, Quewz, Synchro/Simtraffic, CORSIM, VISSIM, or similar programs deemed acceptable by DDOT. The following guidelines should be used during queue/delay analysis on freeways and arterials.

Freeways

If the most recent traffic volume data (that falls within the proposed work schedule) exceeds the work zone capacity thresholds presented in the *Table 2*, a queue or delay analysis should be performed to determine average queue lengths to be expected based on the proposed construction staging.

Table 2. Work Zone Capacity Thresholds for Freeways

NUMBER OF LANES		WORK ZONE CAPACITY	
NORMAL (existing)	OPEN (to traffic)	VPH	VPHPL
4	1	1,350	1,350
3	1	1,450	1,450
2	1	1,400	1,400
4	2	2,900	1,450
3	2	2,900	1,450
4	3	4,500	1,500

Reference: Transportation Research Board, National Research Council, Highway Capacity Manual, 2010 (Chapter 10 - Freeway Facilities)

The following thresholds should be used to evaluate average and 95th percentile queue lengths during construction, as determined by the software model. When the resulting 95th percentile queue exceeds the following thresholds, alternatives for construction should be developed and/or additional work zone impact management strategies should be employed.

1. For 95th percentile queues of one mile or less, the work zone impacts are acceptable.
2. For 95th percentile queues longer than one mile for any period of time, the work zone impacts are considered unacceptable. Alternate strategies should be developed according to the provisions of this policy.

Arterials

Arterial travel delays longer than 15 minutes or 95th percentile traffic queues extending more than 1,500 feet on the mainline, beyond what are considered normal delays and queues for the affected roadway segment, are considered unacceptable traffic impacts during construction.

Procedure

Traffic impact analyses should generally occur during the planning or early design stages of the project development process. For routine DDOT maintenance projects that are considered significant, this analysis should occur prior to implementing any lane restrictions.

1. *Projected impacts are less than thresholds.* When the traffic analysis indicates that projected impacts will be below allowable thresholds, the development process for the proposed level of TMP, as determined in *Section B.3*, may commence.
2. *Projected impacts exceed thresholds.* If the projected impacts are expected to exceed allowable thresholds according to the traffic impact analysis, other design construction phasing, work zone options, or allowable work hours should be considered for reducing the impacts prior to developing the TMP.

It is the responsibility of the TMP Team (consultant/contractor) to provide DDOT with all software files and other traffic data from the analysis. Consultants should communicate with the appropriate DDOT Traffic Operation Administration (TOA) staff in the Transportation Management Center (TMC) to obtain any existing traffic analysis software models for signalized intersection networks, if available, prior to developing new traffic analysis software models.

Guidance for Analysis

Capacity analysis software such as QuickZone, Quewz, Synchro/Simtraffic, CORSIM, Vissim or similar HCM-based programs approved by DDOT, can be used to model the anticipated work zone traffic impacts. Work zone traffic impacts should be analyzed prior to the preliminary investigation stage (30%) for each of the maintenance or construction phases. The following guidelines should be followed when analyzing work zone traffic impacts:

- Analyze each phase of construction separately.
- Use the posted legal work zone speed limit plus 5 miles per hours (mph) in the traffic analysis software models, unless 85th percentile speeds have been confirmed in the field.
- Input traffic volume data no older than three (3) years (unless otherwise approved by DDOT), and other current local and regional traffic data (i.e., heavy vehicle percentages, peak hour factors, trip generation & distribution, etc.) into the traffic analysis software model and account for seasonal traffic variations that may occur during construction.
- Use growth factors approved by DDOT to adjust traffic volumes to construction year levels.
- Include the queuing impacts for key corridors approaching and encompassed within and the project area, as well as significant ramp merges, in the traffic analysis software model.
- Include non-motorized data (pedestrian/bicyclist) in any modeling.
- Consider pedestrian-accessibility requirements (ADA, Title II Regulations).
- Separate analyses for weekday and weekend traffic impacts should be developed if the project involves weekend lane closures.

While there are a variety of acceptable software tools that can be used to estimate the operational characteristics of work zones, DDOT's current common practice (as of 2015) is to use:

- For simple freeway analyses: QuickZone or Quewzare
- For simple arterial analysis: Synchro
- Modeling of complex work zones: Microscopic models, such as SimTraffic, CORSIM, and VISSIM.

NOTE: The Citywide Work Zone Management System, discussed in *Section C.1* of this report, should be consulted during the analysis process in order to identify any other projects in the work area, and determine any additional anticipated impacts. If multiple work zone options exist, an MOTAA (discussed in *Section B.6*) should be performed. The option with minimum traffic operational and safety impacts should be recommended.

Documentation

The results of the work zone impact analysis can be documented in a stand-alone report that is referenced in the TMP, or included within the TMP report. For either option, the following components should be included in the summary:

1. Data Collection and Modeling Approach – The process for obtaining existing traffic data and information should be discussed, including the source, location, and date of the traffic volume data. This section should also include a brief summary and justification of the analysis methodology and tool(s) chosen.

2. Existing and Future Conditions –This section should include information related to existing and future (i.e., during construction) conditions, and describe the approach used to approximate traffic conditions during construction, including truck percentages, growth factors, seasonal adjustments, day of week factors, work zone capacity, etc. The existing roadway characteristics, existing/historical traffic data, traffic operations, accident history, and multimodal safety and mobility issues should also be considered for this section, based on the degree of detail intended for the project.

3. Results of Traffic Analysis – The results of qualitative and quantitative traffic analyses, including multimodal mobility impacts (95th percentile queue length, delay, etc.), recommendations for lane/ramp restrictions and/or closures, work hour restrictions, and potential vehicular/pedestrian detours should be included. This section of the report should also provide information related to holidays, weekend restrictions and/or special events. Changes to the project throughout the design process may require additional analyses to be performed, as necessary.

If a stand-alone report is developed, information related to the project and its location should also be included. This information should include the project background, project purpose, type of work, and a description of project area. Descriptions of the surrounding roadway network, the project goals and constraints, and the general schedule and timeline should be included in this section. General information regarding the lane width and configuration, grade, pedestrian and bike facilities, heavy vehicle impacts, etc. should also be included.

B.6. Maintenance of Traffic Alternatives Analysis

The purpose of an MOTAA is to develop and evaluate the best combination of construction phasing and temporary traffic control strategies to reduce work zone impacts, and to select the best method for delivering the project to the public in a safe and timely matter. An MOTAA should compare work zone options (including staging/phasing options) for each project design alternative and document maintenance of traffic constraints for each option. It should also evaluate and select any detour routes associated with any proposed ramp / road closures during construction. This may require the consultant to obtain additional traffic data from DDOT or collect data. The analysis should address the benefits and concerns associated with each option, and should include the design team's recommendation for the preferred type of MOT.

An MOTAA typically considers three general options, as well as any innovative solutions applicable to the project:

1. Full closure of the road segment affected by construction with detour routes;

2. Staged construction utilizing lane shifts and off-peak work, as needed; and

3. Temporary structure or roadway provided to accommodate traffic during construction.

The MOTAA should consider various combinations of these general options, depending on the type and scale of the project. The results of the MOTAA can be documented in a stand-alone report that is referenced in the TMP; or the result of the MOTAA can be included within the TMP report. The MOTAA may be a factor in choosing the preferred design alternative, and therefore should be completed during the planning stage of a project, or early in the design phase.

One tool that can assist in comparing different construction alternatives is a road user cost analysis for each option. A description of DDOT's preferred method for user cost analyses is provided in the next section.

User Cost Analysis

Work zone road user costs are the additional costs to motorists and the community at-large as a result of work zone activity. These costs can be in the form of travel delay costs, vehicle operating costs, crash costs, emissions costs, noise impacts, business impacts, or general inconvenience to the local community. Road user costs are useful when conducting an MOTAA, and can be used to conduct benefit-cost analyses and to determine appropriate incentive/disincentive values for construction contracts. For additional information, consult FHWA's "Work Zone Road User Costs – Concepts and Applications" report from December 2011 (Report No: FHWA-HOP-12-005).

The FHWA guidelines allow each jurisdiction to modify their road user cost policy to best meet their own needs. DDOTs user cost policy can be found in the attached memorandum dated March 4, 2015 (see **Appendix 1B**).

B.7. Development of Work Zone Impact Management Strategies

This step in the TMP development process involves identifying potential work zone management strategies based on traffic impact assessments conducted in the previous steps. Work zone impact management strategies are used to minimize traffic delays, improve mobility, maintain or improve traveler and worker safety, efficiently complete roadwork, and maintain access for businesses and residents. Strategies should be developed in such a way that they correspond to the scale of the anticipated work zone impacts. As the project progresses through the various developmental stages, and as more project-specific information becomes available, the types of traffic control strategies and impact management strategies selected, should be reviewed and updated as necessary.

For the TMP, work zone impact management strategies for both the mainline and detour routes should be identified based on the selected construction phasing/staging approaches. Where appropriate, the strategies should be identified directly on the project plan sheets. Agencies may elect to develop separate sections or plans specific to the PI and/or TO strategies to distinguish them from the TTC strategies.

The various work zone management strategies should be associated with one of the following three categories:

- Temporary Traffic Control (TTC):
  - Control strategies (i.e. lane shifts, reversible lane, etc.)
  - Traffic control devices (i.e. temporary signs, arrow panels, etc.)
  - Project coordination, contracting, and innovative construction strategies (i.e. utilities coordination, A + B bidding, etc.)
- Public Information (PI):
  - Public awareness strategies (i.e. mass media, project website, etc.)
  - Motorist information strategies (i.e. radio traffic news, dynamic speed message signs, social media, etc.)
- Transportation Operations (TO):
  - Demand-management strategies (i.e. transit incentives, carpooling incentives, etc.)
  - Corridor/network management (traffic operations) strategies (i.e. signal timing improvements, parking restrictions, etc.)

- Work zone safety management strategies (i.e. temporary traffic barrier, crash cushions, etc.)
- Traffic/incident management and enforcement strategies (i.e. transportation management center, automated enforcement, etc.)

The levels of implementation for the strategy categories (i.e., TTC, PI, TO) differ based on TMP types, as summarized previously in *Table 1*. *Figure 4, Figure 5, and Figure* 6 present suggested levels (i.e., minimal, partial, or full implementation) of TTC, PI and TO strategies implementation, respectively, for the various TMP Types.

Refer to Appendix 1C for an overview of work zone impact management strategies and Appendix 1D for work zone design checklist, which provides a summary of Work Zone Impact Management Strategies.

Control Strategies		Traffic Control Devices		Project Coord., Contracting & Innovative Constr. Strategies	
A B C	Construction Phasing/Staging	A B C	Temporary Signs	A B C	Project Coordination
A B C	Full Roadway Closures	A B C	Changeable Message Signs (CMS)	A B C	Contracting Strategies
A B C	Lane Shifts or Closures	A B C	Arrow Panels	A B C	Innovative Construction Technique
A B C	One-lane, Two-way Operation	A B C	Channelizing Devices		
A B C	Two-way Traffic on One Side of Divided Facility (Crossover)	A B C	Temporary Pavement Markings		
A B C	Reversible Lanes	A B C	Flaggers and Uniformed Traffic Control Officers		
A B C	Ramp Closures / Relocation	A B C	Temporary Traffic Signals		
A B C	Fwy-to-Fwy Interchange Closures	A B C	Lighting Devices		
A B C	Night Work				
A B C	Weekend Work				
A B C	Work Hour Restrictions for Peak Travel				
A B C	Pedestrian / Bicycle Access Improvements				
A B C	Business Access Improvements				
A B C	Off-site Detours / Use of Alternate Routes				

Figure 4. Suggested Level of TTC Strategies Implementation for TMP Types

Public Awareness Strategies		Motorists Information Strategies	
A B C	Brochure and Mailers	A B C	Traffic Radio
A B C	Press Releases / Media Alerts	A B C	Changeable Message Signs (CMS)
A B C	Paid Advertisements	A B C	Temporary Motorist Information Signs
A B C	Public Information Center	A B C	Dynamic Speed Message Sign
A B C	Telephone Hotline	A B C	Highway Advisory Radio (HAR)
A B C	Planned Lane Closure Website	A B C	Extinguishable Signs
A B C	Project Website	A B C	Highway Info. Network (Web-based)
A B C	Public Meetings / Hearings	A B C	511 Traveler Info. Systems (Wireless, Handhelds)
A B C	Community Task Forces	A B C	Freight Travel Information
A B C	Coordination with Media / Schools / Bus. / Emerg. Svcs.	A B C	Transportation Management Center (TMC)
A B C	Work Zone Education and Safety Campaigns		
A B C	Work Zone Safety Highways Signs		
A B C	Rideshare Promotions		
A B C	Visual Info. (Videos, Slides, Pres.) for Mtgs. and Web		

Figure 5. Suggested Level of PI Strategies Implementation for TMP Types

A — Minimal Implementation
A — Partial Implementation
A — Full Implementation

Demand Management Strategies	*Corridor/Network Management Strategies*	*Work Zone Safety Management Strategies*	*Traffic/Incident Management and Enforcement Strategies*
Transit Service Improvements	Signal Timing / Coord. Improv.	Speed Limit Reduc. / Var. Speed Limits	ITS for Traffic Monitoring / Mgmt.
Transit Incentives	Temporary Traffic Signals	Temporary Traffic Signals	Transportation Mgmt. Center (TMC)
Shuttle Services	Street/ Intersection Improv.	Temporary Traffic Barrier	Surveillance
Ridesharing / Carpool Incentives	Bus Turnouts	Movable Traffic Barrier Systems	Helicopter for Aerial Surveillance
Park-and-Ride Promotion	Turn Restrictions	Crash Cushions	Traffic Screens
High-Occupancy Vehicle (HOV) Lanes	Parking Restrictions	Temporary Rumble Strips	Mile-Post Markers
Ramp Metering	Truck/Heavy Vehicle Restrictions	Intrusion Alarms	Tow / Freeway Service Patrol
Parking Supply Management	Separate Truck Lanes	Warning Lights	Total Station Units
Variable Work Hours	Reversible Lanes	Auto. Flagger Asst. Devices (AFADs)	Photogrammetry
Telecommuting	Dynamic Lane Closure System	Project Task Force / Committee	Coord. with Media
	Ramp Metering	Construction Safety Supv. / Inspectors	Local Detour Routes
	Ramp Closures	Road Safety Audits	Contract Support for Incident Mgmt.
	Coord. with Adj. Construction Site(s)	TMP Monitor / Inspection Team	Incident / Emerg. Mgmt. Coord.
		Team Meetings	Incident / Emerg. Response Plan
		Project On-site Safety Training	Dedicated (Paid) Police Enforcement
		Safety Awards / Incentives	Cooperative Police Enforcement
		Windshield Surveys	Automated Enforcement
			Increased Penalties for WZ Violations

A — Minimal Implementation
A — Partial Implementation
A — Full Implementation

Figure 6. Suggested Level of TO Strategies Implementation for TMP Types

B.8. Determine TMP Implementation Cost

The TMP implementation cost should be estimated as early as possible in the project life cycle to avoid the under-allocation of funds. Where feasible, cost estimates should be itemized and documented for the various strategies in the TMP with cost responsibilities, opportunities for cost-sharing, any coordination with other projects, and funding sources. The construction budget should reflect efforts required to implement the TMP, including any data collection required for monitoring/evaluation of TMP implementation (see *Section B.10*). Refer to the latest version of the DDOT Standard Specifications for Highways and Structures for Measurement and Payment of Items.

At a minimum, the 60% design submittal should include a detailed estimate for implementing elements of the TMP. Individual projects may have varying pay items depending on size, complexity, and location. TMP components can be funded as part of the construction contract and/or in separate agreements. It should be noted that the costs of TMP development and implementation may be estimated as a percentage of construction project costs.

B.9. Design District Level TMP

At this stage, the initially identified TMP elements should be refined. Appendix 1E provides a general TMP report outline to reference during the TMP development process. This may include consultant contracts for public information and outreach campaigns and other improvements requiring completion prior to construction. The TMP Team should work with technical specialists in disciplines including construction, traffic engineering, roadway design, and public information officers, to jointly identify/confirm the work zone impacts that must be accounted for, as well as any proposed strategies. Construction equipment and material access to the site, storage, and staging areas, as well as potential infrastructure improvements to accommodate future projects should be considered and addressed at this time. If the design has changed, additional analyses may need to be performed to address these changes. The TMP developer will provide all required data for/to DDOT.

At a minimum, the concept/draft TMP submittal should include:

- Introductory Material
- Executive Summary
- TMP Roles and Responsibilities
- Project Description
- Existing and Future Conditions
- Work Zone Impacts Assessment Report
- TMP Monitoring
- Public Information and Outreach Plan
- Incident Management
- TMP Implementation Costs
- Special Considerations (as needed)
- Attachments (as needed)

After finalizing the TMP, a detailed set of plans, specifications and estimates should be developed. The designer is responsible for implementing recommendations set forth in the Draft TMP document. The designer may be required to have more data collected and conduct additional analyses to reflect changes in the project design. The TMP Team should be consulted when decisions regarding the design and TTC dictate a change in the Draft TMP work zone impact management strategies. Revisions to the strategies should be identified as necessary in the TMP.

B.10. Construction Stage Activities

TMP Revision

Review and modification of construction alternatives and traffic plans may occur before and during the course of projects. The Project Engineer will maintain current documentation regarding the changes and/or deficiencies noted during the implementation of the TMP including how and when the deficiencies were corrected. Any major changes or notable items should be identified at the monthly partnering meetings, which occur during construction. This information should also be provided to the TMP Team in a post-construction meeting to inform the designers of the observed lessons learned from the project.

The Contractor is required to submit all proposed TMP changes to the DDOT Project Engineer for review and approval. Changes may include:

- Work activities that alter traffic control requirements
- Work activities schedules
- Project initiation or completion dates
- Work zone impact management strategies

When alternative construction phasing/staging plans or other management strategies have been revised, DDOT technical specialists will review the revised TMP. The DDOT Project Engineer must approve all TMPs developed or revised during contracting or construction prior to implementation.

TMP Implementation

The TMP should be implemented for the duration of construction. Some elements, such as public information and outreach efforts or improvements to detour routes, may require implementation prior to construction. A trained person from DDOT, most likely the Construction Project Engineer (PE), and a trained person from the Contractor, typically the Traffic Safety Officer (TSO) will be designated to oversee the implementation of the TMP and other safety and mobility aspects of the project.

TMP Monitoring

Monitoring the performance of the work zone and TMP during the construction phase is important to establish whether the predicted impacts closely resemble the actual conditions in the field, and if the strategies in the TMP are effective in managing the impacts.

TMP monitoring is important because traffic data may become outdated during construction, traffic control devices for closures may need replacement, and enforcement strategies may need to be modified for unanticipated events. DDOT or a designated private entity will monitor the TMP for both oversight and evaluation purposes.

Monitoring for oversight purposes is important for:

- Determining how strategies are being implemented and verifying that specified TMP elements will occur on schedule and in the manner planned
- Ensuring CMS, Highway Advisory Radio, and other media tools provide accurate and timely information to motorists, bicyclists and pedestrians regarding travel lane and other transportation facility closure times and other project information
- Ensuring contractor compliance with the lane closure schedule

Monitoring for evaluation purposes is important for:

- Assessing and fine-tuning the performance of all TMP strategies and overall performance of the project corridor and alternative routes
- Tracking public acceptance and ensuring continuation of the project
- Determining cost-effectiveness of individual TMP strategies and shifting resources from the least to most cost-effective strategies
- Determining whether additional TMP elements are needed or particular elements refined

Examples of possible performance measures for TMP monitoring include volume, travel time, queue length, delay, number of incidents, incident response and clearance times, contractor incidents, community complaints, user costs, and cumulative impacts from adjacent construction activities. Base performance-monitoring requirements and performance measures, as stated above, on agency policies, standards, and procedures, are included in the project contract documents. All data should be provided to DDOT for its analysis with respect to TMP monitoring.

Appendix 1F contains a sample of a Field Inspection Report.

B.11. Post-Construction Activities

Evaluations of work zone TMP policies, processes, and procedures aid in addressing and managing the safety and mobility impacts of work zones, particularly for significant projects and when using performance-based contracting. TMP evaluation should focus on the overall TMP process and the actual field performance of the work zone. Various measures of effectiveness and measuring techniques are appropriate for corridor and strategy evaluation.

Post-Project Evaluation

The TMP should include references to the development of a short evaluation report upon completion of construction and should identify the persons responsible for developing this report. The report should document lessons learned and provide recommendations on how to improve the TMP process and/or modify guidelines. Elements to consider for inclusion in the post-project evaluation are:

- Overall statement reflecting the usefulness of the TMP
- Successes and failures
- Areas of the TMP successfully implemented
- Changes to the original TMP and results of those changes
- Public reaction to the TMP
- Frequency of legitimate complaints and nature of complaints (or compliments)

- Actual measures of conditions versus what was predicted (for example, predicted and encountered delay time)
- Cost for implementing the strategies
- Types of crashes during construction
- Suggested improvements or changes for similar future project

Figure 7 illustrates the development of District-level processes and procedures for implementing the policy. The Project Manager (PM) / Construction Project Engineer (PE) will be the TMP team leader unless otherwise determined by the DDOT Chief Engineer or designee. The following sections describe the tasks associated with each stage of the life cycle.

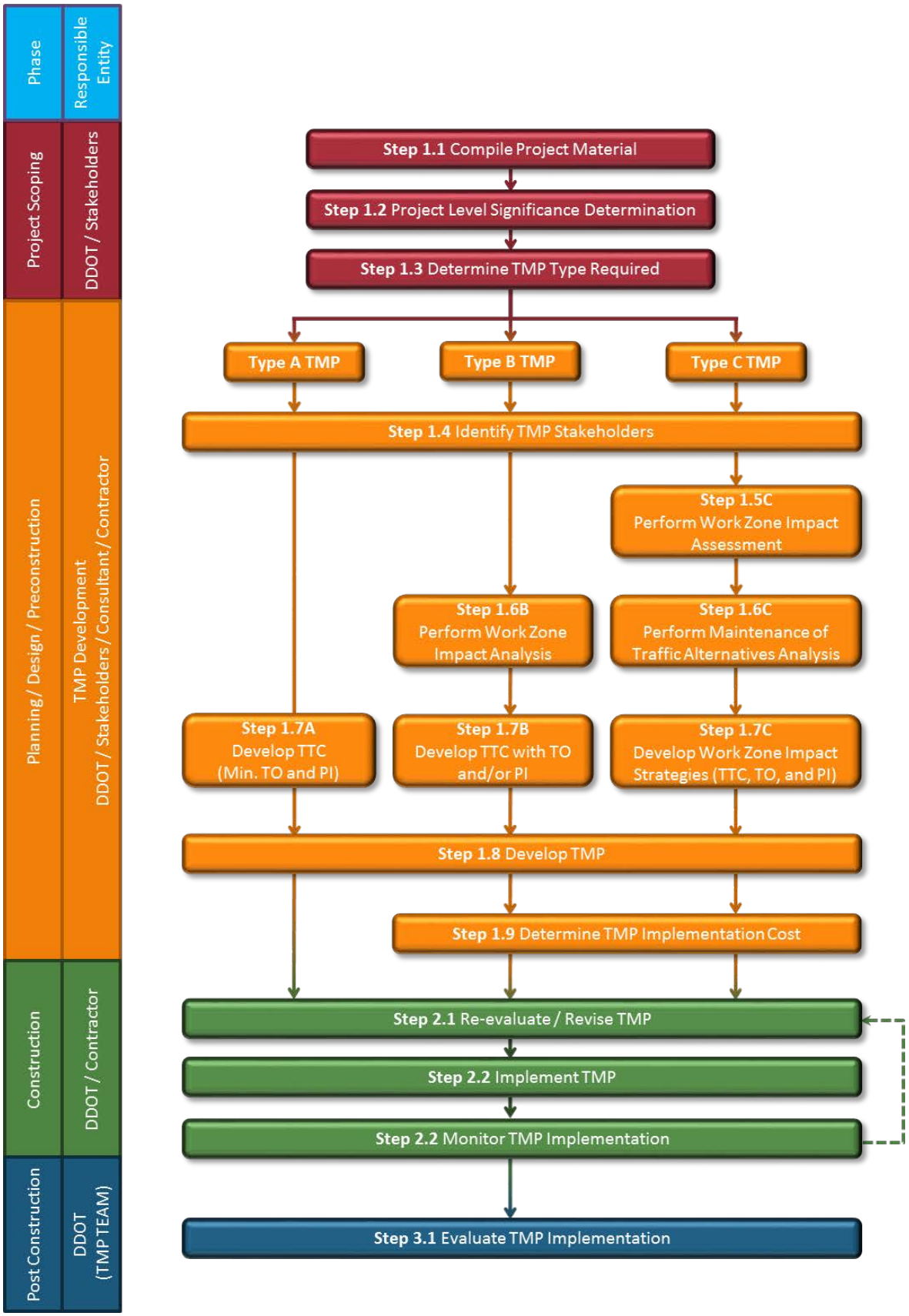

Figure 7. TMP Process Flow Diagram

C. DISTRICT-LEVEL PROCESSES AND PROCEDURES

C.1. Citywide Work Zone Project Management System

DDOT has developed a Citywide Work Zone Project Management System that tracks cumulative work zone impacts and generates regional mitigation strategies to improve mobility and safety throughout the District of Columbia. The system was developed and is maintained by the Infrastructure Project Management Administration (IPMA), which is the DDOT Administration responsible for overseeing the design and construction of transportation facilities within the District.

The Citywide Work Zone Project Management System includes four (4) primary components:

1. A work zone tracking tool
2. A traffic analysis tool
3. An annual Citywide TMP report document
4. An implementation/monitoring program

The goals of the system are to avoid work zone location conflicts, identify and minimize cumulative work zone impacts, identify regional work zone mitigation strategies, and ultimately improve safety and mobility in all work zones throughout the District.

DDOT project managers should coordinate with IPMA (or the entity responsible for transportation facilities design and construction oversight) throughout the various stages of project development to ensure the Citywide Work Zone Project Management System is current and provides DDOT with the full capabilities of the system. While DDOT aims to utilize this system to improve coordination among all work zones, those on critical corridors are of the highest priority.

The DDOT Work Zone Coordination Team (WZCT) will regularly engage inter- and intra-agency project managers to gather project information (new or updated information). At this time, for quality control purposes, this information will be entered into the Work Zone Tracking Tool by the WZCT. The process and frequency for gathering project updates varies and is dependent on the following project categories:

- Long-Term Projects
- Mid-Term Projects
- Near-Term Projects
- On-Going Projects
- Special Events
- Emergency Events

The WZCT will arrange routine project update meetings with stakeholders to ensure all project information is accurate and current.

Long-Term Projects

Long-term projects are ones expected to begin in approximately two to five years. These projects should be entered (or updated) in the Work Zone Tracking Tool annually shortly after relevant long range planning and development documents have been updated. The WZCT will review these long range planning and development documents, engage all major utility companies and developers to identify long-term projects. As needed, the WZCT will make reasonable assumptions related to the sequence of construction and MOT phasing. Work zone information (i.e. location and duration of anticipated sidewalk, bike lane and lane closures, etc.) will be entered into (or updated) in the Work Zone Tracking Tool accordingly.

Mid-Term Projects

Mid-term projects are those expected to begin in approximately six months to two years. These projects should be entered (or updated) in the Work Zone Tracking Tool quarterly shortly after DDOT's annual work plan has been finalized. The WZCT will review the annual work plan, run a *Mid-Term Project Work Zone Tracking Tool Report*, engage all major utility companies and developers to identify mid-term projects and gather preliminary project schedule and lane closure information. As needed, the WZCT will make reasonable assumptions related to the sequence of construction and MOT phasing. Work zone information (i.e. location and duration of anticipated sidewalk, bike lane and lane closures, etc.) will be entered (or updated) in the Work Zone Tracking Tool accordingly.

Near-Term Projects

Near-term projects are those expected to begin within the following six months. At this point, all near-term projects should be entered into the Work Zone Tracking Tool previously or as a result of the interface with DDOT's Transportation Online Permit System (TOPS). These projects should be updated in the Work Zone Tracking Tool monthly. The WZCT will review available project information, run a *Near-Term Project Work Zone Tracking Tool Report*, meet with project managers, engage all major utility companies and developers to identify mid-term projects and gather project schedule and lane closure information. At this point, the WZCT should have a detailed sequence of construction and MOT phasing. The work zone information (i.e. location and duration of anticipated sidewalk, bike lane and lane closures, etc.) will be entered (or updated) in the Work Zone Tracking Tool accordingly.

On-Going Projects

On-going projects generally operate continuously (or throughout one construction season) and are typically asset management or maintenance type projects. On-going projects should be entered info (or updated) in the Work Zone Tracking Tool four times per year. The first entry should occur shortly after DDOT's annual work plan is finalized and subsequent updates should occur at quarterly intervals. The WZCT will review the annual work plan, run an *On-Going Project Work Zone Tracking Tool Report*, meet with project managers, engage all major utility companies to identify on-going projects and gather preliminary project schedule and lane closure information. As needed, the WZCT will make reasonable assumptions related to the sequence of construction and MOT phasing. Work zone information (i.e. location and duration of anticipated sidewalk, bike lane and lane closures, etc.) will be entered (or updated) in the Work Zone Tracking Tool accordingly.

Special Events

Special events are planned activities including parades, races, marches, rallies, festivals, block parties and neighborhood events. Special events should be entered into the Work Zone Tracking Tool as they are received or approved, but at least quarterly. Routine special events (such as the Independence Day Celebration, Cherry Blossom Festival, Marine Corps Marathon, Inauguration, etc.) should be entered into the Work Zone Tracking Tool up to five years in advance. The WZCT will review available special event information, meet with Metropolitan Police Department (who issues special event permits) and gather special event schedule and lane closure information. The special event information (i.e. location and duration of anticipated sidewalk, bike lane and lane closures, etc.) will be entered (or updated) in the Work Zone Tracking Tool accordingly.

Emergency Events

Emergency events, which are anticipated with varying levels of preparation, consist generally of unplanned events. Emergency events typically exist within the range of high probability-low severity incidents (i.e., utility work, minor vehicular crashes, etc.), and low probability-high impact events (i.e., major vehicular crashes, catastrophic events, evacuations). For roadway work that must be performed on an unplanned or emergency basis, the WZCT will coordinate on a continuous basis with the Transportation Systems Management function, which gathers and disseminates emergency information and manages and maintains the transportation infrastructure (i.e., roadways, traffic signals, ITS, utilities, etc.) throughout the District of Columbia. Upon notification, emergency event information will be entered in the Work Zone Tracking Tool (often retroactively). Any restorative roadway work that must be subsequently performed will be addressed by the WZCT as planned projects (i.e., long-term, mid-term, short term, etc.).

For large-scale emergencies (prompting implementation of the Incident Command System), the WZCT will support the emergency support functions (ESF) for Transportation (ESF 1) and Public Works & Engineering (ESF 3), including the initiation of traffic management strategies, protecting incident scenes, providing traffic control, identifying and coordinating roadway repairs, and repairing transportation infrastructure. Given the nature of these incidents, it is likely that unrelated construction activities within the area would be temporarily suspended. However, entry in the Work Zone Tracking Tool will be considered on a case-by-case basis (typically if roadway work attributed to an emergency event overlaps). Similar to lesser-scale emergency events, subsequent restorative work will be addressed by the WZCT as planned projects.

The Citywide Work Zone Project Management System allows DDOT to be proactive when identifying potential work zone impacts and developing plans for mitigation, and it is important for DDOT staff to become familiar with the capabilities and requirements of the system. Part of that process is through formal training sessions, as discussed in the following section.

C.2. Training

All DDOT personnel, consultants, and contractors involved in the development, design, implementation, operation, inspection and enforcement of work zone-related transportation management and traffic control must be trained commensurate with their level of responsibility. Individuals may acquire this training through DDOT-provided courses or training provided by other DDOT-approved agencies or organizations. DDOT's goal is to provide comprehensive training for all current staff regarding recent

updates to work zone documentation, policies, and guidelines, as needed. Additionally, DDOT staff should participate in the available training provided by the other agencies and organizations listed below:

- Advanced Work Zone and Design Course (FHWA)
  - Team Leaders
  - Project Managers
  - Project Engineers
  - Traffic Engineers
  - Traffic Control Design Specialist (ATSSA)
- Design and Operation of Work Zone Traffic Control (FHWA)
  - Inspectors
  - Key Team Members
- Short Interactive Presentation (to be developed)
  - Enforcement Personnel
- Nighttime Work Zones (ATSSA)
  - Inspectors
  - Key Team Members
- Traffic Control and/or Work Zone training (ATSSA, IMSA)
  - Inspectors
  - Key Team Members
  - Flagger Training (ATSSA, IMSA)

Refresher courses should be provided to all the above-mentioned personnel every five years, which will reflect changing industry practices and new agency processes and procedures. IPMA's Office of Safety Standards and Quality Control Division (SSQCD) will implement work zone training requirements as indicated above for various personnel. DDOT is not responsible for training non-agency staff. For additional training requirements, refer to the latest version of the *DDOT Temporary Traffic Control Manual*.

C.3. Work Zone Process Review

A work zone process review should be conducted at least every two years. This review may include an evaluation of work zone crash data and operational data for randomly selected projects. DDOT will maintain the data and information resources needed to support the evaluation of work zone data for the above activities. The results of TMP evaluations can be useful in process reviews. Collecting, analyzing, and synthesizing findings from multiple projects can help refine and improvement the development and implementation of future TMPs.

The process review should include an annual *Work Zone Traffic Control Inspection Ratings Report* and an annual *Work Zone Crash Report*. The *Work Zone Traffic Control Inspection Rating Report* should consist of a summary of inspection ratings from the field inspection report for selected significant projects. The annual *Work Zone Crash Report* should present a crash trend analysis and comparison of work zone crashes

District-wide. Additionally, the process review should include a review of randomly selected post-evaluation reports of significant projects to assess TMP processes and strategies. Appropriate personnel who represent the project development stages and different offices within the agency, FHWA, and non-agency stakeholders, should participate in the process reviews. DDOT IPMA will lead this process.

WORK ZONE SAFETY & MOBILITY POLICY

APPENDIX 1A – FHWA WORK ZONE SAFETY & MOBILITY POLICY (THE RULE)

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DEPARTMENT OF TRANSPORTATION

Federal Highway Administration

23 CFR Part 630

[FHWA Docket No. FHWA–2001–11130]

RIN 2125–AE29

Work Zone Safety and Mobility

AGENCY: Federal Highway Administration (FHWA), DOT.

ACTION: Final rule.

SUMMARY: The FHWA amends its regulation that governs traffic safety and mobility in highway and street work zones. The changes to the regulation will facilitate comprehensive consideration of the broader safety and mobility impacts of work zones across project development stages, and the adoption of additional strategies that help manage these impacts during project implementation. These provisions will help State Departments of Transportation (DOTs) meet current and future work zone safety and mobility challenges, and serve the needs of the American people.

DATES: *Effective Date:* October 12, 2007.

The incorporation by reference of certain publications listed in this rule is approved by the Director of the Federal Register as of October 12, 2007.

FOR FURTHER INFORMATION CONTACT: Mr. Scott Battles, Office of Transportation Operations, HOTO–1, (202) 366–4372; or Mr. Raymond Cuprill, Office of the Chief Counsel, HCC–30, (202) 366–0791, Federal Highway Administration, 400 Seventh Street, SW., Washington, DC 20590–0001. Office hours are from 7:45 a.m. to 4:15 p.m., e.t., Monday through Friday, except Federal holidays.

SUPPLEMENTARY INFORMATION:

Electronic Access

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Background

History

Pursuant to the requirements of Section 1051 of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), (Pub. L. 102–240, 105 Stat. 1914; Dec. 18, 1991), the FHWA developed a work zone safety program to improve work zone safety at highway construction sites. The FHWA implemented this program through non-regulatory action by publishing a notice in the **Federal Register** on October 24, 1995 (60 FR 54562). This notice established the National Highway Work Zone Safety Program (NHWZSP) to enhance safety at highway construction, maintenance, and utility sites. In this notice, the FHWA indicated the need to update its regulation on work zone safety (23 CFR 630, Subpart J).

As a first step in considering amendments to its work zone safety regulation, the FHWA published an advance notice of proposed rulemaking (ANPRM) on February 6, 2002, at 67 FR 5532. The ANPRM solicited information on the need to amend the regulation to better respond to the issues surrounding work zones, namely the need to reduce recurrent roadwork, the duration of work zones, and the disruption caused by work zones.

The FHWA published a notice of proposed rulemaking (NPRM) on May 7, 2003, at 68 FR 24384. The regulations proposed in the NPRM were intended to facilitate consideration and management of the broader safety and mobility impacts of work zones in a more coordinated and comprehensive manner across project development stages, and the development of appropriate strategies to manage these impacts. We received a substantial number of responses to the NPRM. While most of the respondents agreed with the intent and the concepts proposed in the NPRM, they recommended that the proposed provisions be revised and altered so as to make them practical for application in the field. The respondents identified the need for flexibility and scalability in the implementation of the provisions of the proposed rule; noted that some of the terms used in the proposed rule were ambiguous and lent themselves to subjective interpretation. Respondents also commented that the documentation requirements in the proposal would impose undue time and resource burdens on State DOTs.

In order to address the comments received in response to the NPRM, the FHWA issued a supplemental notice of proposed rulemaking (SNPRM) on May 13, 2004, at 69 FR 26513. The SNPRM addressed the comments related to flexibility and scalability of provisions, eliminated ambiguous terms from the language, and reduced the documentation requirements. We received several supportive comments in response to the SNPRM. Most respondents noted that the SNPRM addressed the majority of their concerns regarding the originally proposed rule. However, they did offer additional comments regarding specific areas of concern. In the final rule issued today, the FHWA has addressed all the comments received in response to the SNPRM that are within the scope of this rulemaking

The regulation addresses the changing times of more traffic, more congestion, greater safety issues, and more work zones. The regulation is broader so as to recognize the inherent linkage between safety and mobility and to facilitate systematic consideration and management of work zone impacts. The regulation can advance the state of the practice in highway construction project planning, design, and delivery so as to address the needs of the traveling public and highway workers. The key features of the final rule are as follows:

- A policy driven focus that will institutionalize work zone processes and procedures at the agency level, with specific language for application at the project level.
- A systems engineering approach that includes provisions to help transportation agencies address work zone considerations starting early in planning, and progressing through project design, implementation, and performance assessment.
- Emphasis on addressing the broader impacts of work zones to develop transportation management strategies that address traffic safety and control through the work zone, transportation operations, and public information and outreach.
- Emphasis on a partner driven approach, whereby transportation agencies and the FHWA will work together towards improving work zone safety and mobility.
- Overall flexibility, scalability, and adaptability of the provisions, so as to customize the application of the regulations according to the needs of individual agencies, and to meet the needs of the various types of highway projects.

Summary Discussion of Comments Received in Response to the SNPRM

The following discussion provides an overview of the comments received in response to the SNPRM, and the FHWA's actions to resolve and address the issues raised by the respondents.

Profile of Respondents

We received a total of 33 responses to the docket. Out of the 33 total respondents, 27 were State DOTs; 4 were trade associations; and 2 provided comments as private individuals. The 4 trade associations were namely, the Laborers' Health and Safety Fund of North America (LHSFNA), the American Traffic Safety Services Association (ATSSA), the Associated General Contractors (AGC) of America, and the Institute of Transportation Engineers (ITE). We classified the American Association of State Highway and Transportation Officials (AASHTO) as a State DOT because they represent State DOT interests. The AASHTO provided a consolidated response to the SNPRM on behalf of its member States. Several State DOTs provided their comments individually.

The respondents represented a cross-section of job categories, ranging from all aspects of DOT function, to engineering/traffic/safety/design, to construction and contracting.

Overall Position of Respondents

We received several supportive comments in response to the SNPRM. Most State DOTs, the AASHTO, and all private sector respondents greatly appreciated the FHWA's continued effort to receive input during the development of the proposed rule, and particularly in issuing the SNPRM. Most respondents also noted that the SNPRM addressed the majority of their concerns regarding the originally proposed rule.

The respondents also offered comments on specific areas of concern, and recommended changes to improve the rule's language. The State DOTs and the AASHTO offered comments, which relate to their continued concern that the rule allow for adequate flexibility and scalability while limiting unintended liability and cost. Private sector respondents also offered specific comments on certain areas of concern. Details regarding these issues and FHWA's specific response are discussed in the following section, which provides a section-by-section analysis of the comments.

The level of support for the SNPRM is indicated by the fact that 23 of the 33 respondents expressed overall support for the provisions proposed in the SNPRM. It is to be noted that these respondents were not necessarily supportive of all the provisions, but rather that, their overall position on the SNPRM was supportive. Many of these respondents provided suggestions on modifications and revised language for specific provisions as they deemed appropriate. Of the 23 respondents who were supportive, 21 represented State DOTs and 2 represented trade associations.

Of the remaining respondents, 2 opposed the issuance of the rule, 2 agreed with the intent and the concepts but did not agree with many of the mandatory provisions, and the remaining 6 did not expressly indicate their overall position.

One of the two respondents who opposed the issuance of the rule was the Iowa DOT. It expressed that it supports the goals of improved safety and reduced congestion, but opposes the proposed rule as it would not necessarily help achieve these goals. It believes that its current work zone policies are sufficient to provide for a high standard of safety and mobility. It noted that the rule is not flexible enough, and that it would require significant commitments from its limited staff.

The other respondent that opposed the rule was the Kansas DOT. It suggested that the FHWA retract the rule and, instead, issue the information on work zone safety and mobility as a guide for use by State DOTs. It believes that encouraging State DOTs to review and improve their current practices on work zone safety and mobility, through closer contact with FHWA and other partners, would be more effective than mandating specific processes. It also suggested changes to specific sections, and recommended that the FHWA implement the AASHTO's recommendations, if retraction of the rule was not an option.

Section-by-Section Analysis of SNPRM Comments and FHWA Response

Section 630.1002 Purpose

There were no major comments in response to this section. The overall sentiment of the respondents was supportive of the language as proposed in the SNPRM, and therefore, we will retain the language as proposed in the SNPRM.

Section 630.1004 Definitions and Explanation of Terms

Most respondents were supportive of this section. Some respondents offered specific comments on some of the definitions proposed in the SNPRM. They are discussed as follows:

- Definition for ''Mobility.'' The AGC of America remarked that the definition for mobility seems to imply a greater emphasis on mobility than on safety. It recommended that we change the second sentence of the definition to imply that work zone mobility should be achieved without compromising the safety of highway workers or road users. To address this comment the FHWA has amended the definition by adding the words, ''while not compromising the safety of highway workers or road users'' at the end of the second sentence. In addition, the word ''smoothly'' after the phrase, ''mobility pertains to moving road users,'' has been replaced by the word ''efficiently.''
- Definition for ''Safety.'' The AASHTO and several DOTs recommended that the term, ''road worker(s)'' be changed to ''highway worker(s)'' for the sake of consistency. We agree with this observation, and made this change. The Georgia DOT recommended that the term ''danger'' be changed to ''potential hazards'' to reduce potential liability. We agree with this recommendation, and therefore, replaced the word ''danger'' with ''potential hazards'' in the first sentence. In the second sentence, we rephrased ''minimizing the exposure to danger of road users'' with ''minimizing potential hazards to road users.''
- Definition for ''Temporary Traffic Control (TTC) Plan.'' We moved the definition for the TTC plan from § 630.1004, Definitions and Explanation of Terms, to § 630.1012(b), Transportation Management Plan (TMP), where the requirements for the TTC plan are laid out. This is in response to a comment from the Georgia DOT that the language under the TTC plan section of § 630.1012(b) was not consistent with the Manual On Uniform Traffic Control Devices (MUTCD).[1] Since the definition for the TTC plan was referenced from the MUTCD, it was removed from the definitions section and placed in § 630.1012(b)(1), where TTC plans are discussed.
- Definitions for ''Work Zone'' and ''Work Zone Crash.'' There were several comments recommending changes to certain terminology in both these definitions. For example, the AASHTO

[1] The MUTCD is approved by the FHWA and recognized as the national standard for traffic control on all public roads. It is incorporated by reference into the Code of Federal Regulations at 23 CFR part 655. It is available on the FHWA's Web site at *http://mutcd.fhwa.dot.gov* and is available for inspection and copying at the FHWA Washington, DC Headquarters and all FHWA Division Offices as prescribed at 49 CFR part 7.

and several DOTs suggested that the term, ''traffic units,'' in the first sentence of the Work Zone Crash definition be changed to ''road users.'' However, we have decided not to adopt the changes in order to maintain consistency with other industry accepted sources—the definition for ''work zone'' being referenced from the MUTCD, and that for ''work zone crash,'' from the Model Minimum Uniform Crash Criteria Guideline (MMUCC).[2]

Section 630.1006 Work Zone Safety and Mobility Policy

The majority of the respondents supported the proposed language in this section. The AASHTO and several DOTs recommended the removal of the second clause in the second to last sentence, ''representing the different project development stages.'' These respondents believe that this change would grant the States maximum flexibility to implement the most appropriate team for each project. The FHWA agrees with this observation and has deleted the phrase in question.

The ATSSA recommended that we specifically include or encourage the participation of experienced industry professionals in the multi-disciplinary team referenced in the second to last sentence. The FHWA believes that States will solicit the participation of industry representatives if required for the specific project under consideration.

The Kansas DOT commented that the use of the words ''policy'' and ''guidance'' in the same sentence could be confusing, as policies usually carry more weight than guidance. This comment refers to the second sentence, the first part of which reads, ''This policy may take the form of processes, procedures, and/or guidance * * *'' The FHWA disagrees because we believe that policies do not necessarily have to be mandates. For example, it may be a State DOT policy that it ''shall'' consider and manage work zone impacts of projects, but the actual methods to do so may be provided as guidance to its district/region offices which may vary according to the different types of projects that they encounter. The underlying purpose of the work zone safety and mobility policy section is to require State DOTs to implement a policy for the systematic consideration and management of work zone impacts, so that such consideration and management becomes a part of the mainstream of DOT activities. How a State chooses to implement the policy is its prerogative—and it may take the form of processes, procedures, and/or guidance, and may vary upon the work zone impacts of projects.

The Virginia DOT commented on the second sentence of this section that it does not agree with the ''shall'' requirement to address work zone impacts through the various stages of project development and implementation. It justified its objection by saying that ''addressing work zone impacts through the various stages of project development and implementation'' will not work from a practical standpoint due to unforeseen field conditions and circumstances, and that the shall clause could result in potential litigation. The FHWA disagrees with the Virginia DOT. We would like to mention that the second sentence by itself, when taken out of context, doesn't quite convey the message of the entire section. The preceding sentence and the following sentence need to be considered in interpreting what the second sentence means. The first sentence requires that State DOTs implement a policy for the systematic consideration and management of work zone impacts on all Federal-aid highway projects. The second sentence further qualifies the term ''systematic'' by saying that the policy shall address work zone impacts throughout the various stages of project development and implementation—this implies that the consideration and management of work zone impacts progresses through the various stages. The third sentence further clarifies that the methods to implement this policy may not necessarily be absolute requirements, but rather be implemented through guidance. Further, the third sentence provides a more specific delineator by saying that the implementation of the policy may vary based upon the characteristics and expected work zone impacts of individual projects or classes of projects.

Section 630.1008 Agency-Level Processes and Procedures

The AASHTO and several State DOTs remarked that there is inconsistency with the use of ''Agency'' and ''State Agency,'' and that this needs to be resolved. Further, a few State DOTs sought clarification as to whether ''agency'' applies to the State transportation agency or other entities that might be involved in the project development process (*i.e.*, county and/or local governments and authorities). In response to this comment, we changed all instances of the terms ''State Agency'' and ''Agency'' in the entire subpart to the term ''State,'' as referenced in the rule.

Section 630.1008(a), Section Introduction. There were no specific comments in response to the language in this paragraph. In the second sentence, to remove ambiguity and for clarity, we replaced the words ''well defined data resources'' with the words, ''data and information resources.''

The North Carolina DOT observed that the language in this paragraph is an introduction to the section, and that it should not be labeled as ''(a).'' We did not make this change because the Office of the Federal Register (OFR) requires paragraph designations on all text in a rule.

Section 630.1008(b), Work Zone Assessment and Management Procedures. Most respondents were supportive of the language in this paragraph.

Section 630.1008(c), Work Zone Data. Most State DOTs and the AASHTO opposed the mandatory requirement to use work zone crash and operational data towards improving work zone safety and mobility on ongoing projects, as well as to improve agency processes and procedures. One of the key reasons cited for this opposition was the difficulty and level of effort involved in obtaining and compiling data quickly enough to take remedial action on ongoing projects. A few DOTs also stated that using data to improve State-level procedures was feasible but not at the individual project level. The AASHTO also observed that there is already a reference to data in § 630.1008(e), ''Process Review,'' where the use of data is optional and not mandatory. Some States recommended that we clarify the term ''operational data,'' whether it is observed or collected data. They also noted that the ''shall'' clauses in the first two sentences are inconsistent with the ''encouraged to'' in the last sentence, and questioned as to how the use of data

[2] ''Model Minimum Uniform Crash Criteria Guideline'' (MMUCC), 2d Ed. (Electronic), 2003, produced by National Center for Statistics and Analysis, National Highway Traffic Safety Administration (NHTSA). Telephone 1–(800)–934–8517. Available at the URL: *http://www-nrd.nhtsa.dot.gov*. The NHTSA, the FHWA, the Federal Motor Carrier Safety Administration (FMCSA), and the Governors Highway Safety Association (GHSA) sponsored the development of the MMUCC Guideline which recommends voluntary implementation of the 111 MMUCC data elements and serves as a reporting threshold that includes all persons (injured and uninjured) in crashes statewide involving death, personal injury, or property damage of $1,000 or more. The Guideline is a tool to strengthen existing State crash data systems.

can be mandated when the data resources themselves are optional. The California Transportation Department (CalTrans) questioned the objective of developing TMPs and conducting process reviews if appropriate performance measures and data collection standards are not identified for determining success.

The FHWA provides the following comments and responses to the above stated concerns:

• The purpose of the provisions in this section is not to require States to collect additional data during project implementation, but rather, to improve the use of available work zone field observations, crash data, and operational information to: (1) Manage the safety and mobility impacts of projects more effectively during implementation; and (2) provide the basis for systematic procedures to assess work zone impacts in project development.

For example, most agencies maintain field diaries for constructions projects. These field diaries are intended to provide a log of problems, decisions, and progress made over the duration of a project. In many States, these diaries log incidents and actions such as the need to replace channelization devices into their proper positions after knockdown by an errant vehicle, or to deal with severe congestion that occurred at some point during the day. These log notes, when considered over time, may provide indications of safety or operational deficiencies. To address such deficiencies, it may be necessary and prudent to improve the delineation through the work zone to prevent future occurrences of knockdown events, or to alter work schedules to avoid the congestion that recurs at unexpected times due to some local traffic generation phenomena.

Police reports are another example of an available source of data that may be useful in increasing work zone safety. Provisions are made in many agencies for a copy of each crash report to be forwarded to the engineering section immediately upon police filing of the crash report. Where a work zone is involved, a copy of this report should be forwarded as soon as possible to the project safety manager to determine if the work zone traffic controls had any contribution to the crash so that remedial action can be taken.

These applications do not necessarily require that agencies gather new data, but there may be a need to improve processes to forward such reports to the appropriate staff member for review during project implementation and/or to provide guidance or training to facilitate interpretation of these reports. Agencies may choose to enhance the data they capture to improve the effectiveness of these processes by following national crash data enhancement recommendations and/or linking it with other information (*e.g.*, enforcement actions, public complaints, contractor claims). This same data and information can be gathered for multiple projects and analyzed by the agency to determine if there are common problems that could be remedied by a change in practices. The information may also be used for process reviews.

• The first sentence of this paragraph was revised to convey that States are required to use field observations, available work zone crash data, and operational information at the project level, to manage the work zone impacts of specific projects during project implementation. This provision requires States to use data and information that is available to them, so as to take appropriate actions in a timely manner to correct potential safety or mobility issues in the field. Operational information refers to any available information on the operation of the work zone, be it observed or collected. For example, many areas have Intelligent Transportation Systems (ITS) in place, and many others are implementing specific ITS deployments to manage traffic during construction projects. The application of this provision to a project where ITS is an available information resource, would result in the use of the ITS information to identify potential safety or mobility issues on that project.

• The second sentence was also revised to convey that work zone crash and operational data from multiple projects shall be analyzed towards improving State processes and procedures. Such analysis will help improve overall work zone safety and mobility. Data gathered during project implementation needs to be maintained for such post hoc analyses purposes. Such data can be used to support analyses that help improve State procedures and the effectiveness of future work zone safety and mobility assessment and management procedures.

• The respondents indicated that the use of ''encouraged to'' in the last sentence is inconsistent with the ''shall'' clauses in the first two sentences. Further, the phrase, ''establish data resources at the agency and project levels'' does not clearly convey the message of the provision. This provision does not require States to embark on a massive data collection, storage, and analysis effort, but rather to promote better use of elements of their existing/available data and information resources to support the activities required in the first two sentences. Examples of existing/available data and information resources include: Project logs, field observations, police crash records, operational data from traffic surveillance devices (*e.g.*, data from traffic management centers, ITS devices, *etc.*), other monitoring activities (*e.g.*, work zone speed enforcement or citations), and/or public complaints. We revised the last sentence to convey that States should maintain elements of their data and information resources that logically support the required activities.

• In response to CalTrans' comment regarding establishing performance measures and data collection standards, we appreciate the value of the input, but we believe that we do not have adequate information at this time to specify performance measures for application at the National level. State DOTs may establish such performance measures and data collection standards as applicable to their individual needs and project scenarios. For example, the Ohio-DOT mandates that there shall always be at least two traffic lanes maintained in each direction for any work that is being performed on an Interstate or Interstate look-alike. We believe that such policies need to be developed and implemented according to individual State DOT needs, and hence we maintain a degree of flexibility in the rule language.

Section 630.1008(d), Training. Most State DOTs and the AASHTO opposed the mandatory requirement that would require training for the personnel responsible for work zone safety and mobility during the different project development and implementation stages. These respondents noted that the proposed language implied that State DOTs would be responsible for training all the listed personnel, including those who do not work for the DOT itself, and that this would create a huge resource burden, as well as increase the liability potential for the DOTs. These commenters also ratified their opposition by quoting the MUTCD training requirement, which does not mandate training, but suggests that personnel should be trained appropriate to the job decisions that they are required to make. Some DOTs, including the New York State DOT (NYSDOT), requested that the reference to personnel responsible for enforcement of work zone related transportation management and traffic control be clarified as to whether it refers to law enforcement officers or to field construction/safety inspectors.

The FHWA provides the following comments and responses to the above stated concerns:

• The FHWA agrees that the first sentence in the training section seems to imply that the State would be responsible for training all mentioned personnel; therefore, we changed the sentence to convey that the State shall ''require'' the mentioned personnel be trained. This change will require the State to train direct State employees only, and takes away the burden from the State to train personnel who are not direct employees. We believe that personnel responsible for the development, design, operation, inspection, and enforcement of work zone safety and mobility need to be trained, and this requirement will allow for training to be provided by the appropriate entities. The responsibility of the State would be to require such training, either through policy or through specification. For example, the Florida DOT has developed and required work zone training of their designers and contractors by procedure and by specifications. Similarly, the Maryland State Highway Administration (MD–SHA) provides a maintenance of traffic (MOT) design class to personnel responsible for planning and designing work zones, including consultants and contractors.

• Further, in keeping with the MUTCD language on training, we added the phrase, ''appropriate to the job decisions each individual is required to make'' to the end of the first sentence. This clarifies that the type and level of training will vary according to the responsibilities of the different personnel. For example, Maryland State Highway Police officers attend a 4-hour work zone safety and traffic control session at the Police Academy.

• We also revised the second sentence to convey that States shall require periodic training updates that reflect changing industry practices and State processes and procedures. Since we revised the first sentence to convey that training of non-State personnel is not a State responsibility, in the second sentence, we deleted the phrase, ''States are encouraged to keep records of the training successfully completed by these personnel.''

• In response to the request that ''personnel responsible for enforcement'' of work zone related transportation management and traffic control be clarified, we believe that this group is inclusive of both law enforcement officers and field construction/safety inspectors.

Section 630.1008(e), Process Review. Most respondents were supportive of the language in this section. The AASHTO and several State DOTs recommended that States should have maximum flexibility to implement the most appropriate team for each project. These commenters suggested that the fourth and the fifth sentences of the section be deleted, and that the clause, ''as well as FHWA'' be added to the end of the third sentence.

The FHWA agrees with the observation made by the AASHTO and State DOTs that States should have maximum flexibility to implement the most appropriate review team for each project. Therefore, as suggested, we deleted the fourth and the fifth sentence of the section, and added the clause, ''as well as FHWA'' to the end of the third sentence. Further, in the third sentence, we changed the phrase ''are encouraged to'' to ''should.''

Section 630.1010 Significant Projects

All respondents agreed with the concept of defining significant projects, and the requirement to identify projects that are expected to have significant work zone impacts; however, most State DOTs and the AASHTO opposed the requirement to classify Interstate system projects that occupy a location for more than three days with either intermittent or continuous lane closures, as significant. They cited that all Interstate system projects that occupy a location for more than three days would not necessarily have significant work zone impacts, particularly on low-volume rural Interstate sections. Several DOTs remarked that designation of significant projects purely based on the duration would not be prudent, and that the volume of traffic on that Interstate should be taken into account. They also noted that such classification is not consistent with the MUTCD. They remarked that this provision could not be effectively applied to routine maintenance activities performed by State DOT maintenance crews, and that requesting exceptions to such routine work would be unreasonably arduous.

These respondents also objected to the associated exemption clause for the same provision, commenting that it would be very cumbersome to implement. Some States also requested clarification on whether general exceptions would be granted for work categories for defined segments of Interstate projects where the work would have little impact.

The DOTs of Idaho, Montana, North Dakota, South Dakota, and Wyoming commented that the threshold for designating the reference Interstate projects as significant was too low. They suggested that low volume Interstates and rural Interstates should be excluded, and that, the duration should be extended well above the three-day duration.

The AASHTO and the State DOTs also remarked that the identification of significant projects in ''cooperation with the FHWA'' should be changed to ''in consultation with the FHWA.''

The FHWA provides the following responses and proposed action in response to the referenced concerns:

• We agree with the majority of the concerns raised by the respondents.

• We changed the significant projects clause as applicable to Interstate system projects, to require States to classify as significant projects, all Interstate system projects within the boundaries of a designated Transportation Management Area (TMA), that occupy a location for more than three days with either intermittent or continuous lane closures. We believe that this change addresses all the concerns raised by the respondents. The delineation of projects by the boundaries of a designated TMA will address the work zone impacts of lane-closures on Interstate segments in the most heavily traveled areas with recurring congestion problems. We believe that in general, areas with recurring congestion tend to be severely impacted by lane closures as compared to those without recurring congestion. We also believe that the areas that are already designated as TMAs tend to exhibit patterns of recurring congestion on their Interstates due to heavy traffic demand and limited capacity. This revision, in most cases, would also not require low-volume rural Interstate segments to be classified as significant projects.

• We revised the exemption clause provisions related to the applicable Interstate system projects to allow for exemptions to ''categories of projects.'' This will provide for blanket exemptions for specific categories of projects on Interstate segments that are not expected to have significant work zone impacts. This will eliminate the burdensome procedural aspect of seeking exemptions for Interstate projects on an individual project basis.

• We also reorganized this section to consist of paragraphs (a), (b), (c), and (d). Paragraph (a) provides the general definition for a significant project, with no changes in language from what was proposed in the SNPRM. Paragraph (b) enumerates the purpose of classifying projects as significant, and lays out the requirements for States to classify projects as significant. This language is also the same as what was proposed in the SNPRM. Paragraph (c) provides the revised definition of significant projects

as applicable to Interstate system projects. Paragraph (d) provides the revised exemption clause as applicable to significant projects on the Interstate system.

• In keeping with the overall recommendation of respondents, we changed all instances of ''Agency'' and ''State Agency'' to ''State.''

• We do not agree with the recommendation that the identification of significant projects should be done in ''consultation'' with the FHWA rather than ''cooperation with the FHWA.'' We believe that this is a cooperative process, rather than requiring just consultation. Therefore, we did not make any change to this terminology.

Section 630.1012 Project-Level Procedures

Section 630.1012(a). The North Carolina DOT observed that the language in this section is an introduction to the section, and that it should not be labeled as ''(a).'' We did not make this change because the OFR requires paragraph designations on all text in a rule.

The ITE recommended that the FHWA should encourage consideration of work zone impacts prior to project development, at the corridor and Transportation Improvement Program (TIP) and program development stage. It provided examples of decisions that would be made at the earlier stages, such as, life-cycle cost decisions, and project scheduling decisions. We appreciate ITE's input and agree with the general intent of its suggested content. We believe that the language in §§ 630.1002, Purpose and 630.1010, Significant Projects covers some of the issues to which the ITE refers. Specifically, the following two sentences from the respective sections address the ITE's concerns:

• From § 630.1002, Purpose: ''Addressing these safety and mobility issues requires considerations that start early in project development and continue through project completion.''

• From § 630.1010, Significant Projects: ''This identification of significant projects should be done as early as possible in the project delivery and development process, and in cooperation with the FHWA.''

Section 630.1012(b), Transportation Management Plan (TMP). Most respondents were supportive of the provisions in this section.

The Florida DOT requested further definition for the phrase ''less than significant work zone impacts.'' We believe that the definition for ''work zone impacts'' as provided in § 630.1004 and the clauses for identification of projects with significant work zone impacts, as stated in § 630.1010 adequately describe the phrase ''less than significant work zone impacts.'' We did not take any action in response to this comment.

The New Jersey DOT recommended that, in order to facilitate maximum flexibility to States, the term ''typically'' be introduced before the word ''consists'' in the third sentence of this section. We do not agree with the suggested edit because for significant projects, a TMP shall always consist of a TTC plan, and address Transportation Operations (TO) and Public Information (PI) components, unless an exemption has been granted for that project. We did not take any action in response to this comment.

Section 630.1012(b)(1), Temporary Traffic Control (TTC) Plan. In general, most respondents were supportive of the provisions in this section, except the provision regarding maintenance of pre-existing roadside safety features.

Most State DOTs and the AASHTO were opposed to the provision, which required the maintenance of pre-existing roadside safety features in developing and implementing the TTC plan. They recommended that the FHWA either remove the requirement or change the mandatory ''shall'' to a ''should.''

Several DOTs stated that maintenance of all pre-existing roadside safety features would be very difficult, especially, in urban areas. Other DOTs requested clarification on what ''pre-existing roadside safety features'' would entail—whether it would include items like signs, guardrail, and barriers, or it would include features like shoulders, slopes and other geometric aspects. On that note, several DOTs mentioned that maintenance of pre-existing roadside safety ''hardware'' would be more practical than maintaining pre-existing roadside safety features.

The Laborers Health and Safety Foundation of North America (LHSFNA) continued to stress the requirement for Internal Traffic Control Plans (ITCPs) for managing men and materials within the work area, so as to address worker safety issues better, and to level the playing field for contractors.

The FHWA offers the following in response to the comments and concerns raised above:

• The FHWA agrees with most of the concerns raised by the respondents.

• In the fourth sentence of paragraph (b)(1), we changed the term ''pre-existing roadside safety *features*,'' to ''pre-existing roadside safety *hardware*.'' We believe that this change will address all the concerns raised by the respondents, and eliminate ambiguity and subjectivity from the requirement.

• In response to the LHSFNA's comment regarding ITCPs, we agree that ITCPs are important for providing for worker safety inside the work area, but we still believe that this issue is outside the purview of this rulemaking effort and this subpart.

• In order to be consistent with the remaining sections of this subpart, and to eliminate ambiguity, we deleted the first sentence of this section, and replaced it with the definition for TTC plan as stated in § 630.1004. Consequently, we removed the definition for TTC plan from § 630.1004.

Section 630.1012(b)(2), Transportation Operations (TO) Component. Most respondents were supportive of the provisions in this section. The AASHTO and several DOTs suggested that ''traveler information'' be removed as a typical TO strategy because ''traveler information'' fits more logically in the PI component. The New Jersey DOT recommended that the phrase ''transportation operations and safety *requirements*'' be changed to ''transportation operations and safety *strategies*,'' so as to soften the tone of the language.

We agree with both of the above observations; therefore, we removed ''traveler information'' from the listing of typical TO strategies in the second sentence. We also changed the phrase ''transportation operations and safety *requirements*'' to ''transportation operations and safety *strategies*'' in the last sentence.

Section 630.1012(b)(3), Public Information Component. Most respondents were supportive of the provisions in this section. The AASHTO and several DOTs suggested that ''traveler information'' be included as a typical PI strategy rather than a TO strategy, because ''traveler information'' fits more logically in the PI component. The New Jersey DOT recommended that the phrase ''public information and outreach *requirements*'' be changed to ''public information and outreach *strategies*,'' so as to soften the tone of the language.

We agree with both of the above observations; therefore, we added a new sentence after the first sentence, to indicate that the PI component may include traveler information strategies. We also changed the phrase ''public information and outreach *requirements*'' to ''public information and outreach *strategies*'' in the third sentence.

Section 630.1012(b)(4), Coordinated Development of TMP. Most respondents were supportive of the provisions in this section. The AASHTO and several DOTs

recommended that the terminology, ''coordination and partnership'' in the first sentence, be changed to ''consultation,'' so that it doesn't imply active and direct participation from all the subjects. They explained that the term ''coordination'' implies that all participants have veto/negative powers which may delay project delivery as it is impossible to satisfy everybody. Further, the DOTs of Idaho, Montana, North Dakota, South Dakota, and Wyoming commented that the use of ''*i.e.*'' for the list of stakeholders implies that all those stakeholders are required for all projects. So they recommended that we change the ''*i.e.*'' to ''*e.g.*'' so that it would imply that the list provides examples of possible stakeholders, and that all of them need not be involved in all projects.

The FHWA agrees with both of the above observations and recommendations; therefore, we changed the phrase ''partnership and coordination'' to ''consultation'' in the first sentence of this section. We also changed ''*i.e.*'' to ''*e.g.*'' for the list of stakeholders.

Section 630.1012(c), Inclusion of TMPs in Plans, Specifications, and Estimates (PS&Es). Most respondents were supportive of the provisions in this section. The DOTs of Idaho, Montana, North Dakota, South Dakota, and Wyoming noted that the last sentence in this section could imply that the State shall approve any TMP that is developed by the contractor, irrespective of whether it meets the standards or not. They recommended that the sentence be revised for clarity.

The FHWA agrees with the above observation. We revised the last sentence of this section to convey that contractor developed TMPs shall be subject to the approval of the State, and that the TMPs shall not be implemented before they are approved by the State. This clarifies the language and explicitly states the notion that it is the State that is ultimately responsible for approving any contractor developed TMP.

Section 630.1012(d), Pay Items. Most respondents were supportive of the provisions in this section. However, the ATSAA and the AGC of America opposed the option in § 630.1012(d)(1) for States to use lump sum pay items for implementing the TMPs. The ATSSA believes that unit bid items provide greater specificity and are a better indicator of the direct cost of work zones. Conversely, the use of a lump sum pay item provides less comprehensive data, and may, in some cases, limit, or eliminate the contractor's ability to make a profit on certain projects due to unknown equipment or device requirements either during bidding or project implementation. It cited that unit pay items, especially for the TTC plan, would require that all the identified work zone safety and mobility strategies/equipment/devices be provided for by the contractor. This would level the playing field, and not place conscientious contractors (those who lay emphasis on work zone safety and mobility and include them in their bids) at a disadvantage.

The FHWA recognizes ATSSA's and AGC's concerns, but we believe that States have the required understanding of when to use unit pay items and when not to, and that the requirement for unit pay items on all projects is not practical for real-world application. Therefore, we did not remove the option for DOTs to use lump sum contracting.

We changed ''i.e.'' to ''e.g.'' for the list of possible performance criteria for performance specifications in § 630.1012(d)(2), to remove the implication that the list is an exhaustive list of performance criteria.

Section 630.1012(e), Responsible Persons. Most respondents were supportive of the provisions in this section. A few State DOTs remarked that the terms ''qualified person,'' ''assuring,'' and ''effectively administered,'' in § 630.1012(e) were ambiguous and lent themselves to subjective interpretation.

The FHWA agrees with the above observations. We changed the term ''qualified'' to ''trained,'' as specified in § 630.1008(d) so as to clarify the requirement for the responsible person. We also changed the phrase ''assuring that'' to ''implementing,'' and deleted the phrase, ''are effectively administered.''

Section 630.1014 Implementation

Most respondents were supportive of the provisions in this section. We did not make any changes to the language in this section.

Section 630.1016 Compliance Date

Most respondents were supportive of the provisions in this section. We did not make any changes to the language in this section.

Rulemaking Analyses and Notices

Executive Order 12866 (Regulatory Planning and Review) and U.S. DOT

Regulatory Policies and Procedures

The FHWA has determined that this action is not a significant regulatory action within the meaning of Executive Order 12866 or significant within the meaning of the U.S. Department of Transportation regulatory policies and procedures.

This final rule is not anticipated to adversely affect, in a material way, any sector of the economy. In addition, these changes will not create a serious inconsistency with any other agency's action or materially alter the budgetary impact of any entitlements, grants, user fees, or loan programs; nor will the changes raise any novel legal or policy issues. Therefore, a full regulatory evaluation is not required.

Regulatory Flexibility Act

In compliance with the Regulatory Flexibility Act (RFA) (Pub. L. 96–354, 5 U.S.C. 601–612), the FHWA has evaluated the effects of this final rule on small entities and has determined that it will not have a significant economic impact on a substantial number of small entities.

This rule applies to State departments of transportation in the execution of their highway program, specifically with respect to work zone safety and mobility. The implementation of the provisions in this rule will not affect the economic viability or sustenance of small entities, as States are not included in the definition of small entity set forth in 5 U.S.C. 601. For these reasons, the RFA does not apply and the FHWA certifies that the final rule will not have a significant economic impact on a substantial number of small entities.

Unfunded Mandates Reform Act of 1995

This final rule will not impose unfunded mandates as defined by the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4, March 22, 1995, 109 Stat. 48). The final rule will not result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $120.7 million or more in any one year (2 U.S.C. 1532).

Executive Order 13132 (Federalism)

This action has been analyzed in accordance with the principles and criteria contained in Executive Order 13132, dated August 4, 1999, and it has been determined that this action does not have a substantial direct effect or sufficient federalism implications on States that would limit the policymaking discretion of the States. Nothing in this document directly preempts any State law or regulation or affects the States' ability to discharge traditional State governmental functions.

Executive Order 12372 (Intergovernmental Review)

Catalog of Federal Domestic Assistance Program Number 20.205,

Highway Planning and Construction. The regulations implementing Executive Order 12372 regarding intergovernmental consultation on Federal programs and activities apply to this program.

Paperwork Reduction Act of 1995

Under the Paperwork Reduction Act of 1995 (PRA) (44 U.S.C. 3501, *et seq.*), Federal agencies must obtain approval from the Office of Management and Budget (OMB) for each collection of information they conduct, sponsor, or require through regulations.

The FHWA has determined that this final rule contains a requirement for data and information to be collected and maintained in the support of design, construction, and operational decisions that affect the safety and mobility of the traveling public related to highway and roadway work zones. This information collection requirement was submitted to and approved by the OMB, pursuant to the provisions of the PRA. In this submission, the FHWA requested the OMB to approve a single information collection clearance for all of the data and information in this final rule. The requirement has been approved, through July 31, 2007; OMB Control No. 2125–0600.

The FHWA estimates that a total of 83,200 burden hours per year would be imposed on non-Federal entities to provide the required information for the regulation requirements. Respondents to this information collection include State Transportation Departments from all 50 States, Puerto Rico, and the District of Columbia. The estimates here only include burdens on the respondents to provide information that is not usually and customarily collected.

Executive Order 13175 (Tribal Consultation)

The FHWA has analyzed this action under Executive Order 13175, dated November 6, 2000, and believes that this action will not have substantial direct effects on one or more Indian tribes; will not impose substantial direct compliance costs on Indian tribal governments; and will not preempt tribal law. This rulemaking primarily applies to urbanized metropolitan areas and National Highway System (NHS) roadways that are under the jurisdiction of State transportation departments. The purpose of this final rule is to mitigate the safety and mobility impacts of highway construction and maintenance projects on the transportation system, and would not impose any direct compliance requirements on Indian tribal governments and will not have any economic or other impacts on the viability of Indian tribes. Therefore, a tribal summary impact statement is not required.

Executive Order 13211 (Energy Effects)

The FHWA has analyzed this action under Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution or Use. We have determined that this is not a significant energy action under that order because it is not a significant regulatory action under Executive Order 12866 and is not likely to have a significant adverse effect on the supply, distribution, or use of energy. Further, we believe that the implementation of the final rule by State departments of transportation will reduce the amount of congested travel on our highways, thereby reducing the fuel consumption associated with congested travel. Therefore, the FHWA certifies that a Statement of Energy Effects under Executive Order 13211 is not required.

National Environmental Policy Act

The FHWA has analyzed this action for the purposes of the National Environmental Policy Act of 1969 (42 U.S.C. 4321–4347 *et seq.*) and has determined that this action will not have any effect on the quality of the environment. Further, we believe that the implementation of the final rule by State departments of transportation will reduce the amount of congested travel on our highways. This reduction in congested travel will reduce automobile emissions thereby contributing to a cleaner environment.

Executive Order 12630 (Taking of Private Property)

The FHWA has analyzed this final rule under Executive Order 12630, Governmental Actions and Interference with Constitutionally Protected Property Rights. The FHWA does not anticipate that this action will affect a taking of private property or otherwise have taking implications under Executive Order 12630.

Executive Order 12988 (Civil Justice Reform)

This action meets applicable standards in sections 3(a) and 3(b)(2) of Executive Order 12988, Civil Justice Reform, to minimize litigation, eliminate ambiguity, and reduce burden.

Executive Order 13045 (Protection of Children)

The FHWA has analyzed this action under Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks. The FHWA certifies that this action will not cause an environmental risk to health or safety that may disproportionately affect children.

Regulation Identification Number

A regulation identification number (RIN) is assigned to each regulatory action listed in the Unified Agenda of Federal Regulations. The Regulatory Information Service Center publishes the Unified Agenda in April and October of each year. The RIN contained in the heading of this document can be used to cross reference this action with the Unified Agenda.

List of Subjects in 23 CFR Part 630

Government contracts, Grant programs—transportation, Highway safety, Highways and roads, Incorporation by reference, Project agreement, Traffic regulations.

Issued on: September 1, 2004.

Mary E. Peters,

Federal Highway Administrator.

■ In consideration of the foregoing, the FHWA amends title 23, Code of Federal Regulations, Part 630, as follows:

PART 630—PRECONSTRUCTION PROCEDURES

■ 1. The authority citation for part 630 continues to read as follows:

Authority: 23 U.S.C. 106, 109, 115, 315, 320, and 402(a); 23 CFR 1.32; and 49 CFR 1.48(b).

■ 2. Revise subpart J of part 630 to read as follows:

Subpart J—Work Zone Safety and Mobility

Sec.

§ 630.1002 Purpose.

Work zones directly impact the safety and mobility of road users and highway workers. These safety and mobility impacts are exacerbated by an aging highway infrastructure and growing congestion in many locations. Addressing these safety and mobility issues requires considerations that start early in project development and continue through project completion. Part 6 of the Manual On Uniform Traffic

Control Devices (MUTCD) [1] sets forth basic principles and prescribes standards for the design, application, installation, and maintenance of traffic control devices for highway and street construction, maintenance operation, and utility work. In addition to the provisions in the MUTCD, there are other actions that could be taken to further help mitigate the safety and mobility impacts of work zones. This subpart establishes requirements and provides guidance for systematically addressing the safety and mobility impacts of work zones, and developing strategies to help manage these impacts on all Federal-aid highway projects.

§ 630.1004 Definitions and explanation of terms.

As used in this subpart:

Highway workers include, but are not limited to, personnel of the contractor, subcontractor, DOT, utilities, and law enforcement, performing work within the right-of-way of a transportation facility.

Mobility is the ability to move from place to place and is significantly dependent on the availability of transportation facilities and on system operating conditions. With specific reference to work zones, mobility pertains to moving road users efficiently through or around a work zone area with a minimum delay compared to baseline travel when no work zone is present, while not compromising the safety of highway workers or road users. The commonly used performance measures for the assessment of mobility include delay, speed, travel time and queue lengths.

Safety is a representation of the level of exposure to potential hazards for users of transportation facilities and highway workers. With specific reference to work zones, safety refers to minimizing potential hazards to road users in the vicinity of a work zone and highway workers at the work zone interface with traffic. The commonly used measures for highway safety are the number of crashes or the consequences of crashes (fatalities and injuries) at a given location or along a section of highway during a period of time. Highway worker safety in work zones refers to the safety of workers at the work zone interface with traffic and the impacts of the work zone design on worker safety. The number of worker fatalities and injuries at a given location or along a section of highway, during a period of time are commonly used measures for highway worker safety.

Work zone [2] is an area of a highway with construction, maintenance, or utility work activities. A work zone is typically marked by signs, channelizing devices, barriers, pavement markings, and/or work vehicles. It extends from the first warning sign or high-intensity rotating, flashing, oscillating, or strobe lights on a vehicle to the END ROAD WORK sign or the last temporary traffic control (TTC) device.

Work zone crash [3] means a traffic crash in which the first harmful event occurs within the boundaries of a work zone or on an approach to or exit from a work zone, resulting from an activity, behavior, or control related to the movement of the traffic units through the work zone. This includes crashes occurring on approach to, exiting from or adjacent to work zones that are related to the work zone.

Work zone impacts refer to work zone-induced deviations from the normal range of transportation system safety and mobility. The extent of the work zone impacts may vary based on factors such as, road classification, area type (urban, suburban, and rural), traffic and travel characteristics, type of work being performed, time of day/night, and complexity of the project. These impacts may extend beyond the physical location of the work zone itself, and may occur on the roadway on which the work is being performed, as well as other highway corridors, other modes of transportation, and/or the regional transportation network.

§ 630.1006 Work zone safety and mobility policy.

Each State shall implement a policy for the systematic consideration and management of work zone impacts on all Federal-aid highway projects. This policy shall address work zone impacts throughout the various stages of the project development and implementation process. This policy may take the form of processes, procedures, and/or guidance, and may vary based on the characteristics and expected work zone impacts of individual projects or classes of projects. The States should institute this policy using a multi-disciplinary team and in partnership with the FHWA. The States are encouraged to implement this policy for non-Federal-aid projects as well.

§ 630.1008 State-level processes and procedures.

(a) This section consists of State-level processes and procedures for States to implement and sustain their respective work zone safety and mobility policies. State-level processes and procedures, data and information resources, training, and periodic evaluation enable a systematic approach for addressing and managing the safety and mobility impacts of work zones.

(b) *Work zone assessment and management procedures.* States should develop and implement systematic procedures to assess work zone impacts in project development, and to manage safety and mobility during project implementation. The scope of these procedures shall be based on the project characteristics.

(c) *Work zone data.* States shall use field observations, available work zone crash data, and operational information to manage work zone impacts for specific projects during implementation. States shall continually pursue improvement of work zone safety and mobility by analyzing work zone crash and operational data from multiple projects to improve State processes and procedures. States should maintain elements of the data and information resources that are necessary to support these activities.

(d) Training. States shall require that personnel involved in the development, design, implementation, operation, inspection, and enforcement of work zone related transportation management and traffic control be trained, appropriate to the job decisions each individual is required to make. States shall require periodic training updates that reflect changing industry practices and State processes and procedures.

(e) Process review. In order to assess the effectiveness of work zone safety and mobility procedures, the States shall perform a process review at least every two years. This review may include the evaluation of work zone data at the State level, and/or review of randomly selected projects throughout

[1] The MUTCD is approved by the FHWA and recognized as the national standard for traffic control on all public roads. It is incorporated by reference into the Code of Federal Regulations at 23 CFR part 655. It is available on the FHWA's Web site at *http://mutcd.fhwa.dot.gov* and is available for inspection and copying at the FHWA Washington, DC Headquarters and all FHWA Division Offices as prescribed at 49 CFR part 7.

[2] MUTCD, Part 6, ''Temporary Traffic Control,'' Section 6C.02, ''Temporary Traffic Control Zones.''

[3] ''Model Minimum Uniform Crash Criteria Guideline'' (MMUCC), 2d Ed. (Electronic), 2003, produced by National Center for Statistics and Analysis, National Highway Traffic Safety Administration (NHTSA). Telephone 1–(800)–934–8517. Available at the URL: *http://www-nrd.nhtsa.dot.gov*. The NHTSA, the FHWA, the Federal Motor Carrier Safety Administration (FMCSA), and the Governors Highway Safety Association (GHSA) sponsored the development of the MMUCC Guideline which recommends voluntary implementation of the 111 MMUCC data elements and serves as a reporting threshold that includes all persons (injured and uninjured) in crashes statewide involving death, personal injury, or property damage of $1,000 or more. The Guideline is a tool to strengthen existing State crash data systems.

their jurisdictions. Appropriate personnel who represent the project development stages and the different offices within the State, and the FHWA should participate in this review. Other non-State stakeholders may also be included in this review, as appropriate. The results of the review are intended to lead to improvements in work zone processes and procedures, data and information resources, and training programs so as to enhance efforts to address safety and mobility on current and future projects.

§ 630.1010 Significant projects.

(a) A significant project is one that, alone or in combination with other concurrent projects nearby is anticipated to cause sustained work zone impacts (as defined in § 630.1004) that are greater than what is considered tolerable based on State policy and/or engineering judgment.

(b) The applicability of the provisions in §§ 630.1012(b)(2) and 630.1012(b)(3) is dependent upon whether a project is determined to be significant. The State shall identify upcoming projects that are expected to be significant. This identification of significant projects should be done as early as possible in the project delivery and development process, and in cooperation with the FHWA. The State's work zone policy provisions, the project's characteristics, and the magnitude and extent of the anticipated work zone impacts should be considered when determining if a project is significant or not.

(c) All Interstate system projects within the boundaries of a designated Transportation Management Area (TMA) that occupy a location for more than three days with either intermittent or continuous lane closures shall be considered as significant projects.

(d) For an Interstate system project or categories of Interstate system projects that are classified as significant through the application of the provisions in § 630.1010(c), but in the judgment of the State they do not cause sustained work zone impacts, the State may request from the FHWA, an exception to §§ 630.1012(b)(2) and 630.1012(b)(3). Exceptions to these provisions may be granted by the FHWA based on the State's ability to show that the specific Interstate system project or categories of Interstate system projects do not have sustained work zone impacts.

§ 630.1012 Project-level procedures.

(a) This section provides guidance and establishes procedures for States to manage the work zone impacts of individual projects.

(b) *Transportation Management Plan (TMP).* A TMP consists of strategies to manage the work zone impacts of a project. Its scope, content, and degree of detail may vary based upon the State's work zone policy, and the State's understanding of the expected work zone impacts of the project. For significant projects (as defined in § 630.1010), the State shall develop a TMP that consists of a Temporary Traffic Control (TTC) plan and addresses both Transportation Operations (TO) and Public Information (PI) components. For individual projects or classes of projects that the State determines to have less than significant work zone impacts, the TMP may consist only of a TTC plan. States are encouraged to consider TO and PI issues for all projects.

(1) A TTC plan describes TTC measures to be used for facilitating road users through a work zone or an incident area. The TTC plan plays a vital role in providing continuity of reasonably safe and efficient road user flow and highway worker safety when a work zone, incident, or other event temporarily disrupts normal road user flow. The TTC plan shall be consistent with the provisions under Part 6 of the MUTCD and with the work zone hardware recommendations in Chapter 9 of the American Association of State Highway and Transportation Officials (AASHTO) Roadside Design Guide. Chapter 9 of the AASHTO Roadside Design Guide: ''Traffic Barriers, Traffic Control Devices, and Other Safety Features for Work Zones'' 2002, is incorporated by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51 and is on file at the National Archives and Record Administration (NARA). For information on the availability of this material at NARA call (202) 741–6030, or go to *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.* The entire document is available for purchase from the American Association of State Highway and Transportation Officials (AASHTO), 444 North Capitol Street, NW., Suite 249, Washington, DC 20001 or at the URL: *http://www.aashto.org/bookstore.* It is available for inspection from the FHWA Washington Headquarters and all Division Offices as listed in 49 CFR Part 7. In developing and implementing the TTC plan, pre-existing roadside safety hardware shall be maintained at an equivalent or better level than existed prior to project implementation. The scope of the TTC plan is determined by the project characteristics, and the traffic safety and control requirements identified by the State for that project. The TTC plan shall either be a reference to specific TTC elements in the MUTCD, approved standard TTC plans, State transportation department TTC manual, or be designed specifically for the project.

(2) The TO component of the TMP shall include the identification of strategies that will be used to mitigate impacts of the work zone on the operation and management of the transportation system within the work zone impact area. Typical TO strategies may include, but are not limited to, demand management, corridor/network management, safety management and enforcement, and work zone traffic management. The scope of the TO component should be determined by the project characteristics, and the transportation operations and safety strategies identified by the State.

(3) The PI component of the TMP shall include communications strategies that seek to inform affected road users, the general public, area residences and businesses, and appropriate public entities about the project, the expected work zone impacts, and the changing conditions on the project. This may include traveler information strategies. The scope of the PI component should be determined by the project characteristics and the public information and outreach strategies identified by the State. Public information should be provided through methods best suited for the project, and may include, but not be limited to, information on the project characteristics, expected impacts, closure details, and commuter alternatives.

(4) States should develop and implement the TMP in sustained consultation with stakeholders (*e.g.*, other transportation agencies, railroad agencies/operators, transit providers, freight movers, utility suppliers, police, fire, emergency medical services, schools, business communities, and regional transportation management centers).

(c) The Plans, Specifications, and Estimates (PS&Es) shall include either a TMP or provisions for contractors to develop a TMP at the most appropriate project phase as applicable to the State's chosen contracting methodology for the project. A contractor developed TMP shall be subject to the approval of the State, and shall not be implemented before it is approved by the State.

(d) The PS&Es shall include appropriate pay item provisions for implementing the TMP, either through method or performance based specifications.

(1) For method-based specifications individual pay items, lump sum payment, or a combination thereof may be used.

(2) For performance based specifications, applicable performance criteria and standards may be used (*e.g.*, safety performance criteria such as number of crashes within the work zone; mobility performance criteria such as travel time through the work zone, delay, queue length, traffic volume; incident response and clearance criteria; work duration criteria).

(e) Responsible persons. The State and the contractor shall each designate a trained person, as specified in § 630.1008(d), at the project level who has the primary responsibility and sufficient authority for implementing the TMP and other safety and mobility aspects of the project.

§ 630.1014 Implementation.

Each State shall work in partnership with the FHWA in the implementation of its policies and procedures to improve work zone safety and mobility. At a minimum, this shall involve an FHWA review of conformance of the State's policies and procedures with this regulation and reassessment of the State's implementation of its procedures at appropriate intervals. Each State is encouraged to address implementation of this regulation in its stewardship agreement with the FHWA.

§ 630.1016 Compliance Date.

States shall comply with all the provisions of this rule no later than October 12, 2007. For projects that are in the later stages of development at or about the compliance date, and if it is determined that the delivery of those projects would be significantly impacted as a result of this rule's provisions, States may request variances for those projects from the FHWA, on a project-by-project basis.

[FR Doc. 04–20340 Filed 9–8–04; 8:45 am]

BILLING CODE 4910–22–P

DEPARTMENT OF HOMELAND SECURITY

Coast Guard

33 CFR Part 100

[CGD05–04–155]

RIN 1625–AA08

Special Local Regulations for Marine Events; Hampton River, Hampton, VA

AGENCY: Coast Guard, DHS.

ACTION: Notice of implementation of regulation.

SUMMARY: The Coast Guard is implementing the special local regulations at 33 CFR 100.508 during the Hampton Bay Days Festival to be held September 10–12, 2004, on the waters of the Hampton River at Hampton, Virginia. These special local regulations are necessary to control vessel traffic due to the confined nature of the waterway and expected vessel congestion during the festival events. The effect will be to restrict general navigation in the regulated area for the safety of event participants, spectators and vessels transiting the event area.

DATES: 33 CFR 100.508 will be enforced from 12 p.m. e.d.t. on September 10, 2004 through 6 p.m. e.d.t. on September 12, 2004.

ADDRESSES: Comments and material received from the public, as well as documents mentioned in this preamble as being available in the docket, are part of docket CGD05–04–155 and are available for inspection or copying at Coast Guard Group Hampton Roads, 4000 Coast Guard Blvd., Portsmouth, VA 23703–2199.

FOR FURTHER INFORMATION CONTACT: Chief Petty Officer Michael Bowling, at (757) 483–8521.

SUPPLEMENTARY INFORMATION: Hampton Bay Days, Inc. will sponsor the Hampton Bay Days Festival on September 10–12, 2004 on the Hampton River, Hampton, Virginia. The festival will include water ski demonstrations, personal watercraft and wake board competitions, paddle boat races, classic boat displays, fireworks displays and a helicopter rescue demonstration. A fleet of spectator vessels is expected to gather nearby to view the festival events. In order to ensure the safety of participants, spectators and transiting vessels, 33 CFR 100.508 will be enforced for the duration of the festival activities. Under provisions of 33 CFR 100.508, vessels may not enter the regulated area without permission from the Coast Guard Patrol Commander. Spectator vessels may enter and anchor in the special spectator anchorage areas if they proceed at slow, no wake speed. The Coast Guard Patrol Commander will allow vessels to transit the regulated area between festival events. Because these restrictions will be in effect for a limited period, they should not result in a significant disruption of maritime traffic.

In addition to this notice, the maritime community will be provided extensive advance notification via the Local Notice to Mariners, marine information broadcasts, and area newspapers, so mariners can adjust their plans accordingly.

Dated: August 19, 2004.

Ben R. Thomason, III,

Captain, U.S. Coast Guard, Acting Commander, Fifth Coast Guard District.

[FR Doc. 04–20454 Filed 9–8–04; 8:45 am]

BILLING CODE 4910–15–P

DEPARTMENT OF HOMELAND SECURITY

Coast Guard

33 CFR Part 117

[CGD01–04–114]

Drawbridge Operation Regulations: Fore River, ME

AGENCY: Coast Guard, DHS.

ACTION: Notice of temporary deviation from regulations.

SUMMARY: The Commander, First Coast Guard District, has issued a temporary deviation from the drawbridge operation regulations for the Casco Bay Bridge, mile 1.5, across the Fore River between Portland and South Portland, Maine. This temporary deviation allows the bridge owner to require a four-hour advance notice for bridge openings from September 7, 2004 through November 5, 2004. Additionally, this deviation also allows the bridge to remain in the closed position, Monday through Friday, 9 p.m. to 5 a.m. from September 13, 2004 through October 1, 2004, and again, Monday through Friday, 6 a.m. to 6 p.m. from October 4, 2004 through October 22, 2004. This temporary deviation is necessary to facilitate structural modifications at the bridge.

DATES: This deviation is effective from September 7, 2004 through November 5, 2004.

FOR FURTHER INFORMATION CONTACT: John McDonald, Project Officer, First Coast Guard District, at (617) 223–8364.

SUPPLEMENTARY INFORMATION: The bridge owner, Maine Department of Transportation, requested a temporary deviation from the drawbridge operating regulations to facilitate structural modifications designed to improve reliability of the operating system at the bridge. The Coast Guard coordinated these requested closures with the mariners that normally use this waterway in order to minimize any disruption to the marine transit system.

Under this temporary deviation a four-hour advance notice for bridge openings shall be required from September 7, 2004 through November 5,

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WORK ZONE SAFETY & MOBILITY POLICY

APPENDIX 1B – DDOT USER COST METHODOLOGY MEMORANDUM (MARCH 4, 2015)

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300 M Street, SE, Suite 880 | Washington, DC 20003 | P 202.479.2707 | F 855.263.6293 | www.rkk.com

March 4, 2015

Mr. Clarence L. Dickerson III, PE
Project Development Project Manager, Contracting Officer's Technical Representative
District Department of Transportation, Project Development & Environmental Division
Infrastructure Project Management Administration
55 M Street, SE, Suite 400
Washington, DC 20003

Reference: User Cost Methodology
Contract No: DCKA-2013-T-0126, Task 4 (TMP Services)
Order No: PO498618 – KA0/IPMA/CW Transportation Management Plan

Dear Mr. Dickerson:

The following constitutes our milestone deliverable for Subtask 3.7 for the referenced project in accordance with Contract No. DCKA-2013-T-0126 and our task proposal dated April 11, 2014.

MEMORANDUM

The Traffic Analysis Tool (TAT) for the DDOT Citywide Work Zone Project Management System provides a function to calculate user costs associated with work zone. This brief memorandum summarizes the methodology and parameters used in TAT to calculate user cost.

The calculations used in TAT are based on the methodologies presented in the American Association of State Highway and Transportation Officials (AASHTO) publication User Benefit Analysis for Highways (commonly referred to as the "Red Book"). The "Red Book" presents four (4) primary components of user cost: 1) delay costs, 2) operating costs, 3) crash costs, and 4) project management costs.

Delay costs typically represent the most significant user costs, and therefore, delay costs are the only user cost component currently calculated in TAT. Operating costs are associated with traveling extra distance, making extra stops and idling in a queue. Since the simulation model used in TAT is a meso-simulation, it does not track travel distance, number of stops, and time in idling, and therefore it cannot calculate operating costs. The tool also does not provide a safety evaluation, and therefore cannot calculate crash costs. Finally, project management costs typically relate to the life cycle costs of individual projects, which is outside the scope of the Citywide Work Zone Project Management System.

Delay costs are calculated in two steps. First, each road user's "value of time" is determined. Then, that value of time is multiplied by the average delay per vehicle to obtain the delay cost.

The "Red Book" recommends the following equations for calculating the "value of time" for cars and trucks:

Equation 1: *Value of time per car = average vehicle occupancy * 50% * average wage rate*
Equation 2: *Value of time per truck = average vehicle occupancy * 100% * average truck driver compensation*

TAT provides functions for administrator users to set values for the following parameters to perform the calculation. The current assumed values and sources are listed below:

Parameter 1: Average wage of rate of motorists in cars
Current Value: $30.89 for DC metropolitan area (2013)
Source: Bureau of Labor Statistics website.

Parameter 2: Average vehicle occupancy for cars
Current Value: 1.2
Source: MWCOG reports

Parameter 3: Average total compensation for truck drivers
Current Value: $28.34 ($22.67 wage rate for DC metropolitan area (2013), plus 25% compensation percentage)
Source: Bureau of Labor Statistics website

Parameter 4: Average vehicle occupancy for trucks:
Value: 1.12
Source: Maryland SHA User Cost Guidelines

Average additional delay associated with work zone for an intersection/segment is calculated by taking the average delay in a period with work zones minus the average delay in a baseline case without work zones during selected period (AM peak, PM peak, off peak, or weekend).

Once the value of time and additional delay are known, the hourly delay cost in selected period can be calculated using the summary of all intersections/segments in selected area:

Equation 3: *Hourly Delay Cost = Ave delay * (Vol * % autos * VOT_a + ADT * % truck * VOT_t)*

Where:
Ave delay = average delay per vehicle (hr/veh)
Vol = traffic volume during selected period
% auto = percentage of non-trucks in the traffic stream
VOT_a = value of time per auto ($/hr)
% truck = percentage of trucks in the traffic stream (assume 5% if unknown)
VOT_t = value of time per truck ($/hr)

WORK ZONE SAFETY & MOBILITY POLICY

APPENDIX 1C – WORK ZONE IMPACT MANAGEMENT STRATEGIES

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Overview of Work Zone Impact Management Strategies

This appendix briefly describes various work zone management strategies, grouped according to the following three categories:

1. TEMPORARY TRAFFIC CONTROL (TTC):
    - 1.1 Control strategies
    - 1.2 Traffic control devices
    - 1.3 Project coordination, contracting and innovative construction strategies
2. TRANSPORTATION OPERATIONS (TO):
    - 2.1 Demand management strategies
    - 2.2 Corridor/network management (traffic operations) strategies
    - 2.3 Work zone safety management strategies.
    - 2.4 Traffic/incident management and enforcement strategies
3. PUBLIC INFORMATION AND OUTREACH (PI&O):
    - 3.1 Public Information and Outreach Campaign
    - 3.2 Communication Strategies

This set of strategies is not meant to be all-inclusive; rather, it offers a large number to consider, as appropriate, in developing transportation management plans (TMPs).

Individual strategies may fit into multiple categories. For example, changeable message signs (CMS) are a traffic control device defined in the *Manual on Uniform Traffic Control Devices* (MUTCD), and thus are included in this category. However, they are also frequently used for motorist information and are included in that category as well.

Note: *Maintain preexisting roadside hardware at an equivalent or better level than existed prior to project implementation.*

1 TEMPORARY TRAFFIC CONTROL (TTC)

Temporary traffic control strategies, devices, and contracting/construction techniques and coordination are used to facilitate traffic flow and safety through and around work zones. Standards, guidance, and other information defining the proper use of the traffic control strategies and devices are provided in:

- District of Columbia Temporary Traffic Control Manual Guidelines and Standards.
- District of Columbia Standard Specifications for Highways and Structures, 2006 or latest
- Manual on Uniform Traffic Control Devices Part 6, 2003 or latest
- Chapter 9 of American Association of State Highway and Transportation Officials, 2004 or latest

- National Highway Cooperative Research Program 350 Report, 1993 or latest
- DDOT Context Sensitive Design Guidelines 2005 or latest

In developing and implementing TTC plans for projects, maintain preexisting roadside hardware at an equivalent or better level than existed prior to project implementation.

1.1 Control Strategies

This category includes various traffic control approaches used to accommodate road users within the work zone or the adjoining corridor in an efficient and safe manner, while providing adequate access to the roadway for the required construction, maintenance, or utility work to be performed.

- Construction phasing/staging. Staging typically refers to how the contractor will position the equipment and materials. Phasing refers to the sequencing of the aspects of a project, completing portions of the project one part at a time. Minimize the impacts of a work zone on traffic by using operationally sensitive phasing and staging throughout the life of the project.
- Full roadway closures. This strategy involves complete closure of the roadway for various time periods to minimize the duration of the project and improve worker safety by reducing traffic conflicts. Full closures may be brief (e.g., intermittent, off -peak), short term (e.g., night, weekend), or long term (e.g., continuous for the duration of the project).
- Lane shifts or closures. Lane shifts or closures last for varying durations of time. They may be intermittent, off-peak, night, weekend, for a single project phase, or continuous for the duration of the project. This strategy involves multiple approaches, including:
  - *Reduced lane widths to maintain number of lanes (constriction).*
  - *Lane closures to provide worker safety.*
  - *Reduced shoulder width to maintain number of lanes.*
  - *Shoulder closures to provide worker safety.*
  - *Lane shift to shoulder/median/parking lane to maintain number of lanes.*
- One-lane, two-way controlled operation. One-lane, two-way traffic control involves using one lane for both directions of traffic, allowing work activities to occur in the closed lane.
- Two-way traffic on one side of facility. This strategy involves closing one side of a facility to permit the work to proceed without traffic interference while both directions of traffic are accommodated on the opposing side of the roadway.
- Reversible lanes. Also known as variable lanes or contra-flow lanes, this strategy involves sharing lane(s) of travel to accommodate peak-period traffic flow. The direction of travel in the shared lane varies by time of day or day of week.
- Ramp closures/relocation. Ramp closure involves closing one or more ramps in or near the work zone for specific time periods or construction phases to allow work access or improve traffic flow on the mainline.
- Freeway-to-freeway interchange closures. This strategy involves closing one or more freeway-to-freeway interchange connectors over a period of time.

- **Night work**. Work is performed at night (end of evening peak period to beginning or morning peak period) to minimize work zone impacts on traffic and adjacent businesses.
- **Weekend work**. Construction work (all or individual phases) is restricted to weekend periods from the end of the Friday afternoon peak period to the beginning of the Monday morning peak period.
- **Work hour restrictions for peak travel**. This involves restricting work hours such that work impacting traffic does not occur during periods of peak travel demand and congestion (e.g., peak hours, holidays, special events).
- **Pedestrian/bicycle access improvements**. This strategy provides for alternate facilities for bicyclists and pedestrians (including those with disabilities, in accordance with the Americans with Disabilities Act of 1990) in places where the work zone impacts their accessibility.
- **Business access improvements**. Some projects will directly impact businesses, particularly accessibility. Accessibility improvements for businesses may include signage or information directing motorists to the business(es) and/or relocating access locations.
- **Off-site detours/use of alternate routes**. This strategy involves rerouting some or all traffic off of the roadway under construction and to other existing roadways.

1.2 Traffic Control Devices

The MUTCD provides standards, guidelines, and other information pertaining to installing, maintaining, and operating traffic control devices on streets and highways. Part 6 of the MUTCD, "Temporary Traffic Control," addresses safety, mobility, and constructability issues in work zones. It applies to all types of highway work from major construction on high-volume freeways to minor maintenance on residential streets, and everything in-between. Traffic control devices and other safety devices used for work zones include:

- **Temporary signs**. Several types of temporary signs provide information to road users to enable safe and efficient travel through the work zone or a detour. Temporary signs are an essential and integral part of temporary traffic control and are used in nearly all work zones. Temporary signs typically include the following types:
  - *Warning*. These signs give notice to road users of a situation that may not be readily apparent (e.g., speed reductions and road or lane narrows).
  - *Regulatory*. These signs provide notice to road users of traffic laws or regulations through the work zone (e.g., speed limits, fine notices, parking restrictions, or road closed).
  - *Guide/information*. Advance signing and signing in and around the work zone area notify the motoring public of the work zone and/or offer options for alternative routes. Signs may include dates and/or locations of construction and/or closures. Detour signs direct motorists onto detour routes, through the detour, and back to the route from which they were diverted. Advance notice is required so that motorists have time to choose an alternate route.

- **Changeable message signs (CMS)**. Both fixed and portable CMSs are highly effective in conveying work zone information to drivers, especially when that information is subject to frequent change or addresses a short-term or current situation or condition within the work zone. These signs provide real-time information to drivers concerning specific work operations, traffic patterns, and other conditions in the work zone. These devices help drivers avoid conflicts and potential crashes as they travel through the work zone.
- **Arrow panels**. Also referred to as arrow boards, arrow panels operating in flashing or sequential mode are intended to aid motorists as they navigate and merge through and around the work zone.
- **Channelizing devices**. These devices include traffic cones, drums, barricades, or tubular markers and provide traffic control through the work zone. The purpose is to define the intended travel path through the work zone and delineate potential work zone hazards.
- **Temporary pavement markings**. Various types of temporary markings on the pavement are available to define travel lanes and provide guidance and information for the road user through the work zone.
- **Flaggers and uniformed traffic control officers**. Flaggers, and to a lesser extent police or traffic control officers, direct and control road user and pedestrian traffic in work zones.
- **Temporary traffic signals**. Fixed or portable temporary traffic signals can improve traffic flow through and near the work zone and/or address safety concerns.
- **Lighting devices**. A wide range of lighting devices, listed in Part 6 of the MUTCD are available for use in work zones. Lighting strategies offer enhancement to other work zone strategies by attracting attention to the devices and improving delineation, particularly for adverse conditions. They can also be used to improve worker safety and to guide road users through a work zone, particularly during night work.

1.3 Project Coordination, Contracting, and Innovative Construction Strategies

- **Project coordination**. Project coordination strategies having the potential to reduce mobility and safety impacts of work zone activities include:
  - *Coordination with other projects.* Coordinating, sequencing, and scheduling projects can minimize motorist delay and impacts on potentially affected businesses and communities.
  - *Utilities coordination.* Coordinating and scheduling utility work both within the impacted work zone area and near the project can minimize potential work disruptions or interruptions resulting from utility work, and reduce overall construction duration. Coordination can also reduce the recurrence of work zones by doing two jobs together. For example, the installation of a communications conduit (for traffic management, ITS, etc.), a new water main or power along a highway corridor may coincide with a pavement reconstruction project on that highway.
  - *Right-of-way coordination.* Increased consideration of potential right-of- way needs and issues may help reduce project delays and duration.

- *Coordination with other transportation infrastructure.* Coordination with non-highway transportation facilities such as transit junctions, railroad crossings, and other intermodal facilities can help minimize traffic disruptions.

- Contracting strategies. These strategies typically involve contractual agreements to reduce the project duration or traffic impacts including:
  - *Design-build*. This strategy involves using a single contract to design and build the project, thus reducing project duration by allowing construction to begin prior to design completion.
  - *A+B bidding*. A+B bidding encourages contractors to minimize construction impacts by reducing construction time. Part A refers to the contractor's bid for the actual items of work, and Part B is the total number of days bid to complete the project multiplied by the daily road user cost stipulated in the contract. The combined values of the A and B portions determine the winning bid. The contractor's payment is based on both Part A and the actual number of days used under Part B.
  - *Incentive/disincentive clauses*. This strategy involves using incentives and/or disincentives in the construction contract to minimize construction duration.
  - *Lane rental*. Lane rental involves a charge assessed to the contractor when a portion of the roadway is obstructed and unavailable to traffic. The lane rental charge can vary according to time of day, day of week, number of lanes impacted, and duration. The contractor's bid includes an estimate of the number of hours that closures will be in place, with the actual payment to the contractor based on the actual use of closures.

- Innovative construction techniques (pre-cast members, rapid cure materials). These strategies employ special materials such as quick-curing concrete or pre-cast items (e.g., culverts, bridge deck slabs, and pavement slabs) to lessen the duration of construction or maintenance activities where traffic restrictions need to be minimized (e.g., roadways with high volumes). They are also used when work activities must be completed during night or weekend periods to allow reopening travel lanes for normal weekday travel.

2 TRANSPORTATION OPERATIONS (TO)

Transportation operations strategies can mitigate work zone impacts by using improved transportation operations and management of the transportation system. TO strategies typically include:

2.1 Demand Management
2.2 Corridor/Network Management
2.3 Work Zone Safety Management Strategies
2.3 Work Zone Intelligent Transportation Systems
2.4 Traffic/Incident Management and Enforcement Strategies

2.1 Demand Management Strategies

Demand management strategies include a wide range of techniques intended to reduce the volume of traffic traveling through the work zone by such means as diverting travelers to alternate modes, shifting trips to off-peak hours, or shifting vehicles to alternate routes. These strategies include:

- **Transit service improvements**. Where appropriate, transit service improvements may include modifying transit schedules and/or routes, increasing frequency, or establishing transit service in the corridor.
- **Transit incentives**. Transit incentives include employer and/or traveler transit subsidies and guaranteed ride home programs.
- **Shuttle services**. Shuttles and charter buses can reduce traffic volumes through a work zone if a sufficient number of users along the corridor are anticipated to use the service.
- **Parking supply management**. This strategy involves reducing traffic demand by managing the parking supply, typically through cost strategies.
- **Variable work hours**. This strategy encourages motorists who typically travel through the work zone during periods of high demand to work variable hours (off peak) in order to reduce travel demand during peak periods.
- **Telecommuting**. Telecommuting allows motorists to work at home, or at a telecommuting center near home, either full or part time. Encouraging motorists who normally travel through the work zone to telecommute for the duration of the project can reduce the demand.
- **Ridesharing/carpooling incentives**. Rideshare/carpool incentives can reduce the number of vehicles traveling through a work zone. Incentives may include preferential parking for carpools, the addition of mainline HOV lanes or bypass lanes on ramps, providing vanpool vehicles, etc.
- **Park-and-ride promotion**. Creating, expanding, and/or promoting (advertising) park-and-ride lots to encourage ridesharing or transit use can reduce the number of vehicles traveling through the work zone.

2.2 *Corridor/Network Management Strategies*

This category includes using various traffic operations techniques and technologies to optimize traffic flow through the work zone corridor and adjacent roadways:

- **Signal timing/coordination improvements**. Retiming traffic signals can increase throughput of the roadway(s), improve traffic flow, and optimize intersection capacity in and around the work zone.
- **Temporary traffic signals**. Installing temporary traffic signals can improve traffic flow through and near the work zone. At a corridor or network level, using temporary traffic signals is more effective than STOP signs or flaggers for providing mobility through the work zone area. These temporary traffic signals may also be coordinated with existing signals.
- **Street/intersection improvements**. Improvements on streets and intersections for the roadway and/or alternate routes may be necessary to provide increased capacity to handle the traffic through the work zone or within the adjacent corridor. This may involve improvements to the mainline and intersections, including roadway and/or shoulder widening, additional through and/or turn lanes and removing parking.
- **Bus turnouts**. Constructing bus stop areas that are recessed from the travel lanes may be helpful in work zones or on detour routes with a high occurrence of bus traffic and stops.

- **Turn restrictions**. Restricting turn movements for driveways and/or intersections can increase roadway capacity, reduce potential congestion and delays, and improve safety. Restrictions may be applied during peak periods or all day.
- **Parking restrictions**. Eliminating parking in all or part of the work zone and/or alternate routes, or parking restrictions during work hours or peak traffic periods can be used to increase capacity by converting the parking lane to an additional travel lane, reduce traffic conflicts, or provide improved access to the work area.
- **Truck/heavy vehicle restrictions**. Imposing restrictions on truck travel through the work zone, either during specific periods or at all times, can increase passenger vehicle capacity of the roadway when a facility normally has a high truck volume. When using this strategy, follow the requirements of 23 CFR Part 658.11 (d) (1) and (g).
- **Reversible lanes**. Also known as variable lanes or contra-flow lanes, this strategy involves sharing lane(s) of travel to accommodate peak period traffic flow. The direction of travel in the shared lane varies by time of day or day of the week.
- **Dynamic lane closure system**. Also called dynamic lane merge system, the system uses dynamic electronic signs and other special devices to control vehicle merging at the approach to lane closures.
- **Ramp closures**. This strategy involves closing one or more ramps in or around the work zone. Closures may be necessary to provide work access within the work space or used to improve traffic flow on the mainline.
- **Coordination with adjacent construction site(s)**. Combining or coordinating projects within a specific corridor can minimize the combined impacts on the motoring public and community. Coordination typically involves scheduling projects within a corridor to ensure that adequate capacity remains available to accommodate the anticipated travel demand within the corridor by not implementing work zones on adjacent or parallel highways at the same time. This may entail communicating about the timing of lane closures and occurrence of incidents, and coordinating diversion routes. It may also involve completing needed capacity and safety improvements on a highway prior to its use to carry traffic diverted or detoured from another project.

2.3 Work Zone Safety Management Strategies

Use this category of devices, features, and management procedures to address traffic safety concerns in work zones. Work zone safety management strategies include:

- **Speed Limit Reduction/Variable Speed Limit**. Reduced work zone speed limits may improve traffic safety and protect workers. Reduced sped limits may also be appropriate on detours with increased traffic volumes and conflicts.
- **Temporary Traffic Signals**. In some work zones, temporary traffic signals can be used in place of traffic control officers or flaggers, which may increase safety by removing these personnel from the roadway.
- **Temporary traffic barrier**. Temporary traffic barriers provide positive physical separation between travel lanes and the adjacent work space, or between opposing travel lanes. Screens may be mounted on the top of temporary traffic barriers to reduce headlight glare.

- Movable traffic barrier systems. This system involves a mechanical transfer machine, which quickly shifts temporary barrier laterally to the full width of a travel lane while protecting both the transfer operation and traffic in the work zone. This system permits rapid and safe reconfiguration of the traffic barrier system, allowing daily opening and closing of lanes for reversible-lane operations and to provide additional space for the contractor to work during off-peak conditions.
- Crash cushions. Also known as an impact attenuator, a crash cushion is a fixed or mobile barrier used to protect a temporary hazard or prevent vehicle intrusion into the workspace or other hazardous area. It works by gradually decelerating the vehicle to a stop or by redirecting the vehicle away from the hazard.
- Temporary rumble strips. Rumble strips are grooves or raised strips placed across or adjacent to a travel lane to alert motorists to a change in roadway conditions or that they have strayed out of the travel lane.
- Intrusion alarms. Various types of sensors can detect vehicles that stray out of the travel lane approaching or adjacent to the workspace and into the work area. When an intrusion is detected, a loud siren and/or flashing lights provide a warning to workers.
- Warning lights. Various types of warning lights, as described in the MUTCD, are available to alert drivers and pedestrians and draw attention to critical signs, channelizing devices, and other work zone features.
- Automated Flagger Assistance Devices (AFADs). AFADs are portable traffic control systems that assist a flagger operation for short-term lane closures, on two-lane highways. For a typical flagging operation with AFADs, one or both flaggers can be positioned a short distance away from the roadway and moving traffic. A flagger(s) can use a radio control unit or an attached cable to operate an AFAD(s).
- Project task force/committee. This strategy creates a project task force or committee to address safety and/or traffic control within the work zone and adjacent corridor.
- Construction safety supervisor/inspectors. Daily inspection and supervision of safety and/or traffic control operations is an integral part of project management, and can be provided by various contractor and/or agency personnel, as appropriate to their specific project responsibilities.
- Road safety audits. Road safety audits involve analyzing a future or existing roadway by an independent expert on safety issues. It is a proactive way to reduce crashes and identify potential safety hazards. Audits may be performed during any stage of a road project, including planning, preliminary design, detailed design, traffic control planning, construction, pre-opening, and on existing roads.
- TMP monitor/inspection team. This strategy involves establishing a team (or person) to monitor and inspect implementation and monitoring of the work zone transportation management strategies.
- Team meetings. The project team meets on a regular basis to discuss TMP strategies, implementation, and monitoring, particularly related to safety concerns.

- **Project on-site safety training**. Ongoing safety training to ensures workers are familiar with safety procedures and specific risks associated with the project and maintains a high level of safety awareness.
- **Safety awards/incentives**. Strategy uses awards or incentives for innovations that reduce the safety impacts associated with the work zone.
- **Windshield surveys**. This strategy involves a designated DOT employee and/or contractor driving through the work zone area to conduct a firsthand assessment of safety and/or traffic flow. This strategy provides periodic assessments of the effectiveness of project safety features.

2.4 Work Zone Intelligent Transportation Systems (WZ-ITS)

Using intelligent transportation systems (ITS) in work zones has the potential to make traffic flow through and around the work zone safer and more efficient. WZ ITS electronics, computers, and communications equipment can be used to collect information, process it, and take appropriate action. ITS technology can be applied in work zones to monitor and manage traffic, provide traveler information, or track and evaluate contract incentives/disincentives (performance-based contracting). WZ-ITS technology may also be applied to enhance the safety of both the road user and worker or increase capacity.

- **Late lane merge concept**. This strategy instructs motorists to use both lanes until the merge point and then take turns merging as they approach a single lane closure situation. The late lane merge concept can be accomplished using static sign or a dynamic system.
- **PCMS with speed display**. Portable Changeable Message Signs (PCMS) with Speed Display is a WZ-ITS system that can be effectively used to reduce the speed of vehicles traveling through work zones and to increase speed limit compliance in work zones. Speed-detection devices are connected to the PCMS units and provide vehicle speed information to the PCMS. The vehicle speeds are then displayed to passing motorists.
- **Travel time estimation system**. Travel time estimation is a WZ-ITS system that obtains real-time traffic data and uses computer software to predict the current travel time on a section of roadway. The information can then be displayed to the motorist on a PCMS, displayed on the Internet, or sent to a pager/cell phone/PDA.
- **Advanced speed information system**. An advanced speed information system is a WZ-ITS system that uses microwave traffic sensors and PCMSs to alert motorists of upcoming traffic conditions. This information can also be displayed on the Internet or sent to a pager/cell phone/PDA.
- **Advanced congestion warning system**. This WZ-ITS system is designed to detect congestion (or slowed traffic) in a work zone and alert travelers farther upstream via PCMSs that the congestion is occurring. This information can also be displayed on the Internet or sent to a pager/cell phone/PDA.
- **Conflict warning system**. This WZ-ITS system is designed to detect potentially hazardous conditions and warn travelers of the condition in time for evasive action. Typical conflict warning systems include runaway truck warning, excessive speed warning, and restricted clearance warning.

- **Travel time monitor system**. This WZ-ITS system obtains real-time traffic data and uses computer software to monitor the current travel time on a section of roadway. This information can be used in combination with a maximum travel- time-oriented performance-based specification to verify contractor compliance with the spec and/or to determine the incentive/disincentive to be awarded to the contractor.
- **Freeway queue monitor system**. This WZ-ITS system is designed to assess current traffic conditions and report the queue length in real-time over specified intervals. This information can be used in combination with a maximum queue length-oriented performance-based specification to verify contractor compliance with the spec and/or to determine the incentive/disincentive to be awarded to the contractor.

2.5 *Traffic/Incident Management and Enforcement Strategies*

This category includes various strategies to manage work zone traffic operations. Work zone traffic management strategies involve monitoring traffic conditions and making adjustments to traffic operations based on changing conditions. Because some of those changing conditions involve traffic incidents, this category also looks at management strategies with specific applicability to traffic incidents. These strategies involve improved crash detection, verification, response, and clearance, mechanical failures, and other incidents in work zones and on detour routes. This category also includes strategies to provide adequate enforcement of traffic regulations in work zones.

- **ITS for traffic monitoring/management**. Use ITS in work zones to identify areas where traffic flow is impeded so as to provide traveler information and/or make adjustments to the work zone. A work zone ITS deployment uses sensors to detect traffic conditions and can automatically feed this information to motorist information outlets such as CMS and Websites, or to a TMC. Monitoring traffic cameras can help detect places where drivers are having difficulty negotiating a work zone and can then adjust the layout.
- **Transportation management center (TMC)**. A TMC can coordinate and manage traffic and incident management activities in and around the work zone. The existing TMC for the District can be used and may be staffed by either contract staff and/or agency personnel. If the project is large and of long duration, establish and operate a project-specific TMC to help manage incidents and maintain traffic flow.
- **Surveillance [Closed-Circuit Television (CCTV), loop detectors, lasers, probe vehicles]**. Surveillance equipment, such as detector stations or cameras, can help identify traffic problems and detect, verify, and respond to incidents in the work zone.
- **Helicopter for aerial surveillance**. Use aerial surveillance to identify and verify traffic problems and incidents.
- **Traffic screens**. These screens reduce driver distractions in work zones, which can help to keep traffic moving and enhance safety. Mount screens on the top of temporary traffic barriers to discourage gawking and reduce headlight glare.
- **Call boxes**. Installing temporary or permanent call boxes through the work zone provides motorists with a means to contact incident response personnel, thus expediting the response and clearance times for crashes and breakdowns.
- **Milepost markers**. Milepost markers are signs located in the median off the edge of the road, which list location information (direction, route, mile, and tenths of a mile). Some

areas may refer to these as location reference markers because they can be used to mark direction; route, bridge or overpass names; intersection names, etc. in addition to mileage information.

- Tow/freeway service patrol. This strategy uses dedicated or on-site (or near site) towing services to reduce the time required to remove vehicles involved in an incident (breakdown or crash). Towing service is almost always contracted, while freeway service patrols might be contracted but are more likely to be publicly operated. This is similar to District's ROPE program.
- Total station units. This involves using survey equipment to document/map major incidents (e.g., fatal crashes or HAZMAT conditions) in order to reduce clearance time. In some locations, laser measuring units are replacing total station units.
- Photogrammetry. Photogrammetry uses photos taken in the field and computer software to document and measure incident-related data (e.g., skid marks and vehicle location), which may reduce incident clearance times.
- Media coordination. This strategy involves working with local news media to publicize traffic delays, incidents, and incident management. Working with media contacts in advance to establish procedures to be followed in the event of a major delay or incident can facilitate the dissemination of specific information upon the occurrence of a major delay or incident.
- Local detour routes. Advance identification and approval/authorization of local detour routes is an especially useful strategy to address major traffic delays and incidents, particularly for high-volume and incident-prone work zones.
- Contract support for incident management. This strategy provides additional contract support for incident management and response beyond what is available from the construction contractor or within the agency. Contracts may include entities such as police agencies, towing/recovery providers, engineering consultants, or others, depending on the type of support needed for a project.
- Incident/emergency management coordinator. This strategy provides a designated individual with overall responsibility for incident and emergency management on a project. Responsibilities may include developing incident and/or emergency response plans, overseeing implementation and monitoring of the work zone management strategies, and overall management of incidents or emergencies.
- Incident/emergency response plan. Developing a plan with information needed to respond to an incident typically includes roles and responsibilities, response agencies, processes/procedures, actions to take for various incident types and levels, contact information, alternate routes, personnel and equipment information, staging area locations, and other information appropriate to the individual project.
- Dedicated (paid) police enforcement. This strategy provides police patrols in the work zone under a contractual arrangement with the agency or contractor.
- Cooperative police enforcement. Cooperative enforcement is similar to dedicated enforcement, except it is implemented through a cooperative agreement between the police and agency.

- **Automated enforcement**. Automated enforcement involves using various technologies such as radar, cameras, video, and sensors to detect and record vehicle speed or traffic signal violations. When a vehicle speed exceeds a specified threshold or a red signal violation occurs, the vehicle's license plate and/or driver are photographed. The citation with the photo(s) is then mailed to the vehicle's registered owner.
- **Increased penalties for work zone violations**. This strategy imposes increased penalties for speeding or other violations in work zones. Such penalties include increased fines, increased points, license suspension, and even mandatory prison terms for serious violations.

3 PUBLIC INFORMATION AND OUTREACH (PI&O)

Including a public information component in the TMP has the potential to reduce work zone impacts by providing road users and the community with specific information concerning road projects and alerting them to potential impacts and available means to avoid them. Additionally, the strategy can provide more general information concerning appropriate driving and travel behavior and travel options associated with the work zone. Early public involvement, particularly by the affected communities and businesses, in the developing the TMP and keeping them informed throughout the project, is essential both to identify potential impacts and to ensure effective mitigation strategies are developed and implemented. Coordination with DDOT's public information office will help to ensure success, particularly for significant projects. This section deals with:

3.1 Public Information and Outreach Campaign

3.2 Communication Strategies

3.3 Funding/Budgeting for Public Information and Outreach efforts

3.1 Public Information and Outreach Campaign

A work zone public information and outreach campaign involves several strategies for communicating with road users, the general public, area residences and businesses, and appropriate public entities regarding road construction projects. Develop public information and outreach campaigns for work zones, particularly those identified as significant. This section describes the steps in developing a campaign.

3.1.1 Determine the Appropriate Size and Nature of the Campaign

Determine the size and nature of the public information and outreach effort by the anticipated impacts of the road construction project. For a short-lived, small project causing minor traffic disruption, public information and outreach may be limited to routine publication of a press release on the DDOT website and in local newspapers. A longer, more disruptive work zone warrants a more elaborate public information and outreach campaign. Consider a range of elements when determining the size and nature of a public information and outreach campaign. These include the effects of the project on:

- Traffic delay and safety at both corridor and network levels, including the effects on parallel corridors and alternate routes.

- Traffic delay and safety at nearby intersections, interchanges, and railroad crossings.
- Special traffic and safety conditions such as heavy truck traffic and poor weather.
- Disruptions of other transportation modes, including public transportation, pedestrian, and bicycle access.
- Evacuation routes.
- Hazardous material transportation routes.
- Emergency responders.
- Other public and private entities (such as schools and universities).
- Planned special events (holiday parades, concerts, etc.).
- Tourist attractions.
- Businesses and residences.

3.1.2 Identify Resources

To be successful, a public information and outreach campaign must be supported with sufficient resources and therefore should be considered when developing project budgets. Both internal DDOT resources and external resources can play a role in developing and implementing a public information and outreach campaign. Internal resources include DDOT staff, facilities, and equipment (websites, dynamic message signs). External resources may involve paying for public relations expertise (possibly including graphic design and Web design); radio, TV, and newspaper advertising; printing or a public information center or kiosk. Low cost or free external resources may include radio and TV traffic broadcasts, newspaper articles, and help from project partners. The budget for a work zone public information and outreach campaign depend on several factors, including the size and nature of the campaign; the communication strategies selected; whether the selected strategies are already established by DDOT and can readily be used; and the role of partners.

3.1.3 Identify Partners

Consider working with a range of partners in both the planning and implementation stages of public information and outreach campaigns. Partners in the public information and outreach process may include:

- State and local agencies.
- Elected and appointed public officials.
- Major employers and service providers (e.g. Federal and local agencies, hospitals etc.) in the affected area.
- Other groups such as neighborhood associations, business associations, etc.
- Chambers of Commerce, etc.
- Traveler information providers, including radio, TV, and newspapers.

Major reasons for including these partners are to:

- Establish lines of communication. These connections are particularly important during major periods of disruption and when changes occur.
- Distribute information. Involving outside groups in planning an outreach campaign is in itself a way to distribute information. Holding a meeting with the aim of soliciting community input, for example, is also a way to inform the public of disruptions and plans to deal with them.
- Improve the product. Partners in developing outreach strategies bring unique perspectives about successful types of messages and methods of communication. This may be particularly important in areas with diverse population groups (e.g. non-English speaking communities, truck drivers, and the elderly).
- Share the costs. Partners may be willing to share the cost of producing materials or to provide free forms of advertising. For example, major employers are often willing to incorporate messages in company communications, and on their websites.

One way to obtain input from affected parties is through a Working Group of stakeholders from the community affected by the work zone. Ideally developed during the planning stage of the project, the objective of creating such a group is to obtain input and review/comment on the development and implementation of construction and transportation management strategies to minimize the impacts of the project on the community. Both DDOT and the contractor may meet with the Working Group to obtain input and recommendations at various stages of the project delivery process starting during planning and extending through design, construction, and project assessment.

While meeting with all stakeholders is important, meeting with local businesses and business organizations specifically is often a very important element of a public information and outreach effort. Businesses are a conduit for providing project information because they have a vested interest in communicating what they know with customers and suppliers. In addition, these meetings provide businesses the opportunity to suggest ways to manage a project that can minimize any negative effects. Below is a list of Possible Stakeholders and Interested Parties. The list is not inclusive and will vary depending on project complexity.

- DDOT Internal Partners
  - Internal partners
  - Communications Section
  - Region Public Information Representative(s)
- DDOT Jurisdictional Partners
  - City/county agencies
  - Federal lands agencies
  - Other
- Shipping/Freight Industry; Commodity Haulers
  - Trucking industry
  - Ports
  - Railroads

- Special Interest Groups
  - AAA Mid-Atlantic
  - Associations
  - Other
- Property Owners and Property Residents
  - Directly affected by project (top priority)
  - Adjacent to project
  - Other property owners on right of way
- Community Residents
  - People living in the neighborhood
  - People living in the vicinity
  - People living in the highway corridor
  - Commuters traveling the highway corridor
- Elected Officials/Other
  - Mayor/City Council
  - Council of Governments
- Other Affected Community Agencies/Emergency services providers
  - Capitol Police
  - Emergency operations managers
  - Schools and school bus managers
  - Parks
  - Area attractions/entertainment venues/fairgrounds/festival organizers
  - Other
- Local business community
  - Businesses affected by the project (top priority) Businesses in the neighborhood
  - Businesses in the vicinity Businesses in the highway corridor
- Environmental Justice
  - Low-income communities
  - Minority communities
  - Spanish translations needed
  - Other

- Highway Users
  - Local drivers/local deliveries
  - Commuters/regional and through trips
  - Trucking industry
  - Heavy-haul trucking companies
  - Annual permit holders
  - Local Bus Companies (WMATA, Connector etc.)
  - Charter/Tour bus companies
  - School districts (school buses)
- Civic Organizations
  - Chamber of Commerce/city club/visitor association
  - Local community service clubs
  - Local neighborhood associations
  - Visitor Bureau
  - Other

3.1.4 Identify Target Audiences

A key to any public information and outreach campaign is to identify the target audience(s). This will help to determine the types of messages to be conveyed and the best methods of communicating those messages. Identify audiences through three categories, as shown in the table below. An outreach campaign must also consider the different types of people affected by a work zone. Certain groups may need special information or information provided in a different way. Residents who live near an upcoming work zone are often a primary audience as they may be affected by the work zone on a daily basis. A common situation is a large group or groups of limited English- speaking residents. Other segments of the population warranting special consideration are the elderly, children, and the disabled.

Public Information and Outreach Campaign Audiences

- Types of Travelers
  - Pre-trip
  - En route
  - Personal -local, commute
  - Personal -local, non-commute
  - Personal -non-local (e.g., tourists)
  - Commercial -local
  - Commercial -non-local (long distance)

- Types of Trip Generators
  - Major employers
  - Shopping districts/malls
  - Recreation and tourist facilities (e.g., parks, museums)
  - Organizers of planned special events
  - Emergency responders/hospitals
  - Business associations
  - Associations
  - Intermodal passenger terminals (e.g., Union Station)
  - Intermodal freight terminals
- Types of People
  - Residents (and neighborhood associations)
  - Minorities (particularly groups with limited English-speaking capability)
  - Special demographics (particularly elderly, children, disabled)
  - Business owners

3.1.5 Develop Campaign Message(s)

The three messages generally incorporated into successful work zone public information and outreach campaigns are:

i. Safety First - The most important message to convey to drivers is to encourage motorists to take safety precautions to protect themselves and highway workers. Continuously remind drivers to adhere to posted speed limits and stay alert to prevent crashes. Reinforce this message with warnings about increased traffic fines and enforcement activity, if appropriate.

ii. Work zone disruptions can be reduced when travelers plan ahead. Additionally, travelers who know what to expect will be less frustrated about delays. Another general message that should be conveyed to the public is to think ahead about the timing of travel, the route, the mode, and the destination.

   a. Work zone details. Employ a variety of public information and outreach strategies to provide current details of a work zone, including the Web, project hotline, newspaper articles, changeable message signs (CMS), and others. At a minimum, details of a work zone should include the dates and times of work zone activity and the routes, lanes, and ramps affected. If these details are changing, then it is important to provide the most current information. Incorrect and out-of-date information compromise the effectiveness of public information and outreach campaign.

b. **Travel times, average speed and delays**. Public information on travel times and delays can range from very general (e.g., "Expect delays") to very specific (e.g., "Travel time through work zone is 20 minutes"). Color code average speed by segments and display them on the Website. More specific information is usually more useful to travelers and preferable when it is available.

c. **Alternate methods and modes of transportation**. Reducing the amount of traffic through a work zone is one way to reduce congestion and travel delay. This may involve providing detailed information on carpooling/ridesharing, transit, park and ride, and telecommuting options. Target messages regarding telecommuting to major employers as well as commuters.

d. **Alternate routes**. In many cases, alternate routes must be devised and communicated to travelers. These routes may differ, depending on the type of driver (local, long distance, commercial drivers) and timing. Alternate route messages are essential when construction involves shutting down an entire route. Locate alternate route messages that may involve CMS 1at decision points for drivers.

iii. **DDOT Cares** - Motorists are more willing to cope with disruptions and cooperate with directions when they feel that all necessary steps are being taken to make things easier. Accepting inconvenience related to the work performed is more likely with a genuine message from those involved.

3.1.6 Determine Communication Strategies

After identifying the appropriate audience and messages for the work zone project the next step is to determine the strategies to be used to get the messages to the target audiences. While there are wide range of ways to communicate with the public about work zones, tailor strategies to the project context, the message being conveyed, and funding limitations.

Modify communication strategies to fit the needs of each project. A combination of several of strategies may make sense for some projects, while only one or two strategies may be necessary for other projects. Typically, there will significant interaction between different means of communication. For example, informational materials such as brochures and fact sheets are often posted to project Websites, which makes them more widely accessible. Similarly, media may use information posted to project Websites or gained from project materials to provide information through newspapers, the radio, and television news. Ensure consistent messages across all communication strategies to achieve credibility.

3.1.7 Determine When to Communicate

Avoid providing information to the public only when a work zone is up and running. A public information and outreach campaign must develop and implement strategies before construction begins and after the project is complete. In the before phase, concentrate the campaign on general information about the project, the problems it may cause, and where to find more information. Near

the commencement date of a work zone, it may be appropriate to add other methods such as free media coverage and paid advertising, a telephone hotline, and using CMS. After the completion of the project, debrief effectiveness of strategies to determine what worked and what did not.

3.1.8 *Evaluate Effectiveness*

During a long-term construction project, periodically evaluate the effectiveness of the public information and outreach campaign with the aim of redirecting resources if necessary. An evaluation might:

- Document and report the impacts of the work zone, such as the number of crashes and traffic delay.
- Document and report questions, comments, compliments, and complaints received via hotline, Website, letter, etc.
- Assess perceptions of successes and failures among the project partners.
- Survey public, businesses, or commercial truck drivers affected by the work zone.
- Survey tourism bureaus or other major facilities near the work zone.

A list of evaluation tools includes:

- Pre-project Baseline Survey
  - Postcard survey
  - Telephone survey
  - Other
- Public Meeting Survey
  - Ballot survey
  - "Bean-jar" survey
  - Other
- Mid-Construction Survey
  - Postcard survey
  - Telephone survey
  - Other
- End-of-Project Survey
  - Postcard survey
  - Telephone survey
  - Other

3.2 *Communication Strategies*

This section describes a number of commonly used communication strategies.

3.2.1 *Public Awareness Strategies*

Public awareness strategies include various methods to educate and reach out to the public, businesses, and the community concerning the road project and work zone:

- Branding. Using distinctive project names and trademark graphics, logos and catchphrases, otherwise known as branding, can be an effective method of getting the target audience(s) to easily recognize any information related or pertaining to the work zone.
- Press kit. A press kit containing information the media needs to get the word out about the project allows consistent messages to be provided to the media and helps develop positive relationships with the media.
- Brochures and mailers. Brochures and mailers are printed materials containing project-related information, such as advanced notice of the project's start date, schedules, pictures/graphics of the project, a description of the need for the project, alternative routes, etc. These may be distributed to motorists at key locations (e.g., large employers in the project area, rest stops, travel information centers), via automobile associations, or mailed to affected businesses or communities.
- Press releases/media alerts. This strategy provides project-related information to the news media, affected businesses, and other affected or interested parties using print and/or electronic media.
- Mass media. Outreach to radio, television, and newspapers should be a cornerstone of any public information campaign. It is important to establish a working relationship with reporters to encourage positive publicity and accurate information.
  - *Earned Media* -Use earned media, or free media, such as news stories and traffic information, to the maximum extent. Large projects are typically considered newsworthy by local media outlets, so it can be relatively easy to get news coverage.
  - *Paid Media* -Paid announcements of an upcoming major project may use newspaper, radio, or television ads. Paid advertisements can also be used for progress updates, or to provide information regarding major changes to the work zone configuration. Paid advertising can be expensive, but may be a cost-effective way of reaching a wide audience.
- Paid advertisements (PSA). Paid announcements of an upcoming major project may use newspaper, radio, and television ads, as well as billboards. Paid advertisements can also be used for progress updates or to provide information regarding major changes to the work zone configuration and management approach.
- Project information center. Typically located on or near the project site, the facility contains materials such as scale model displays, maps, brochures, videos, etc., describing the project, its potential impacts, and available alternatives to minimize the impacts.

- Telephone hotline. This traveler information system provides traffic or travel information for the work zone using a toll-free telephone number. It can include prerecorded messages and/or real-time interactive request and response information.
- Planned lane closure website. This strategy is typically not for one specific project, but is usually implemented for an entire geographic region/jurisdiction. The Webpage summarizes planned lane closures for public information, lists routes involved as well as the closure start and end dates, presents both in text and graphical formats as part of a much larger website.
- Project website. This traveler information system provides traffic or travel information for the work zone via the web/Internet. It can include both long term static information and/or real-time interactive information and be part of a much larger work zone website.
- Public meetings/hearings. This strategy involves public relations staff presenting project information to the public, community, and/or businesses, and soliciting input concerning potential concerns, impacts, and management strategies.
- Community task forces. Develop community task force(s), which includes various stakeholders from the community likely to be affected by the work zone (businesses, neighborhood groups, interested individuals, public officials, or other representatives). Task forces can be a means of providing information and receiving input related to a road project.
- Coordinate with media/schools/businesses/emergency services. Coordinate with various community, business, and media groups likely to be affected by the work zone, or that can disseminate needed information. Examples of these groups include local/cable TV newsrooms, schools and school districts, local major employers/businesses, and local emergency services (fire, police, and ambulance). Establish various mechanisms such as fax, e mail, phone message, mailings, etc., to communicate project-related information, including start dates, project schedules, significant traffic pattern changes, and traffic crashes and incidents within the work zone.
- Work zone education and safety campaigns. This strategy involves improving the awareness of motorists and/or increasing worker training in order to reduce the number of fatalities and injuries in work zones. This can be accomplished through brochures, web sites, media campaigns (radio, television), videos, etc.
- Work zone safety highway signs. This strategy involves the use of signs placed strategically at work zone approaches to increase driver awareness to work zone safety concerns.
- Rideshare promotions. This strategy involves the marketing of an existing rideshare program or creation of a new program through signage, advertisements, brochures, and events.
- Visual information (videos, slides, presentations) for meetings or for web- based dissemination. This involves the use of videos, slides, and presentations to supplement public meetings, public information center displays, or press releases.

3.2.2 Motorist Information Strategies

These strategies provide current and/or real-time information to road users regarding the project work zone. Motorist information strategies include:

- Radio traffic news. Disseminate project-related information is through regularly scheduled traffic reports on commercial radio stations.

- Changeable Message Signs (CMS). Place these fixed or portable message boards along roadways or at key locations to notify road users of lane and road closures, work activities, incidents, potential work zone hazards, queues and slowed or stopped traffic ahead, and travel time or delay information, as well as alternate routes in or around the work zone. Place CMS at key locations before potential diversion points to give motorists an opportunity to divert to an alternate route or take other appropriate measures based on the information provided. As an enforcement tool, these signs can also be used to inform drivers of work zone speed limit reductions and enforcement activities.
- Temporary motorist-information signs. Temporary conventional signs mounted in the ground, overhead, or on vehicles to provide traveler information to guide motorists through the work zone and warn of potential hazards.
- Dynamic speed message sign. This portable system can be mounted as a fixed sign or located on a portable trailer. Radar measures the speed of approaching vehicles, which is displayed on the sign along with or near the work zone speed limit. The objective of this system is to enhance safety by reducing speeding and minimizing speed variations throughout the work zone.
- Highway Advisory Radio (HAR). Use HAR when longer, more detailed messages than can be provided using signage may be necessary for some work zone situations. HAR involves disseminating information to motorists while en route over wide-area wireless communications directly to in-vehicle radios. Signs inform motorists of the radio frequency where the information is available.
- Extinguishable signs. These signs are typically associated with highway advisory radio (HAR) systems where the sign indicates how to obtain information on roadway conditions (e.g., tune in to 1610 AM). These signs turn on and off, depending on when the HAR has a message available.
- Highway Information Network (Web-Based). A highway information network is a website where multiple stakeholder groups can place information related to the roadway. The website is shared among the various stakeholder groups, each with its own data storage areas (including control of functionality, security, data quality, etc.).
- Traveler information systems (wireless, handhelds). Using such technology as cell phones, pagers, in-vehicle systems, and e-mail notifications, this strategy provides motorists with work zone-related information and static (e.g., project dates) and/or real time (e.g., potential delays).
- Freight travel information. This is an appropriate strategy when there is a moderate-to-high percentage of freight movement through the work zone. It involves coordinating with the freight community (trucking companies, truck drivers, etc.) to identify work zone information considered useful (e.g., truck restrictions, occurrences of incidents, and planned closures) and developing a mechanism to disseminate that information to freight stakeholders. Information dissemination can be to central locations (e.g., via a fax or email distribution list to trucking companies) or to truckers as they approach the work zone (e.g., via CB communications tools such as the CB Wizard Alert System).

- **Transportation Management Center (TMC)**. Use TMCs to coordinate and manage road user information dissemination activities. The TMC may be staffed by either contract staff and/or agency personnel. For large projects of long duration, establish and operate a project-specific TMC to help manage incidents and maintain traffic flow.
- **Live traffic cameras on the web**. Real-time live traffic cameras on the web allow users to view real-time traffic conditions.
- **Project information hotline**. Use a toll-free telephone number to provide prerecorded messages and/or real-time traffic or travel information for the work zone.
- **E-mail alerts**. E-mail alerts provide travelers with timely information on work zone activity and traffic delays. Lane closures, delays, and incident/crash information are distributed to travelers who have signed up to receive the information via computer, cell phone or hand-held device.

3.3 Funding/Budgeting

Public information and outreach efforts can be time consuming and resource intensive. However, when citizens feel their concerns have not been adequately addressed, costly project delays, lawsuits, and even project cancellations can occur.

As stated, the budget for a work zone public information and outreach campaign will depend on several factors, including the size and nature of the campaign, the communication strategies selected, whether the selected strategies are already established in DDOT and can be readily used, and the role of partners.

Unit costs for various public information and outreach efforts will vary based on the region, strategy chosen and size of the effort. Consult with the Office of Communications and/or the District Community Liaison for assistance in determining potential costs for these efforts.

The following are sample unit costs for various TMP strategies in the Washington Metropolitan area.

- Hiring consultant to do TMP ($250,000+)
- Billboards ($3500/Month)
- Radio ad ($800/Minute)
- Newspaper Ad (1/2 page, color - $14,000/day)
- Open House ($3,000)
- TV Commercial (Local - $4,000+)
- Portable CMS ($10,000)
- Portable Highway Advisory Radio ($60,000/unit)
- Ground-mounted signs ($300/each)

In general, each project Public Information and Outreach Plan should include:

- Brief summary of report
- Goals and Objectives
- Roles and Staffing

- List of affected stakeholders to be targeted
- Communication plan and timeline for each element
- Project Cost and funding source breakdown
- Schedule of communication with DDOT
- Means of evaluation of communications plan
- Review and submittals

WORK ZONE SAFETY & MOBILITY POLICY

APPENDIX 1D – WORK ZONE DESIGN CHECKLIST

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Work Zone Design Checklist

Project: _____ Date: _____

Completed by (or contract person): _____

Organization: _____

STEP 1 – IDENTIFY TRAFFIC CONTROL OPTIONS			
Work Zone Setup	YES	NO	N/A
1. Have all applicable work zone types been adequately considered? *(Work outside of roadway, full roadway closure, permanent lane/shoulder/ramp closures, crossovers/contraflow, detour, intermittent road closures, reduced lane widths, reduced shoulder widths, lane shifts, daily lane/shoulder closures, use of shoulder or median, runaround, one-lane, two-way operation, temporary signal, flagger, reversible lane, use of temporary structures, use of temporary pavement, widening, night work, weekend work, bypasses, temporary widening)*	☐	☐	☐
2. Have different staging options been considered?	☐	☐	☐
3. Does pedestrian/bicycle traffic or ADA access need to be maintained?	☐	☐	☐
4. Is this roadway/intersection a high accident location?	☐	☐	☐
5. What is the minimum allowable lane width?	☐	☐	☐
6. Is a reduced work zone speed limit required?	☐	☐	☐
7. Should certain types of vehicles be prohibited from entering the work zone (over-height, weight restrictions)? Will oversized load permits be affected?	☐	☐	☐
8. Will the work zone be adequate in terms of:			
• Traffic control devices?	☐	☐	☐
• Railroad crossing and controls?	☐	☐	☐
• Geometrics (turning radii, ramp merge/diverge areas, etc.)?	☐	☐	☐
• Bridge restrictions and other structures?	☐	☐	☐

Project Timing	YES	NO	N/A
1. Can the contractor restrict the roadway during certain times or events? • *(AM or PM rush hours, overnight, local events, holidays, weekends, sporting events, adjacent projects in the study area)*	☐	☐	☐
2. Is there present or future roadwork in the immediate area that may affect traffic or the Contractor's operations?	☐	☐	☐
Roadside Safety	**YES**	**NO**	**N/A**
1. Will extra protection be required for project-specific elements? • *(pedestrians, bicyclists, school areas and crossings, playgrounds and parks)*	☐	☐	☐
2. Have areas been designated for the contractor to store equipment and construction materials?	☐	☐	☐
3. Are areas designated for the contractor to dispose of waste material?	☐	☐	☐
4. Have areas been designated for contractor's employees to park on-site and/or off-site?	☐	☐	☐
Detour	**YES**	**NO**	**N/A**
1. Will traffic be detoured?	☐	☐	☐
2. If yes, does the detour route provide adequate roadway characteristics? *(Weight restrictions, height-width, wide loads, capacity, traffic control devices, railroad crossing and controls, geometrics (turning radii, ADA requirements, etc.), bridge restrictions and other structures, truck restrictions)*	☐	☐	☐
3. Will there be other construction along the detour that might influence traffic?	☐	☐	☐
4. Have all necessary government organizations as well as local stakeholders been notified of the proposed detour? *(Cities, districts, counties, or states as well as school systems, transit systems, police, fire, and ambulance services, postal mail route services)*	☐	☐	☐
5. Will all fronting businesses have acceptable ingress and egress?	☐	☐	☐
6. Can the detour be continued during winter (snow removal concerns)?	☐	☐	☐
7. Is a public information meeting required?	☐	☐	☐
STEP 2 – IDENTIFY WORK ZONE IMPACTS			
Data Collection	**YES**	**NO**	**N/A**
1. Has the appropriate data been collected? • *(Volumes, signal timings, origin-destination, travel time, crashes, speed, delay)*	☐	☐	☐
Work Zone Analysis	**YES**	**NO**	**N/A**
1. Has the work zone traffic analyses been completed for each stage of construction using the appropriate tools? • *(QuickZone, QUEWZ-98, HCS, Synchro/SimTraffic, Corsim, Vissim, Other)*	☐	☐	☐
2. Have the appropriate traffic analyses been conducted? (Queuing analysis, signal timing optimization, ramp meter analysis, travel time analysis, delay analysis, other)	☐	☐	☐
3. Have work zone and ramp/other capacities been identified?			
• Work zone capacity =	☐	☐	☐
• Ramp / other capacity =	☐	☐	☐

Mobility Impacts	YES	NO	N/A
1. Has the work zone traffic analysis identified impacts on any of the following?			
• Ability to maintain all accesses (business, community, etc.)	☐	☐	☐
• Pedestrian, bicycle, and ADA facilities	☐	☐	☐
• Public safety (workers and traveling public)	☐	☐	☐
• Emergency vehicle access	☐	☐	☐
• Construction equipment access & movement through the work zone	☐	☐	☐
• Specific user groups (businesses, communities)	☐	☐	☐
• Over-height, over-weight vehicles	☐	☐	☐
• Transit services	☐	☐	☐
• Traffic operations in and around the work zone (freeway queues, network operations, effect on local roads and detour routes)	☐	☐	☐
• Ramp capacity	☐	☐	☐
• Intersection traffic control (signal timing, adequate signage, etc.)	☐	☐	☐
• Existing special traffic operations (HOV, contraflow, drawbridges, etc.)	☐	☐	☐
• User Costs (delay)	☐	☐	☐
Construction Related Impacts	**YES**	**NO**	**N/A**
1. Has the Maintenance of Traffic identified impacts on the following?			
• Ability to provide required decision sight distance and merge/diverge areas at ramps	☐	☐	☐
• Right-of-way	☐	☐	☐
• Environment	☐	☐	☐
• Required bridge widths	☐	☐	☐
• Earthwork, retaining walls, pier clearances, profile differences, etc.	☐	☐	☐
• Ability to maintain existing drainage, utility and lighting systems	☐	☐	☐
• Construction duration	☐	☐	☐
• Construction costs	☐	☐	☐
• Constructability	☐	☐	☐
• Noise levels	☐	☐	☐
• Roadway surface conditions	☐	☐	☐
• Storage of equipment or materials	☐	☐	☐
• Service life (bridges, pavements, etc.)	☐	☐	☐

STEP 3 – IDENTIFY IMPACT MANAGEMENT STRATEGIES			
Temporary Traffic Control	YES	NO	N/A
Traffic Control Devices			
1. Will traffic control signing and striping will be located in the plans?	☐	☐	☐
2. Will existing signals need to be kept operational?	☐	☐	☐
3. Will sign message modifications be required on permanent signage for MOT?	☐	☐	☐
4. Have all temporary traffic control devices been considered for the work zone and any detour routes? • *(temporary signals, temporary roadway lighting, striping removal, PCMS, temporary signs, CMS, arrow panels, etc.)*	☐	☐	☐
Project Coordination, Contracting and Innovative Construction Strategies			
1. Has the project been coordinated with necessary parties? • *(Adjacent projects in the study area, utilities, right-of-way, other non-highway transportation facilities such as transit junctions or railroad crossings)*	☐	☐	☐
2. Have all innovative contracting strategies been considered? • *(Design-build, A+B bidding, incentive/disincentive clauses, lane rental, performance specifications)*	☐	☐	☐
3. Have innovative or accelerated construction techniques been considered? *(Prefabricated/precast elements, rapid cure materials)*	☐	☐	☐
Transportation Operations	YES	NO	N/A
1. Have all applicable demand management strategies been considered? *(Transit service improvements, transit incentives, shuttle services, parking supply management, variable work hours, telecommuting, ridesharing/carpooling incentives, park-and-ride promotion)*	☐	☐	☐
2. Have all applicable corridor/network management strategies been considered? • *(Signal timing/coordination improvements, temporary traffic signals, street/intersection improvements, bus turnouts, turn restrictions, parking restrictions, truck/heavy vehicle restrictions, reversible lanes, dynamic lane closure system, ramp closures, railroad crossing controls, coordination with adjacent construction site(s))*	☐	☐	☐
3. Have all applicable work zone safety management strategies been considered? • *(Speed limit reduction/variable speed limits, temporary traffic signals, temporary traffic barrier, movable traffic barrier systems, crash-cushions, temporary rumble strips, warning lights, automated flagger assistance devices, project task force/committee, construction safety supervisors/inspectors, road safety audits, TMP monitor/inspection team)*	☐	☐	☐

Transportation Operations	YES	NO	N/A
4. Have all applicable Work Zone ITS strategies been considered for traffic monitoring/management? • *(Late Lane Merge Concept, PCMS with speed display, Travel Time Estimation System, Advanced Speed Information System, Advanced Congestion Warning System, Conflict Warning System, Travel Time Monitoring System, Freeway Queue Monitoring System, CCTV Monitoring, Real-time Detour (or other traffic diversion strategies), Team meetings, Project on-site safety training, Safety awards/incentives, Wind shield Survey)*	☐	☐	☐
5. Have all applicable traffic/incident management and enforcement strategies been considered? • *(ITS for traffic monitoring/management, Transportation Management Center (TMC), surveillance [Closed-Circuit Television (CCTV), loop detectors, lasers, probe vehicles], helicopter for aerial surveillance, traffic screens, call boxes, mile-post markers, tow/freeway service patrol, total station units, photogrammetry, coordination with media, local detour routes, contract support for incident management, incident/emergency management coordination, incident/emergency response plan, dedicated (paid) police enforcement, cooperative police enforcement, automated speed enforcement, increased penalties for work zone violations)*	☐	☐	☐
Public Information and Outreach	**YES**	**NO**	**N/A**
1. Have all applicable public awareness strategies been considered? • *(Branding, press kits, brochures and mailers, press releases/media alerts, mass media (earned and/or paid), paid advertisements, project information center, telephone hotline, planned lane closure website, project website, public meetings/hearings, workshops and community events, community task forces, media coordination, schools, businesses, and emergency services, work zone education and safety campaigns, work zone safety highway signs, rideshare promotions, visual information (videos, slides, presentations) for meetings and web based dissemination)*	☐	☐	☐
2. Have all applicable motorist information strategies been considered? *(Radio traffic news, changeable message signs, temporary motorist information signs, dynamic speed message sign, Highway Advisory Radio (HAR), extinguishable signs, highway information network (web-based), traveler information systems(wireless, handheld), freight travel information, Transportation Management Center (TMC), live traffic camera on web, project information hotline, email alerts)*	☐	☐	☐

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WORK ZONE SAFETY & MOBILITY POLICY

APPENDIX 1E – TMP REPORT OUTLINE

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TMP Report Outline

This section contains a comprehensive list of the components that could be included in a Transportation Management Plan (TMP) report. The order, terminology and inclusion of components may vary from project to project. The level of detail of the TMP will reflect the level of potential work zone impacts of the project.

The components discussed in this section include elements of the TMP document itself, as well as elements for TMP implementation and evaluation. The following table summarizes the TMP components. Individual TMP components are described in more detail in the subsections that follow the table.

1. INTRODUCTORY MATERIAL

- Cover Page
- Licensed Engineer Stamp
- Table of Contents
- List of figures
- List of tables
- List of abbreviations and symbols
- Terminology

2. EXECUTIVE SUMMARY

3. TMP ROLES AND RESPONSIBILITIES

- TMP Coordinator
- TMP Team
- TMP Implementation Task Leaders
- Approval Contact(s)
- Emergency Contacts

4. PROJECT DESCRIPTION

- Project background
- Project type
- Project area/corridor
- Project goals and constraints
- Proposed construction phasing/staging
- General schedule and timeline
- Need for detours
- Related projects

5. EXISTING AND FUTURE CONDITIONS

- Data collection and modeling approach
- Existing roadway characteristics (roadway classification, number lanes, geometry, etc.)
- Existing and historical traffic data (volumes, speed, capacity, v/c ratio, truck percentages, congestion, peak traffic hours)
- Existing traffic operations (signal timing, traffic controls)

- Crash data
- Stakeholder concerns/issues
- Traffic predictions during construction (volume, delay, queues)

6. WORK ZONE-IMPACTS ASSESSMENT REPORT

- Qualitative summary of anticipated work zone impacts
- Impacts assessment of alternative project design and management strategies
  - Construction approach/phasing/staging strategies
  - Work zone impacts management strategies
- Traffic analysis results
  - Traffic analysis strategies
  - Measures of effectiveness
  - Analysis tool selection methodology and justification
  - Analysis results
- Selected Construction Phasing
  - Construction approach/phasing/staging strategy selected
  - Work zone impacts management strategies selected

7. TMP MONITORING

- Monitoring requirements
- Evaluation report

8. PUBLIC INFORMATION AND OUTREACH PLAN

9. INCIDENT MANAGEMENT

- Trigger points
- Decision and phone tree
- Contractor's contingency plan
- Standby equipment or personnel

10. TMP IMPLEMENTATION COSTS

- Itemized costs
- Cost responsibilities/share opportunities
- Funding source(s)

11. SPECIAL CONSIDERATIONS (AS NEEDED)

12. ATTACHMENTS (AS NEEDED)

1. INTRODUCTORY MATERIAL

This section contains introductory material for the report. Components may include:

- **Cover Page** -Present title/project name, date, and agency name and/or person responsible for the report, with contact information.
- **Licensed Engineer Stamp Page** -Include project name, statement that the TMP was developed under the direction of a licensed engineer, and signature, printed name and license stamp of the engineer responsible for developing the TMP. Engineering for the TMP must be performed under the direction of a licensed engineer.
- **Table of Contents** -Lists sections and subsections of the report with their page numbers.
- **List of Figures** -Lists figures and associated page numbers.
- **List of Tables** -Lists tables and associated page numbers List of abbreviations and symbols
- **Abbreviations and Symbols** -Lists repeated abbreviations and mathematical symbols in alphabetical order.
- **Terminology** -Describes/defines key technical terms found in the report.

2. EXECUTIVE SUMMARY

The Executive Summary presents a brief overview and summary of the project, general approach, selected construction phasing and staging approach(es), anticipated work zone impacts of the project, chosen TMP strategies, cost estimate for implementing the TMP, and project conclusions/recommendations.

3. TMP ROLES AND RESPONSIBILITIES

This section documents the roles and responsibilities for developing, implementing, monitoring and evaluating the TMP. These may include, but are not limited to:

- **TMP Coordinator** -DDOT person responsible for the overall TMP development.
- **TMP Team** -Identify stakeholders and other TMP Team members involved in the TMP development and review.
- **TMP Implementation Task Leaders** -Identify project personnel responsible for implementing specific tasks recommended by the TMP.
- **Approval Contact(s)** -The person or persons who must give final approval to the TMP.
- **Emergency Contacts** -List of known contact persons for each emergency service agency, including police, fire, ambulance, and utilities.

4. PROJECT DESCRIPTION

The project description component of the TMP presents the project scope and definition. Much of this information will have already been gathered as part of Project Planning and Preliminary Engineering. It may include:

- **Project Background** -Includes a brief description of the project, its purpose, and its developmental history. It may also include additional information related to the project, roadway, or study area.

- **Project Type** -Identifies the nature of the project, which may range from capital projects, new construction, rehabilitation, major maintenance, to routine maintenance.
- **Project Area/Corridor** -Describes physical extents of the construction or maintenance work, as well as the estimated region(s) and corridor(s) that the project may affect. Use a map to illustrate how this information is recommended
- **Project Goals and Constraints** -A brief listing of the goals, benefits, and challenges that are expected by this project.
- **Proposed Construction Phasing/Staging** - Include project phasing, land and/or facility closure strategies, whether temporary lanes will be used for general traffic, ramp/interchange closures, construction strategies, lane closure hours, duration, etc. Also identify holiday, event, seasonal and/or nighttime restrictions. Provide the Sequence of Construction and Traffic Control Plans separately.
- **General Schedule and Timeline** - Specify project start and finish dates and phasing schedule (if appropriate), including all major milestones and planned shutdown times for events for winter, environmental windows, etc.
- **Need for Detours** -Include where detours are identified for staging purposes or for alternate routes. Provide detour plans separately.
- **Related Projects** -Identify other ongoing or planned projects in the vicinity of the project area that may cause cumulative impacts to the project area and/or corridor(s).

5. EXISTING AND FUTURE CONDITIONS FOR PROJECT AREA

This TMP component provides information on existing and anticipated future conditions in the study area, including traffic, safety, and business and community access. While the level of detail will vary based on the project, it should consider:

- **Data Collection and Modeling Approach** -A brief discussion on how existing traffic data and information was obtained and what approach was used to estimate conditions during construction. Include a brief discussion on the growth rates used for analysis, including the source and any assumptions.
- **Existing Roadway Characteristics** -Presents a history of roadways in the study area, roadway classification(s), number of lanes, geometrics, and urban/suburban/rural.
- **Existing and Historical Traffic Data** -Includes measures such as volumes (traffic, pedestrian, etc.) speed, capacity, volume to capacity ratio, truck percentage, queue length, peak traffic hours, through versus local traffic, etc. Historical traffic data should be no more than three (3) years old.
- **Existing Traffic Operations** -Includes signal timing, delay, and traffic control types.
- **Accident History –** Where feasible, document an accident history, including number and type of crashes.
- **Stakeholder Concerns/Issues** -Provides a list of project stakeholders and others potentially impacted by the project. Include input from the community and business representatives and other stakeholders and prioritize to address local concerns.

- Traffic Mobility Issues -List major events with the potential to impact mobility during the project.
- Traffic Predictions during Construction (Volume, Delay, Queues) - Based on existing and historical data and traffic growth rates, develop and document estimates of traffic and safety during construction. Compare future estimates to the existing data.

6. WORK ZONE IMPACTS ASSESSMENT

A work zone impacts assessment involves a brief discussion on how the project is expected to impact its vicinity. Include major corridors, local streets, how traffic patterns are expected to change, and an estimate on how traffic demand might change because of the project.

- Traffic Analysis
  - Traffic Analysis Strategies –If not previously discussed, include a brief description of how the expected future (construction) traffic conditions were determined. Document any traffic reduction factors or other parameters assumed for the calculations.
  - Identify Measures of Effectiveness -List the measure of effectiveness used for the analysis, such as capacity, volume queue, speed, travel time, diversion, safety, noise, environmental, adequacy of detour routes, cost effectiveness, etc.
  - Analysis Tool Selection Methodology and Justification -List the traffic analysis tools used. Include a brief summary on how the tool was selected and criteria used to select the most appropriate tool.
  - Analysis Results -Compare existing and construction traffic conditions and operations, with and without the TMP impact management strategies. Traffic analysis should also address, in more quantitative manner than the staging impacts assessment, the impacts on:
    - Access to residences and businesses
    - Access for pedestrians, bicyclists, and persons with disabilities
    - Emergency service impacts (fire, ambulance, police, hospitals)
    - Safety
    - Adequacy of detour routes
    - School bus operations
    - Bus operations and stops
    - Other transit services
    - Tourist facilities
    - Seasonal impacts (beach traffic, etc.)
    - Cost-effectiveness
- Selected Construction Phasing -Develop plans, specs, and estimates for the selected alternative. Describe the selected construction approach, including the selected construction phasing/staging strategy and selected work zone-impact management strategies.

- Document any work hour restrictions for each stage (e.g., night work, peak hour restrictions, etc.)
- Develop the following documents while the TMP is being prepared and referenced them in the TMP:
    - Construction phasing/staging plans - Provide the construction approach/phasing/staging strategy on plan sheets.
    - Temporary Traffic Control Plans (TCPs) - Provide detailed TCPs for each stage and phase of construction. Document work zone impact management strategies on plan sheet, where possible (e.g., geometric improvements and control devices). If not on the plans, list strategies with text describing any restrictions, usage (duration, stage/phase, etc.), or other considerations in the contract documents (possibly in a special provision).
    - Detour Plans (if required).
    - Temporary Traffic Signal Plans, including any timing modifications (if required).
    - Temporary Lighting Plans (if required).
    - Public Information and Outreach Plan
    - Necessary Special Provisions covering other TMP elements.

7. TMP MONITORING/EVALUATION CRITERIA

Develop project specific criteria and methods for measuring and evaluating the TMP and determine how it will be modified if improvements are needed.

- Monitoring Requirements – Include the TMP monitoring requirements in the TMP report and make them part of the contract documents. The evaluation should consider both the performance of individual TMP strategies as well as overall performance of the work zone and work zone impact area. This may include, but is not limited to:
    - Identification and process for monitoring TMP performance (e.g. volume counts, queue length verification of work zone set-up crashes, complaints and feedback, surveys, etc.).
    - Tracking TMP implementation costs and comparing them to the budgeted costs.
    - Approach for corrective action when TMP performance requirements are not met.
    - Submission of revised/alternative TMPs and the approval process.
    - Person(s) responsible for each component of the TMP monitoring.
- Evaluation Report for the TMP – The TMP should include reference to development of an evaluation report upon completion of construction to document lessons learned and provide recommendations on how to improve the TMP process and/or modify guidelines. The TMP document should specify the persons responsible for completing the Evaluation Report.

8. PUBLIC INFORMATION AND OUTREACH PLAN

The public information and outreach plan serves two main purposes. First, it informs the public about the overall purpose of the project to generate and maintain public support. Second, it encourages changes in travel behavior during the project to minimize congestion. Include public awareness and motorist information strategies in the public information and outreach plan. The DDOT Office of Communications may require separate documentation for public information and outreach efforts.

9. INCIDENT MANAGEMENT

Incident management is a planned and coordinated program that detects and removes incidents from the highway and restores traffic capacity as safely and quickly as possible. Discuss emergency communications at the preconstruction meeting. Important elements to discuss include:

- Roles and responsibilities of those involved in incident management.
- Key contacts and their contact information.
- Emergency and essential services contacts.

10. TMP IMPLEMENTATION COSTS

Estimating the work zone management strategy implementation costs and including these costs within the overall project cost is critical as it may be difficult to obtain additional funding at a later time. The earlier TMP costs are incorporated into the budget, the more likely the under-allocation of funds can be avoided. Where feasible, itemize and document the cost estimates for the work zone impact management strategies in the TMP. Specify cost responsibilities, opportunities for sharing or coordinating with other projects, and funding sources. TMP components can be funded as part of the construction contract and/or in separate agreements.

11. SPECIAL CONSIDERATIONS

Identify any special considerations related to the TMP not included in a previous section. This may include reiterating special provisions, highlighting considerations that may need to be included in contracting documents, identifying work zone management strategies that require implementation prior to construction, etc.

12. ATTACHMENTS (AS NEEDED)

Appendices in the TMP document should include information that may be relevant or of interest to the TMP reviewer, implementer, DDOT, or other stakeholders. This could include, but is not limited to:

- Observed, historical, and/or estimated traffic volumes, speeds travel times, level-of service, delay, and crashes.
- Maps.
- Plans (Sequence of Construction, TTC, TO, Detour Plans).
- Detailed analysis methodology, assumptions and parameters used.
- Special provision text.

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WORK ZONE SAFETY & MOBILITY POLICY

APPENDIX 1F – FIELD INSPECTION REPORT

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Field Inspection Report

(For use on all significant projects; can also be a beneficial guide for non-significant projects)

Rating / Grade of Project: ☐

Inspected By: _____

Date: _____ Time: _____ Weather: _____

Worksite Location: _____

Public Space Job: _____ IPMA Job: _____

Ward Number: _____ Quadrant of the City: _____

Type of Work Performed: _____

In Travel Lane: _____

General Contractor: _____ Subcontractor: _____

Contact Person: _____ Contact Person: _____

Permit Number: _____ Citation: _____ Code: _____ Photos Attached: **Yes / No**

SIGNS

- ☐ DDOT typical or TTC Plan (for the current phase of job) not followed
- ☐ Non-standard type (material, size, color)
- ☐ Poor reflectivity
- ☐ Conflicting permanent & temporary signing
- ☐ Sign legend problem
- ☐ Duct tape, obstructed, damaged, dirty, overlay plate, non-standard

- ☐ Wrong message
- ☐ Inappropriate/ contradictory signs not covered/removed
- ☐ Sign support problem
- ☐ Sign missing or down
- ☐ Horizontal and vertical clearances

ARROW PANEL

- ☐ Non or Non-standard
- ☐ Malfunction (bulb-out, etc.)
- ☐ Incorrect placement
- ☐ Incorrectly aimed (or misaligned bulbs)
- ☐ Not dimmed at night
- ☐ Not protected as in DDOT standard
- ☐ Inadequate sight distance
- ☐ Wrong indication / display

PORTABLE VARIABLE MESSAGE SIGNS

- ☐ Application does not meet DDOT guidelines
- ☐ Incorrect or unapproved message
- ☐ Non-standard or unapproved VMS equipment
- ☐ Not protected as in DDOT standard
- ☐ Improper placement
- ☐ Inadequate sight distance
- ☐ Too many messages

CHANNELIZING DEVICES (CONES, DRUMS, ETC.)

- ☐ Non-standard device (shape, density)
- ☐ Non-standard single or multilane taper
- ☐ Incorrect spacing
- ☐ Placed too far away from traffic (> 2 ft)
- ☐ Damaged, dirty or non-reflective
- ☐ Improper alignment
- ☐ No CDs placed preceding barrier end sections
- ☐ Improperly weighted
- ☐ Missing or poor reflectivity

PAVEMENT MARKINGS

- ☐ None or non-standard markings
- ☐ Less than full complement of pavement markings/ delineation
- ☐ Unnecessary or conflicting markings not obliterated completely
- ☐ Failing of temporary markings/RPMs
- ☐ Less than required number of RPMs
- ☐ Improper alignment
- ☐ Incorrect skip size/space

TEMPORARY BARRIER / CRASH CUSHIONS

- ☐ Improper barrier wall flare
- ☐ Improper barrier end treatment
- ☐ Improper temporary barrier end transition with existing W-Beam or concrete barrier
- ☐ Non-standard or no object marker/vertical panel
- ☐ Reflector maintenance needed
- ☐ Reflector on barrier flare not allowed

- ☐ Damaged or dirty barrier wall
- ☐ Improper barrier delineation
- ☐ Inadequate or no crash cushion
- ☐ Improper installation of crash cushions
- ☐ Damaged or dirty crash cushions

FLAGGERS

- ☐ Non-certified flagger
- ☐ Non-standard STOP/SLOW paddle
- ☐ Incorrect signaling device (flag)
- ☐ Incorrect flagging
- ☐ Wearing improper clothing
- ☐ No flaggers present (signs displayed)
- ☐ Improper distance from advanced warning sign to flagger

GENERAL

- ☐ Traffic Control Device is not NCHRP-350 approved
- ☐ Lane closures do not have ongoing operations/work
- ☐ Less than minimum lane/shoulder widths as per TCP
- ☐ Improper stopping or detouring of traffic
- ☐ D Unprotected hazards on or adjacent (< 30 feet) to travel roadway
- ☐ Nighttime portable lighting improperly installed and causing glare
- ☐ Pavement drop-off not in compliance with DDOT standards
- ☐ Pavement not clean
- ☐ Contractor crossing equipment improperly
- ☐ Did not utilize available TARs and/or PVMS

WORK ZONE SAFETY & MOBILITY POLICY

APPENDIX 1G – FHWA RESOURCES

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Implementing the Rule on Work Zone Safety and Mobility

FHWA-HOP-05-065
September 2005
Tracy Scriba - FHWA, Param Sankar and Krista Jeannotte - Cambridge Systematics
Federal Highway Administration (FHWA), Washington, DC
http://www.ops.fhwa.dot.gov/wz/rule_guide/index.htm

Work Zone Impacts Assessment – An Approach to Assess and Manage Work Zone Safety and Mobility Impacts of Road Projects

FHWA-HOP-05-068
May 2006
Param Sankar and Krista Jeannotte – Cambridge Systematics
Jeffrey P. Arch, P.E., and Marcelino Romero – PB Farradyne
Federal Highway Administration (FHWA), Washington, DC
http://www.ops.fhwa.dot.gov/wz/resources/final_rule/wzi_guide/index.htm

Developing and Implementing Transportation Management Plans for Work Zones

FHWA-HOP-05-066
December 2005
Krista Jeannotte and Andre Chandra – Cambridge Systematics
Federal Highway Administration (FHWA), Washington, DC
http://www.ops.fhwa.dot.gov/wz/resources/publications/trans_mgmt_plans/index.htm

Work Zone Public Information and Outreach Strategies

FHWA-HOP-05-067
November 2005
William J. Mallett and Jakia Torrence – Battelle, Jennifer Seplow – SAIC
Federal Highway Administration (FHWA), Washington, DC
http://www.ops.fhwa.dot.gov/wz/info_and_outreach/index.htm

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WORK ZONE MANAGEMENT MANUAL

FOR THE DISTRICT OF COLUMBIA

PART THREE:

TRANSPORTATION FACILITY CLOSURE POLICY

District Department of Transportation

January 2016

TABLE OF CONTENTS

LIST OF TABLES

A. INTRODUCTION

A.1. Policy Statement

The purpose of this policy is to establish a uniform and consistent manner in which transportation facility closures are processed in the District of Columbia in order to minimize impacts. The term "transportation facility" includes (but is not limited to) public roadways, ramps, transitways, bicycle lanes, shared pathways and sidewalks. This policy applies to all public transportation facilities within the District of Columbia. This policy outlines closure restrictions, the closure request process and the closure waiver process.

This policy provides the District Department of Transportation (DDOT) with the ability to effectively manage their transportation network in a way that minimizes impacts to motorists, bicyclists and pedestrians. However, this policy is also intended to streamline construction progress and identify occurrences of multiple transportation facility closures in proximity to each other. The intent of this policy is to provide the framework for short and long-term closure requests by any public or private entity. This policy documents the process and key elements associated with requesting a partial or complete closure of a transportation facility.

Transportation facility closures are typically generated by infrastructure improvement projects, developer projects, utility projects, special events or emergencies; but the range of closure specifics is extensive. For example, a closure may involve a planned, one-time, overnight, mobile operation on a freeway shoulder. Or, a closure may involve an eight-month, full-time, double lane closure on a major arterial for emergency utility work. Each closure is unique and involves many factors including duration, type of facility, day of week, time of day, season, construction schedule, community support and political influence. The intent of this policy is to harness these variables, evaluate for conflicts and opportunities, and efficiently process closure requests while minimizing surprises to the residents, business owners, commuters, other stakeholders and elected officials.

This policy is enforced by DDOT's Project Delivery Group, which currently utilize the Citywide Work Zone Project Management System and the new Work Zone Management Manual to track and analyze the cumulative impacts of planned transportation facility closures through the District. The Project Delivery Group continues to be focused on streamlining the review and processing of closure requests, monitoring safety and mobility in work zones and conducting work zone audits to ensure compliance with policies, standards, and guidelines. All transportation facility closure requests are considered in light of the Mayor's Vision Zero initiative, which aims to eliminate all fatalities and serious injuries by 2024.

DDOT is committed to the continuous movement of traffic through all work zones by the elimination or reduction of delays. To minimize the severity and duration of mobility impacts on the traveling public resulting from work zones, all transportation facility projects shall be adequately evaluated and analyzed. Planned closures that cause only minimal congestion are an effective traffic management strategy. Given the purpose of this policy and the importance of safety and mobility in work zones, transportation facility closures shall occur after they have been sufficiently justified to DDOT. Except for emergency situations and very few other exceptions noted in this policy, all closures shall be approved in writing prior to implementation.

A.2. Background

In the past, transportation facility closure decisions were primarily based on field observations, previous experience and limited engineering judgment which often led to field conflicts, significant motorist delays, inadequate bicycle and pedestrian detours, construction inefficiencies and surprises to stakeholders. Sometimes conflicting lane closures in close proximity generated motorist confusion and degraded safety in work zones. Blocked or inaccessible pedestrian walkways piqued public interest and drew regional attention. Many of these experiences led to schedule delays and cost overruns. Elected officials were periodically engaged by their constituents to help resolve disputes or question the lack of progress. This policy is aimed at avoiding these types of pitfalls and missteps.

The closing of transportation facilities has the potential to have far-reaching impacts and must be carefully evaluated from the initial request through completion. Residents, local businesses, commuters, Business Improvement Districts and Advisory Neighborhood Commissions are particularly attuned to mismanaged work zones and unscheduled closures. And given the ease of communication to a large audience and social media, they do not hesitate to express frustration and a lack of confidence in public agencies. This policy quantifies the anticipated impacts of all closures and proactively communicates alternate routes and means of avoiding delays.

In 2009, the Federal Highway Administration (FHWA) launched the Every Day Counts (EDC) program in cooperation with the American Association of State and Highway and Transportation Officials (AASHTO) to speed up the delivery of highway projects and to address the challenges presented by limited budgets. DDOT both recognizes and encourages innovations in construction processes identified that shorten the project delivery process, enhance roadway safety, reduce congestion and improve environmental sustainability. This transportation facility closure policy directly supports the intent of the EDC initiative.

It is expected that this policy will improve the timeframe for processing transportation facility closure requests, better communicate expectations of closure setups and means of providing positive guidance, more thoroughly analyze the cumulative impacts of all closures and work zones, and ensure that proper outreach and notifications are conducted well in advance of approved closures throughout the District. This document is not meant to be a stand-alone document. Rather, it is intended to be used in concert with the other sections of DDOT's Work Zone Management Manual (WZMM) to arrive at the least impactful and most streamlined means of constructing the improvements or managing a special event.

A.3. Impacted Organizations

This policy applies to all individuals, firms and agencies involved in the planning, design, construction and maintenance on a public roadway in the District. This includes, but not limited to, consultants, utility companies, contractors, developers, agencies and DDOT Administrations. Those proposing transportation facility closures on public roadways are responsible for initially assessing if a proposed closure falls within the permissible closure guidelines of this policy. DDOT encourages "early and often" communication with stakeholders and nearby projects to seek opportunities, avoid conflicts and mitigate impacts. DDOT's Project Delivery Group will ultimately review and approve or deny closure requests based on this policy and other factors. If any ambiguity or unsureness exists on how to utilize this policy as details of projects and special events evolve, the proposer should seek guidance from DDOT's Project Delivery Group.

A.4. Key Definitions

Capital improvement projects (CIP) – a project that serves to maintain or improve a District asset, particularly as part of the transportation infrastructure.

Developer projects – projects primarily funded and constructed by private or commercial firms that develop or redevelop existing parcels in compliance with the approved land use.

District Department of Transportation (DDOT) – the primary agency responsible for transportation infrastructure planning, design, construction and maintenance in the District of Columbia.

District of Columbia Municipal Regulations (DCMR) –the official compilation of the permanent rules, statements, and legal documents circulated by DC government executive agencies and departments, the Council of the District of Columbia, and independent entities.

DDOT Temporary Traffic Control Manual (TTCM) - the District Department of Transportation manual issued to promote a uniform standard of traffic control associated with Special Events, Incident Management, and Work Area Protection along the streets and highways of the District of Columbia.

DDOT Work Zone Safety and Mobility Policy – the District Department of Transportation policy that provides guidance for assessing the District work zone impacts on the traveling public across the various stages of all Federal-Aid Highway-funded projects that are determined to be significant.

Emergency conditions – a non-recurring event that either interrupts or overwhelms transportation operations.

Emergency repair – a repair requiring an immediate response to protect public safety and prevent further damage to transportation infrastructure.

Flagger – work zone personnel that directs traffic during roadway construction, typically holding a paddle with "Stop" on one side and "Slow" on the other which they use to help indicate to motorists to slow down, stop and pass through the work zone.

Haul Route – a simple, temporary road built to facilitate the movement of construction-related equipment and/or materials along the route of work zone.

Maintenance of Traffic Alternatives Analysis (MOTAA) – an analysis that identifies and compares the benefits as well as potential functional faults of work zone alternatives. The analysis is performed for each detailed design alternative and addresses the benefits and concerns related to work zone options. This process results in recommendations for the preferred strategy for maintenance of traffic (MOT) for each detailed design alternative.

Public Space Regulations Administration (PSRA) – DDOT administration that enforces public space laws and regulations and inspects all work in public space completed under a public space permit to ensure the work is completed by DDOT standards.

Road maintenance – work required to maintain public infrastructure.

Special Event – an uncommon, unique, noteworthy, or extra occurrence of a specific activity open to the general public and designed, advertised, or promoted for an identified purpose. The event is to be conducted or held on a designated day or series of days, whether held outdoors, indoors, or both, in a public or private facility at which at least 50 vendors will be present.

Temporary Traffic Control (TTC) / Traffic Control Plan (TCP) – a design plan that addresses traffic operations and safety through a work zone. The TCP will follow DDOT Standards and Guidance for the layout and placement of traffic control devices, signs, and related equipment for the project. The degree of detail in the TCP will depend on the project complexity and the extent of the interface between all modes of traffic and construction activity.

Transportation Management Plan (TMP) - a comprehensive plan that lays out a set of strategies for managing the work zone impacts of a project; and expands the mitigation of work zone impacts beyond traffic safety and control.

Transportation System Maintenance Division (TSMD) – division within the DDOT Traffic Operations Administration (TOA) responsible of maintaining a functioning, safe and efficient transportation network in the District through field operations, inspection and oversight activities.

Utility projects – projects primarily funded by various utility companies including DC Water, PEPCO, Washington Gas, Verizon, etc.

A.5. Goals and Objectives

Transportation facility closures in the District's urban environment create daily challenges related to ensuring efficient traffic operations, maintaining continuous access to businesses and an increased awareness of pedestrian, bicycle, streetcar and transit needs. Roadway capacities change day-to-day, peak period-to-peak period and season-to-season throughout the District making a simple approach to managing facility closures inadequate. The goal of this policy is to provide specific closure guidance and set clear expectations of what is acceptable. During planning sessions, this streamlined approach saves time and minimizes "back and forth" negotiating between DDOT and the closure requestor. During construction and maintenance operations, this approach will help minimize frivolous requests. The objectives of this policy is to provide a standard *playbook* by which all agencies, firms and contractors who conduct work on public roadways in the District can operate.

B. ROLES AND RESPONSIBILITIES

B.1. DDOT

DDOT will manage the transportation facility closure review and approval process as well as provide guidance to DDOT personnel, other agencies, designers, and contractors on the application of this policy. DDOT will review and provide input on all TMPs, Work Zone Impact Analyses / Assessments, Maintenance of Traffic Alternative Analyses, Work Zone Mitigation Strategies, Traffic Control Plans and proposed closures for conformance to the Work Zone Management Manual (WZMM). Upon satisfactory compliance, DDOT will approve the TMP, Traffic Control Plans and other work products as appropriate. DDOT will facilitate coordination with projects that may affect traffic flow on District facilities. DDOT will coordinate with the Public Information Officer to provide all information needed for the public information / relations campaign.

DDOT will monitor and perform work zone inspection audits of projects and special events. DDOT will compare actual work zone mobility impacts to those generated during the work zone analysis / assessment and identify any differences. DDOT will acquire crash data to ascertain the proximity of planned work zones and special events to high crash intersections and consider crash mitigation measures. DDOT will review

and monitor work zone safety through the review and analysis of work zone crash reports. DDOT will also continually monitor and improve the work zone impact analysis / assessment procedures and update the processes of these guidelines as needed.

B.2. Other Agencies

Other agencies and stakeholders shall actively participate in the transportation facility closure process and assist DDOT, designers, and contractors in the application of this policy. Other agencies should review TMPs, Work Zone Impact Analyses / Assessments, Maintenance of Traffic Alternative Analyses, Work Zone Mitigation Strategies, Traffic Control Plans, and proposed closures and provide feedback to DDOT. In some cases, DDOT may seek TMP or TCP "buy-in" prior to approving these documents.

B.3. Designers

Designers shall prepare develop TMPs, Work Zone Impact Analyses / Assessments, Maintenance of Traffic Alternative Analyses, Work Zone Mitigation Strategies, Traffic Control Plans and proposed closures in accordance with the WZMM. Designers shall coordinate with nearby projects and special events.

B.4. Contractors

Contractors shall adhere to the work hour schedule requirements specified in the contract. The contractor may submit an alternate work hour schedule for consideration by DDOT prior to the start of work. Work cannot begin until the alternate schedule is approved. The alternate schedule shall be processed for approval in accordance with DDOT requirements. The contractor shall abide by the requirements set forth by DDOT in the transportation facility closure notification procedures.

C. TRANSPORTATION FACILITY CLOSURE POLICY

C.1. Overarching Methodology

The District of Columbia has both historic and international significance. Founded in 1791, the capitol city of the United States is often listed as one of the top ten tourist destinations in the United States. With a growing resident population of more than 660,000, commuters nearly double the number of people in the District each weekday. In fact, over 50,000 business and more than 175 embassies exist in the 68.3 square miles of the District. The Washington D.C. metropolitan area is often listed as the most congested urban area in the nation. Critically important infrastructure, utility, maintenance and developer projects as well as capitol area special events are frequently on a national (or international) stage with high risk of traffic congestion, safety concerns and negative public perception.

Given the congested, high risk and politically charged environment of the District, closure of a transportation facility is significant and closely evaluated. Vehicular lane closures, sidewalk closures and bicycle closures all have an impact to the transportation network and each one has the potential to cause severe congestion, safety concerns or injuries. Closures also typically involve workers being exposed to fast-moving traffic in limited work areas. Since 2012, DDOT has developed a proactive, regional approach to managing work zones aimed at enhancing safety and mobility. This policy directly supports the safety and mobility efforts on District transportation facilities.

As stated in DDOT's Work Zone Safety and Mobility Policy, a Transportation Management Plan (TMP) is required for all projects in the District of Columbia. The level of TMP required (Type A, Type B or Type C) will vary based on the level of anticipated impacts. Type B and Type C TMPs require a work zone impact analysis or work zone impact assessment, respectively, to quantify the impacts for each phase of work or special event configuration. The results of the work zone analysis / assessment provide details of possible closure periods (off-peak, overnight, weekend, etc.) in order to maintain acceptable levels of mobility. DDOT strongly recommends performing a quantitative analysis and safety evaluation to determine the impact of all transportation closures.

C.2. Specific Closure Restrictions

Unless otherwise justified by a work zone impact analysis / assessment, permitted by the Engineer, or approved by DDOT, work is prohibited on any public transportation facility during peak periods from 7:00 am to 9:30 am and 3:30 pm to 6:30 pm on weekdays (Monday through Friday), Saturdays, Sundays, National or District Holidays, or days preceding and following said holidays. However, these restrictions may be modified at any time by DDOT. Any day declared a holiday by the District shall be observed. When a holiday falls on a Sunday, the following Monday will be observed as a holiday. When a holiday falls on a Saturday, the preceding Friday will be observed as a holiday. The District recognizes the following days as legal holidays:

A. New Year's Day (January 1);
B. Martin Luther King Jr's Birthday;
C. Emancipation Day;
D. President's Day;
E. Memorial Day;
F. Labor Day;
G. Independence Day (July 4th);
H. Columbus Day;
I. Veteran's Day;
J. Thanksgiving Day;
K. Christmas Day (December 25).

The following sections provide additional detail regarding restrictions on specific facilities.

Roadway, Ramp, and Transitway Closures

Restrictions on roadways, ramps and transitways include work within a lane, within 15 feet of the nearest edge line (on an open section roadway), or within 2 feet of the face of curb (on a closed section roadway). This restriction applies to any classification of public roadway in the District including, but not limited to, alleys, local, collectors, arterials, expressways, freeways, and ramps.

Roadway, ramp and transitway closures are based on the type of facility, number of lanes available, number of lanes proposed to be closed, duration of the proposed closure, traffic data, proposed detour route, season of the year and many other factors. Unique circumstances may warrant modifications to the closure

restrictions listed at the beginning of *Section C.2*. These unique circumstances might include, but are not limited to, the following:

A. Night time temperatures, noise restrictions (based on adjacent land use), materials supply limitations, etc.;

B. Nature of construction required (ramp reconstruction, etc.);

C. Special events (presidential inauguration, national sporting events, etc.);

D. Seasonal events (such as harvests);

E. Transport of oversize vehicles.

Any proposed deviation from the closure restrictions listed at the beginning of *Section C.2* shall comply with the Facility Closure Waiver Process (*Section H*). Refer to Detour Considerations (*Section D*) for guidance on full closures and associated detours.

Bicycle Lane and Shared Pathway Closures

Restrictions on bicycle lanes and shared pathways include all bicycle facilities (i.e. protected lanes, unprotected lanes and shared lanes) and shared pathways (i.e. hiker / biker trails, off-road paths or trails). Efforts shall be made to safety accommodate bicycles through or around the work area or special event using the guidance in DDOT's Work Zone Safety and Mobility Policy and Temporary Traffic Control Manual (TTCM). The width of bicycle lanes and shared pathways shall not be reduced without prior approval by DDOT, who may permit a flagging operation or closure and detour to be implemented.

When work encroaches upon a bike lane, bike trail, shared lane, signed bike route or a road or sidewalk commonly used by bicyclists, an accessible, safe and clearly defined route shall be provided and maximum effort made to provide a convenient bicycle way separate from active work areas. The Contractor shall not force a cyclist into an unsafe condition, such as grating, debris, or an abrupt stop within moving traffic as part of traffic control. Bicycle lanes and other identified bicycle routes shall be kept free of obstructions. If bicyclists cannot be accommodated through the work area with facilities comparable to pre-construction conditions, bicycle detours shall be considered.

Any proposed deviation from the closure restrictions listed at the beginning of *Section C.2* shall comply with the Facility Closure Waiver Process (*Section H*). Refer to Detour Considerations (*Section D*) for guidance on full closures and associated detours.

Parking Lane Closures

Restrictions on parking lanes include work which blocks or prevents parking within a designated parking space. Any proposed deviation from the closure restrictions listed at the beginning of *Section C.2* shall comply with the Facility Closure Waiver Process (*Section H*).

Access Closures

Access restrictions include blocking access to driveways, businesses, parks or some other public or private space. Access closures also refer to temporary or long-term turning movement restrictions due to the work zone or special event. Access closures can often have safety benefits and help improve traffic operations,

but have undesirable impacts on neighbors, businesses and commercial properties. Access closures should be carefully evaluated to ensure they do not incur unintended consequences.

Any proposed deviation from the closure restrictions listed at the beginning of *Section C.22* shall comply with the Facility Closure Waiver Process (*Section H*). Refer to Detour Considerations (*Section D*) for guidance on full closures and associated detours.

Sidewalk Closures

When the work zone or special event encroaches on a sidewalk, pedestrian walkway or crosswalk, special considerations must be given to the pedestrian's access and safety. Per DDOT's Safe Accommodations Act, a safe and accessible pedestrian path / walkway shall be maintained at all times. If a sidewalk, pedestrian walkway or crosswalk is closed, they shall be barricaded to physically prevent pedestrian passage and pedestrians shall be positively guided to an alternate route. Per DDOT's Temporary Traffic Control Manual, protective barricades, fencing, and bridges, together with warning and guidance devices and signs, shall be utilized so that the passageway for pedestrians is wheelchair accessible, safe and well defined.

Where walkways are closed by construction, a wheelchair accessible alternate walkway shall be provided. Where it is necessary to divert pedestrians into the roadway, barricading or channelizing devices shall be provided to separate the pedestrian walkway from the adjacent traffic lane. Temporary curb ramps shall be provided to maintain wheelchair accessibility. At no time shall pedestrians be diverted into a portion of the street used concurrently by moving vehicular traffic.

At locations where adjacent alternate walkways cannot be provided, appropriate signs shall be posted at the limits of construction and in advance of the closure at the nearest crosswalk or intersection to divert pedestrians across the street. To prevent visually impaired people from inadvertently entering a closed area, physical barricades shall be installed to prevent passage. All pedestrian walkways shall be wheelchair accessible at all times. Pedestrian access shall be maintained to all properties adjacent to the construction site.

Sidewalk closures of any duration require conceptual approval by DDOT prior to formal submission of the TCP or any other plan submission. To request conceptual approval, a sequence of construction, schedule (including the estimated sidewalk closure duration) and justification as to why the work activity cannot occur without the closure is required. For sidewalk closures proposed for longer than 30 consecutive days, the justification shall include a detailed analysis of alternatives and the proposed alternate pedestrian access route. Sidewalk closures are not permitted for staging, delivery of materials or construction parking with prior approval by DDOT.

Once conceptual approval is obtained, all sidewalk closures shall be clearly depicted on the TCP and submitted to DDOT for approval. The duration of all sidewalk closures shall be specified on the TCP and shall be inclusive of projected downtimes due to factors such as inclement weather, holidays, equipment breakdowns, material deliveries and utility delays. In case of any actual sidewalk closure duration exceeding those provided in the approved TCP, DDOT will order the contractor to stop work and vacate the public right-of-way. The Contractor is responsible to give notice to DDOT of any change to the construction and critical path schedule that affects the approved TCP or duration of any approved sidewalk closures.

Due to the impacts of sidewalk closures on communities and businesses, DDOT desires to proactively communicate with users on the re-opening of sidewalk. As such, signs shall be posted in the vicinity of the

sidewalk point of closure(s) which state "This sidewalk to be re-opened no later than (date based on closure duration specified on the approved TCP). Call (number to be determined) if not opened by this date." Sidewalks shall be promptly re-opened by the date specified on the posted signs or DDOT may elect to issue a stop work order to the project or special event.

An alternative pedestrian access route shall be provided anytime a sidewalk is closed for any duration. It is preferred that an alternative pedestrian access route be on the same side of the street utilizing portable barriers (i.e. concrete or water-filled) and covered walkways as necessary to ensure proper protection and guidance. If this is not feasible and DDOT concurs, an alternative pedestrian access route which crosses the street may be further considered. The closure of sidewalks on both sides of a street is prohibited, unless at least one alternative pedestrian access route is provided on the same street.

Unless otherwise specified by DDOT, covered walkways shall be used under the following conditions:

A. Within the Central Business District (as defined by DDOT);
B. At metro stations;
C. Within 20 feet of a bus stop;
D. Along roadways classified as arterials or higher;
E. Along roadways with six (6) or more lanes.

C.3. Special Events

As the nation's capital, special events are a regular occurrence throughout the District. Special events include large events like the annual Cherry Blossom Festival as well as smaller, one-time events. Major sporting events (MLB Washington Nationals, NHL Washington Capitals, MLS DC United) are included in the category of special events. Special events affect mobility on transportation facilities and should be carefully planned. While some are annual events with effective routine closures, other special events are arranged on relatively short notice, such as a political march. DDOT shall be included in all discussions related to special events to ensure conflicts are avoided with other work zones and specials and to ensure adequate mobility is maintained. Transportation facility closures for special events shall be minimized. DDOT retains the decision authority on special event closures on public transportation facilities.

For reference, the following list contains special events, estimated attendance and timeframe.

Table 1: Special Events

SPECIAL EVENT	*ESTIMATED ATTENDANCE*	*TIMEFRAME*
Washington DC Restaurant Week		January
Washington Auto Show	Thousands	January 23-28
St. Patrick's Day Parade	Thousands	March 11, noon - 2:30pm
National Cherry Blossom Festival	1 million	April 14, 10am - 6pm
Washington International Film Festival	37,000	April 19 - 29
Smithsonian Craft Show		April 19 - 22, 10am - 6pm
White House Easter Egg Roll	Thousands	April, 8am-2pm
National Memorial Day Parade		May 28, 10:30am
National Capital Barbecue Battle	100000	June 23 - 24, 11am - 10 pm
Smithsonian Folk life Festival	1 million	June 27 – July 1, 4-8, 11 am - 5:30 pm
Capital Pride	200,000	June, 9 days
DC Caribbean Carnival	500,000	July 23-25 10am - 7pm
Independence Day Celebration	500,000	July 4, begins at noon
Legg Mason Tennis Classic	72,000	August
Kennedy Center Prelude Festival		September
Black Family Reunion Celebration	500,000	September, 12pm - 8pm
Adams Morgan Day	12,000-15,000	12pm - 6pm
America Support You Freedom Walk		September, 6:30 - 9pm
National Book Festival	85,000	September, 10am - 5pm
Reel Affirmations Film Festival	30,000	October
Marine Corps Marathon	30,000	October 29
Holiday Homecoming		
Veterans Day Celebration		November 11
Washington Craft Show	Thousands	November 17-19
National Christmas Tree Lighting & Pageant Of Peace	5,000	December

C.4. Critical Corridors Restrictions

DDOT has identified twenty (20) arterial routes as "Critical Corridors" as the primary commuter routes in and out of the District. A map of these corridors can be found in the Work Zone Safety & Mobility Policy. Transportation facility closures and special events of any nature on these routes require special attention and additional scrutiny in order to minimize impacts.

D. DETOURS

Transportation facility closures will require detours of roadways, ramps, bicycle lanes, shared pathways and sidewalks. All detours shall meet the following requirements in addition to any specified by DDOT as being necessary for a particular project:

A. Detour routes shall be as simple and direct as possible;

B. Detour routes shall be clearly delineated by proper temporary traffic control devices per DDOT's Temporary Traffic Control Manual;

C. Detour routes shall be selected primarily based on quantitative and qualitative analyses that justify the detour route can adequately accommodate the additional volume of vehicular traffic, pedestrians or bicyclists;

D. Roadway detours shall be routed onto equal or higher classification roadways, unless otherwise approved by DDOT.

E. NOISE RESTRICTIONS

Noise levels resulting from construction or demolition shall not exceed eighty (80) decibels, from 7 a.m. to 7 p.m. in the District of Columbia. The maximum noise level by zones and time of day in the District of Columbia is presented in the chart below:

No noise from construction, excluding minor home repairs, shall be permitted within a residential, special purpose, or waterfront zone on any Sunday or legal holiday, or after 7:00 p.m. and before 7:00 a.m. on any weekday.

The District's Noise Ordinance allows work as follows:

Table 2: Noise Restrictions by Zones

ZONE	*DAYTIME*	*NIGHTTIME*
Commercial or light manufacturing zone	65 dB(A)	60 dB(A)
Industrial zone	70 dB(A)	65 dB(A)
Residential, special purpose or waterfront zone	60 dB(A)	55 dB(A)

F. POLICY EXCEPTIONS

During emergency situations, transportation facility closure time restrictions are waived. Also, facility closures necessitated by emergency situations supersede all previously approved facility closures. Unless otherwise approved by DDOT, work during emergency situations is to be performed on a continuous, (i.e., 24-hour) basis to minimize the duration of closures and impacts to motorists, pedestrians and bicyclists. DDOT shall be notified of all transportation facility closures for emergency situations as early as possible in order to assist with resources and public outreach efforts.

G. TRANSPORTATION FACILITY CLOSURE PROCESS

The transportation facility closure process actually begins at project concept stage or during the initial planning efforts for a special event and continues throughout the entire project development life-cycle. During the development of the TMP (required per DDOT's Work Zone Safety and Mobility Policy), some alternatives may involve potential closures of travel lanes, ramps, transitway facilities, bicycle facilities, shared paths and sidewalks. Facility closures for special events may be needed as well. It is crucial that all closures be closely evaluated.

DDOT classifies transportation facility closures as either planned or unplanned. A significant majority are planned closures associated with capital improvement, maintenance, utility or developer projects or special events. Planned closures are ones which have been evaluated and eventually approved by DDOT. Unplanned closures are emergency-type closures – ones that are because of an imminent safety issue, incident, impromptu gathering or political event. Often unplanned events are initially uncontrolled until police, fire/rescue or other first responders arrive on the scene. The following sections outline the process for planned and unplanned closures.

G.1. Planned Closures

Planned closures are usually initiated by a variety of projects or special events. Throughout design development, the designer shall develop a TMP with specific emphasis on the desired facility closures. DDOT will review the studies, analyses and justification packages and provide feedback regarding the suggested closures. It is imperative that designers carefully evaluate the need for transportation facility closures at each design stage (30%, 60%, 90% and 100%) and develop appropriate justification for DDOT review. Inadequate or unsubstantiated closures will not be approved. In compliance with the Work Zone Safety and Mobility Policy, a final deliverable is typically a TMP, TCP or special event package which specifies the DDOT approved closure periods and detours, if applicable.

Work zones and special events with transportation facility closures often generate congestion. Traffic queuing shall be monitored by DDOT and the Contractor, and compared against what the congestion was anticipated to be per the work zone impacts analysis / assessment or TMP.

The process for planned closures includes the following primary steps:

A. Transportation facility closure information form shall be submitted to IPMA during the planning or design phases of a project;

B. Transportation facility closure requests shall be submitted via the permitting process;

C. The technical and planning review and approval processes shall be executed by one or more DDOT entities, and

D. Appropriate stakeholders shall be notified.

Schedule Requirements

Once DDOT approves a transportation facility closure, the contractor must provide advance notification when a closure is pending. A minimum of a two (2) week advance notification is required for the closure of any transportation facility. This notification will be provided by the same responsible parties identified to notify law enforcement/fire/EMS.

All persons or agencies doing work within or infringing upon the street right of way shall conduct said work to acceptable standards of safety and efficiency and, shall be responsible for the following:

A. Obtaining all necessary lane closure permits and/or permissions to perform work in the street right of way from DDOT;

B. Obtaining approval for haul route(s) from DDOT;

C. Supplying, installing, and maintaining all traffic control devices and equipment as outlined in the WZMM unless specific instructions that deviate or grant exceptions to the stipulations within the WZMM are included in the contract documents;

D. Supplying flaggers and proper equipment when required;

E. Scheduling and expediting the work to minimize inconvenience to the public;

F. Providing adequate safeguards for the worksite and the general public.

G.2. Unplanned Closures

Emergency repairs are work efforts requiring immediate response to circumstances that severely impair the safety or usefulness of the roadway, which could result in loss of life or serious injury to the public. Such projects include bridge deck failures, bridge structure impact damage, roadside appurtenances, slope stability problems, or any catastrophic failures that compromise the safety of the roadway. Emergency repairs are exempt from the transportation facility closure policy. Repairs deemed an emergency by the DDOT Chief Engineer (or an appropriate designee) require no prior approval before a lane or road closure action can be taken. Communications shall be established and maintained with the Transportation Operations Division of the TOA throughout the duration of the closure.

After the emergency situation has been stabilized, the following actions shall be taken:

1. Transportation facility closure information form shall be retroactively submitted to IPMA within 24 to 72 hours of the unplanned event.
2. Perform After-Action Meeting. A meeting may be conducted to assess the performance of response to the emergency situation. This meeting may involve the DDOT Chief Engineer (or an appropriate designee) and shall include appropriate staff from TOA, IPMA, and others as deemed necessary.

3. Follow the process for planned closures for any permanent repairs deemed necessary to restore the roadway to its pre-emergency conditions.

H. TRANSPORTATION FACILITY CLOSURE WAIVER PROCESS

The proposed closure of transportation facilities will not be considered unless a closure request demonstrates that impacts cannot be reasonably avoided through alternative construction methods, that the facility cannot be reasonably relocated through reassignment of vehicle lanes or other existing facilities, that the duration and extent of impacts has been minimized, and that an adequate detour is available.

H.1. Maintenance Waiver

Maintenance work often requires unique considerations for lane closures. Such unique circumstances may warrant modification(s) to the basic allowed closure hours. These unique circumstances might include, but are not limited to, the following:

A. Night time temperatures, noise restrictions, materials supply limitations, etc.

B. The nature of the construction required. For example, blasting may be done only during daylight hours.

C. Specific construction activities that require longer work shifts than can be provided by the closure hours in this document. Concrete slab replacement projects, for example, can require such efforts.

D. Special events (for example: festivals, sporting events with large attendance, etc.).

E. Potential restrictions for oversize vehicles.

H.2. Design Waiver

All design projects must consider and outline allowed lane closure hours for the project. During the design process, when it is determined that a unique situation exists that would require the need to modify the allowable closure hours, approval for a waiver from the DDOT is required.

Such hours, as agreed to by DDOT, shall be well-documented within the General Notes of the Temporary Traffic Control Plan set.

H.3. Construction Waiver

Upon implementing closure hours, it may be determined that an adjustment to the lane closure hours is needed during construction. A variance / waiver request should, at a minimum, include the following:

A. The location and limits of the District roadway lane closure,

B. Reiteration of the allowed hours provided in the Lane Closure permit,

C. Presentation of the requested change in the allowed hours, specifying the new hours by the season, day-of-week, and start and end time,

D. Concise statements providing the appropriate justification for the request of a variance / waiver,

E. Documentation that other maintenance or construction methods have been considered that would not require a variance / waiver; and

F. Concise statements regarding how the new hours are expected to affect the safety and mobility of traffic on the roadway.

Such requests shall take the form of a letter or memorandum addressed to the DDOT Chief Engineer (or the appropriate designee). The request may be delivered as an email attachment or a hardcopy.

I. POLICY COMPLIANCE

It is the responsibility of each Contractor to review and to properly stage approved lane closures and monitor conformance. The Contractors shall coordinate and monitor all projects that may affect traffic flow on all roadways impacted as a result of the project, as well as other work zones in the close proximity to the project. The Contractors shall adhere to the work hour schedule requirements specified by DDOT in the contract.

The Contractor may submit an alternate work hour schedule for consideration by the DDOT prior to the start of work. However, work cannot begin until the alternate schedule is approved. The alternate schedule shall be processed for approval in accordance with the DDOT requirements.

When determined that construction operations result in repeated travel delays, DDOT shall require the Contractor to revise the Traffic Control Plan and the approved work schedule to minimize travel delays.

DDOT reserves the right to modify previously approved or specified times of closures when, it its own determination, it becomes necessary. If the DDOT Engineer determines that the lane closure is creating undo traffic delay and congestion, they may suspend the work and/or modify the lane closure schedule. The Contractor shall abide by all requirements set forth by DDOT.

I.1. Unacceptable Closure Impacts

When the suspension of construction operations due to unacceptable travel delays will cause a negative impact on public safety, such as when there are open trenches or a lack of proper delineation, the DDOT Engineer may allow the operations to continue until the safety concern can be resolved. The DDOT Engineer shall immediately notify the DDOT Traffic Operations Administration (TOA) of such situations and shall keep TOA briefed on the status of the work. This type of situation should be avoided to the greatest extent possible through the careful planning and monitoring of construction operations.

DDOT retains the right to take any necessary corrective action based on an inspection of traffic impacts resulting from approved lane closures. At any time, the Contractor can be notified by DDOT that an approved lane closure schedule must be modified.

When DDOT determines that traffic impacts resulting from approved lane closures are exceeded (i.e., congestion, safety), the Contractor shall be required by DDOT to immediately restore the facility to normal conditions in a reasonable timeframe. DDOT will have final authority in determining the conditions and timeframes for which traffic patterns are to be restored.

I.2. Closure Notifications

Public outreach is a notable part of the TMP for any project or special event. The TMP will outline specific outreach efforts to inform stakeholders and help minimize operational impacts. Efforts must be made to provide advance notification to law enforcement agencies, local fire departments and emergency medical services about upcoming transportation facility closures.

WORK ZONE MANAGEMENT MANUAL

FOR THE DISTRICT OF COLUMBIA

PART FOUR:

TEMPORARY TRAFFIC CONTROL MANUAL

District Department of Transportation

January 2016

TABLE OF CONTENTS

CHAPTER 6G. TYPE OF TEMPORARY TRAFFIC CONTROL ZONE ACTIVITIES

LIST OF FIGURES

CHAPTER 6C. TEMPORARY TRAFFIC CONTROL ELEMENTS

CHAPTER 6E. FLAGGER CONTROL

CHAPTER 6F. TEMPORARY TRAFFIC CONTROL ZONE DEVICES

CHAPTER 6G. TYPE OF TEMPORARY TRAFFIC CONTROL ZONE ACTIVITIES

CHAPTER 6H. TYPICAL APPLICATIONS

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

LIST OF TABLES

CHAPTER 6C. TEMPORARY TRAFFIC CONTROL ELEMENTS

CHAPTER 6E. FLAGGER CONTROL

CHAPTER 6F. TEMPORARY TRAFFIC CONTROL ZONE DEVICES

CHAPTER 6H. TYPICAL APPLICATIONS

(DC Revision) INTRODUCTION

Standard:

01 **The "District of Columbia (DC) Temporary Traffic Control Manual (2015)" ("the Manual"), is published by the District Department of Transportation (DDOT) and is issued to prescribe uniform standards and specifications for all traffic control devices within the public right-of-way. The Manual is issued in accordance with Title 50 of the District of Columbia Code.**

02 **Traffic control devices shall be defined as all signs, signals, markings, and other devices placed on, over, or adjacent to a street, highway, pedestrian facility, or bikeway by authority of a public agency having jurisdiction, and that are inteneded to regulate, warn, or guide traffic.**

03 **The Federal Highway Administration's (FHWA), Part 6 of the *Manual On Uniform Traffic Control Device (MUTCD)*, is reproduced and modified herein as a separate publication that presents the City's uniform standards for temporary traffic control during construction, maintenance operations and special events impacting streets, highways, and pedestrian and bikeway facilities in the District of Columbia.**

04 **Nothing contained herein is intended to supercede the requirements of the MUTCD, but rather to supplement that document in order to address the unique circumstances and operational characteristics within the District of Columbia.**

Support:

05 Section 23 of the Code of Federal Regulations (CFR), Part 655.603, adopts the MUTCD as the national standard for any street, highway, pedestrian or bicycle facility open to public travel in accordance with 23 U.S.C. 109(d) and 402(a); and the "Uniform Vehicle Code" (UVC) is one of the documents prominently and specifically referenced in the MUTCD. The UVC contains a model set of motor vehicle codes and traffic laws for use throughout the United States. The States and the District of Columbia are encouraged to adopt Section 15-117 of the UVC, which states that "No person shall install or maintain in any area of private property used by the public any sign, signal, marking, or other device intended to regulate, warn, or guide traffic unless it conforms to the State manual and specifications adopted under Section 15-104." Section 15-104 of the UVC adopts the MUTCD as the standard for conformance.

Standard:

06 **The U.S. Secretary of Transportation, under authority granted by the Highway Safety Act of 1966, decreed that traffic control devices on all streets and highways open to public travel in accordance with United States Code (U.S.C.) Title 23 109(d) and 402(a) in each State shall be in substantial conformance with the Standards issued or endorsed by the FHWA.**

07 **Any traffic control device design or application provision contained in the MUTCD and this Manual shall be considered to be in the public domain. Traffic control devices contained in either manual shall not be protected by a patent or copyright, except for the Interstate Shield and any other items owned by the FHWA.**

Guidance:

08 *The need for uniformity of standard control devices is particularly applicable to operations during roadway temporary traffic control operations. Because conditions would generally be abnormal, roadway users are dependent on the design, placement, and uniformity of traffic control devices for direction and guidance to safely and efficiently traverse areas having features that would be unexpected. The constantly shifting and changing nature of work zone activity on or adjacent to the roadway may require frequent readjustments of traffic control devices in order to handle new situations. Thus, the appropriate placement of standard traffic control devices within the public right-of-way is the continuous responsibility of officials having authority and jurisdiction over the particular facility. This responsibility includes the timely and periodic inspection of the devices incorporated in the Temporary Traffic Control Plan to confirm their appropriateness throughout the duration of the temporary traffic control operation.*

09 *This Manual is issued to promote a uniform standard of traffic control associated with SPECIAL EVENTS, INCIDENT MANAGEMENT, and WORK AREA PROTECTION along the streets and highways of the District of Columbia. The standards, policies, and objectives contained in this Manual are intended to furnish information and guidance to personnel authorized to do work on the highway right of way and are not intended to establish a legal requirement for installation. Good engineering judgment must be used to arrive at the best traffic controls for a particular worksite, and shall give due consideration to the nature of the activity, location and abutting land uses, duration of the work, type of roadway, traffic volume, speed, mode composition and potential safety concern. Thus, while this Manual provides guidelines for design and*

application of traffic control devices, it is not intended to substitute for engineering judgment.

10 *It should be recognized that it is not feasible to cover every conceivable situation. The objective of this Manual is to illustrate many of the typical worksites and to describe many common conditions encountered. When circumstances occur which are not specifically covered in this Manual, or which require modification of the instructions contained herein, the judgment of the various levels of operating supervisors must be relied upon to meet the required objectives. When warranted, the appropriate District Department of Transportation Engineer should be consulted to select or tailor the proper traffic control devices.*

11 *The Standard, Guidance, Option, and Support material described in the MUTCD and this Manual provides the transportation professional with the information needed to make appropriate decisions regarding the use of traffic control devices on streets and highways. The material in this manual is organized to better differentiate between Standards that must be satisfied, Guidance that should be followed, Options that may be applicable, and Support that is intended to be information.*

12 *Throughout this Manual the headings Standard, Guidance, Option, and Support are used to classify the objective of the text that follows. Figures, tables, and illustrations are used generally to supplement the text; but in some situations they may constitute a specific Standard, Guidance, Option, or Support. The user of this Manual should therefore refer to the appropriate text to determine the intentof the figure, table, or illustration.*

Standard:

13 **When used in this Manual, the text headings shall be defined as follows:**

A. Standard - a statement of required, mandatory, or specifically prohibitive practice regarding a traffic control device. All standards are labeled, and the text appears in bold large type. The verb *shall* is typically used. Standards are sometimes modified by Options.

B. Guidance - a statement of highly recommended practice in typical situations, with deviations allowed if engineering judgment or engineering study indicates the deviation to be appropriate. These deviations shall be properly documented when not following guidance stipulations. All Guidance statements are labeled and the text appears in large italicized type. The verb 'should' is typically used. Guidance statements are sometimes modified by Options.

C. Option - a statement of practice that is a permissive condition and carries no requirement or recommendation. Options may contain allowable modifications to a Standard or Guidance. Option statements are labeled, and the text appears in regular font. The verb may is typically used.

D. Support - an informational statement that does not convey any degree of mandate, recommendation, authorization, prohibition, or enforceable condition. Support statements are labeled, and the text appears in regular font. The verbs *shall*, *should*, and *may* are not used in Support statement.

CHAPTER 6A. GENERAL

Section 6A.01 General

Support:

01 Whenever the acronym "TTC" is used in Part 6, it refers to "temporary traffic control."

Standard:

02 **The needs and control of all road users (motorists, bicyclists, and pedestrians within the highway, or on private roads open to public travel (see definition in Section 1A.13), including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA), Title II, Paragraph 35.130) through a TTC zone shall be an essential part of highway construction, utility work, maintenance operations, the management of traffic incidents, and situations during special events.**

Support:

03 When the normal function of the roadway, or a private road open to public travel, is suspended, TTC planning provides for continuity of the movement of motor vehicle, bicycle, and pedestrian traffic (including accessible passage); transit operations; and access (and accessibility) to property and utilities.

04 (DC Revision) The primary function of a TTC plan is to provide for the reasonably safe and effective movement of vehicles, streetcar, bicyclists, and pedestrians through and/or around TTC zones while reasonably protecting road users, workers, and responders to traffic incidents, properties, and equipment.

05 Of equal importance to the public traveling through the TTC zone is the safety of workers performing the many varied tasks within the work space. TTC zones present constantly changing conditions that are unexpected by the road user. This creates an even higher degree of vulnerability for the workers and incident management responders on or near the roadway (see Section 6D.03). At the same time, the TTC zone provides for the efficient completion of whatever activity interrupted the normal use of the roadway.

06 Consideration for road user safety, worker and responder safety, and the efficiency of road user flow is an integral element of every TTC zone, from planning through completion. A concurrent objective of the TTC is the efficient construction and maintenance of the highway and the efficient resolution of traffic incidents.

07 No one set of TTC devices can satisfy all conditions for a given project or incident. At the same time, defining details that would be adequate to cover all applications is not practical. Instead, Part 6 displays typical applications that depict common applications of TTC devices. The TTC selected for each situation depends on type of highway, road user conditions, duration of operation, physical constraints, and the nearness of the work space or incident management activity to road users.

08 Improved road user performance might be realized through a well-prepared public relations effort that covers the nature of the work, the time and duration of its execution, the anticipated effects upon road users, and possible alternate routes and modes of travel. Such programs have been found to result in a significant reduction in the number of road users traveling through the TTC zone, which reduces the possible number of conflicts.

09 Operational improvements might be realized by using intelligent transportation systems (ITS) in work zones. The use in work zones of ITS technology, such as portable camera systems, highway advisory radio, variable speed limits, ramp metering, traveler information, merge guidance, and queue detection information, is aimed at increasing safety for both workers and road users and helping to ensure a more efficient traffic flow. The use in work zones of ITS technologies has been found to be effective in providing traffic monitoring and management, data collection, and traveler information.

Standard:

10 **(DC Revision) TTC plans and devices shall be the responsibility of the District Department of Transportation's Infrastructure Project Management Administration (IPMA), or as deemed appropriate, under the authority of a public body or official having jurisdiction over the transportation facility for guiding road users. There shall be adequate statutory authority for the implementation and enforcement of needed road user regulations, parking controls, speed zoning, and the management of traffic incidents. Such statutes shall provide sufficient flexibility in the application of TTC to meet the needs of changing conditions in the TTC zone.**

Support:

11 Temporary facilities, including pedestrian routes around worksites, are also covered by the accessibility requirements of the Americans with Disabilities Act of 1990 (ADA) (Public Law 101-336, 104 Stat. 327, July 26, 1990. 42 U.S.C. 12101-12213 (as amended)).

Guidance:

12 *The TTC plan should start in the planning phase and continue through the design, construction, and restoration phases. The TTC plans and devices should follow the principles set forth in Part 6. The management of traffic incidents should follow the principles set forth in Chapter 6I.*

Standard:

12A **(DC Revision) The TTC plans shall comply with the latest version of DDOT's "Work Zone Safety and Mobility Policy," and "Pedestrian Safety and Work Zone Standards," available for download on the DDOT website at http://www.ddot.dc.gov.**

Option:

13 TTC plans may deviate from the typical applications described in Chapter 6H to allow for conditions and requirements of a particular site or jurisdiction.

Standard:

13A **(DC Revision) TTC plans that deviate from the typical applications described in Chapter 6H shall be subject to approval by the DDOT Engineer.**

Support:

14 (DC Revision) The provisions of Part 6 apply to all transportation facilities within the District of Columbia. A rural highway is normally characterized by lower volumes, higher speeds, fewer turning conflicts, and less conflict with pedestrians. An urban street is typically characterized by relatively low speeds, wide ranges of road user volumes, narrower roadway lanes, frequent intersections and driveways, significant pedestrian activity, and more businesses and houses.

15 The determination as to whether a particular facility at a particular time of day can be considered to be a high-volume roadway or can be considered to be a low-volume roadway shall be the responsibility of DDOT's Chief Engineer or designated official

16 (DC Revision) It is the responsibility of the contractor, agency, or organization performing work on, or adjacent to, a highway to install and maintain such devices which are necessary to provide safe passage for the traveling public (including pedestrians and bicyclists) through the work zone, as well as for the safeguard of workers.

Section 6A.02 Responsibility

Standard:

01 **(DC Revision) All agencies, contractors or other entinties intending to do work within public right-of-way or in the proximity to pedestrian, vehicular and private property shall conduct said work to acceptable standards of safety and efficiency and shall be responsible for the following:**

- **A. Obtaining all necessary permits and/or permission to perform work in the vehicular, streetcar and/or pedestrian right-of-way from the Public Space Regulations Administration (PSRA) of the District Department of Transportation;**
- **B. Supplying, installing, and maintaining all traffic control devices and equipment appropriate for the work area, and removing all traffic control devices upon completion of work;**
- **C. Supplying flaggers and other personnel trained in work zone traffic control;**
- **D. Scheduling and expediting the work to maximize safety and to minimize inconvenience and adverse impact to the public;**
- **E. Calling "Miss Utility" before digging, and notifying the District Department of Transportation 48 hours in advance of starting work;**
- **F. Informing occupants of abutting properties by advance written notice of parking prohibitions or access limitations;**
- **G. Obtaining permission to remove, relocate, cover, or modify existing traffic control and monitoring devices;**
- **H. Replacing or reimbursing the City for damage to or loss of existing traffic control devices, their supports, and parking meters;**
- **I. Monitoring traffic control devices for temporary traffic control zones and removing them as soon as they are no longer needed.**

Section 6A.03 Training

Standard:

01 **(DC Revision) Each person whose actions have a direct impact on maintenance, special event, construction, utility, and incident management – from the upper level management personnel through field personnel – shall receive training in traffic control appropriate to on-the-job decisions each individual is required to make. Only those individuals who are qualified by means of adequate training and certification in safe traffic control practices and have a basic understanding of the principles established by applicable standards and regulations, including those of this Manual and the MUTCD, shall supervise the selection, placement, and maintenance of traffic control devices in work and incident management areas.**

02 **(DC Revision)The contractor or agency, and organization shall designate a competent traffic safety officer who shall be certified and thoroughly experienced in the maintenance of work zone traffic control. Prior to commencing work requiring traffic control management, the contractor or agency shall submit, along with the "Application for Public Space Permit," the name of the traffic safety officer and any designated substitute. The District Department of Transportation shall have the right to require proof of experience and certification of designated traffic safety officers. Certification by the American Traffic Safety Services Association (ATSSA) or equivalent shall be the minimum evidence of training. The traffic safety officer shall be present to supervise the placement and removal of traffic control devices for all phases of work.**

Section 6A.04 Minimum Standards

Standard:

01 **(DC Revision) The standards presented in this Manual are the minimum required. Additional signs, cones, barricades, and warning devices may be used, but, at no time will less than what is specified herein be acceptable. Since public safety is involved, a high degree of conformity to the presented standards is required. This Manual is intended to supplement the MUTCD, which remains the nationally adopted standard. The MUTCD should be consulted for treatments, which are not specifically identified in this Manual.**

Section 6A.05 Public Holidays, Special Events, and Inaugurations

Support**:**

01 (DC Revision) Public Holidays – The following days are recognized as public holidays:

A. New Year's Day;
B. Dr. Martin Luther King Jr. Birthday;
C. Emancipation Day (District of Columbia Only);
D. President's Day;
E. Memorial Day;
F. Labor Day;
G. Independence Day;
H. Columbus Day;
I. Veteran's Day;
J. Thanksgiving Day;
K. Christmas Day.

02 (DC Revision) Any day declared a public holiday by the District of Columbia Government shall be observed. When a public holiday falls on a Sunday, the following Monday will be observed as a holiday. When a public holiday falls on a Saturday, the preceding Friday will be observed.

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CHAPTER 6B. FUNDAMENTAL PRINCIPLES

Section 6B.01 Fundamental Principles of Temporary Traffic Control

Standard:

00A **(DC Revision) The control of road users (motorists, streetcars, bicyclists, and pedestrians) through a temporary traffic control zone shall be an essential part of highway construction, utility work, special events, maintenance operations, and management of traffic incidents.**

00B **(DC Revision) The needs of pedestrians who have disabilities shall be considered in accordance with the Americans with Disabilities Act of 1990 (ADA), Title II, Paragraph 35.130. For further information, see the new accessibility guidelines for buildings, and facilities, transportation vehicles, September 1994, http://www.ada.gov/.**

Support:

01 Construction, maintenance, utility, and incident zones can all benefit from TTC to compensate for the unexpected or unusual situations faced by road users. When planning for TTC in these zones, it can be assumed that it is appropriate for road users to exercise caution. Even though road users are assumed to be using caution, special care is still needed in applying TTC techniques.

02 Special plans preparation and coordination with transit, other highway agencies, law enforcement and other emergency units, utilities, schools, and railroad companies might be needed to reduce unexpected and unusual road user operation situations.

03 (DC Revision) During TTC activities, commercial vehicles might need to follow a different route from passenger vehicles because of bridge, weight, clearance, or geometric restrictions. Also, vehicles carrying hazardous materials might need to follow a different route from other vehicles. The Hazardous Materials and National Network signs are included in Sections 2B.62 and 2B.63 of the 2009 MUTCD, respectively.

04 Experience has shown that following the fundamental principles of Part 6 will assist road users and help protect workers in the vicinity of TTC zones.

Guidance:

05 *Road user and worker safety and accessibility in TTC zones should be an integral and high-priority element of every project from planning through design and construction. Similarly, maintenance and utility work should be planned and conducted with the safety and accessibility of all motorists, bicyclists, pedestrians (including those with disabilities), and workers being considered at all times. If the TTC zone includes a grade crossing, early coordination with the railroad company or light rail transit agency should take place.*

Support:

06 (DC Revision) Formulating specific plans for TTC at traffic incidents is difficult because of the variety of situations that can arise. Section 6I provides more information on TTC at traffic incidents.

Guidance:

07 *The following are the seven fundamental principles of TTC:*

1. *General plans or guidelines should be developed to provide safety for motorists, bicyclists, pedestrians, workers, enforcement/emergency officials, and equipment, with the following factors being considered:*

A. The basic safety principles governing the design of permanent roadways and roadsides should also govern the design of TTC zones. The goal should be to route road users through such zones using roadway geometrics, roadside features, and TTC devices as nearly as possible comparable to those for normal highway situations.

B. (DC Revision) TTC plan, in detail appropriate to the complexity of the work project or incident, should be prepared and understood by all responsible parties before the site is occupied. Any changes in the TTC plan should be approved by an official who is knowledgeable (for example, trained and/or certified) in proper TTC practices and documented.

2. *Road user movement should be inhibited as little as practical, based on the following considerations:*

A. (DC Revision) TTC at work and incident sites should be designed on the assumption that drivers will only reduce their speeds if they clearly perceive a need to do so (see Section 6C.01) (see information on speed control).

B. Frequent and abrupt changes in geometrics such as lane narrowing, dropped lanes, or main roadway transitions that require rapid maneuvers, should be avoided.

C. Work should be scheduled in a manner that minimizes the need for lane closures or alternate routes, while still getting the work completed quickly and the lanes or roadway open to traffic as soon as possible.

D. (DC Revision) Attempts should be made to reduce the volume of traffic using the roadway or freeway to match the restricted capacity conditions. Road users should be encouraged to use alternative routes that do not include TTC zones. For high- volume roadways and freeways, the closure of selected entrance ramps or other access points and the use of signed diversion routes should be evaluated.

E. Bicyclists and pedestrians, including those with disabilities, should be provided with access and reasonably safe passage through the TTC zone.

F. If work operations permit, lane closures on high-volume streets and highways should be scheduled during off-peak hours. Night work should be considered if the work can be accomplished with a series of short-term operations.

G. Early coordination with officials having jurisdiction over the affected cross streets and providing emergency services should occur if significant impacts to roadway operations are anticipated.

H. (DC Revision) Provisions should be made for the reasonably safe operation of work, particularly on high-speed, high-volume roadways.

3. Motorists, bicyclists, and pedestrians should be guided in a clear and positive manner while approaching and traversing TTC zones and incident sites. The following principles should be applied:

A. Adequate warning, delineation, and channelization should be provided to assist in guiding road users in advance of and through the TTC zone or incident site by using proper pavement marking, signing, or other devices that are effective under varying conditions. Providing information that is in usable formats by pedestrians with visual disabilities should also be considered.

B. TTC devices inconsistent with intended travel paths through TTC zones should be removed or covered. However, in intermediate-term stationary, short-term, and mobile operations, where visible permanent devices are inconsistent with intended travel paths, devices that highlight or emphasize the appropriate path should be used. Providing traffic control devices that are accessible to and usable by pedestrians with disabilities should be considered.

C. Flagging procedures, when used, should provide positive guidance to road users traversing the TTC zone.

4. To provide acceptable levels of operations, routine day and night inspections of TTC elements should be performed as follows:

A. Individuals who are knowledgeable (for example, trained and/or certified) in the principles of proper TTC should be assigned responsibility for safety in TTC zones. The most important duty of these individuals should be to check that all TTC devices of the project are consistent with the TTC plan and are effective for motorists, bicyclists, pedestrians, and workers.

B. As the work progresses, temporary traffic controls and/or working conditions should be modified, if appropriate, in order to provide mobility and positive guidance to the road user and to provide worker safety.

C. TTC zones should be carefully monitored under varying conditions of road user volumes, light, and weather to check that applicable TTC devices are effective, clearly visible, clean, and in compliance with the TTC plan.

D. When warranted, an engineering study should be made (in cooperation with law enforcement officials) of reported crashes occurring within the TTC zone. Crash records in TTC zones should be monitored to identify the need for changes in the TTC zone.

5. Attention should be given to the maintenance of roadside safety during the life of the TTC zone by applying the following principles:

A. To accommodate run-off-the-road incidents, disabled vehicles, or emergency situations, unencumbered roadside recovery areas or clear zones should be provided where practical.

B. Channelization of road users should be accomplished by the use of pavement markings, signing, and crashworthy, detectable channelizing devices.

C. Work equipment, workers' private vehicles, materials, and debris should be stored in such a manner to reduce the probability of being impacted by run-off-the-road vehicles.

6. Each person whose actions affect TTC zone safety, from the upper-level management through the field workers, should receive training appropriate to the job decisions each individual is required to make.

7. Good public relations should be maintained by applying the following principles:

A. The needs of all road users should be assessed such that appropriate advance notice is given and clearly defined alternative paths are provided.

B. The cooperation of the various news media should be sought in publicizing the existence of and reasons for TTC zones because news releases can assist in keeping the road users well informed.

C. The needs of abutting property owners, residents, and businesses should be assessed and appropriate accommodations made.

D. The needs of emergency service providers (law enforcement, fire, and medical) should be assessed and appropriate coordination and accommodations made.

E. The needs of railroads and transit should be assessed and appropriate coordination and accommodations made.

F. The needs of operators of commercial vehicles such as buses and large trucks should be assessed and appropriate accommodations made.

Standard:

07A **(DC Revision) A review of TTC zone shall be performed for compliance immediately after a change in traffic patterns. Deficiencies identified in TTC zone shall be corrected based on the approval of the designated DDOT representative, and shall be documented as soon as practical. The review and documentation of TTC installation shall be by someone trained and knowledgeable about the fundamental principles of TTC and related work activities being performed. The individual responsible for TTC shall have the authority to halt work until applicable or remedial safety measures are taken.**

07B **(DC Revision) Only those individuals who are trained in proper TTC practices and have a basic understanding of the principles (established by applicable standards and guidelines, including those of this Manual) shall supervise the selection, placement, and maintenance of TTC devices used for TTC zones and for incident management**.

08 **Before any new detour or temporary route is opened to traffic, all necessary signs shall be in place.**

09 **(DC Revision) All TTC devices shall be removed as soon as practical when they are no longer needed. When work is suspended longer than 30 minutes, advance warning signs (including supports) that are no longer applicable shall be removed from the roadway (including shoulders). Other non-applicable devices shall be removed from the work area so they are not visible to drivers.**

10 **(DC Revision) Temporary traffic control installation shall be reviewed daily to ensure the continued functionality of the TTC devices and their compliance with this Manual. These reviews shall be documented on a weekly basis including detailed information as warranted for the type of operation, using the 'Daily Checklist for Temporary Traffic Control" form found in this document.**

Guidance:

11 *(DC Revision) Review of TTC on high speed, high traffic volume projects should also be performed during night and non-work periods (weekends), as well on all projects after severe weather conditions.*

Support:

12 (DC Revision) Other methods of documentation include written notes, project diary entries, photographs, and video recordings.

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CHAPTER 6C. TEMPORARY TRAFFIC CONTROL ELEMENTS

Section 6C.01 Temporary Traffic Control Plans

Support:

01 (DC Revision) A TTC plan describes TTC measures to be used for facilitating road users through a work zone or an incident area. TTC plans play a vital role in providing continuity of safe and effective road user flow when a work zone, incident, or other event temporarily disrupts normal road user flow. Important auxiliary provisions that cannot conveniently be specified on project plans can easily be incorporated into Special Provisions within the TTC plan.

01A (DC Revision) The primary purpose of a TTC Plan is safety for motorists, pedestrians and bicyclists.

02 TTC plans range in scope from being very detailed to simply referencing typical drawings contained in this Manual, standard approved highway agency drawings and manuals, or specific drawings contained in the contract documents. The degree of detail in the TTC plan depends entirely on the nature and complexity of the situation.

Standard:

02A **(DC Revision) With the exception of issuance of a blanket permit, which is acceptable for one year, the TTC plans shall be effective for a period of no longer than six months after approval by DDOT. Any work to occur beyond six (6) months from TTC plan approval shall require resubmittal of the TTC plans to DDOT.**

02B **(DC Revision) When applying for a blanket permit, an electronic spreadsheet shall be sent weekly to Traffic Operations Administration (TOA) and Public Space Regulations Administration (PSRA) prior to work commencing.**

02C **(DC Revision) The needs and control of all road users (motorists, street cars, bicyclists, and pedestrians within the highway, including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA), Title II, Paragraph 35.130) through a TTC zone shall be an essential part of highway construction, utility work, maintenance operations, and special events, special events, and the management of traffic incidents, http://www.ada.gov/.**

Guidance:

03 *TTC plans should be prepared by persons knowledgeable (for example, trained and/or certified) about the fundamental principles of TTC and work activities to be performed. The design, selection, and placement of TTC devices for a TTC plan should be based on engineering judgment.*

04 *Coordination should be made between adjacent or overlapping projects to check that duplicate signing is not used and to check compatibility of traffic control between adjacent or overlapping projects.*

05 *Traffic control planning should be completed for all highway construction, utility work, maintenance operations, and incident management including minor maintenance and utility projects prior to occupying the TTC zone. Planning for all road users should be included in the process.*

06 *(DC Revision) Provisions for effective continuity of accessible circulation paths for pedestrians should be incorporated into the TTC process. Where existing pedestrian routes are blocked or detoured, information should be provided about alternative routes that are usable by pedestrians with disabilities, particularly those who have visual disabilities. Access to temporary bus stops, travel across intersections with accessible pedestrian signals (see Section 4E.09 of the 2009 MUTCD), and other routing issues should be considered where temporary pedestrian routes are channelized. Barriers and channelizing devices that are detectable by people with visual disabilities should be provided.*

Option:

07 Provisions may be incorporated into the project bid documents that enable contractors to develop an alternate TTC plan.

08 Modifications of TTC plans may be necessary because of changed conditions or a determination of better methods of safely and efficiently handling road users.

Standard:

09 **(DC Revision) This alternate or modified plan shall be reviewed and approved by a trained and knowledgeable authority in TTC practices prior to being approved by DDOT.**

Guidance:

10 *(DC Revision) Provisions for effective continuity of transit service should be incorporated into the TTC planning process because often public transit buses cannot efficiently be detoured in the same manner as other vehicles (particularly for short-term maintenance projects). Where applicable, the TTC plan should provide for features such as accessible temporary bus stops, pull-outs, and satisfactory waiting areas for transit patrons, including persons with disabilities, if applicable (see Section 8A.08 of the 2009 MUTCD for additional light rail transit issues to consider for TTC).*

11 *Provisions for effective continuity of railroad service and acceptable access to abutting property owners and businesses should also be incorporated into the TTC planning process.*

12 *(DC Revision) Reduced speed limits should be used only in the specific portion of the TTC zone where conditions or restrictive features are present. However, frequent changes in the speed limit should be avoided. A TTC plan should be designed so that vehicles can safely travel through the TTC zone with a speed limit reduction of no more than 10 mph.*

Guidance:

12B *(DC Revision) TTC plans should be designed with due consideration for the posted speed limit and prevailing speeds applicable to the particular roadway prior to construction activity when possible.*

13 *(DC Revision)A reduction of more than 10 mph in the speed limit should be used only when required by restrictive features in the TTC zone and subjected to approval by the designated DDOT Engineer. Where restrictive features justify a speed reduction of more than 10 mph, additional driver notification should be provided. The speed limit should be stepped down in advance of the location requiring the lowest speed, and additional TTC warning devices should be used.*

14 *(DC Revision) Regulatory speed signs should be used such that the District of Columbia Metropolitan Police Department are able to enforce the reduced speed limit. Reduced speed zoning (lowering the regulatory speed limit) should be avoided as much as practical because drivers will reduce their speeds only if they clearly perceive a need to do so.*

Support:

15 (DC Revision) Research has demonstrated that large reductions in the speed limit, such as a 25 mph reduction, on high-speed roadways increase speed variance and the potential for crashes. Smaller reductions in the speed limit of up to 10 mph cause smaller changes in speed variance and lessen the potential for increased crashes. A reduction in the regulatory speed limit of only up to 10 mph from the normal speed limit has been shown to be more effective.

Standard:

16 **(DC Revision) Speeds shall only be reduced within construction/maintenance work zones by the DDOT Engineer upon completion of an engineering and traffic investigation warranting the reduction. Documentation of the change shall be performed.**

Section 6C.02 Temporary Traffic Control Zones

Support:

01 (DC Revision) A TTC zone is an area of a highway where road user conditions are changed because of a work zone, an incident zone, or a planned special event through the use of TTC devices, police, DDOT's traffic control officers (TCO) or other authorized personnel.

02 A work zone is an area of a highway with construction, maintenance, or utility work activities. A work zone is typically marked by signs, channelizing devices, barriers, pavement markings, and/or work vehicles. It extends from the first warning sign or high-intensity rotating, flashing, oscillating, or strobe lights on a vehicle to the END ROAD WORK sign or the last TTC device.

03 An incident zone is an area of a highway where temporary traffic controls are imposed by authorized officials in response to a traffic incident (see Section 6I.01). It extends from the first warning device (such as a sign, light, or cone) to the last TTC device or to a point where road users return to the original lane alignment and are clear of the incident.

04 (DC Revision) A planned special event often creates the need to establish altered traffic patterns to handle the increased traffic volumes generated by the event. The size of the TTC zone associated with a planned special event can be small, such as closing a street for a festival, or can extend throughout a municipality for larger events. The duration of the TTC zone is determined by the duration of the planned special event. Based on the size and duration of the event, TTC detour plans should be considered.

Standard:

05 **(DC Revision) Any planned special event that impacts traffic flow on the District-maintained roadways shall complete and submit for approval a Special Event Permit Application, available for download at https://www.tops.ddot.dc.gov/.**

Section 6C.03 Components of Temporary Traffic Control Zones

Support:

01 Most TTC zones are divided into four areas: the advance warning area, the transition area, the activity area, and the termination area. Figure 6C-1 illustrates these four areas. These four areas are described in Sections 6C.04 through 6C.07.

Section 6C.04 Advance Warning Area

Support:

01 The advance warning area is the section of highway where road users are informed about the upcoming work zone or incident area.

Option:

02 The advance warning area may vary from a single sign or high-intensity rotating, flashing, oscillating, or strobe lights on a vehicle to a series of signs in advance of the TTC zone activity area.

Guidance:

03 *Typical distances for placement of advance warning signs on freeways and expressways should be longer because drivers are conditioned to uninterrupted flow. Therefore, the advance warning sign placement should extend on these facilities as far as 1/2 mile or more.*

Option:

03A (DC Revision) Low-speed urban streets with speeds of 25 mph or less may reduce the spacing to +/- 150 feet between signs.

04 *On urban streets, the effective placement of the first warning sign in feet should range from 4 to 8 times the speed limit in mph, with the high end of the range being used when speeds are relatively high. When a single advance warning sign is used (in cases such as low-speed residential streets), the advance warning area can be as short as 100 feet. When two or more advance warning signs are used on higher-speed streets, such as major arterials, the advance warning area should extend a greater distance (see Table 6C-1).*

05 *Since rural highways are normally characterized by higher speeds, the effective placement of the first warning sign in feet should be substantially longer—from 8 to 12 times the speed limit in mph. Since two or more advance warning signs are normally used for these conditions, the advance warning area should extend 1,500 feet or more for open highway conditions (see Table 6C-1).*

06 *The distances contained in Table 6C-1 are approximate, are intended for guidance purposes only, and should be applied with engineering judgment. These distances should be adjusted for field conditions, if necessary, by increasing or decreasing the recommended distances.*

Figure 6C-1. Component Parts of a Temporary Traffic Control Zone

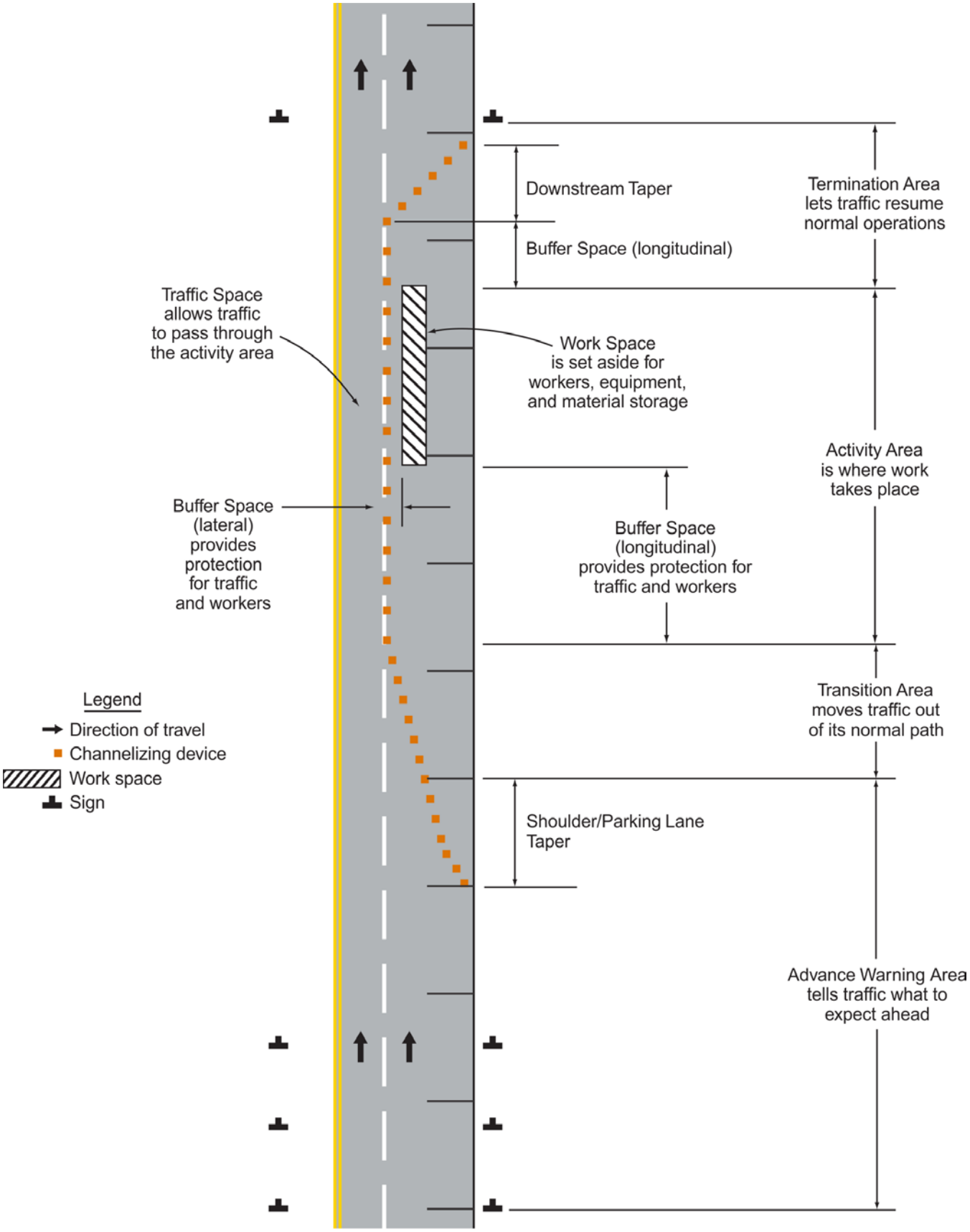


Table 6C-1. Recommended Advance Warning Sign Minimum Spacing

Road Type	Distance Between Signs*		
	A	B	C
Urban (25 mph)	150 feet	150 feet	150 feet
Urban (30 mph)	200 feet	200 feet	200 feet
Urban (35 mph)	250 feet	250 feet	250 feet
Urban (40 mph)	350 feet	350 feet	350 feet
Urban (45 mph)	550 feet	550 feet	550 feet
Urban (50 mph)	600 feet	600 feet	600 feet
Urban (55 mph)	700 feet	700 feet	700 feet
Expressway / Freeway	1,000 feet	1,500 feet	2,640 feet

* The column headings A, B, and C are the dimensions shown in Figures 6H-1 through 6H-46 and the DDOT Utility Typicals in Appendix C. The A dimension is the distance from the transition or point of restriction to the first sign. The B dimension is the distance between the first and second signs. The C dimension is the distance between the second and third signs. (The "first sign" is the sign in a three-sign series that is closest to the TTC zone. The "third sign" is the sign that is furthest upstream from the TTC zone.)

Support:

07 The need to provide additional reaction time for a condition is one example of justification for increasing the sign spacing. Conversely, decreasing the sign spacing might be justified in order to place a sign immediately downstream of an intersection or major driveway such that traffic turning onto the roadway in the direction of the TTC zone will be warned of the upcoming condition.

Option:

08 Advance warning may be eliminated when the activity area is sufficiently removed from the road users' path so that it does not interfere with the normal flow.

Section 6C.05 Transition Area

Support:

01 (DC Revision) The transition area is that section of highway where road users are redirected out of their normal path. In mobile operations, the transition area moves with the work space. Transition areas usually involve strategic use of tapers, which because of their importance are discussed separately in detail.

Standard:

02 **When redirection of the road users' normal path is required, they shall be directed from the normal path to a new path.**

Option:

03 Because it is impractical in mobile operations to redirect the road user's normal path with stationary channelization, more dominant vehicle-mounted traffic control devices, such as arrow boards, portable changeable message signs, and high-intensity rotating, flashing, oscillating, or strobe lights, may be used instead of channelizing devices to establish a transition area.

Section 6C.06 Activity Area

Support:

01 The activity area is the section of the highway where the work activity takes place. It is comprised of the work space, the traffic space, and the buffer space.

02 The work space is that portion of the highway closed to road users and set aside for workers, equipment, and material, and a shadow vehicle if one is used upstream. Work spaces are usually delineated for road users by channelizing devices or, to exclude vehicles and pedestrians, by temporary barriers.

Option:

03 The work space may be stationary or may move as work progresses.

Guidance:

04 *Since there might be several work spaces (some even separated by several miles) within the project limits, each work space should be adequately signed to inform road users and reduce confusion.*

Guidance:

04A *(DC Revision) The maximum length of the work space should not exceed two miles unless approved by the DDOT Engineer.*

Support:

05 The traffic space is the portion of the highway in which road users are routed through the activity area.

06 The buffer space is a lateral and/or longitudinal area that separates road user flow from the work space or an unsafe area, and might provide some recovery space for an errant vehicle.

Standard:

07 **(DC Revision) Neither work activity nor storage of equipment, vehicles, or material shall occur within a buffer space.**

Option:

07A (DC Revision) A shadow vehicle may be deployed in the buffer space, provided it is in the proximity to the work area and accounts for the anticipated roll-ahead distance if stuck.

08 Buffer spaces may be positioned either longitudinally or laterally with respect to the direction of road user flow. The activity area may contain one or more lateral or longitudinal buffer spaces.

Standard:

09 **(DC Revision) Along roadways within the District of Columbia, a longitudinal buffer space shall be provided in advance of the work space. With the exception of the shadow vehicle placed near the work area, no storage of equipment, vehicles or material shall be permitted within a buffer space.**

Option:

10 The longitudinal buffer space may also be used to separate opposing road user flows that use portions of the same traffic lane, as shown in Figure 6C-2.

Table 6C-2a. Length of Longitudinal Buffer Space (Urban)

Speed*	Distance
20 mph	35 feet
25 mph	55 feet
30 mph	85 feet
35 mph	120 feet
40 mph	170 feet
45 mph	220 feet
50 mph	280 feet
55 mph	335 feet
60 mph	415 feet
65 mph	485 feet

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

Table 6C-2b. Length of Longitudinal Buffer Space (Freeway/Expressway)

Speed*	Distance
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.

11 (DC Revision) When a longitudinal buffer space is used, the values shown in Table 6C-2a may be used to determine the minimum length of the longitudinal buffer space for urban roadways.

11A (DC Revision) When a longitudinal buffer space is used, the values shown in Table 6C-2b may be used to determine the minimum length of the longitudinal buffer space for rural and freeway/expressway roadways.

Support:

12 Typically, the buffer space is formed as a traffic island and defined by channelizing devices.

13 When a shadow vehicle, arrow board, or changeable message sign is placed in a closed lane in advance of a work space, only the area upstream of the vehicle, arrow board, or changeable message sign constitutes the buffer space.

Option:

14 The lateral buffer space may be used to separate the traffic space from the work space, as shown in Figures 6C-1 and 6C-2, or such areas as excavations or pavement- edge drop-offs. A lateral buffer space also may be used between two travel lanes, especially those carrying opposing flows.

Guidance:

15 *The width of a lateral buffer space should be determined by engineering judgment.*

15A *(DC Revision) On interstates, freeways, or expressways, a lateral buffer space of one travel lane should be used, except where temporary traffic barrier is used to separate the work area from the traveled way, or if other conditions prevent the use of a lateral buffer space.*

Option:

16 When work occurs on a high-volume, highly congested facility, a vehicle storage or staging space may be provided for incident response and emergency vehicles (for example, tow trucks and fire apparatus) so that these vehicles can respond quickly to road user incidents.

Guidance:

17 *(DC Revision) If used, an incident response and emergency-vehicle storage area should not extend into any portion of the buffer space.*

Section 6C.07 Termination Area

Standard:

01 **(DC Revision) The termination area shall be used to return road users to their normal path. The termination area shall extend from the downstream end of the work space to the END ROAD WORK signs.**

02 **(DC Revision) An END ROAD WORK sign, a Speed Limit sign, or other signs shall be used to inform road users that they can resume normal operations.**

Guidance:

02A *(DC Revision) Conditions may exist where posting the END ROAD WORK signs may be helpful. However, the END ROAD WORK signs should normally not be used if other temporary traffic control zones begin within a quarter-mile of the temporary traffic control within the urban core.*

Option:

03 A longitudinal buffer space may be used between the work space and the beginning of the downstream taper.

Section 6C.08 Tapers

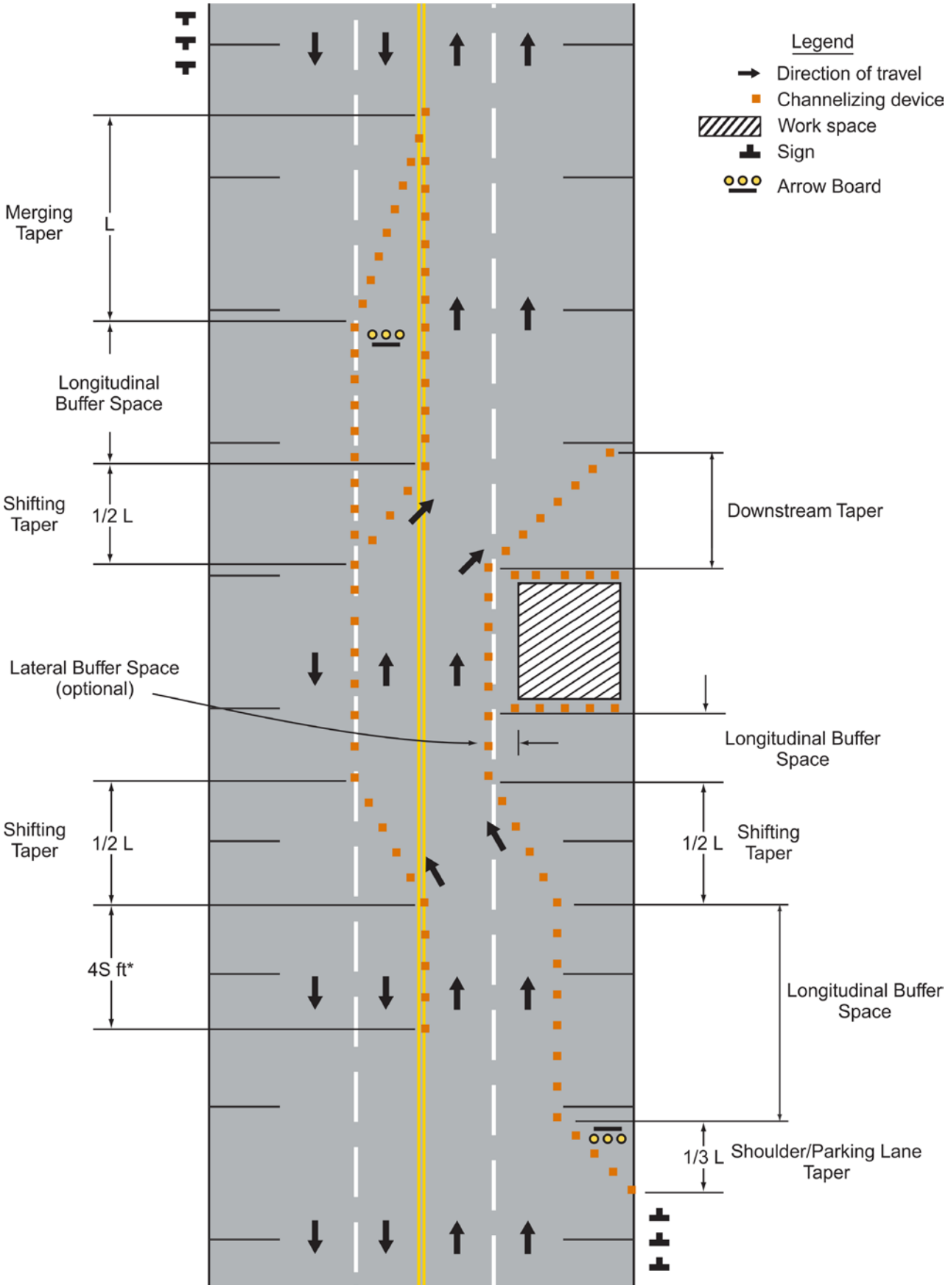
Guidance:

01 *Tapers should be used in both the transition and termination areas. Whenever tapers are to be used in close proximity to an interchange ramp, crossroads, curves, or other influencing factors, the length of the tapers may be adjusted, subject to approval by DDOT.*

Support:

02 Tapers are created by using a series of channelizing devices and/or pavement markings to move traffic out of or into the normal path. Types of tapers are shown in Figure 6C-2.

Figure 6C-2. Types of Tapers and Buffer Spaces



03 Longer tapers are not necessarily better than shorter tapers (particularly in urban areas with characteristics such as short block lengths or driveways) because extended tapers tend to encourage sluggish operation and to encourage drivers to delay lane changes unnecessarily. The test concerning adequate lengths of tapers involves observation of driver performance after TTC plans are put into effect.

04

Guidance:

05 *The appropriate taper length (L) should be determined using the criteria shown in Tables 6C-3 and 6C-4.*

06 *(DC Revision) The maximum distance in feet between devices in a taper should not exceed 20 feet at speeds up to 35 mph and 40 feet for speeds greater than 35 mph.*

06A *(DC Revision) For multiple lane closures, the appropriate distance between the tapers (tangent approach) should be determined using the criteria shown in Tables 6C-3 and 6C-4.*

Support:

07 A merging taper requires the longest distance because drivers are required to merge into common road space.

Guidance:

08 *A merging taper should be long enough to enable merging drivers to have adequate advance warning and sufficient length to adjust their speeds and merge into an adjacent lane before the downstream end of the transition.*

Support:

09 A shifting taper is used when a lateral shift is needed. When more space is available, a longer than minimum taper distance can be beneficial. Changes in alignment can also be accomplished by using horizontal curves designed for normal highway speeds.

Guidance:

10 *(DC Revision) A shifting taper should have a minimum length of at least 1/2 L (see Tables 6C-3 and 6C-4).*

Support:

11 A shoulder taper might be beneficial on a high-speed roadway where shoulders are part of the activity area and are closed, or when improved shoulders might be mistaken as a driving lane. In these instances, the same type, but abbreviated, closure procedures used on a normal portion of the roadway can be used.

Table 6C-3. Types of Tapers for Temporary Traffic Control Zones

Type of Taper		Taper Length
Merging Taper	Number of Lanes is reduced	*L minimum*
Shifting Taper	Lateral shift, no lane reduction	*1/2 L minimum*
Shoulder Taper	Shoulder closed	*1/3 L minimum*
Two-way Traffic Taper	Opposing directions	*50 feet min, 100 feet max*
Downstream Taper	End of work area	*100 feet/lane max*

Table 6C-4. Taper Length Criteria for Temporary Traffic Control Zones

Taper Lengths (*L*)					
Speed Limit (S)	Width of offset (W)				Remarks (Formula)
	9'	10'	11'	12'	
25 mph	95'	105'	115'	125'	$L = WS^2/60$
30 mph	135'	150'	165'	180'	$L = WS^2/60$
35 mph	185'	205'	225'	245'	$L = WS^2/60$
40 mph	240'	270'	295'	320'	$L = WS^2/60$
45 mph	405'	450'	495'	540'	$L = WS$
50 mph	450'	500'	550'	600'	$L = WS$
55 mph	495'	550'	605'	660'	$L = WS$

Guidance:

12 *(DC Revision) Shoulder tapers, where applicable, should have a length of approximately one-third L (see Table 6C-3). If a shoulder is used as a travel lane, either through practice or during a TTC activity, a normal merging or shifting taper should be used.*

13 *(DC Revision) A downstream taper should be used in termination areas to provide a visual cue to the driver that access is available back into the original lane or path that was closed.*

Guidance:

14 *If used, a downstream taper should have a minimum length of 50 feet and a maximum length of 100 feet with devices placed at a spacing of approximately 20 feet.*

Support:

15 The one-lane, two-way taper is used in advance of an activity area that occupies part of a two-way roadway in such a way that a portion of the road is used alternately by traffic in each direction.

Guidance:

16 *Traffic should be controlled by a flagger or temporary traffic control signal (if sight distance is limited), or a STOP or YIELD sign. A short taper having a minimum length of 50 feet and a maximum length of 100 feet with channelizing devices at approximately 20-foot spacing should be used to guide traffic into the one-lane section, and a downstream taper should be used to guide traffic back into their original lane.*

Guidance:

17 *(DC Revision) In a one-lane, two-way operation, traffic should be controlled by a flagger or temporary lane control signals. A short taper having a minimum length of 100 feet with channelizing devices at approximately 20-foot spacing should be used to guide traffic into the one-way section.*

Section 6C.09 Detours and Diversions

Support:

01 A detour is a temporary rerouting of road users onto an existing highway in order to avoid a TTC zone.

Standard:

01A **(DC Revision) All detours on the District of Columbia roadways shall have a detour plan approved by DDOT.**

Guidance:

01B *(DC Revision) Under emergency conditions, personnel should be provided to ensure safe roadway closure until proper devices are in place. Proper devices should be in place within 24 hours of the start of emergency operation.*

Guidance:

02 *Detours should be clearly signed over their entire length so that road users can easily use existing highways to return to the original highway.*

Support:

03 A diversion is a temporary rerouting of road users onto a temporary highway or alignment placed around the work area.

Section 6C.10 One-Lane, Two-Way Traffic Control

Standard:

01 **(DC Revision) When traffic in both directions must use a single lane for a limited distance, movements from each end shall be coordinated.**

Guidance:

02 *Provisions should be made for alternate one-way movement through the constricted section via methods such as flagger control, a flag transfer, a pilot car, traffic control signals, or stop or yield control.*

03 *Control points at each end should be chosen to permit easy passing of opposing lanes of vehicles.*

04 *If traffic on the affected one-lane roadway is not visible from one end to the other, then flagging procedures, a pilot car with a flagger used as described in Section 6C.13, or a traffic control signal should be used to control opposing traffic flows.*

Option:

05 (DC Revision) If the work space on a low-volume street or road is short and road users from both directions are able to see the traffic approaching from the opposite direction through and beyond the worksite, the movement of traffic through a one-lane, two-way constriction may be self-regulating. For example, at a spot constriction, such as an isolated pavement patch on highways with lower speeds and adequate sight distance.

Section 6C.11 Flagger Method of One-Lane, Two-Way Traffic Control

Guidance:

01 *(DC Revision) Except as provided in Paragraph 2, traffic should be controlled by a flagger at each end of a constricted section of roadway. One of the flaggers should be designated as the coordinator. To provide coordination of the control of the traffic, the flaggers should be able to communicate with each other orally, electronically (preferred), or with manual signals. These manual signals should not be mistaken for flagging signals.*

Option:

02 When a one-lane, two-way TTC zone is short enough to allow a flagger to see from one end of the zone to the other, traffic may be controlled by either a single flagger or by a flagger at each end of the section.

Guidance:

03 *When a single flagger is used, the flagger should be stationed on the shoulder opposite the constriction or work space, or in a position where good visibility and traffic control can be maintained at all times. When good visibility and traffic control cannot be maintained by one flagger station, traffic should be controlled by a flagger at each end of the section.*

Section 6C.12 Flag Transfer Method of One-Lane, Two-Way Traffic Control

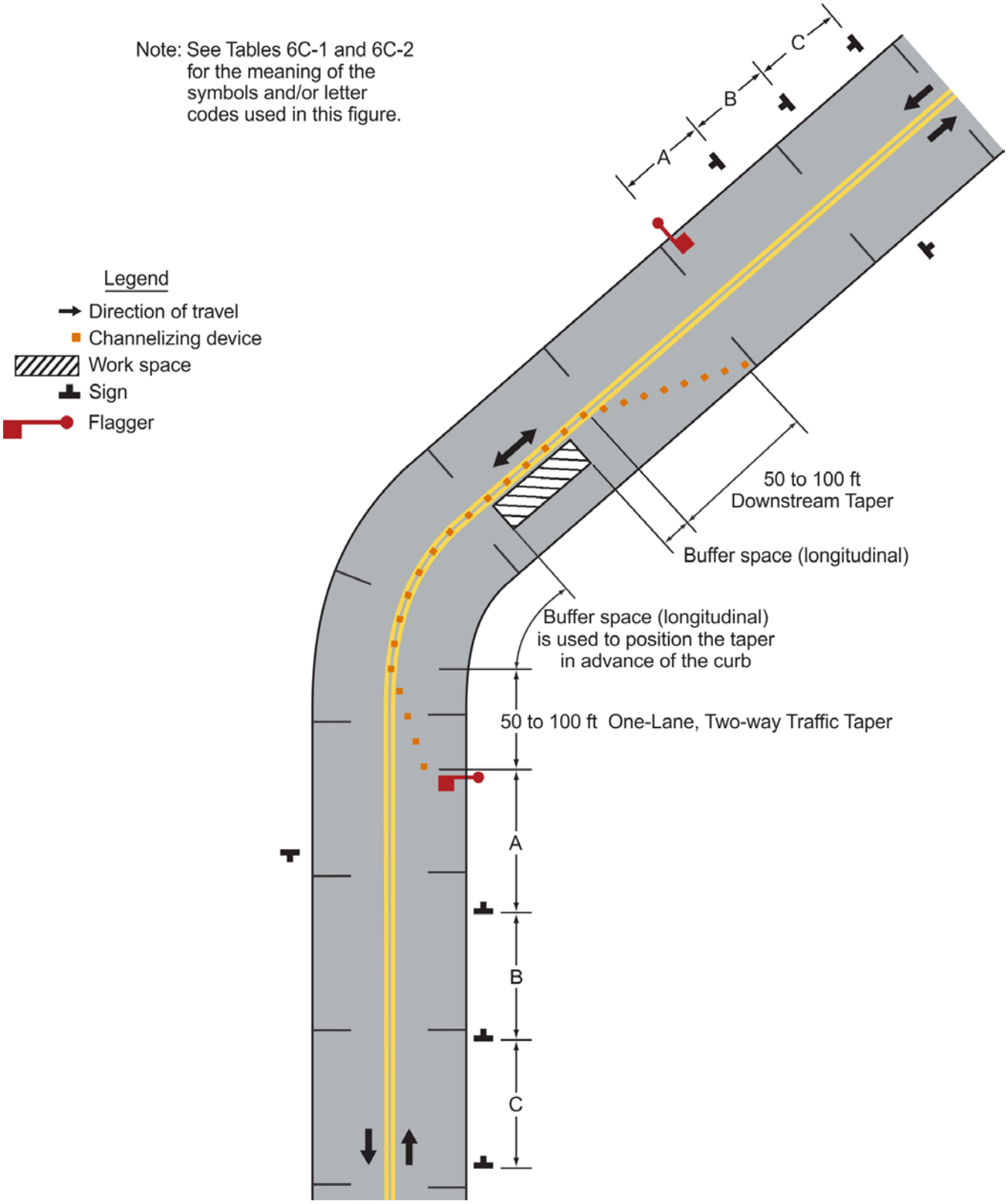
Support:

01 The driver of the last vehicle proceeding into the one-lane section is given a red flag (or other token) and instructed to deliver it to the flagger at the other end. The opposite flagger, upon receipt of the flag, then knows that traffic can be permitted to move in the other direction. A variation of this method is to replace the use of a flag with an official pilot car that follows the last road user vehicle proceeding through the section.

Guidance:

02 *The flag transfer method should be employed only where the one-way traffic is confined to a relatively short length of a road, usually no more than 1 mile in length.*

Figure 6C-3. Example of a One-Lane, Two-Way Traffic Taper



Section 6C.13 Pilot Car Method of One-Lane, Two-Way Traffic Control

Option:

01 A pilot car may be used to guide a queue of vehicles through the TTC zone or detour.

Guidance:

02 *(DC Revision) The operation of the pilot vehicle should be coordinated with flagging operations or other controls at each end of the one-lane section. The pilot car should have the name of the contractor or contracting authority prominently displayed.*

Standard:

03 **(DC Revision) The PILOT CAR FOLLOW ME (G20-4) sign shall be mounted at a conspicuous location on the rear of the pilot vehicle.**

04 **A flagger shall be stationed on the approach to the activity area to control vehicular traffic until the pilot vehicle is available.**

Section 6C.14 Temporary Traffic Control Signal Method of One-Lane, Two-Way Traffic Control

Option:

01 (DC Revision) Traffic control signals may be used to control vehicular traffic movements in one-lane, two-way TTC zones (see Figure 6H-12 and Chapter 4H of the 2009 MUTCD).

Section 6C.15 Stop or Yield Control Method of One-Lane, Two-Way Traffic Control

Option:

01 STOP or YIELD signs may be used to control traffic on low-volume roads at a one-lane, two-way TTC zone when drivers are able to see the other end of the one-lane, two-way operation and have sufficient visibility of approaching vehicles.

Guidance:

01A *(DC Revision) The use of STOP or YIELD signs for traffic control on low-volume road at one-lane, two-way work zone should have written approval from the DDOT Engineer. See warrants for No-Passing Zones at Curves in Chapter 3B of the 2009 MUTCD.*

02 *If the STOP or YIELD sign is installed for only one direction, then the STOP or YIELD sign should face road users who are driving on the side of the roadway that is closed for the work activity area.*

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CHAPTER 6D. PEDESTRIAN, BICYCLE, AND WORKER SAFETY

Section 6D.01 Pedestrian and Bicycle Considerations

Support:

01 A wide range of pedestrians might be affected by TTC zones, including the young, elderly, and people with disabilities such as hearing, visual, or mobility. These pedestrians need a clearly delineated and usable travel path. Considerations for pedestrians with disabilities are addressed in Section 6D.02.

Standard:

02 **(DC Revision) The various TTC provisions for pedestrian and worker safety set forth in this Manual and Part 6 of the 2009 MUTCD, or equivalent revisions, shall be applied by knowledgeable (for example, trained and/or certified in Advanced Work Zone Traffic Control) persons after appropriate evaluation and engineering judgment.**

02A **(DC Revision) When pedestrian and/or bicycle pathways are closed or disrupted due to construction, maintenance, special events or utility work, pedestrian and bicycle traffic controls are required. These controls shall include signs, channelizing devices, flags, etc. to clearly direct pedestrians and cyclists through or around the work site.**

02B **(DC Revision) Safe and efficient access to businesses, residences, and crosswalks within the TTC zone shall be maintained.**

Guidance:

02C *(DC Revision) A major objective of the TTC shall be to minimize adverse economic consequences to businesses within the work zone area. As such maintaining proper pedestrian and ADA compliant access should be prioritized, and this should include maintaining existing bicycle facilities and related parking designated for businesses should be maintained.*

Standard:

03 **(DC Revision) Advance notification of sidewalk, bicycles lane, and/or other public bicycle path closures shall be required and is subject to approval by DDOT prior to implementation.**

04 **If the TTC zone affects the movement of pedestrians, adequate pedestrian access and walkways shall be provided. If the TTC zone affects an accessible and detectable pedestrian facility, the accessibility and detectability shall be maintained along the alternate pedestrian route.**

04A **(DC Revision) A public right-of-way occupancy permit that authorizes closure of sidewalk, bicycle lane, or other public bicycle path shall require the permittee to provide safe accommodations for pedestrians and bicyclists.**

04B **(DC Revision) The blockage of a sidewalk, bicycle lane, or other bicycle path shall be treated in the same manner as the closure of a lane of vehicular traffic by applying similar TTC practices as would be applied to the closure of a lane of vehicular traffic. for each permit used. The design and placement of the TTC signs, devices, and roadway markings shall be in compliance with the 2009 MUTCD.**

04C **(DC Revision) The permittee shall maintain all pedestrian routes within the TTC/work zone free of obstructions and surface hazards, such as construction equipment, construction materials, debris, mud and loose gravel at all times.**

Option:

05 If establishing or maintaining an alternate pedestrian route is not feasible during the project, an alternate means of providing for pedestrians may be used, such as adding free bus service around the project or assigning someone the responsibility to assist pedestrians with disabilities through the project limits.

Support:

06 It must be recognized that pedestrians are reluctant to retrace their steps to a prior intersection for a crossing or to add distance or out-of-the-way travel to a destination.

Standard:

07 **(DC Revision) The following items shall be considered when planning for pedestrians in TTC zones:**

- **A. Pedestrians and cyclists shall not be led into conflicts with vehicles, equipment, and operations.**
- **B. Pedestrians and cyclists shall not be led into conflicts with vehicles moving through or around the worksite.**
- **C. Pedestrians and cyclists shall be provided with convenient and accessible path that replicate**

as nearly as practical the most desirable characteristics of the existing sidewalk(s) and bicycle lanes and pathways.

D. (DC Revision) Deleted. See Section 6D.01, Paragraph 17.

Guidance:

08 *(DC Revision) A pedestrian or bicycle route should not be severed and/or moved for non-construction activities such as parking for vehicles and equipment.*

09 *Consideration should be made to separate pedestrian movements from both worksite activity and vehicular traffic. Unless an acceptable route that does not involve crossing the roadway can be provided, pedestrians should be appropriately directed with advance signing that encourages them to cross to the opposite side of the roadway. In urban and suburban areas with high vehicular traffic volumes, these signs should be placed at intersections (rather than midblock locations) so that pedestrians are not confronted with midblock worksites that will induce them to attempt skirting the worksite or making a midblock crossing.*

Support:

10 (DC Revision) Figures 6H-28 and 6H-29 show typical TTC device usage and techniques for pedestrian movement through work zones. Figure 6H-28 shows a minimum walkway width of 5 feet. However, a minimum of 6 feet should be provided wherever practical.

Guidance:

11 *(DC Revision) To accommodate the needs of pedestrians and cyclists, including those with disabilities, the following considerations should be addressed when temporary pedestrian pathways in TTC zones are designed or modified:*

A. Provisions for continuity of accessible paths for pedestrians and cyclists should be incorporated into the TTC plan.

B. Access to transit stops, schools, businesses, residences, and other pedestrian generators should be maintained.

C. A smooth, continuous hard surface should be provided throughout the entire length of the temporary pedestrian and/or bicycle facility. There should be no curbs or abrupt changes in grade or terrain that could cause tripping or be a barrier to wheelchair use. The geometry and alignment of the facility should meet the applicable requirements of the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)" (see Section 1A.11 of the 2009 MUTCD).

D. 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 or bicycle facility. When it is not possible to maintain a minimum width of 60 inches throughout the entire length of the pedestrian pathway, a 60 x60-inch passing space should be provided at least every 200 feet to allow individuals in wheelchairs to pass.

E. Blocked routes, alternate crossings, and sign and signal information should be communicated to pedestrians with visual disabilities by providing devices such as audible information devices, accessible pedestrian signals, or barriers and channelizing devices that are detectable to the pedestrians traveling with the aid of a long cane or who have low vision. Where pedestrian traffic is detoured to a TTC signal, engineering judgment should be used to determine if pedestrian signals or accessible pedestrian signals should be considered for crossings along an alternate route.

F. When channelization is used to delineate a pedestrian pathway, a continuous detectable edging should be provided throughout the length of the facility such that pedestrians using a long cane can follow it. These detectable edgings should comply with the provisions of Section 6F.74.

G. Signs and other devices mounted lower than 7 feet above the temporary pedestrian pathway should not project more than 4 inches into accessible pedestrian facilities.

Standard:

11A **(DC Revision) The following items shall be considered when creating a Traffic Control Plan (TCP):**

A. Impact on pedestrian generators (schools, senior centers, transit stops, etc.);

B. Impact on existing pedestrian flow;

C. Pedestrian information needs – advance, transition, work area, and exit information;

D. Pedestrian facilities - walkway width, surface, boundaries, transitions, and channelization;

E. Intersections – crosswalk placement, additional signing/marking, and traffic signals modification (timing, pedestrian signals, push button, etc.);

F. Adequate pedestrian protection – physical separation from work space and vehicular traffic, overhead protection, etc.;

G. Construction staging to maintain pedestrian access throughout all construction phases

H. Temporary nighttime lighting;

I. Complaince with the Americans with Disabilities Act (ADA);

J. Location/access to businesses, residences, etc., and

K. Frequent checks of the pedestrian accommodations by engineers or field inspectors during construction to ensure that the temporary Traffic Control Plan (TCP) is followed, traffic control devices are maintained in good condition, and a safe accessible pedestrian route is available at all times.

Option:

12 (DC Revision) Whenever it is feasible, closing off the worksite from pedestrian intrusion may be preferable to channelizing pedestrian traffic along the site with TTC devices such as barricades and drums or suitable fencing.

Guidance:

13 *Fencing should not create sight distance restrictions for road users. Fences should not be constructed of materials that would be hazardous if impacted by vehicles. Wooden railing, fencing, and similar systems placed immediately adjacent to motor vehicle traffic should not be used as substitutes for crashworthy temporary traffic barriers.*

Standard:

13A **(DC Revision) TTC devices used to delineate a pedestrian walkway within a TTC zone shall be crashworthy in accordance with the National Cooperative Highway Research Program (NCHRP) Report 350; and when struck by vehicles, such devices shall present a minimum threat to pedestrians, workers, and occupants of impacting vehicles.**

Guidance:

14 *Ballast for TTC devices should be kept to the minimum amount needed and should be mounted low to prevent penetration of the vehicle windshield.*

Standard:

15 **(DC Revision) Movement by work vehicles and equipment across designated pedestrian and bicycle paths shall be minimized, and when necessary, shall be controlled by flaggers or TTC devices appropriate for this purpose. Staging or stopping of work vehicles or equipment along the side of pedestrian and bicycle paths shall be avoided, since it encourages movement of workers, equipment, and materials across the pedestrian, and/or bicycle path.**

Guidance:

16 *(DC Revision) Access to the work space by workers and equipment across pedestrian walkways and bicycle pathways should be minimized because the access often creates unacceptable changes in grade, and rough or muddy terrain, and pedestrians and cyclists will tend to avoid these areas by attempting non-intersection crossings or entering the roadway at the unexpected locations.*

Standard:

17 **(DC Revision) A temporary covered walkway shall be used to protect pedestrians from falling debris and to provide a covered passage for pedestrians, (see Work Zone Management Manual, Appendix A). Temporary covered walkways are subject to the following criteria:**

A. The structural design and construction of covered pathways shall be approved by DDOT.

B. Covered walkways shall be sturdily constructed and adequately lit for nighttime use with vandal-resistant fixtures mounted on 30-foot centers near the roof line.

C. Under no circumstances shall work equipment or any other objects (including small trailers) associated with work zone operations be placed on top of the roof of the covered walkway, unless approved by DDOT.

D. When permitted, the minimum requirements for the floor and roof loading shall be 300 pounds per square foot. The walking surface shall be paved or covered with plywood or wood planking.

E. An overhead clearance of at least eight feet and a minimum navigable width of at least six

feet shall be provided.

F. Continuous handrails shall be installed along the walls of the covered walkway to aid pedestrians that have ambulatory difficulties.

G. Adequate provisions, including wheelchair ramps, shall be made for persons with disabilities.

H. Covered pedestrian pathways shall be provided with corner treatments which allow a minimum 45-foot sight distance triangle.

18 **(DC Revision) Deleted. See Section 6D.01, Paragraph 17, Item B.**

Guidance:

19 *When pedestrian and vehicle paths are rerouted to a closer proximity to each other, consideration should be given to separating them by a temporary traffic barrier.*

20 *(DC Revision) If a temporary traffic barrier is used to shield pedestrians, it should be designed to suit site conditions, and should be configured to allow for adequate drainage from the adjacent roadway. Catch basins should be accessible for proper drainage and maintenance.*

Support:

21 (DC Revision) Depending on the possible vehicular speed and angle of impact, temporary traffic barriers might deflect upon impact by an errant vehicle. Guidance for locating and designing temporary traffic barriers can be found in Chapter 9 of AASHTO's "Roadside Design Guide" (see Section 1A.11 of the 2009 MUTCD).

Standard:

22 **Short intermittent segments of temporary traffic barrier shall not be used because they nullify the containment and redirective capabilities of the temporary traffic barrier, increase the potential for serious injury both to vehicle occupants and pedestrians, and encourage the presence of blunt, leading ends. All upstream leading ends that are present shall be appropriately flared or protected with properly installed and maintained crashworthy cushions. Adjacent temporary traffic barrier segments shall be properly connected in order to provide the overall strength required for the temporary traffic barrier to perform properly.**

23 **Normal vertical curbing shall not be used as a substitute for temporary traffic barriers when temporary traffic barriers are needed.**

Option:

24 Temporary traffic barriers or longitudinal channelizing devices may be used to discourage pedestrians from unauthorized movements into the work space. They may also be used to inhibit conflicts with vehicular traffic by minimizing the possibility of midblock crossings.

Support:

25 A major concern for pedestrians is urban and suburban building construction encroaching onto the contiguous sidewalks, which forces pedestrians off the curb into direct conflict with moving vehicles.

Guidance:

26 *If a significant potential exists for vehicle incursions into the pedestrian path, pedestrians should be rerouted or temporary traffic barriers should be installed.*

Support:

27 TTC devices, jersey barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.

Guidance:

28 *(DC Revision) Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)" (see Section 1A.11 of the 2009 MUTCD), and should not be used as a control for pedestrian movements.*

29 *In general, pedestrian routes should be preserved in urban and commercial suburban areas. Alternative routing should be discouraged.*

30 *(DC Revision) The contractor in charge of the TTC zone should regularly inspect the activity area so that effective pedestrian TTC is maintained.*

Support:

31 (DC Revision) Additional information on this topic can be found in Section 3315 (Safe Accommodation for Pedestrians and Bicyclists) of the District of Columbia Municipal Regulations Title 24, Chapter 33

(Public Space and Safety – Public Right-of-Way Occupancy Permits).

Section 6D.02 Accessibility Considerations

Support:

01 (DC Revision) Additional information on the design and construction of accessible temporary facilities is found in publications listed in Section 1A.11 of the 2009 MUTCD (see Publications 12, 38, 39, and 42).

Guidance:

02 *The extent of pedestrian needs should be determined through engineering judgment or by the individual responsible for each TTC zone situation. Adequate provisions should be made for pedestrians with disabilities.*

Standard:

03 **When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility. Where pedestrians with visual disabilities normally use the closed sidewalk, a barrier that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.**

Support:

04 Maintaining a detectable, channelized pedestrian route is much more useful to pedestrians who have visual disabilities than closing a walkway and providing audible directions to an alternate route involving additional crossings and a return to the original route. Braille is not useful in conveying such information because it is difficult to find. Audible instructions might be provided, but the extra distance and additional street crossings might add complexity to a trip.

Guidance:

05 *Because printed signs and surface delineation are not usable by pedestrians with visual disabilities, blocked routes, alternate crossings, and sign and signal information should be communicated to pedestrians with visual disabilities by providing audible information devices, accessible pedestrian signals, and barriers and channelizing devices that are detectable to pedestrians traveling with the aid of a long cane or who have low vision.*

Support:

06 The most desirable way to provide information to pedestrians with visual disabilities that is equivalent to visual signing for notification of sidewalk closures is a speech message provided by an audible information device. Devices that provide speech messages in response to passive pedestrian actuation are the most desirable. Other devices that continuously emit a message, or that emit a message in response to use of a pushbutton, are also acceptable signing information can also be transmitted to personal receivers, but currently such receivers are not likely to be carried or used by pedestrians with visual disabilities in TTC zones. Audible information devices might not be needed if detectable channelizing devices make an alternate route of travel evident to pedestrians with visual disabilities.

Guidance:

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

Section 6D.03 Worker Safety Considerations

Support:

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

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

Guidance:

02A *(DC Revision) Workers should not enter unprotected travel lanes of interstates, freeways, or expressways during planned activities, including crossing the roadway to access the median or shoulder on*

the opposite side from the protected work area.

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

A. Training—all workers should be trained on how to work next to motor vehicle traffic in a way that minimizes their vulnerability. Workers having specific TTC responsibilities should be trained in TTC techniques, device usage, and placement. Training should be conducted on a continual basis as stipulated by DDOT certification requirements.

B. Worker Clothing – All workers should be adequately clothed for the type of work they will be performing. (See standard below for clothing requirement when working near traffic.)

C. Temporary Traffic Barriers—temporary traffic barriers should be placed along the work space depending on factors such as lateral clearance of workers from adjacent traffic, speed of traffic, duration and type of operations, time of day, and volume of traffic.

D. Speed Reduction—reducing the speed of vehicular traffic, mainly through regulatory speed zoning, funneling, lane reduction, or the use of uniformed law enforcement officers or flaggers, should be considered.

E. Activity Area—planning the internal work activity area to minimize backing-up maneuvers of construction vehicles should be considered to minimize the exposure to risk.

F. Worker Safety Planning—a trained person designated by the employer should conduct a basic hazard assessment for the worksite and job classifications required in the activity area. This safety professional should determine whether engineering, administrative, or personal protection measures should be implemented. This plan should be in accordance with the Occupational Safety and Health Act of 1970, as amended, "General Duty Clause" Section 5(a)(1) - Public Law 91-596, 84 Stat. 1590, December 29, 1970, as amended, and with the requirement to assess worker risk exposures for each job site and job classification, as per 29 CFR 1926.20 (b)(2) of "Occupational Safety and Health Administration Regulations, General Safety and Health Provisions" (see Section 1A.11 of the 2009 MUTCD).

Standard:

04 **(DC Revision) All workers, including emergency responders, within the right-of-way who are exposed either to traffic (vehicles using the highway for purposes of travel) or to work vehicles and construction equipment within the TTC zone shall wear high-visibility safety apparel that meets the Performance Class 3 requirements of the ANSI/ISEA 107–2010 publication entitled "American National Standard for High-Visibility Safety Apparel and Headwear" (see Section 1A.11 of the 2009 MUTCD), or equivalent revisions, and labeled as meeting the ANSI 107-2010, or equivalent revisions, standard performance for Class 3 risk exposure, except as provided in Paragraph 5. A person designated by the employer to be responsible for worker safety shall make the selection of the appropriate class of garment.**

04A **(DC Revision) At all times (i.e., daytime and nighttime), flaggers shall wear high-visibility apparel that meets or exceeds the Performance Class 3 requirements of the ANSI/ISEA 107-2010 publication entitled "American National Standard for High-Visibility Safety Apparel and Headwear" (see Section 1A.11 of the 2009 MUTCD), or equivalent revisions, and labeled as meeting the ANSI 107-2010 standard performance for Class 3 risk exposure (see Section 6E.02 High Visibility Safety Apparel for Flagger Control).**

04B **(DC Revision) All workers, including emergency responders, media, towing and recovery personnel and others within the right-of-way who are either exposed to traffic or to work vehicles and construction equipment within the TTC zone shall wear high-visibility safety apparel that meets Performance Class 3 requirements of the ANSI/ISEA 107-2010 publication entitled "American National Standard for High-Visibility Safety Apparel and Headwear" (see Section 1A.11 of the 2009 MUTCD), or equivalent revisions, and labeled as meeting the ANSI 107-2010 standard performance for Class 3 risk exposure.**

04C **(DC Revision) All workers installing, maintaining and removing TTC devices in nighttime work zones and during emergency situations when traffic control must be installed during low-light conditions and inclement weather (i.e., rain, sleet, snow, etc.) shall wear Class E trousers in addition to the standard Performance Class 3 risk requirements of the ANSI/ISEA 107-2010 publication. Nighttime work zones are operations which occur from 30 minutes before sunset until 30 minutes after sunrise.**

Option:

05 (DC Revision) Emergency and incident responders and law enforcement personnel within the TTC zone may wear high- visibility safety apparel that meets the performance requirements of the ANSI/ISEA 207-2006 publication entitled "American National Standard for High-Visibility Public Safety Vests" (see Section 1A.11 of the 2009 MUTCD), or equivalent revisions, and labeled as ANSI 207-2006, or equivalent revisions, in lieu of ANSI/ISEA 107-2010 apparel.

Standard:

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

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

Option:

08 Firefighters or other emergency responders working within the right-of-way and engaged in emergency operations that directly expose them to flame, fire, heat, and/or hazardous materials may wear retroreflective turn- out gear that is specified and regulated by other organizations, such as the National Fire Protection Association.

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

A. Shadow Vehicle—in the case of mobile and constantly moving operations, such as pothole patching and striping operations, a shadow vehicle, equipped with appropriate lights and warning signs, may be used to protect the workers from impacts by errant vehicles. The shadow vehicle may be equipped with a rear-mounted impact attenuator.

B. Road Closure—if alternate routes are available to handle road users, the road may be closed temporarily. This may also facilitate project completion and thus further reduce worker vulnerability.

C. Law Enforcement Use—in highly vulnerable work situations, particularly those of relatively short duration, law enforcement units may be stationed to heighten the awareness of passing vehicular traffic and to improve safety through the TTC zone.

D. Lighting—for nighttime work, the TTC zone and approaches may be lighted.

E. Special Devices—these include rumble strips, changeable message signs, hazard identification beacons, flags, and warning lights. Intrusion warning devices may be used to alert workers to the approach of errant vehicles.

Support:

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

Section 6D.04 Bicycle Considerations

Support:

01 (DC Revision) Planning for bicyclists in TTC zones on highways and streets requires careful consideration of the following factors:

A. A travel route that replicates the most desirable characteristics of a wide paved shoulder or bikeway through or around the TTC zone is desirable for bicyclists.

B. If the TTC zone interrupts the continuity of an existing bikeway system, signs directing bicyclists through or around the zone and back to the bikeway are desirable.

C. Unless a separate bike path is provided through or around the TTC zone, it is desirable to maintain an adequate roadway lane width to allow bicyclists and motor vehicles to travel side by side through or around the TTC zone.

Guidance:

02 *(DC Revision) When the roadway width is inadequate for allowing bicyclists and motor vehicles to travel side by side, warning signs should be used to advise motorists of the presence of bicyclists in the affected travel lanes. See Section 6G.05 for more details.*

Standard:

03 **(DC Revision) Bicyclists shall not be led into direct conflicts with mainline traffic, work site vehicles, or equipment moving through or around the TTC zone.**

04 **(DC Revision) The routing for a safe accommodation for bicyclists shall replicate the safety level of the existing bicycle route.**

05 **(DC Revision) The method for providing the safe accommodation for bicyclists shall be prioritized.**

Support:

06 Figures 6H-6, 6H-19 and 6H-30 show typical TTC device usage and techniques for bicycle movement through TTC zones.

CHAPTER 6E. FLAGGER CONTROL

Section 6E.01 Qualifications for Flaggers

Standard:

00 **(DC Revision) All flaggers and spotters working on District-maintained roadways, except for emergency personnel and law enforcement officers, shall be certified by a DDOT-recognized flagger certification program. All flaggers, except for emergency personnel and law enforcement officers, shall be required to carry a valid flagger certification card and photo identification on their person at all times.**

Guidance:

01 *(DC Revision) 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. Adequate training in safe temporary traffic control practices;

C. Ability to move and maneuver quickly in order to avoid danger from errant vehicles;

D. Good physical condition, including sight, mobility, and hearing;

E. 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;

F. Courteous but firm manner;

G. Ability to communicate in English while on duty;

H. Ability to understand and apply safe traffic control practices, sometimes in stressful or emergency situations; and

I. Ability to recognize dangerous traffic situations and warn workers in sufficient time to avoid injury;

J. At least 18 years old.

Section 6E.02 High-Visibility Safety Apparel

Standard:

01 **(DC Revision) For daytime and nighttime activity, flaggers shall wear high-visibility safety apparel that meets or exceeds the Performance Class 3 requirements of the ANSI/ISEA 107–2010 publication entitled "American National Standard for High-Visibility Apparel and Headwear" (see Section 1A.11 of the 2009 MUTCD), or equivalent revisions, and labeled as meeting the ANSI 107-2010, or equivalent revisions standard performance for Class 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.**

02 **(DC Revision) For nighttime activity, high-visibility safety apparel that meets the Performance Class 3 requirements of the ANSI/ISEA 107–2010 publication entitled "American National Standard for High-Visibility Apparel and Headwear" (see Section 1A.11 of the 2009 MUTCD), or equivalent revisions, and labeled as meeting the ANSI 107-2010, or equivalent revisions, standard performance for Class 3 risk exposure shall be designated for flagger wear.**

Guidance:

02A *(DC Revision) The flagger should be properly attired such that they are not distracting to motorists (no provocative clothing or clothing with words or phrases unrelated to work zone operation).*

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 (DC Revision) In lieu of ANSI/ISEA 107-2010 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 of the 2009 MUTCD), or equivalent revisions, and labeled as ANSI 207-2006, or equivalent revisions.

Section 6E.03 Hand-Signaling Devices

Standard:

01 **(DC Revision) The STOP/SLOW (R1-1/W20-8) paddle shall 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 shall be limited to emergency situations.**

02 **(DC Revision) The STOP/SLOW paddle shall have an octagonal shape on a rigid handle, shall be at least 24 inches wide with letters at least eight inches high, and should be fabricated from light, semi-rigid material. It shall be mounted on a 7-foot round pole. The background of the STOP face shall be red with white letters and border and made of encapsulated lens sheeting material. The background of the SLOW face shall be fluorescent orange prismatic lens sheeting material with black letters and borders.**

03 **(DC Revision) Deleted. See Section 6E.03, Paragraph 02.**

Support:

04 (DC Revision) The optimum method of displaying a STOP or SLOW message is to place the STOP/SLOW paddle on a rigid staff, with a minimum of 7 feet from the bottom of the sign paddle to the top of the roadway elevation, in order to display a STOP or SLOW message that is stable and 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, or 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 **(DC Revision) Flags, when used for emergency situations, 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.**

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

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 **(DC Revision) When a flashlight is used for flagging in an emergency situation at night in a non-illuminated flagger station, it shall be equipped with a steady burn red glow cone or steady burn traffic**

baton/wand to supplement the STOP/SLOW paddle or flag. 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

Option:

14 (DC Revision) For surveying and other operations occurring on the road edge or near the centerline of two-lane roadways, a combination STOP/SLOW paddle and SLOW/SLOW paddle utilizing a double-sided SLOW flip panel may be used to prevent unnecessary stopping of vehicles by flagger.

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.*

15A *(DC Revision) Advance warning signs spacing for the AFAD should be adjusted if traffic queues extend beyond the ONE LANE ROAD AHEAD 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 **(DC Revision) 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 36 x 36 inches with letters at least 12 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 **(DC Revision) 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 LED Stop Beacon (see Section 4L.05) mounted a maximum of 24 inches above the STOP face and a LED 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 of the 2009 MUTCD.

Option:

05 (DC Revision) Type B warning light(s) (see Section 6F.83B) 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.

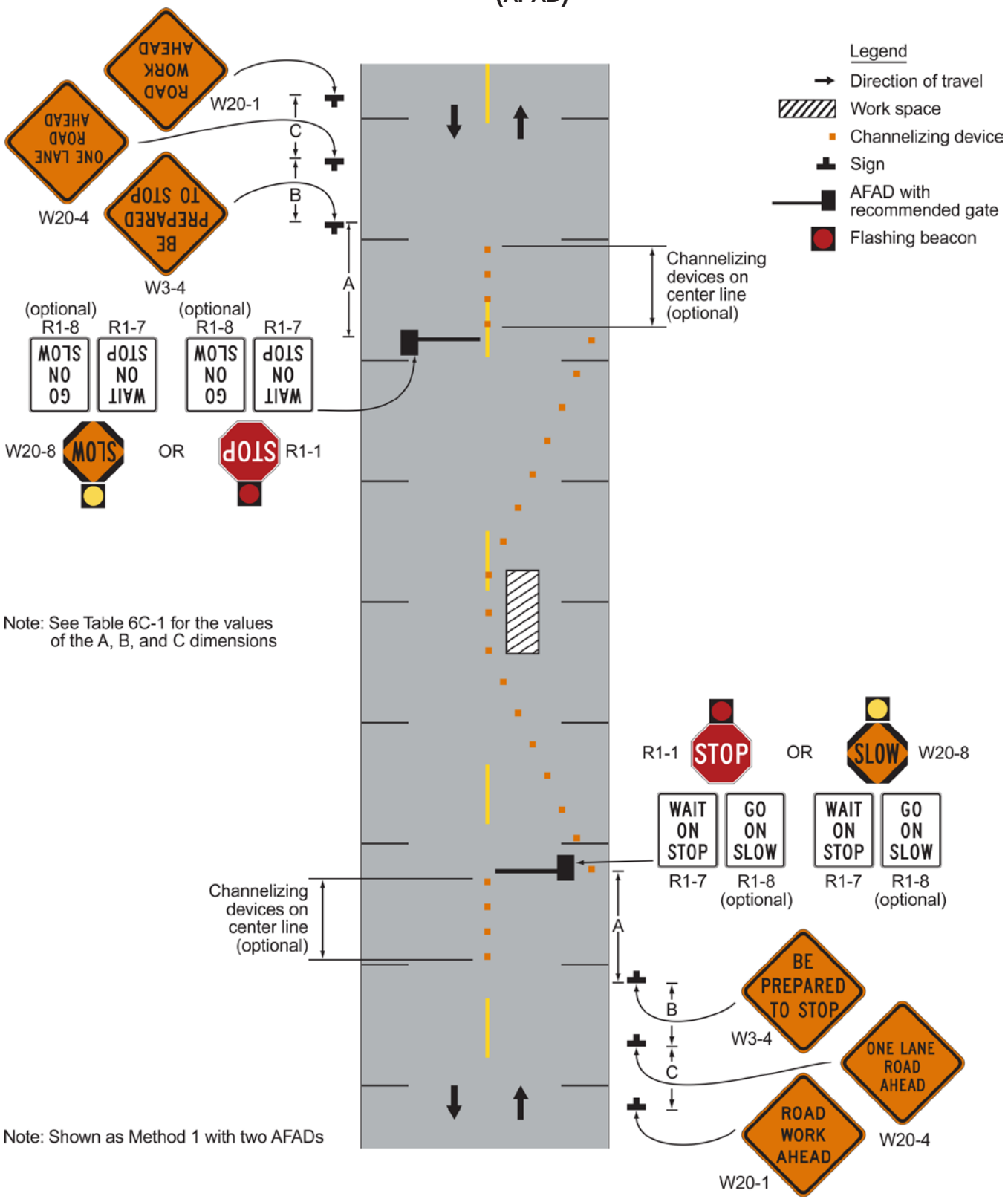
Standard:

11 **(DC Revision) 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 of the 2009 MUTCD. 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 but shall not extend beyond 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 **(DC Revision) 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 of the 2009 MUTCD. 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 but shall not extend beyond the lane being controlled.

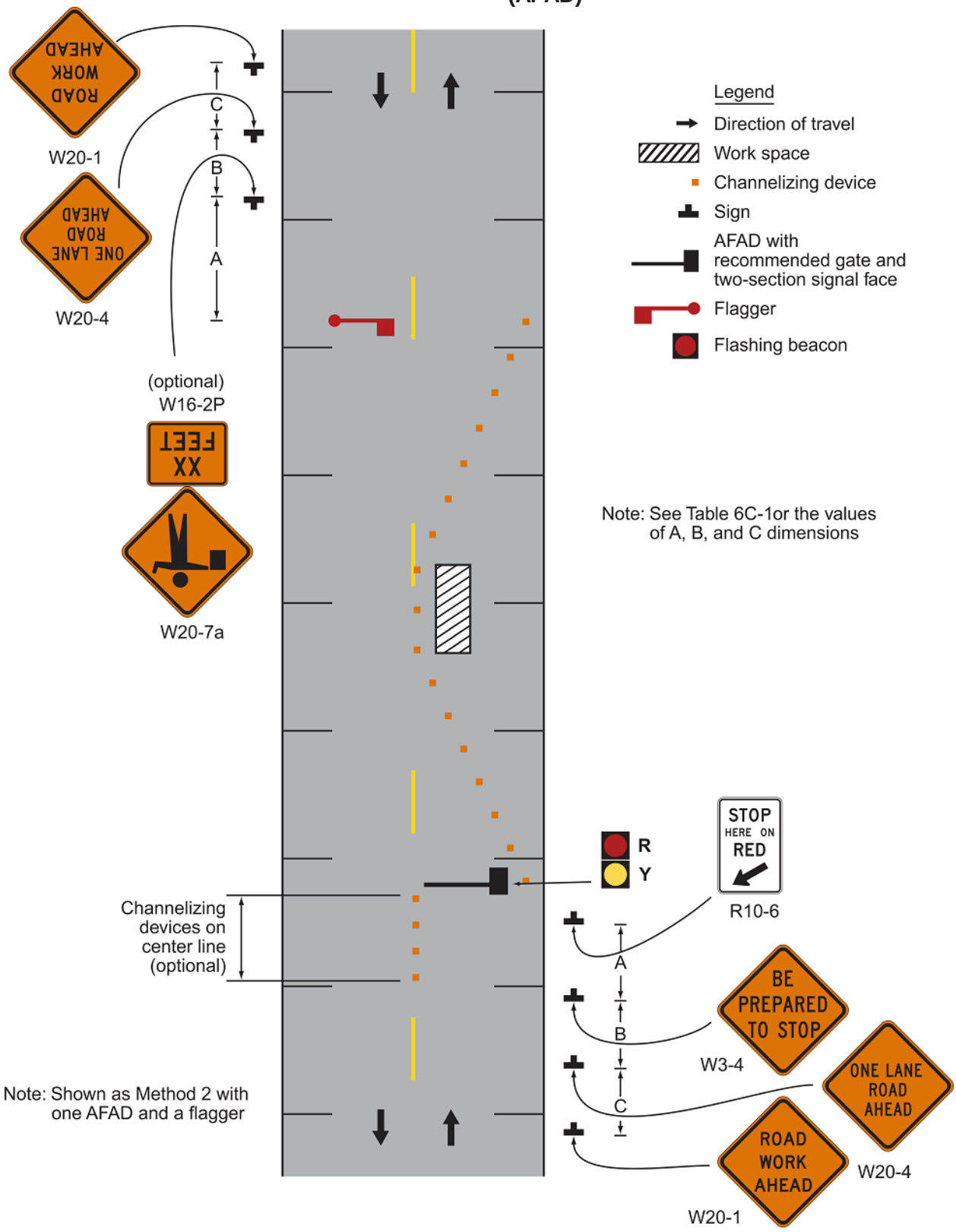
05 **(DC Revision) A Stop Here On Red (R10-6 or R10-6a) sign (see Section 2B.53 of the 2009 MUTCD) shall be installed on the right-hand side of the approach at the point at which drivers are expected to stop when the steady CIRCULAR RED lens is illuminated (see Figure 6E-2).**

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 *(DC Revision) 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 of the 2009 MUTCD, is justified by engineering judgment.*

Section 6E.07 Flagger Procedures

Support:

01 (DC Revision) The use of paddles and flags by flaggers is illustrated in Figure 6E-3. Figure 6E-4 also illustrates the use of paddles and flags by flaggers and includes a summary of flagging methods and guidelines.

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 that operate at a minimum of 80 decibels) 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

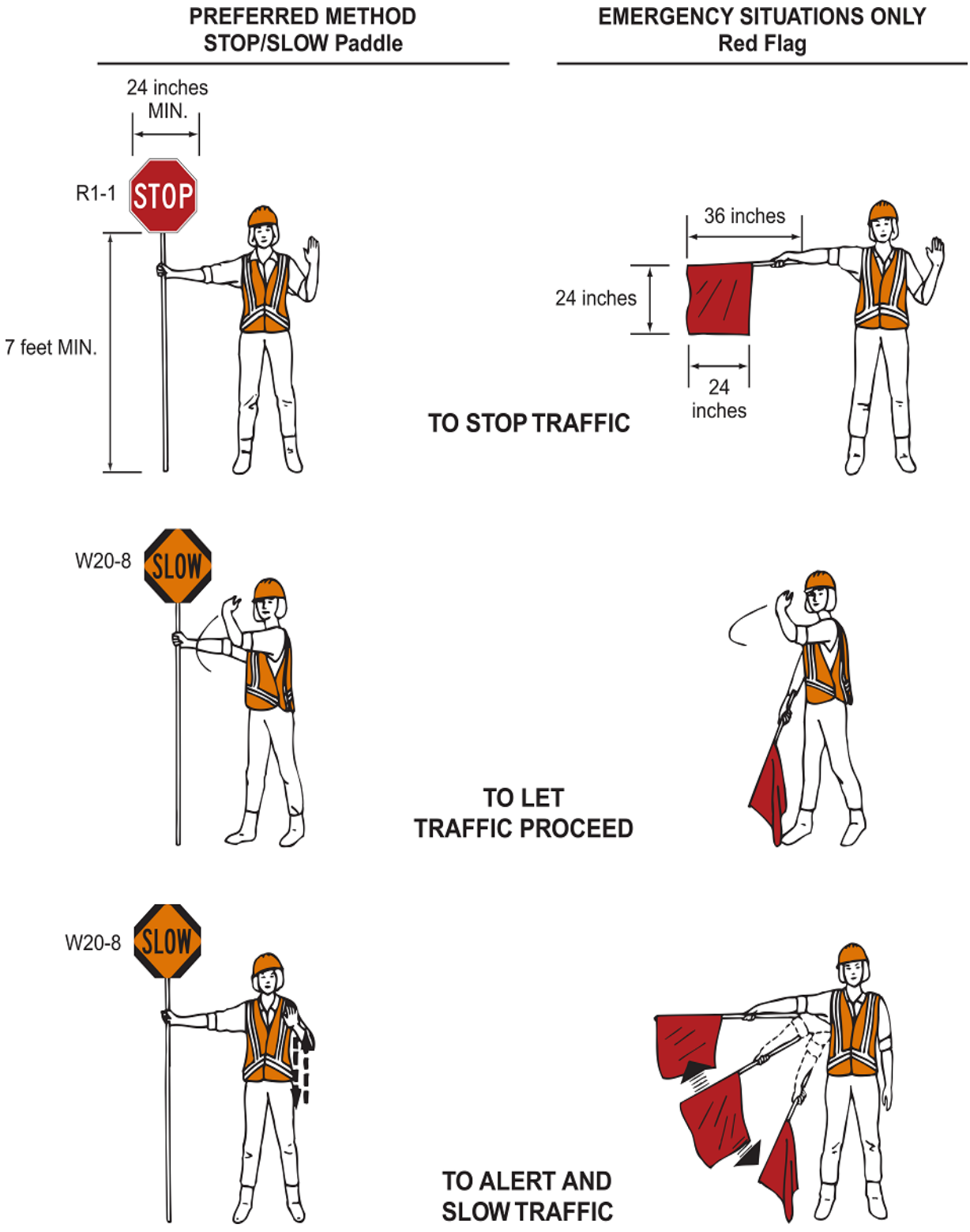
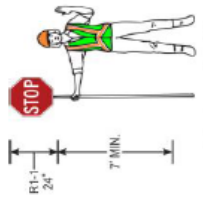
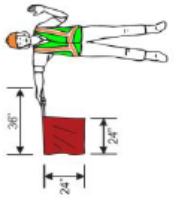
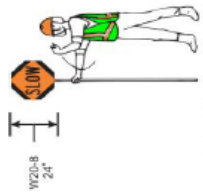
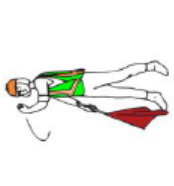
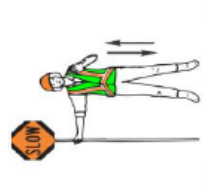
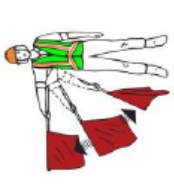
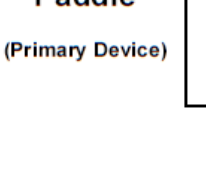
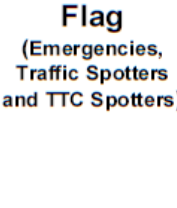


Figure 6E-4. Flagger Requirements (Sheet 1 of 2)

Flagging Requirements

Paddle (Primary Device)	Flag (Emergencies, Traffic Spotters and TTC Spotters)
	
To Stop Traffic	
	
Traffic Proceed	
	
To Alert and To Slow Traffic	
	

Safeguard Traffic

1. A sufficient number of certified, competent and courteous flaggers shall be provided and available at all times when required.
2. The flagger is responsible for public safety and safeguarding workers on the job, warning motorists while guiding them safely through a work zone.
3. Flagger shall be able to communicate in English specific instructions clearly, firmly and courteously.
4. Flagger shall be able to apply safe traffic control practices in stressful or emergency situations and also be able to recognize dangerous traffic situations.
5. Flagger shall be at least 18 years old.

Flaggers shall perform their duties in the following manner:

1. Flaggers shall carry a valid flagger certification card and photo identification on their person at all times when flagging.
2. Be alert and attentive at all times.
3. Flagger shall stand alone, away from other workers, work vehicles, or equipment.
4. Flagger shall always stand while waiting for traffic and have an escape route if approached by an errant vehicle.
5. Make eye contacts with road users, and user proper hand signals with flagging devices.
6. Do not leave until properly relieved.
7. Flagger shall be relieved every two hours for a minimum period of 15 minutes.
8. Flagger shall coordinate with other flaggers.

Proper Dressed

1. Flagger shall wear high-visibility safety apparel that meets or exceeds the Performance Class 2 or 3 requirements of the ANSI/ISEA 107–2010.
2. 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.
3. The retro-reflective 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.
4. Shirts with sleeves and long pants (removal of shirt is prohibited).
5. Headphones are prohibited.

Flagging Devices

The STOP/SLOW (R1-1/W20-8) paddle shall 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 shall be limited to emergency situations.

Sign Paddle

1. Sign paddle shall have an octagonal shape on a rigid handle, with at least 24" wide with letters at least 8" inches high.
2. It shall be mounted on a minimum of 7-foot from the bottom of the sign paddle to the top of the roadway elevation. The background of the SLOW face shall be fluorescent orange prismatic lens sheeting material with black letters and border.
3. Sign paddle shall be legible and clean.

Flag

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

Methods of Flagging Traffic

Where to stand

1. Flagging stations shall be preceded by proper advance warning signs and shall be located far enough in advance of work space so that approaching road users will have sufficient distance to stop before entering work space.
2. Flagger should be clearly visible to the first approaching road users at all times. Guidelines for determining the distance of the flagger station in advance of the work space are shown in the table below. The distance provides a clear line of sight to traffic approaching the flagger station (these distances should be increased for downgrades and other geometric conditions affecting the distance).
3. Stand facing traffic either on the edge of shoulder of the road or near the edge of pavement.
4. 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 stuck by an errant vehicle.
5. At night, flagging stations shall be illuminated with a minimum of horizontal luminance of 5-foot candles (50 lux).

Posted Speed of TTC zone (mph)	20	25	30	35	40	45	50	55	60	65
Minimum Distance (feet)	35	55	85	120	170	220	280	335	415	485
Recommended Distance (feet)	115	155	200	250	305	360	425	495	570	645

How to stop traffic

1. Flagger should stand either on the shoulder adjacent to the road user being controlled or in the closed lane prior to stopping road user.
2. (a) Using a Paddle - the flagger shall face road users and aim the STOP paddle face forward towards 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, and make eye contact with the road user.
   (b) Using a Flag - 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, and make eye contact with the road user.
3. If time persists, drivers may be informed concerning the reason for the delay. Speaking in English, be courteous and brief. For example, "Patching a hole, please drive on the left."

How to release traffic

1. Before releasing traffic, the flagger will return to the normal flagging location. Keep your paddle on STOP or flag extended until you are safely on the shoulder of the roadway.
2. (a) Using a Paddle – the flagger shall face road users with the SLOW paddle face aimed towards 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.
   (b) Using a Flag – 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.
   (c) Where traffic is stopped temporarily in one lane, release traffic by turning the paddle a quarter so that the word "STOP" faces you and is parallel to the roadway. With your free arm signal, the road users to proceed into the open lane.

How to alert and slow traffic but not stop it

1. Stand facing traffic
2. (a) Using a Paddle - 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.
   (b) Using a Flag - the flagger shall face road users and slowly wave the fag 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.

Never wave a paddle or flag

1. Signals must be clear and direct.
2. Use hand signals with devices. Don't make drivers guess what they should do.
3. Never wave a paddle or flag to stop traffic or for it to proceed.
4. Flags shall not be used to signal road users to proceed.

Figure 6E-4. Flagger Requirements (Sheet 2 of 2)

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.*

Standard:

09 **(DC Revision) Only uniformed law enforcement officers and traffic control officers (TCO) are allowed to direct traffic through an operating traffic signal. Flaggers do not have the authority and shall not direct vehicles through an operating traffic signal.**

10 **(DC Revision) A single flagger shall control only one lane of approaching traffic.**

Support:

11 (DC Revision) Flaggers that have been trained and certified by a DDOT-recognized flagger certification program in the proper use of audible devices may use whistles or other approved audible devices to alert and warn workers of approaching vehicle which failed to stop at the flagger station when instructed to do so. Audible devices that produce warning sounds at a minimum of 80 decibels should be generally sufficient to be heard during periods of heavy traffic or construction. The District of Columbia Noise Control Act specifies a maximum decibel level of 80 decibels for daytime construction (without a variance).

Section 6E.08 Flagger Stations

Standard:

01 **(DC Revision) Flagger stations shall be located far enough in advance of the work space so that approaching road users have sufficient distance to stop before entering the work space. Flagger stations shall be located such that there is high visibility for on-coming traffic.**

Guidance:

02 *(DC Revision) The distances shown in Table 6E-1, which provides information regarding the stopping sight distance as a function of speed, should be used for the location of a flagger station. The distances in Table 6E-1 should also be used to provide a clear line of sight to road users approaching the flagger station. Motorists should be able to see the flagger at the flagger station when they reach the position of the flagger symbol sign. These distances should be increased for downgrades and other geometric conditions that affect stopping distance.*

Table 6E-1. Distance of Flagger Station in Advance of the Work Space

Speed*	Minimum Distance	Recommended Distance
20 mph	35 feet	115 feet
25 mph	55 feet	155 feet
30 mph	85 feet	200 feet
35 mph	120 feet	250 feet
40 mph	170 feet	305 feet
45 mph	220 feet	360 feet
50 mph	280 feet	425 feet
55 mph	335 feet	495 feet
60 mph	415 feet	570 feet
65 mph	485 feet	645 feet

* Posted speed of the temporary traffic control zone.

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 **(DC Revision) Except in emergency situations, flagger stations shall be preceded by proper advance warning sign or signs to allow adequate perception and reaction distance for drivers. Except in emergency situations flagger stations shall be illuminated at night.**

04A **(DC Revision) The flagger symbol sign shall be removed, covered, or turned away from road users when the flagger operation is suspended for 30 minutes or longer.**

05 **(DC Revision) Flagger stations shall be illuminated at night by an overhead or ground-mounted light source with a minimum of horizontal luminance of 5 foot-candles (50 lux), except in emergency situations. The light source shall be mounted ensuring that it does not prohibit the escape route of the flagger or the light's glare does not prohibit the sight of the traveling public or the flagger.**

06 **(DC Revision) The intensity of the light source for the flagger station in foot-candles shall be available in written documentation.**

Support:

07 (DC Revision) Foot-candle is a unit that measures the intensity of a light source, while lux measures luminance. Luminance is the amount of light falling on an area or the flagger station. The reference to horizontal luminance means the area of the flagger station is covered at a minimum rate of 50 lux over the entire area and not just in spots. To obtain horizontal luminance, the light source is higher than the flagger station and is aimed at the flagger. The lighting source must not interfere with the flagger or motorist line of sight.

08 (DC Revision) 1 foot-candle equals 10.8 lux, so a 5 foot-candle will produce more than 50 lux (5 x 10.8 = 54 lux)

Guidance:

09 *(DC Revision) To assure that a fully alert flagger is present at the flagger station, flaggers should be relieved every two hours for a minimum period of 15 minutes.*

10 *(DC Revision) The flagger should stand either on the curb or 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, whistles, etc.) of approaching danger by out-of control vehicles.*

Standard:

11 **(DC Revision) The flagger shall stand alone, never permitting a group of workers to congregate around the flagger station. Vehicles and equipment shall not be allowed around the flagger station, which can interfere with the visibility of the flagger to approaching motorists.**

12 **(DC Revision) When the flagger is no longer at the flagger station performing flagging duties, the advance warning signs advising of flagging operations shall be removed.**

Option:

13 (DC Revision) If work and/or equipment is still in the area, the ROAD WORK AHEAD sign may remain.

14 (DC Revision) At a spot constriction, the flagger may have to take a position on the curb or shoulder opposite the closed section in order to operate effectively.

15 (DC Revision) At spot lane closures where adequate sight distance and low traffic volume are available for the safe handling of traffic, the use of one flagger may be sufficient.

Standard:

16 **(DC Revision) All flagger stations shall be in communication with each other via electronic communication equipment (2-way radios, cell-phones with direct connection, etc.).**

17 **(DC Revision) Additional flagger stations shall be located on intersecting roadways within the work zone such that approaching road users will have sufficient distance to stop and be controlled by the flagger.**

Guidance:

18 *(DC Revision) A supplemental flagger should be considered in advance of the primary flagger(s) when geometric conditions obstruct the sight-line to the primary flagger.*

Standard:

19 **(DC Revision) When a grade crossing exists in the vicinity of a TTC zone, lane restriction, flagging, or other operations shall not create conditions where vehicles can be queued across the rail road track. If the queuing of vehicles across the rail road tracks cannot be avoided, a uniformed law enforcement officer or flagger shall be provided at the upstream side of the crossing to prevent vehicles from stopping within the grade crossing, considered to be 50 feet on either side of the closest and farthest rail, even if automatic warning devices are in place.**

Section 6E.09 Traffic Spotters

Support:

01 (DC Revision) A traffic spotter's primary function is to alert and assist motorists through temporary traffic control zones on low volume, low speed collector and local roads, and also in emergency situations only.

Standard:

02 **(DC Revision) Qualifications, clothing requirements, and hand signaling procedures for traffic spotters shall be the same as for flaggers. Hand signaling devices for traffic spotters shall be a red flag a minimum of 24**

inches square fastened to a staff that is approximately 36 inches in length.

Guidance:

03 *(DC Revision) The location of the traffic spotter should be where he/she is visible and capable of directing traffic from both directions.*

Standard:

04 **(DC Revision) The ROAD WORK AHEAD sign shall be the minimum sign requirement for traffic spotters.**

Option:

05 (DC Revision) Additional signing and other traffic control devices may be required, depending on the type and visibility of the operation, subject to the discretion of DDOT.

Section 6E.10 Temporary Traffic Control Spotters

Support:

01 (DC Revision) A temporary traffic control (TTC) spotter is a certified flagger whose primary function is to monitor traffic conditions and warn co-workers who are performing tasks such as installing or removing temporary traffic control devices, traffic counters and removing debris from the roadway of oncoming traffic.

Standard:

02 **(DC Revision) Qualifications, clothing requirements, and hand signaling procedures for TTC spotters shall be the same as for flaggers. The hand signaling devices for TTC spotter shall be a red flag or a fluorescent orange/red flag a minimum of 24 inches square fastened to a staff that is approximately 36 inches in length.**

03 **(DC Revision) The location of the TTC spotter shall be highly visible to oncoming traffic and the TTC spotter shall stop traffic if necessary when co-workers are installing or removing devices.**

Option:

04 (DC Revision) TTC spotters may be used for other work operations such as conducting inventory reviews, measuring guardrail, reviewing damaged guardrail, and measuring lane width.

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CHAPTER 6F. TEMPORARY TRAFFIC CONTROL ZONE DEVICES

Section 6F.01 Types of Devices

Standard:

00A **(DC Revision) Traffic control devices shall be defined as all signs, signals, marking, and other devices used to regulate, warn, or guide traffic, placed on, over, or adjacent to a street, highway, pedestrian facility, or bikeway by authority of the District Department of Transportation or official having jurisdiction.**

00B **(DC Revision) All traffic control devices used on street and highway construction, special events, maintenance, utility, or incident management operations shall conform to the applicable provisions of this Manual.**

Guidance:

01 *(DC Revision) 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. The special needs and control of motorcyclists should also be considered through a TTC zone.*

Support:

02 (DC Revision) FHWA policy requires that all roadside appurtenances such as traffic barriers, barrier terminals and impact attenuators, 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" and/or the 2009 AASHTO "Manual for Assessing Safety Hardware (MASH)" report. 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 (DC Revision) Crashworthiness and crash testing information on devices described in Part 6 are found in AASHTO's "Roadside Design Guide" (see Section 1A.11 of the 2009 MUTCD).

05 (DC Revision) As defined in Section 1A.13 of the 2009 MUTCD, "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."

05A (DC Revision) Information on the maintenance of TTC devices is contained in "Quality Guidelines for Work Zone Traffic Control Devices", published by the American Traffic Safety Services Association (ATSSA) and is available at the ATSSA website "http://www.atssa.com".

Standard:

06 **(DC Revision) 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 of the 2009 MUTCD), pedestrian facility, or bikeway by authority of a public body or official having jurisdiction.**

07 **(DC Revision) 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 of the 2009 MUTCD) 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 **(DC Revision) The colors for regulatory signs shall follow the Standards for regulatory signs in Table 2A-5 and Chapter 2B of the 2009 MUTCD. Warning signs in TTC zones shall have a black legend on a fluorescent orange background, except for the Railroad Advance Warning (W10-1) sign, which**

shall have a black message and border on a yellow background. Colors for guide signs shall follow the Standards in Table 2A-5 and Chapter 2D of the 2009 MUTCD, except for guide signs as noted in Section 6F.55. Sign material shall conform to the latest District Road and Bridge Specifications including all revisions.

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.

Standard:

04A **(DC Revision) Warning and guide signs used for TTC incident management situations (see Chapter 6I) shall have a black legend and border on a fluorescent pink background.**

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 (DC Revision) Standard orange flags or flashing warning lights on post-mounted signs may be used in conjunction with signs.

Standard:

08 **(DC Revision) When standard orange 24 X 24 inches flags or flashing warning lights are used in conjunction with signs, they shall not block the sign face. When flags become faded they shall be removed or replaced.**

09 **(DC Revision) Except as provided in Section 2A.11 of the 2009 MUTCD, 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 of the 2009 MUTCD).

13 (DC Revision) Section 2A.06 of the 2009 MUTCD 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.**

14A **(DC Revision) All non-retroreflective signs, including mesh signs, are not allowed and shall not be used due to fading, sunlight shining through, and lack of visibility during hours of darkness.**

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.

Standard:

18 **(DC Revision) All TTC signs, including those made of flexible material (i.e. roll-up signs), shall be made of prismatic retroreflective sign sheeting.**

Guidance:

19 *(DC Revision) The backs of all signs should be clearly marked with the owner's name and contact information.*

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.*

Standard:

01A **(DC Revision) Where TTC devices are used on roadways having a median wider than eight feet, left and right sign assemblies shall be used.**

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.

02A (DC Revision) Crashworthy signs may be mounted on or above Type 3 barricades.

Support:

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

03A (DC Revision) Guidelines for height and lateral clearance of temporary ground-mounted signs are shown in Figure 6F-1.

Standard:

04 **(DC Revision) The minimum height of ground-mounted signs, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement, shall be 7 feet (see Figure 6F-1).**

05 **(DC Revision) Post-mounted signs installed at the side of the road in residential and urban areas shall be mounted at a height of at least 7 feet, measured from the bottom of the sign to the elvevation of the near edge of the pavement. For crashworthy purposes, the top of the sign shall be a minimum of 9 feet above the ground elevation at the base of the sign. The height to the bottom of a secondary sign mounted below another sign may be one foot less than the 7-foot requirement. Signs mounted on barricades and barricade/sign combinations shall be crashworthy.**

05A **(DC Revision) Ground-mounted sign panels shall be securely fastened to posts or supports and erected plumb and maintained in plumb condition.**

05B **(DC Revision) For sign posts which are not fixed in the ground, but instead mounted on horizontal support platforms, sand bags shall be used for ballast to prevent overturning.**

Guidance:

06 **(DC Revision) Deleted. See Paragraph 05.**

07 **(DC Revision) Deleted. See Paragraph 05.**

08 *(DC Revision) Sign supports should be located so as to accommodate pedestrians and bicyclists in areas designated for their use. A minimum lateral width of 5 feet should be maintained for pedestrian pathways. 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 18
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 Zone Speed Limit	R2-12	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	—	—
Mandatory Movement (text)	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	—	—
Road Closed to Thru Traffic (Detour)	R11-4DC1	6F.09	96 x 48	—	—
Pedestrians Prohibited (This Side of Street)	R11-9DC	6F.14	30 x 24	—	—
Open to Local Businesses	R11-10DC	6F.08	30 x24	—	—
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.16	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	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

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
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
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
Truck Crossing	W11-10DC	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

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

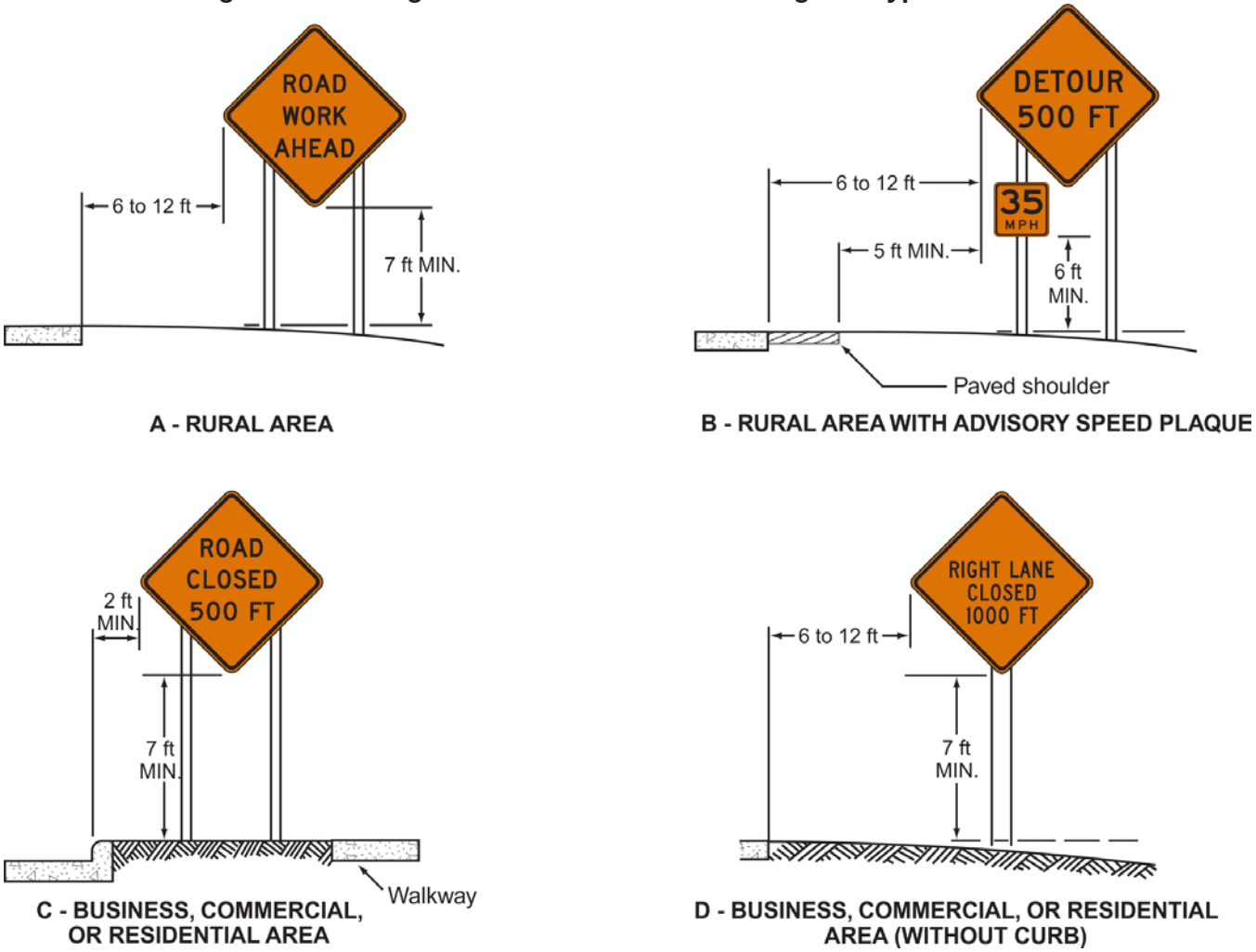
Sign or Plaque	Sign Designation	Section	Conventional Road	Freeway or Expressway	Minimum
XX Feet (plaque)	W16-2P	6F.16	24 x 18	30 x 24	—
Road Work (with distance)	W20-1	6F.18	36 x 36	48 x 48	30 x 30
Detour (with distance)	W20-2	6F.19	36 x 36	48 x 48	30 x 30
Road (Street) Closed (with distance)	W20-3	6F.20	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 Zone (plaque)	G20-5aP	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 - up arrow	M4-9DC1	6F.59	30 x 24	—	—
Detour - double arrow	M4-9DC2	6F.59	30 x 24	—	—
Detour	M4-10	6F.59	48 x 18	—	—
Pedestrians	M4-11DC	6F.59	30 x 24	—	—

* See Table 2B-1 of the 2009 MUTCD 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



Standard:

09 **(DC Revision) 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 of the 2009 MUTCD).**

10 **(DC Revision) Signs mounted on Type 3 Barricades and Type 3 Barricade/sign combinations shall be crashworthy.**

10A **(DC Revision) Signs shall be post-mounted on fixed supports for any work that occurs for a duration of more than 3 consecutive days (72 hours).**

Guidance:

10B *(DC Revision) For operations that occur for a duration of less than 3 consecutive days (72 hours), portable spring-loaded sign supports should be used.*

11 *(DC Revision) 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 5 should not be used for a duration of more than 3 days.*

Option:

12 (DC Revision) 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 5* 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.**

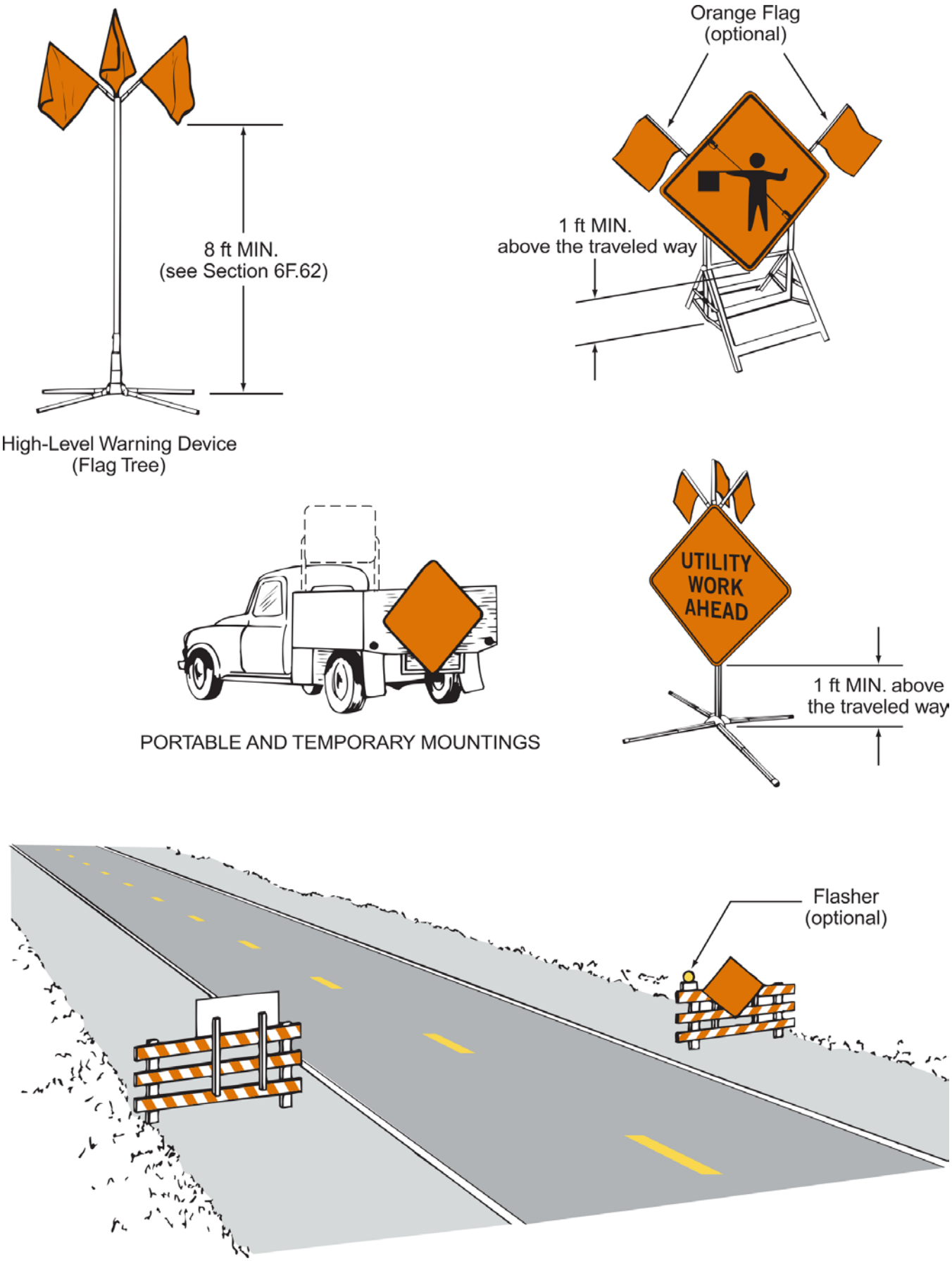
15A **(DC Revision) Portable sign supports shall meet the following conditions: accommodate signs of all standard shapes and sizes including octagonal and triangular; have a flag holder, which will accommodate two flags as an integral part of the unit; have adjustable legs capable of adjusting to uneven surfaces; and while supporting a 16 square foot rigid sign panel, the sign support shall be spring-loaded and shall withstand 50 mph winds without tipping over or rotating more than 5 degrees about its vertical axis without the use of tie downs or ballast of any kind. The complete unit shall not exceed 40 pounds. The unit shall meet the latest edition of the MASH report crashworthy standards.**

Guidance:

15B *(DC Revision) The legs of portable signs supports should be as flush as possible to the ground or roadway surface for stability.*

15C *(DC Revision) Portable sign supports used for signs found in Paragraph 11, or shown in the typical traffic control figures in Chapter 6H, should be supported with a sand bag weighing approximately 25-pounds on each leg when they are used on long-term projects.*

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



Standard:

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

16A **(DC Revision) Tripod type portable sign stands, regardless of their crashworthiness, shall not be used in any roadway.**

Support:

16B (DC Revision) A tripod type sign stand reduces the sign's retroreflectivity and visibility because it does not allow the sign to be installed perpendicular to the roadway.

Option:

16C (DC Revision) Additional weight consisting of a sand bag weighing approximately 25-pounds may be placed on each leg of a sign stand or no more than two cone weights or one drum collar weight positioned on the center of the sign stand and around the mast may be used to comply with the portable sign requirement.

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.

17A (DC Revision) If utility conflicts or concrete sidewalks/ medians prevent the installation of permanent signs in the appropriate locations, portable sign supports may be used.

Guidance:

17B *(DC Revision) Sign posts placed in the clear zone should yield or break away upon impact to minimize obstructions to road users and to not present an undue risk to workers.*

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.

Standard:

19 **(DC Revision) When portable signs are no longer in use, the signs and their supports shall be removed or placed behind positive protection.**

20 **(DC Revision) Portable sign supports shall meet the breakaway requirements for permanent installations discussed in the AASHTO Roadside Design Guide.**

Section 6F.04 Sign Maintenance

Support:

00A (DC Revision) Signs used in TTC zones are moved frequently, loaded and unloaded from the trucks, and in general receive much harsher treatment than permanent signs. For this reason, particular attention must be given to maintaining these signs properly for cleanliness, visibility, and correct positioning.

Standard:

00B **(DC Revision) When TTC signs are covered to prevent the display of the message, the entire sign shall be covered with silt fence or other materials approved by the DDOT Engineer such that no portion of the message side of the sign shall be visible. Tape, such as duct tape, shall not be used on the sign face.**

00C **(DC Revision) Plywood shall be used on ground-mounted TTC signs only. Attachment methods used to attach the covering material to the signs shall be of a durable construction that will prevent the unintentional detachment of the material from the sign.**

00D **(DC Revision) At no time shall a TTC sign on a post or portable sign stand be rotated to prevent the display of the message.**

00E **(DC Revision) Signs and their portable sign stands shall be removed from the roadway when not in use.**

Option:

00F (DC Revision) Advance warning signs and their portable supports may be disassembled and stored behind a barrier or guardrail.

Standard:

01 **(DC Revision) All TTC signs shall be reviewed after the initial set-up and periodically during every work shift to ensure they are functioning properly and they shall be properly maintained for cleanliness, visibility, and correct positioning. Signs that have lost significant legibility shall be promptly replaced in accordance with the American Traffic Safety Service Association (ATSSA)'s Quality Standards for Work Zone Traffic Control Devices.**

Guidance:

02 *(DC Revision) Deleted. See Paragraph 1.*

Support:

03 (DC Revision) Sections 2A.08 of the 2009 MUTCD and 6F.01 of this Manual contain 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 **(DC Revision) Regulatory signs impose legal obligations on all motorists, and they shall be authorized by the DDOT Chief Engineer or an official having jurisdiction and conform to Chapter 2B of the 2009 MUTCD.**

Section 6F.06 Regulatory Sign Design

Standard:

01 **(DC Revision) TTC regulatory signs shall conform with the Standards for regulatory signs presented in Part 2 of the 2009 MUTCD and in the FHWA's "Standard Highway Signs and Markings" book (see Section 1A.11 of the 2009 MUTCD).**

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.07A Regulatory Sign Applications

Standard:

01 **(DC Revision) 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 conformance with applicable ordinances or statutes of the jurisdiction as well as comply with the sign design standards of the 2009 MUTCD.**

Section 6F.07B Advance Warning Signs

Standard:

01 **(DC Revision) For all roads functionally classified as principal (i.e., major) arterials or above, an Advance Warning Sign shall carry the legend of "AHEAD", "XX Miles", or "XX Feet" in advance of the work area.**

02 **(DC Revision) For all road functionally classified as minor arterials or below , Advance Warning Sign shall carry the legend of "AHEAD", "XX Blocks", or "XX Feet" or a legend deemed necessary by the DDOT Engineer, in advance of the work zone.**

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.

02A (DC Revision) The words ALLEY CLOSED may be substituted for ROAD (STREET) CLOSED where applicable.

02B (DC Revision) The words RAMP 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 1of 2)

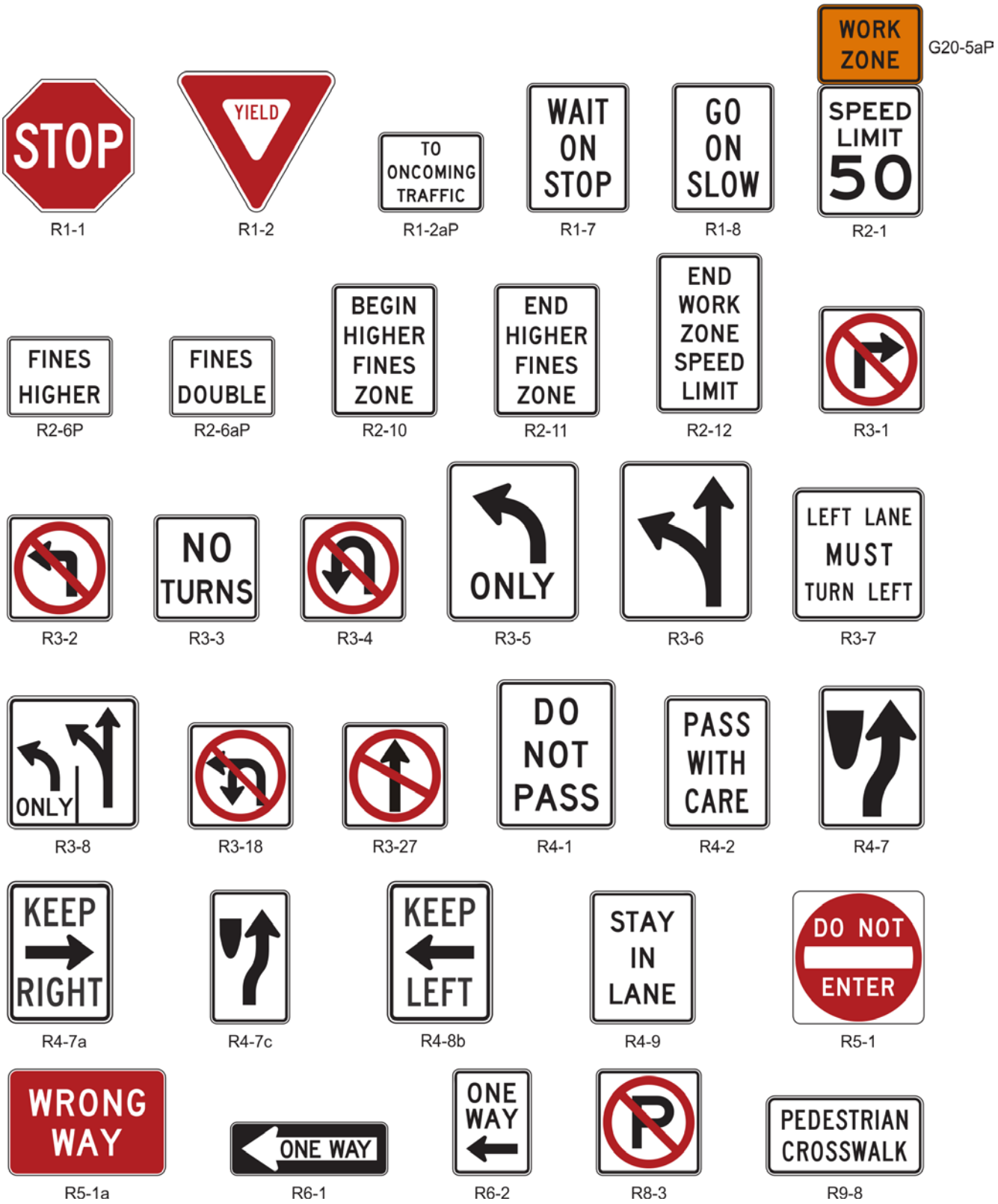
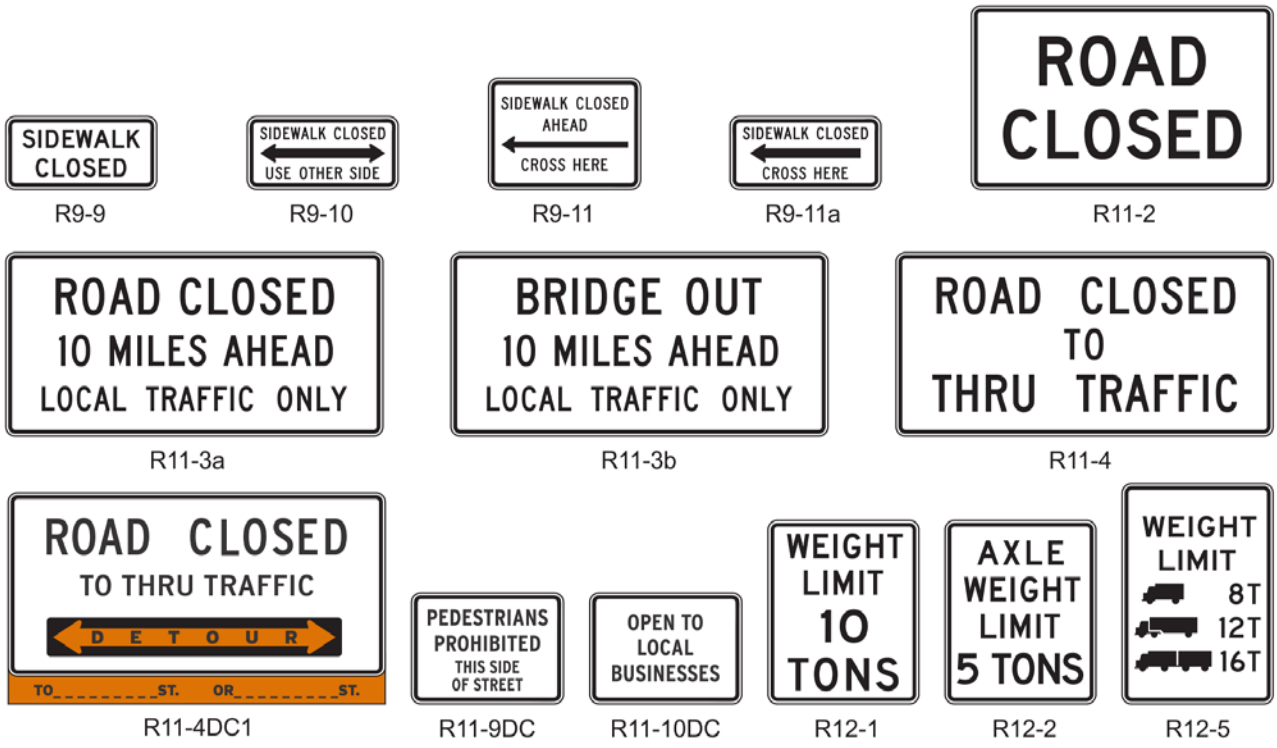


Figure 6F-3. Regulatory Signs and Plaques in Temporary Traffic Control Zones (Sheet 2 of 2)



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.**

05 **(DC Revision) The RAMP CLOSED sign shall be installed above a Type 3 Barricade on short-term and long-term projects.**

Option:

06 (DC Revision) The Type 3 Barricade with RAMP CLOSED sign may be replaced with a shadow vehicle on short-term projects.

Section 6F.09 Local Traffic Only Signs (R11-3a, R11-4, R11-4DC1, R11-10DC)

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 *(DC Revision) In residential applications, the Local Traffic Only sign (R11-3a) should have the legend ROAD CLOSED XX BLOCKS (OR XX FEET) AHEAD, LOCAL TRAFFIC ONLY.*

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 R11-3a 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.

Option:

06 (DC Revision) The ROAD (STREET) CLOSED - DETOUR ROUTING (R11-4DC1) sign (see Figure 6F-3) may be used in place of the ROAD (STREET) CLOSED TO THRU TRAFFIC sign when necessary, to provide detour information.

07 (DC Revision) The OPEN TO LOCAL BUSINESSES (R11-10DC) sign (see Figure 6F-3) may be used to indicate when access to local busineses is permitted via roads designated as closed to through traffic.

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

Standard:

08 (DC Revision) WEIGHT LIMIT signs (R12-1, R12-2, R12-5) (see Figure 6F-3), which shows the gross weight or axle weight that is permitted on the roadway or bridge, shall be consistent with DC regulations and shall not be installed without the approval of the authority having jurisdiction over the highway.

09 **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.

Standard:

02 **(DC Revision) A STAY IN LANE (R4-9) (see Fig. 6F-3) shall be used when motorists are exposed to a lane differential during pavement milling and paving operations**.

03 **(DC Revision) When used on a portable sign support, the STAY IN LANE sign shall be adjusted daily, and a sand bag weighing approximately 25-pounds shall be placed on each leg of the sign stand.**

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

Option:

01 A WORK ZONE (G20-5aP) 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 ZONE SPEED LIMIT (R2-12) 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 (DC Revision) A FINES HIGHER, FINES DOUBLE, or $XX FINE plaque (see Section 2B.17 of the 2009 MUTCD 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.

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, R11-9DC)

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 (DC Revision) These signs are typically mounted on a 4-foot wide 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.

Option:

07 (DC Revision) The PEDESTRIANS PROHIBITED (R11-9DC) sign (see Fig. 6F-3) may be used in combination with the "R9 series" signs where there may be pedestrian compliance concerns.

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 **(DC Revision) TTC warning signs shall conform to the Standards for warning signs presented in Part 2 of the 2009 MUTCD and in FHWA's "Standard Highway Signs and Markings" book (see Section 1A.11 of the 2009 MUTCD). 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 of the 2009 MUTCD to have fluorescent yellow-green backgrounds.**

Standard:

03 **(DC Revision) Warning signs used for TTC incident management areas shall have a black legend and border on a fluorescent pink background.**

Option:

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.

Standard:

10A **(DC Revision) Because of their importance, advance warning signs for higher-speed locations (i.e., locations with prevailing speeds of 45 mph and greater), shall have a size of 48 x 48 inches (see Part 2 of the 2009 MUTCD). For freeways and expressways, the size of diamond-shaped TTC warning signs shall be a minimum of 48 x 48 inches.**

10B **(DC Revision) Conventional roads, where speeds and volumes are moderately low, a maximum size of 36 x 36 inches shall be used for advance warning signs.**

10C **(DC Revision) Advance warning signs for local roadways and residential streets shall not be less than 30 x 30 inches.**

Standard:

10D **(DC Revision) Under no condition shall the advance warning signs be placed such that they are an obstacle for pedestrians or cyclists.**

Option:

10E (DC Revision) Advance warning signs larger than the minimum standard may be used for greater legibility or additional emphasis of the TTC zones (see Part 2 of the 2009 MUTCD).

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 *(DC Revision) 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 150 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.*

02A *(DC Revision) Signs erected for individual operations within the TTC zone limits of a construction project should be placed with appropriate spacing and should not conflict with advance warning signs that are to remain for the entire duration of the project.*

02B *(DC Revision) The word AHEAD should be used in place of a specific distance on advance warning signs in most applications.*

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 (DC Revision) As an alternative to AHEAD on advance warning signs, a specific distance may be used based on approval from DDOT.

Support:

04A (DC Revision) For urban conditions, it is generally better to attempt to place all advance warning signs within a one block area versus spreading out over several blocks.

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

Figure 6F-4. Warning Signs and Plaques in Temporary Traffic Control Zones (Sheet 2of 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 **(DC Revision) The ROAD (STREET) WORK (W20-1) sign shall have the legend ROAD (STREET) WORK, XX BLOCKS, XX FEET, XX MILES, or AHEAD, as per the functional classification of the road or as deemed necessary by the DDOT Engineer.**

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 **(DC Revision) The DETOUR sign shall have the legend DETOUR, XX BLOCKS, XX FEET, XX MILES, or AHEAD based on the functional classification of the road or as deemed necessary by the DDOT Engineer.**

03 **(DC Revision) Detour signs used for TTC in incident management areas shall have a black legend and border on fluorescent pink background.**

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 **(DC Revision) The ROAD (STREET) CLOSED sign shall have the legend ROAD (STREET) CLOSED, XX BLOCKS, XX FEET, XX MILES, or AHEAD, as per the functional classification of the road or as deemed necessary by the DDOT Engineer.**

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

Standard:

01 **(DC Revision) 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. It shall have the legend ONE LANE ROAD, XX BLOCKS, XX FEET, XX MILES, or AHEAD based on the functional classification of the road or as deemed necessary by the DDOT Engineer.**

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

Standard:

01 **(DC Revision) The Lane(s) Closed (W20-5, W20-5a) 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 **(DC Revision) For a single lane closure, the Lane Closed (W20-5) sign (see Figure 6F-4) shall have the legend RIGHT (LEFT) LANE CLOSED, XX BLOCKS, 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 BLOCKS, XX FEET, XX MILES, or AHEAD based on the functional classification of the road or as deemed necessary by the DDOT Engineer.

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.*

Option:

02 (DC Revision) The words INNER LANE CLOSED AHEAD may be substituted for CENTER LANE CLOSED AHEAD where applicable (i.e., roundabouts).

Section 6F.23A THRU TRAFFIC MERGE LEFT (RIGHT) (W4-7)

Option:

01 (DC Revision) The THRU TRAFFIC MERGE LEFT (RIGHT) (W4-7) sign (see Figure 6F-4) may be used in advance of an intersection where one or more lane closures on the far side of a multi-lane intersection require through vehicular traffic approaching the intersection to use the left (right) lane to proceed through the intersection.

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)

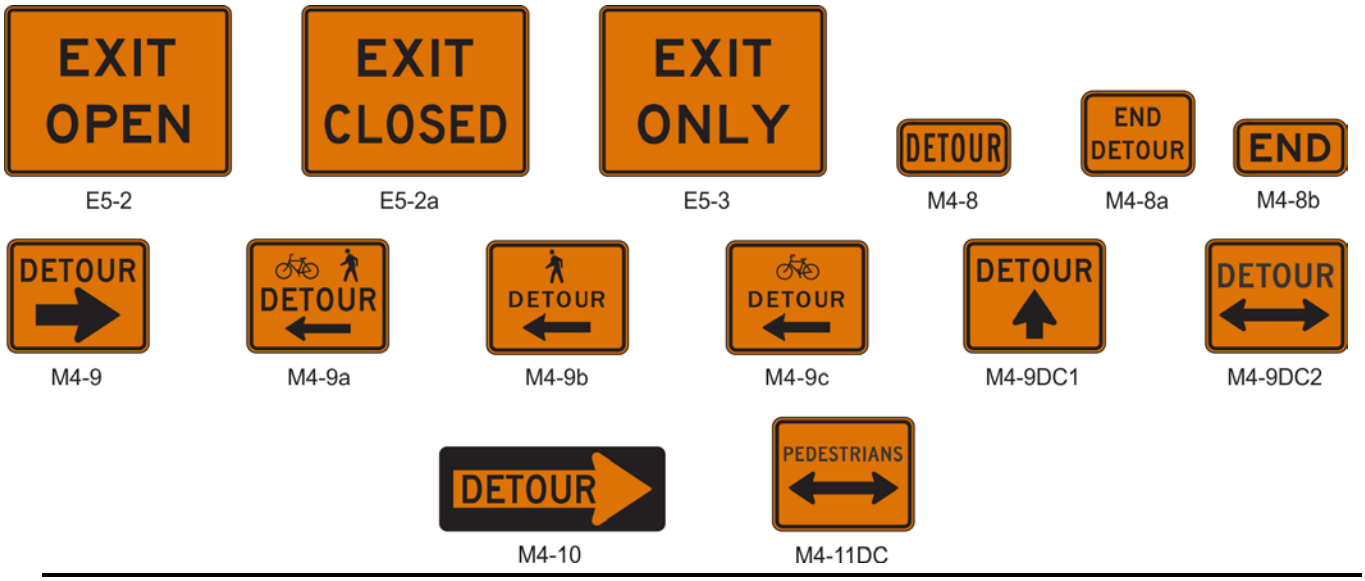
Option:

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 *(DC Revision) When an exit ramp is closed, an EXIT CLOSED sign panel with a black legend and border on a retroreflective 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.

Guidance:

04 *(DC Revision) Where conditions warrant the use of a supplemental flagger but roadway geometrics prohibit the use of a supplemental flagger, a SLOW sign should be placed in the advance warning area.*

Standard:

05 **(DC Revision) The Flagger (W20-7) symbol sign shall be removed or covered from view of road users when the flagging operation is suspended for 30 minutes or longer.**

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.

02 *(DC Revision) The Two-Way Traffic (W6-3) sign should also be used at locations where motorists could perceive that they are in a one-way roadway when, in fact, they are on a two-lane, two-way highway.*

Option:

03 (DC Revision) A crashworthy Two-Way Traffic (W6-4) sign may be used on channelizing devices to separate two-way traffic in an urban area.

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, W11-10DC)

Option:

01 (DC Revision) Motorized Traffic (W8-6, W11-10, and W11-10DC) 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, W11-10DC) 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.37A 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 (DC Revision) 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 XX FEET OR XX BLOCKS, or WORK AHEAD sign based on the functional classification of the road or as deemed necessary by the DDOT Engineer.

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.37B Rough Road Sign (W8-8), Bump Sign (W8-1) and Motorcycle Plaque (W8-15P)

Standard:

01 **(DC Revision) The Rough Road (W8-8) sign (see Figure 6F-3) shall be used to warn of a rough roadway surface and pavement milled surfaces.**

02 **A Bump (W8-1) sign (see Figure 6F-3) shall be used to warn road users of abrupt or sudden changes in grade during and after pavement milled surface operations.**

Option:

03 A MOTORCYCLE (W8-15P) plaque (see Figure 6F-3) may be mounted below a Rough Road (W8-8) sign when the sign is mounted on a post.

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.

01A (DC Revision) The words XX FEET or XX MILES may be substituted for the word AHEAD on the UTILITY WORK AHEAD sign based on approval by the DDOT Engineer.

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, 6H-33 and Appendix B of the Work Zone Management Manual.

Standard:

03 **(DC Revision) The UTILITY WORK sign shall carry the legend UTILITY WORK, XX BLOCKS, XX FEET, XX MILES, or AHEAD based on the functional classification of the road or as deemed necessary by the DDOT Engineer.**

Section 6F.40 Signs for Blasting Areas

Support:

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

Standard:

05 **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.*

02 *(DC Revision) When used on a portable sign support, the UNEVEN LANES sign shall be adjusted daily with the work operation, and a sand bag weighing approximately 25-pounds shall be placed on each leg of the sign stand.*

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

Standard:

01 **(DC Revision) A STEEL PLATE AHEAD (W8-24) sign (see Figure 6F-4) shall be used to warn road users whenever steel plate(s) is being used to protect the surface of the roadway open to travel.**

02 **(DC Revision) When used on a portable sign support, the STEEL PLATE AHEAD sign shall be adjusted daily with the work operation.**

Guidance:

03 *(DC Revision) A sand bag weighing approximately 25-pounds shall be placed on each leg of the sign stand.*

Option:

04 (DC Revision) Conspicuity pavement marking may be applied to steel plate(s) when used (see Section 6G.20).

Support:

05 (DC Revision) The steel plate could make the road surface uneven and could create slippery conditions during wet weather; therefore, conspicuity pavement markings are required when steel plates are used.

Option:

06 (DC Revision) Additional warning signs may be unnecessary for the conditions present. A ride through of the worksite should be performed to check for bumps and rough road conditions.

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

Guidance:

01 *(DC Revision) 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, at every major entry point to 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.

02A (DC Revision) When shoulder or lane closures affect bicycle facilities, the Bicycle Warning (W11-1) sign and Share the Road (W16-1P) plaque may be used to warn of unexpected entries by bicycles into the roadway.

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 (DC Revision) In combination with a warning sign, a Supplementary Distance (W7-3a) plaque (see Figure 6F-4) with the legend NEXT XX MILES or XX FEET, as deemed necessary by the DDOT Engineer, 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 (DC Revision) In long TTC zones, Supplementary Distance plaques with the legend NEXT XX MILES or XX FEET, as per functional classification or as deemed necessary by the DDOT Engineer, 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 **(DC Revision) The Supplementary Distance plaque with the legend NEXT XX MILES or XX FEET or XX BLOCK 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 *(DC Revision) When used in Temporary Traffic Control zones, the Supplementary Distance plaque with the legend NEXT XX MILES or XX FEET, as per the functional classification of the road or as deemed necessary by the DDOT Engineer, 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 (DC Revision) 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 of the 2009 MUTCD.

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.**

04 **(DC Revision) Guide signs used in TTC incident management situations shall have a black legend and border on a fluorescent pink background.**

Option:

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 **(DC Revision) 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). A flagger shall be stationed on the approach to the activity area to stop motor vehicle traffic until the pilot vehicle is available.**

Section 6F.59 Detour Signs (M4-8, M4-8a, M4-8b, M4-9, M4-9a, M4-9b, M4-9c, M4-9DC1, M4-9DC2, M4-10, and M4-11DC)

Standard:

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

02 **(DC Revision) Detour signs in TTC incident management situations shall have a black legend and border on a fluorescent pink background.**

Option:

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.

04A (DC Revision) Special detour signs may be used on roadways that intersect closed roadways to advise motorists of a corresponding detour.

Guidance:

04B *(DC Revision) Special detour sign legends should have a minimum letter height of 6 inches on two-lane roadways and multi-lane roadways with a posted speed limit. Special detour sign legends should have a minimum letter height of 8 inches on multi-lane roadways with a posted speed limit.*

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 *(DC Revision) The DETOUR (M4-9, M4-9DC1, and M4-9DC2) signs (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 *(DC Revision) A Street Name sign should be placed above, or the street name should be incorporated into, DETOUR (M4-9, M4-9DC1, and M4-9DC2) signs 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.

13A (DC Revision) Alternative PEDESTRIAN DETOUR signs (M4-9DC1, M4-9DC2, and M4-11DC) (see Figure 6F-5) may be used to indicate the designated pedestrian detour routing.

Guidance:

14 *(DC Revision) The DETOUR (M4-8) sign should be placed on tangent sections at intervals not to exceed 0.25 miles and at major intersections.*

Option:

15 (DC Revision) In urban areas, M4-8 signs may be placed at every intersection within the particular TTC zone.

Section 6F.60 Portable Changeable Message Signs

Support:

01 (DC Revision) 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 of the 2009 MUTCD. The information in this Section describes situations where the provisions for portable changeable message signs differ from those given in Chapter 2L of the 2009 MUTCD.

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 **(DC Revision) Portable changeable message signs shall comply with the applicable design and application principles established in Chapter 2A of the 2009 MUTCD. Portable changeable message signs shall display only traffic operational, regulatory, warning, and guidance information, and shall not be used for advertising messages.**

Support:

08 (DC Revision) Section 2L.02 of the 2009 MUTCD contains information regarding overly simplistic or vague messages that is also applicable to portable changeable message signs.

Standard:

09 **(DC Revision) The color of the elements should be yellow or orange on a black background.**

Support:

10 (DC Revision) Section 2L.04 of the 2009 MUTCD 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 (DC Revision) Section 2B.13 of the 2009 MUTCD 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:

12A *(DC Revision) The message panel should have adjustable rates, so that the entire message can be read at least twice at the posted speed.*

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.

Standard:

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

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

C. The recommended driver action.

2. *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 **(DC Revision) When abbreviations are used, they shall be easily understood (see Work Zone Managment Manual, Part 1 – Introduction).**

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 **(DC Revision) The mounting of portable changeable message signs shall be such that the bottom of the message sign panel shall be a minimum of 7 feet above the roadway 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 *(DC Revision) 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. Multiple portable changeable message signs should be placed on the same side of the roadway, and should be separated from each other by a minimum distance of 1,000 feet.*

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.*

Standard:

30A **(DC Revision) Six (6) channelizing devices (such as drums or cones) shall be provided to close the shoulder or parking lane in advance of each portable changeable message sign located within the shoulder or parking lane during the daytime. When a portable changeable message sign will be on site at night, drums shall be utilized.**

Guidance:

30B *(DC Revision) If a portable changeable message sign is placed on the median of a divided roadway and is less than 30 feet from either direction of travel, the portable changeable message sign should be delineated with 6 drums in that direction of travel.*

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

32 *(DC Revision) 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. If the portable changeable message sign is stored within a shoulder (or parking lane) or partially blocking a shoulder (or parking lane), the shoulder (or parking lane) should be closed according to Section 6G.07. If the portable changeable message sign is stored well beyond the shoulder (or parking lane) but within the clear zone, it should be delineated by a taper of channelizing devices with a length of 1/3 L using the formulas in Tables 6C-3, and 6C-4 (see Section 6C.08). Clear zone is defined by AASHTO's "Roadside Design Guide" (see Section 1A.11of the 2009 MUTCD).*

Standard:

32A **(DC Revision) When portable changeable message signs are not being used to display TTC**

messages and if relocation or shielding is not practical, portable changeable message signs shall be delineated with a minimum of 6 drums.

32B **(DC Revision) All portable changeable message signs no longer in use shall be removed from the work area within 48 hours, unless approved by DDOT.**

Guidance:

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.**

02 **(DC Revision) An arrow board in the arrow or chevron mode shall 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 **(DC Revision) If used, an arrow board shall be used in combination with appropriate signs, channelizing devices, or other TTC devices.**

Guidance:

04 *(DC Revision) An arrow board should be placed on the shoulder of the roadway or, if practical, further from the traveled lane. It should be delineated with retroreflective TTC devices, or when within the clear zone, shielded with a barrier or impact attenuator. 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.*

04A *(DC Revision) If the arrow board is stored within a shoulder (or parking lane) or partially blocking a shoulder (or parking lane), the shoulder (or parking lane) should be closed according to Section 6G.07. If the arrow board is stored well beyond the shoulder (or parking lane) but within the clear zone, it should be delineated by a taper of channelizing devices with a length of 1/3 L using the formulas in Tables 6C-3, and 6C-4 (see Section 6C.08). Clear zone is defined by AASHTO's "Roadside Design Guide" (see Section 1A.11of the 2009 MUTCD).*

Standard:

04B **(DC Revision) Arrow panel trailers shall 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.**

05 **(DC Revision) Arrow boards or full matrix display boards shall meet the minimum size, legibility distance, number of elements, and other specifications shown in Figure 6F-6.**

Support:

06 (DC Revision) Type A arrow boards are appropriate for use on low-speed (below 35 mph) urban streets. Type B arrow boards are appropriate for intermediate-speed (35 mph to 44 mph) facilities and for maintenance or mobile operations on high-speed (45 mph and greater) 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 DDOT Engineer.

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 **(DC Revision) All arrow boards or full matrix display boards shall be finished in non-reflective black. The arrow board or full matrix display boards shall be mounted on a vehicle, a trailer, or other suitable support.**

08A **(DC Revision) When arrow boards are not in use, they shall be removed from the roadway.**

Guidance:

09 *(DC Revision) 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 or full matrix display board should be 7 feet, except on vehicle-mounted arrow boards, which should be as high as*

practical.

1. *(DC Revision) A vehicle-mounted arrow board or full matrix display should be provided with remote controls.*

Standard:

10 **(DC Revision) Arrow board or full matrix display 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:

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

Standard:

12 **(DC Revision) The arrow board or full matrix display board shall have suitable elements capable of the various operating modes. The color presented by the elements shall be yellow.**

Guidance:

13 *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) (right arrow shown; left is similar)
1. At least one of the three following modes shall be provided:	
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

Table 6F-4. Arrow Panel Display Standards

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:

14 **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.**

15 **(DC Revision) An arrow board or full matrix display 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 Caution mode.

16 **An arrow board in the arrow or chevron mode shall be used only for stationary or moving lane closures on multi-lane roadways.**

17 **(DC Revision) 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 or full matrix display board shall be used only in the caution mode.**

Guidance:

18 *For a stationary lane closure, the arrow board should be located on the shoulder at the beginning of the merging taper.*

19 *(DC Revision) Where the shoulder is narrow, the arrow board should be located in the closed lane as close to the beginning of the merging taper as possible, but completely within the channelizing devices.*

Standard:

20 **(DC Revision) For consistency and to reduce confusion, only one arrow board or full matrix display board shall be used for each travel lanes closed. When arrow boards or full matrix display board are used to close multiple lanes, a separate arrow board shall be used for each closed lane.**

20A **(DC Revision) The arrow board or full matrix display board shall be located behind channelizing devices used to transition traffic from the closed lane.**

Guidance:

21 *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.*

22 *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:

23 **(DC Revision) A vehicle displaying an arrow board shall be equipped with high-intensity rotating, flashing, oscillating, or strobe lights; however, the lights shall not interfere with the visibility and recognition of the arrow board.**

24 **Arrow boards shall only be used to indicate a lane closure. Arrow boards shall not be used to indicate a lane shift.**

25A **(DC Revision) An arrow display shall not be used on a two-lane, two-way roadway for temporary one-lane operation.**

Option:

25 A portable changeable message sign may be used to simulate an arrow board display.

Standard:

26 **(DC Revision) The minimum legibility distance is the distance at which flashing arrow boards shall be legible at noon on a cloudless day and at night by persons with vision of or corrected to 20/20.**

Option:

27 (DC Revision) The minimum legibility distance for each arrow board type is shown in Table 6F-4.

Standard:

28 **(DC Revision) Arrow boards shall be maintained in a manner in which all of the appropriate numbers of lamps for selected mode are operating properly. Corrective action shall be taken when there is more than one lamp out in the stem (prior to returning to the next work shift). Immediate (within 30 minutes of notification) corrective action shall be taken when there are any lamps out in the arrow head(s).**

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 (DC Revision) A high-level warning device, most commonly used in high-density road user situations to warn road users of short-term operations, is designed to be seen over the top of typical passenger cars and/or parked vehicles. 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 **(DC Revision) Designs of various channelizing devices shall be as shown in Figure 6F–7. All channelizing devices shall be crashworthy and shall have retroreflective sheeting.**

01A **(DC Revision) The retroreflective material used on channelizing devices shall have a smooth, sealed outer surface that will display a similar color day or night.**

Guidance:

01B *(DC Revision) The retroreflective material used on channelizing devices should be prismatic.*

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.*

07A *(DC Revision) Channelizing devices should be constructed and ballasted to perform in a predictable manner when inadvertently struck by a vehicle. Channelizing devices should be crashworthy.*

07B *(DC Revision) Fragments or other debris from the device or the ballast should not pose a significant hazard to road users or workers in the immediate area.*

08 *(DC Revision) The spacing between cones, tubular markers, vertical panels, drums, and barricades should be as shown in Table 6F-5 and should not exceed a distance in feet equal to 1.0 times the speed limit in mph, and should not exceed 60 feet when used for both taper channelization, and tangent channelization.*

Table 6F-5. Spacing of Channelizing Devices

Channelizing Device Spacing		
Work Zone Location	Posted Speed Limit	Spacing
Low-Speed Road	20 mph or less	10’
In Transitions and Curves	35 mph or less	20’
Parallel to the Travelway	35 mph or less	40’
Spot Construction Access*	35 mph or less	80’
In Transitions and Curves	Greater than 35 mph	40’
Parallel to the Travelway	Greater than 35 mph	80’
Spot Construction Access*	Greater than 35 mph	120’

∗For easier access by construction vehicles into the work area, spacing may be increased to this distance, but shall not exceed one access per ¼-mile.

08A *(DC Revision) The spacing of the first four channelizing devices in a series used for taper channelization should not exceed 25 feet.*

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.*

09A *(DC Revision) Channelizing devices are elements in a total system of traffic control devices for use in temporary traffic control zones. These elements should be preceded by a subsystem of warning devices that are adequate in size, number, and placement for the type of highway on which the work is to take place. Standard designs of channelizing devices are shown in Figure 6F-7.*

Option:

10 (DC Revision) Warning lights (see Section 6F.83B) may be added to channelizing devices in areas with frequent fog, snow, or severe roadway curvature, or where visual distractions are present.

Standard:

11 **(DC Revision) 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. Barrier retroreflective vertical panels shall not be installed on Group 1 or 2 channelizing devices. Warning lights or other devices placed on channelizing devices shall meet crashworthiness requirements and shall have approval for use on that type of channelizing devices.**

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 **(DC Revision) The retroreflective material used on channelizing devices shall have a smooth, sealed outer surface that will display a similar color day or night. In addition to conforming to the requirements stated herein, channelizing devices, including retroreflective material, shall conform to the requirements of DDOT’s Standard Specifications for Highways and Structures.**

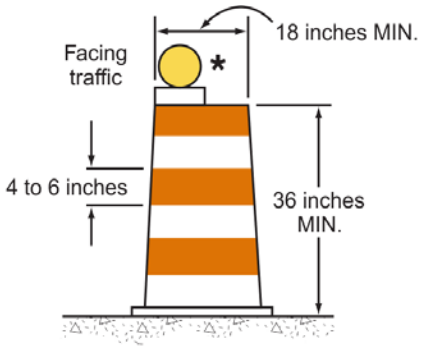
Option:

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.

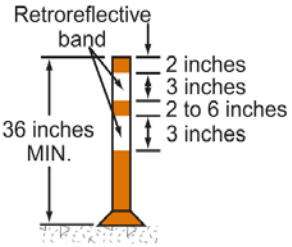
Standard:

16 **The letters and numbers of the name and telephone number shall be non-retroreflective and not over 2 inches in height.**

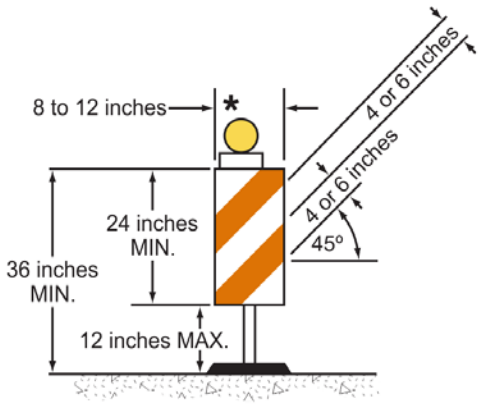
Figure 6F-7. Channelizing Devices



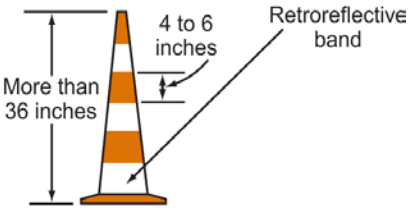
DRUM



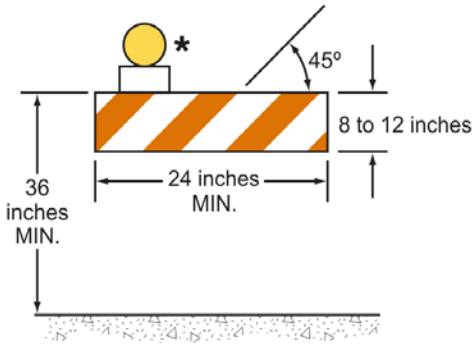
TUBULAR MARKERS



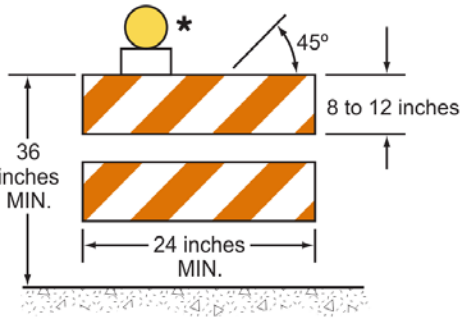
VERTICAL PANEL



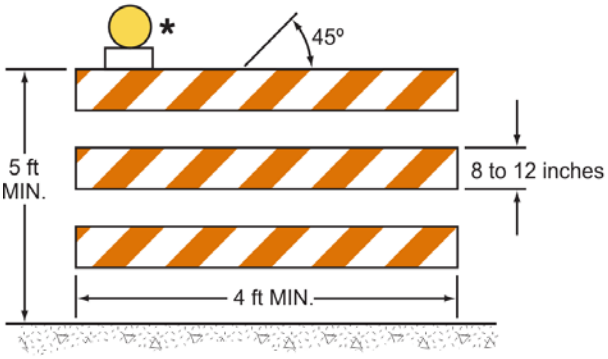
CONES



TYPE 1 BARRICADE **



TYPE 2 BARRICADE **



TYPE 3 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 **(DC Revision) Devices that are damaged or have lost a significant amount of their retroreflectivity and effectiveness shall be replaced. Replacement and correction of ineffective channelizing device shall be accomplished in accordance with the American Traffic Safety Service Association (ATSSA)'s Quality Standards for Work Zone Traffic Control Devices.**

Section 6F.64 Cones

Standard:

01 **(DC Revision) 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. The height of cones for use on all roadways shall be 36 inches.**

02 **(DC Revision) Cones are not permitted for nighttime use in the District of Columbia. Cones shall be retroreflectorized. Retroreflectorization of cones shall be provided by a minimum 13-inch white band placed a maximum of 3 inches from the top, or by a white band 6 inches wide located 3 to 4 inches from the top of the cone and an additional 4 inch wide white band 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:

03A (DC Revision) Due to the unique and temporary nature of traffic management for special events, including complex traffic shifts to accommodate ingress and egress, retroreflective cones may be used at night during planned special events.

03B (DC Revision) Retroreflective cones may be used in lieu of drums during a single nighttime emergency operation.

03C (DC Revision) Retroreflective cones may be used to supplement mobile striping operations.

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.*

Standard:

09 **(DC Revision) When workers are not present on the jobsite to maintain the cones, drums and vertical panels shall be used for channelization.**

Section 6F.65 Tubular Markers

Support:

00A (DC Revision) The term "tubular marker" is used for a tubular marker that is affixed to the pavement and is cylindrical from top to bottom.

00B (DC Revision) Tubular markers are used to guide and channelize traffic for temporary traffic control.

Tubular markers generally have the same circular cross-section throughout their length. Tubular markers may be affixed to the ground or may be portable.

Standard:

01 **(DC Revision) Tubular markers (see Figure 6F-7) shall be predominantly orange and shall be not less than 36 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 **(DC Revision) Tubular markers shall be a minimum of 36 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 **(DC Revision) For nighttime use, tubular markers shall be retroreflectorized. Retroreflectorization of 42 inches or larger tubular marker 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.**

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.**

07A **(DC Revision) When a non-cylindrical tubular marker is used, it shall be attached to the pavement to ensure that the width facing road users meets the minimum requirements.**

08 **(DC Revision) When workers are not present on the jobsite to maintain the tubular markers, the tubular markers shall be affixed to the pavement.**

Section 6F.66 Vertical Panels

Standard:

01 **(DC Revision) Vertical panels (see Figure 6F-7) shall have retroreflective striped material that is 8 to 12 inches in width and at least 36 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. Vertical panels used on expressways, freeways, and other high-speed roadways shall have a minimum of 270 square inches of retroreflective area facing motor vehicle traffic.**

01A **(DC Revision) Vertical panels shall be mounted with the top a minimum of 36 inches above the roadway, and a minimum of 42 inches above the pedestrian travel way. Vertical panels shall be mounted with the bottom no greater than 12 inch above the ground.**

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 **(DC Revision) 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 inches wide. The horizontal circumferential marking on drums shall be made of fluorescent**

orange and white prismatic retroreflective sheeting. 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 **(DC Revision) Ballast shall not be placed on the top of a drum. Drums shall be adequately ballasted to prevent movement by passing vehicles. Weighted collars shall lay flat on the ground or roadway around the bottom of drums, and shall be the approved type and size for that particular device.**

Guidance:

06 *(DC Revision) Drums that use weighted collars for ballast should use a minimum of 2 drum collars when placed within 12 feet of active travel lanes on Limited Access highways to ensure stability.*

Standard:

07 **(DC Revision) Drums shall be used in all unmanned work zone locations, in all merging and shifting tapers on Limited Access highways during nighttime operations, in tapers providing delineation of PCMS's. On long-term stationary TTC zones, drums shall be used in tapers providing delineation of the Arrow Board.**

08 **(DC Revision) Drums shall be used for tapers on freeway system or where indicated bythe DDOT Engineer.**

09 **(DC Revision) All traffic safety drums used for the maintenance of traffic shall be of a low density material.**

Section 6F.68 Type 1, 2, or 3 Barricades

Standard:

00A **(DC Revision) Type 2 Barricades shall only be used for pedestrian channelization along temporary pedestrian paths. Type 2 Barricades shall not be used to close a roadway, sidewalk or crosswalk.**

00B **(DC Revision) When used for pedestrian channelization, Type 2 Barricades shall be continuous and the rails shall be mounted in accordance with the ADA Act in order to provide for a cane rail (bottom rail) and hand rail (top rail).**

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 **(DC Revision) 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.**

Option:

04 (DC Revision) Deleted.

Standard:

05 **(DC Revision) 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 *(DC Revision) 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 of the 2009 MUTCD).*

Option:

12 For Type 1 Barricades, the support may include other unstriped horizontal rails necessary to provide stability.

Standard:

12A **(DC Revision) Barricades shall be crashworthy, as they are located adjacent to motor vehicle traffic flow and are subject to impact by errant vehicles from both the front and side directions.**

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.

Standard:

14A **(DC Revision) If used, sand ballasts shall consist of an appropriate mixture of material to preclude freezing.**

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.

Standard:

17A **(DC Revision) Ballast shall not be placed on top of any striped rail. Type 3 Barricades shall not be ballasted by objects such as rocks or chunks of concrete. Ballast shall not extend into the accessible passage width of 60 inches.**

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 (DC Revision) Type 3 Barricades used at a road closure may be placed completely across a roadway or from curb to curb. Type 3 Barricades may be used alone in groups to close or partially close a road.

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.**

Guidance:

22A *(DC Revision) 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.*

Option:

23 (DC Revision) Crashworthy signs may be mounted on or above a Type 3 Barricade.

Section 6F.69 Directional Indicator Barricades – Deleted

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 **(DC Revision) Temporary traffic barriers serving as TTC devices shall comply with requirements for such devices as set forth throughout this Manual.**

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 *(DC Revision) Temporary traffic barriers should not be used for a merging taper except in low-speed urban areas. Temporary traffic barriers should not be used for a constricted/restricted TTC zone.*

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

Standard:

01 **(DC Revision) Channelizing devices other than those described in this Manual shall require approval from the DDOT Engineer, or review and approval of an engineering study prior to their use.**

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 2.5 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.*

05 *(DC Revision) If prefabricated edging is used to separate pedestrians and vehicular traffic, such edging should be certified as crashworthy (see section 6F.01). If a section of lumber is used to form a railing system, any part of the railing that is more than 3 feet above the pavement should be treated lumber and cause no harm to bare hand touching it.*

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.**

01A **(DC Revision) Temporary raised islands shall not be used on Limited Access highways.**

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.*

05A *(DC Revision) Orange flexible post delineators 36 inches in height and 2.25 to 4 inches in width should be affixed on top of the raised island for delineation.*

Standard:

05B **(DC Revision) Flexible post delineators (see Figure 6F-9) shall be spaced every 80 feet, with a temporary pavement marker spaced in between each delineator on top of the temporary raised median. Retroreflective sheeting shall be placed three inches from the top of each flexible post delineator.**

05C **(DC Revision) Flexible post delineators (see Figure 6F-9) Tubular Markers, shall be predominantly orange and shall not be less than 36 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.**

05D **(DC Revision) Flexible post barriers (see Figure 6F-9) shall comply with the MASH report (i.e., latest version) crash testing standards.**

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.**

Guidance:

04 *(DC Revision) The Opposing Traffic Lane Divider (W6-4) sign should only be used to supplement a channelizing device that is being used to separate opposing traffic in a TTC zone.*

Section 6F.77 Pavement Markings

Guidance:

01 *(DC Revision) Road users should be provided pavement markings within a temporary traffic control zone comparable to the pavement markings normally maintained along such roadways, particularly at either end of the TTC zone. The intended vehicle path should be clearly discernable by road users during daytime, nighttime, and twilight periods under both wet and dry pavement conditions.*

Standard:

01A **(DC Revision) The provisions of this Section shall not be considered applicable for short-term, mobile, or incident management TTC zones.**

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 **(DC Revision) Existing pavement markings shall be maintained in all long-term stationary (see Section 6G.02) TTC zones in accordance with Chapters 3A and 3B of the 2009 MUTCD, 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 **(DC Revision) For long-term stationary operations, pavement markings, including raised pavement markers, 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.**

04A **(DC Revision) Pavement scarring of the roadway in excess of 1/8 inch depth shall be repaired to prevent deterioration of the pavement surface and to provide a smooth surface for motorcyclists.**

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.

01A (DC Revision) Temporary pavement markings are those that are allowed to remain in place until the

earliest date when it is practical and possible to install pavement markings that meet the 2009 MUTCD Part 3 standards for pavement markings.

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.*

02A *(DC Revision) A reflectometer should be used to check the retroreflectivity of temporary pavement markings to determine whether minimum retroreflective standards are met. Temporary pavement markings should be replaced if they do not meet the minimum retroreflective standard.*

03 *(DC Revision)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 District'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 **(DC Revision) 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 of the 2009 MUTCD. 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 (DC Revision) Half-cycle lengths with a minimum of 2-foot stripes may be used on roadways with severe curvature (see Section 3A.06 of the 2009 MUTCD) for broken line center lines in passing zones and for lane lines.

08 (DC Revision) For temporary situations of three calendar days or less, for a 2- or 3-lane road, no-passing zones may be identified by using "NO PASSING ZONE" (W14-3) signs rather than pavement markings. Also, "NO PASSING ZONE" signs may be used instead of pavement markings on low-volume roads (as defined in Section 5A.01 of the 2009 MUTCD) for longer periods in accordance with the District's policy.

Guidance:

09 *(DC Revision) The NO PASSING ZONE signs should be placed in accordance with Sections 2B.28, 2B.29, and 2C.45 of the 2009 MUTCD.*

10 *If used, the NO CENTER LINE sign should be placed in accordance with Section 6F.47.*

Section 6F.79 Temporary Raised Pavement Markers.

Standard:

00 **(DC Revision) Temporary raised pavement markers shall be installed with construction pavement markings, except non-retroreflective removable markings, in transition (lane drop) or lane-shift areas of work zones which will encroach upon the traveled way for a period of more than 3 days and in other areas as required by the DDOT Engineer. Temporary raised pavement markers shall be installed on 20-foot centers in lane shift and transition areas. When temporary raised pavement markers are used in other areas, they shall be installed on 40-foot centers unless otherwise required by the DDOT Engineer.**

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 **(DC Revision) 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 of the 2009 MUTCD). The value of N for a broken or dotted line shall equal the length of one line segment plus one gap.**

04 **(DC Revision) 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 of the 2009 MUTCD).

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 (DC Revision) 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 of the 2009 MUTCD.

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 *(DC Revision) Spacing along roadway curves should be as set forth in Section 3F.04 of the 2009 MUTCD 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:

02A (DC Revision) Four types of lighting devices are commonly used in TTC zones. They are floodlights, flashing warning beacons, warning lights, and steady-burn electric lamps**.**

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.**

06 **(DC Revision) Flashing lights shall be either a separate large rotating amber beacon or strobe light(s). Flashing lights shall be mounted on the vehicle in such a manner as to be clearly visible for 360 degrees around the vehicle. The flashing lights shall be visible from a distance of not less than 3,000 feet under normal atmospheric conditions at night.**

Option:

07 (DC Revision) Vehicles that are also expected to perform incident management may supplement the

amber flashing lights at the rear of the vehicle with red flashing lights at the rear of the vehicle.

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.*

02A *(DC Revision) Floodlights should be placed off the shoulder (or parking lane) of the roadway and behind a traffic barrier, if practical. Where a traffic barrier is not available to shield the floodlight, it should be placed off the shoulder (or parking lane) and outside of the clear zone.*

Standard:

02B **(DC Revision) If a floodlight is placed on the shoulder (or in the parking lane) of the roadway or within the clear zone, it shall be delineated with retroreflective TTC devices.**

02C **(DC Revision) Six (6) drums shall be provided to close the shoulder (or parking lane) in advance of each floodlight located within the shoulder.**

Guidance:

02D *(DC Revision) If a floodlight is placed on the median of a divided roadway and is less than 30 feet from either direction of travel, the floodlight should be delineated with 6 drums in that direction of travel.*

02E *(DC Revision) Floodlights should be located, to the extent possible, outside of the clear zone or shielded behind a traffic barrier.*

Standard:

02F **(DC Revision) When floodlights are not being used and if relocation or shielding is not practical, floodlights shall be delineated with a minimum of 6 drums**

02G **(DC Revision) All floodlights no longer in use shall be removed from the work area within 48 hours, unless approved by the DDOT Engineer.**

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.**

Standard:

05 **(DC Revision) The adequacy of the floodlight placement and elimination of potential glare shall 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 during each shift**.

Guidance:

05A *(DC Revision) If glare from standard types of floodlight equipment cannot be eliminated, consideration should be made for the use of non-glare lighting devices (such as non-glare air-filled lighting devices).*

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.83A Flashing Warning Beacons

Support:

01 (DC Revision) Flashing warning beacons are often used to supplement a TTC device.

Standard:

02 **(DC Revision) Flashing warning beacons shall comply with the provisions of Chapter 4L of the 2009 MUTCD. A flashing warning beacon shall be a flashing yellow light with a minimum nominal diameter of 8 inches.**

Guidance:

03 *(DC Revision) Flashing warning beacons should be operated 24 hours per day.*

Support:

04 (DC Revision) The temporary terminus of a freeway is an example of a location where flashing warning

beacons alert motorists to the changing roadway conditions and the need to reduce speed in transitioning from the freeway to another roadway type.

Section 6F.83B 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 **(DC Revision) Warning lights shall be in accordance with the current ITE "Purchase Specification for Flashing and Steady-Burn Warning Lights" (see Section 1A.11 of the 2009 MUTCD).**

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 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.83C Steady-Burn Electric Lamps

Support:

01 (DC Revision) Steady-Burn electric lamps are a series of low-wattage, yellow, electric lamps, generally hard-wired to a 110-volt external power source.

Option:

02 (DC Revision) Steady-Burn electric lamps may be used in place of Type C Steady-Burn warning lights.

Section 6F.83D Vehicle Warning Lights

Guidance:

01 *(DC Revision) Amber warning lights on vehicles should be mounted so as to be viewed 360 degrees on vehicles without arrow boards, and 180 degrees on vehicles with arrow boards.*

Standard:

02 **(DC Revision) Vehicle warning lights shall be a high intensity amber rotating, flashing, oscillating or strobe light or combinations of and meet the following conditions:**

A. Rotating amber lights shall consist of a minimum of 2 halogen sealed beams enclosed within a dome, which displays an amber color when illuminated. Sealed beams shall be at least 60,000 Candlepower and shall have a flash rate of 80 to 100 flashes per minute. Rotating amber lights shall be visible under both day and night conditions for a minimum distance of 1/2 mile on Limited Access highways, or a minimum of 1500 feet on all other roadways. Rotating amber lights shall be mounted as to be viewed 360 degrees; double lights may be used to achieve 360 degree viewing. 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.

B. Oscillating amber lights shall consist of a minimum 35 watt halogen bulb with an oscillating parabolic reflector or LED Module which produces an up and down and side to side motion. Oscillating lights shall display amber color when illuminated or be contained within an amber colored sealed lens. Oscillating amber lights shall be visible under both day and night conditions for a minimum distance of 1/2 mile on Limited Access highways, or a minimum of 1500 feet on all other roadways. Oscillating amber lights shall be mounted as to be viewed 360 degrees; or may be used in combinations with amber rotating and/or strobe lights.

C. High intensity amber strobe lights or amber flashing lights shall consist of a double flash unit and display amber color when illuminated or be contained within an amber colored sealed lens. Flash rate shall be 80±10 flashes per minute. Strobe or flashing lights shall be visible under both day and night conditions for a minimum distance of 1/2 mile on Limited Access highways, or a minimum of 1500 feet on all other roadways. Strobe lights shall be mounted so as to be viewed 360 degrees; double lights may be used to achieve 360 degree viewing.

03 **(DC Revision) Warning lights shall be used on all vehicles performing moving and mobile operations.**

04 **(DC Revision) The use of high-intensity white rotating, flashing, oscillating, or strobe lights is reserved for emergency vehicles in the District of Columbia and shall not be used on construction/maintenance vehicles.**

Option:

05 (DC Revision) If the work operation vehicle in a moving/mobile operation is a motorized piece of equipment, such as a motor grader, grad-all, etc., warning lights may be used.

Guidance:

06 *(DC Revision) The light-weight and portability of warning lights are advantages that make these devices useful as supplements to the retroreflectorization of signs and channelizing devices. The flashing lights are effective in attracting road users' attention.*

07 *(DC Revision) Unless perceived as a hazard, parked work operation vehicles or equipment in a stationary lane closure should not have their vehicle warning lights in operation, which could be a distraction to motorist.*

Section 6F.84 Temporary Traffic Control Signals

Standard:

01 **(DC Revision) Temporary traffic control signals (see Section 4D.32 of the 2009 MUTCD) used to control road user movements through TTC zones and in other TTC situations shall comply with the applicable provisions of Part 4 of the 2009 MUTCD.**

01A **(DC Revision) All temporary traffic control signals along District-maintained roadways shall have a signal plan approved by DDOT Engineer.**

Support:

02 **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:

03 **(DC Revision) 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 of the 2009 MUTCD. Safeguards shall be incorporated to avoid the possibility of conflicting signal indications at each end of the TTC zone. All equipment shall be in compliance with the current national standard and in excellent condition.**

Guidance:

04 *(DC Revision) 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 of the 2009 MUTCD) are needed for crossing along an alternate route.*

05 *When temporary traffic control signals are used, conflict monitors typical of traditional traffic control signal operations should be used.*

Standard:

05A **(DC Revision) The DDOT Engineer shall determine which traffic control signal will be used – portable or temporarily mounted on fixed supports.**

05B **(DC Revision) The supports for TTC signals shall not encroach into the minimum required width of a "pedestrian access route" of 60 inches or an "alternate circulation path" of 48 inches.**

Option:

06 Temporary traffic control signals may be portable or temporarily mounted on fixed supports.

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 **(DC Revision) 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 of the 2009 MUTCD, or unless a uniformed officer or flagger is provided at the crossing to prevent vehicles from stopping within 7the 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 (DC Revision) Temporary traffic barriers, including shifting portable or movable barrier installations to accommodate varying directional motor vehicle traffic demands, may be used to separate two-way motor vehicle traffic.

Guidance:

04 *(DC Revision) 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. When serving the additional function of channelizing motor vehicle traffic, temporary traffic barriers should be a light color for increased visibility.*

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.**

05A **(DC Revision) When serving the additional function of channelizing traffic, portable barriers shall be of a light color for increased visibility. More specific information on the use and design of portable barriers and impact attenuators can be obtained from Chapters 8 and 9, respectively, of the AASHTO Roadside Design Guide. For nighttime visibility, barriers shall be supplemented with delineators, barrier vertical panels, and a flashing light.**

05B **(DC Revision)Barrier vertical panels 8 inches in width and 12 inches in height shall be installed on top of the barrier. Panels shall be installed on 48-foot centers in the transition or taper sections and on 96-foot centers in the tangent sections. A Type A flashing light shall be installed on the barrier at the**

breakpoint where the transition or taper ends and the barrier becomes parallel to the roadway. Barrier vertical panels shall have a fluorescent orange retroreflective surface in the direction of oncoming traffic.

05C **(DC Revision) The effect of striking the ends of barriers shall be mitigated by use of impact attenuators or by flaring the ends of barriers away from the traveled way. Following in the order of preference are the methods to be used in mitigating the effect of striking the ends of barriers:**

A. Where a guardrail exists, the guardrail shall be attached to the barrier with the appropriate fixed object attachment.

B. Where a cut slope exists, the barrier shall be buried into the cut slope. Drainage shall be provided as needed.

C. The end of barrier (in B) shall be extend until it is beyond the established clear zone.

D. When the barrier end is inside the desired Clear Zone, attenuator service Type 1 or Type 2 (Sand Barrels) shall be used. Refer to Special Design Drawings for type and quantity needed for each location.

06 **(DC Revision) 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 of the 2009 MUTCD) by flaring until the end is outside the acceptable clear zone or by providing crashworthy end treatments.**

06A **(DC Revision) Beginning on January 1, 2011, temporary Portland Cement Concrete traffic barriers shall be crashworthy in accordance with the latest edition of the MASH, published by AASHTO.**

Option:

06B (DC Revision) Prior to January 1, 2016, a temporary Portland Cement Concrete traffic barrier that is not crashworthy in accordance with the latest edition of the MASH report may be used on District of Columbia-maintained roadways if it meets or exceeds all of the following criteria:

A. The barrier was manufactured prior to October 1, 2002.

B. The barrier is constructed of Class A concrete (as defined in the DDOT Standard Specifications) and is adequately reinforced.

C. Has a joint system that provides a positive connection between adjacent segments that can transfer tension and moment in a vertical plane across the joint.

Standard:

06C **(DC Revision) If temporary Portland Cement Concrete traffic barrier that is not crashworthy as described in Paragraph 6A is used, the Contractor shall certify, in writing, to the DDOT Engineer prior to installation, that the barrier meets the above 3 conditions in Paragraph 6C and the joint system provided has been tested and found acceptable under NCHRP Report 230 test criteria.**

06D **(DC Revision) Temporary Portland Cement Concrete traffic barrier shall be offset a minimum of 1 foot from the edge of traveled way.**

Option:

07 Warning lights or steady-burn lamps may be mounted on temporary traffic barrier installations.

Support:

08 (DC Revision) Movable barriers are a linear system of connected barrier segments capable of being rapidly repositioned laterally using a transfer vehicle that travels along the barrier. The transfer is accomplished in a manner that does not interfere with vehicular traffic in adjacent lanes. 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. Applications of movable barriers include the following:

A. Closing an additional lane during work periods while maintaining the advantage of having the travel way separated from the work space by a barrier;

B. Closing an additional lane during off-peak periods to provide extra space for work activities without adversely impacting vehicular traffic flow; and

C. Creating a temporary reversible lane, thus providing unbalanced capacity favoring the major direction of vehicular traffic flow.

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 through 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 (DC Revision) 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 of the 2009 MUTCD).

Section 6F.86 Impact Attenuator

Support:

01 (DC Revision) Impact attenuators 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 impact attenuators that are used in TTC zones are stationary impact attenuators and truck-mounted attenuators. Impact attenuators 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 impact attenuators can be found in AASHTO's "Roadside Design Guide" (see Section 1A.11 of the 2009 MUTCD).

Standard:

02 **(DC Revision) Impact attenuators shall be crashworthy conforming to the requirements of National Cooperative Highway Research Program (NCHRP) Report 350, except as otherwise indicated herein. They shall also be designed for each application to stop or redirect errant vehicles under prescribed conditions. Impact attenuators shall be periodically inspected to verify that they have not been hit or damaged. Damaged impact attenuators shall be promptly repaired or replaced to maintain their crashworthiness.**

Support:

03 (DC Revision) Stationary impact attenuators 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 **(DC Revision) Stationary impact attenuators shall be designed for the specific application intended.**

05 **(DC Revision) Truck or trailer mounted attenuators shall be energy-absorbing devices attached to the rear of shadow vehicle. If used, the shadow vehicle with the attenuator shall be located in advance of the work area, workers, or equipment, according to the manufacturer-specified roll-ahead distance, 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.*

Standard:

07A **(DC Revision) Shadow trucks with truck mounted attenuators (TMA) shall be used:**

- **A. When closing a lane on a 4 or more lane roadway with a posted speed of 40 mph or greater.**
- **B. On ramps and loops of interstate and limited access highways.**
- **C. When a mobile operation occupies all or part of the travel lane on a multilane roadway with a posted speed of 40 mph or greater.**
- **D. Other locations where DDOT determines such protection is warranted.**

07B **(DC Revision) When the installation and removal of TTC devices is performed as a mobile operation meeting the conditions listed in Paragraph 7A, a TMA shall be used on the shadow vehicle.**

07C **(DC Revision) TMA units used on all Limited Access highways, as well as on all 4 or more lane primary roadways with posted speeds of 45 mph or greater, shall be MASH, Test Level 3 units. As of January 1, 2011, all TMA units shall conform to the requirements of the latest edition of the MASH report, Test Level 3 regardless of where the units will be used.**

07D **(DC Revision) The shadow truck with a TMA shall be positioned at a sufficient distance (50 to 100 feet) in advance of the workers or equipment being protected to allow for appropriate vehicle roll-ahead, and also to avert incidents where errant vehicles could travel around the shadow truck and strike the workers and/or equipment being protected.**

07E **(DC Revision) When all work crew, equipment, or hazards have been sufficiently removed from the lane closure, the shadow truck shall be removed.**

Support:

07F (DC Revision) Shadow trucks should be used when installing and removing lane closures from the roadway. In mobile operations, the shadow truck with a truck-mounted attenuator should be 1,000 feet in advance of the work vehicle.

Option:

07G (DC Revision) Shadow trucks with TMA may be eliminated when their use would destroy or damage uncured asphalt.

07H (DC Revision) For additional operations or hazards located further downstream from the taper, a shadow vehicle without a TMA may be used for protection, and placed at a sufficient distance (50 to 100 feet) in advance of the hazard.

Support:

07I (DC Revision) Asphalt pavement resurfacing operations are typically those instances where shadow trucks with TMA would destroy or damage uncured asphalt. Other operations being accomplished under the same project would still require the use of TMA if their use would not destroy or damage the uncured asphalt.

07J (DC Revision) Examples of those operations include shoulder work where the adjacent lane is required to be closed, pavement marking applications (except pavement marking tape being inlaid into the new asphalt surface), and other similar types of operations.

Standard:

07K **(DC Revision) During operation as a shadow vehicle with a TMA, the truck shall not be used as a work operations vehicle. All material and/or equipment on the shadow vehicle TMA shall be properly secured to prevent spillage if struck by an errant vehicle.**

Option:

07L (DC Revision) Additional vehicles in an operation may have a TMA device on it as long as it is not in use as a shadow vehicle providing protection as described in Paragraph 7F and as shown in the typical TTC layouts in Section 6H.

Guidance:

07M *(DC Revision) The attenuator should be in the full down-and-locked position when in use. For stationary operations, the truck's parking brake should be set and the front wheels positioned straight ahead.*

Support:

08 (DC Revision) Chapter 9 of AASHTO's "Roadside Design Guide" (see Section 1A.11 of the 2009 MUTCD) contains additional information regarding the use of shadow vehicles.

Standard*:*

09 **(DC Revision) The TMA shall 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.

02 Through noise and vibration they attract the driver's attention to such features as unexpected changes in alignment and to conditions requiring a stop.

03 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:

04 **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.**

05 **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:

06 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.

07 A sign warning drivers of the onset of rumble strips may be placed in advance of any transverse rumble strip installation.

Guidance:

08 *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.*

09 *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.*

10 *Transverse rumble strips should not be placed on sharp horizontal or vertical curves.*

11 *Rumble strips should not be placed through pedestrian crossings or on bicycle routes.*

12 *(DC Revision) 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 of the 2009 MUTCD).*

13 *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 *(DC Revision) Design of screens should be in accordance with Chapter 9 of AASHTO's "Roadside Design Guide" (see Section 1A.11 of the 2009 MUTCD).*

Section 6F.89 Future and Experimental Devices

Support:

01 (DC Revision) The District of Columbia, as well as other States, FHWA, AASHTO, the Transportation Research Board, and other organizations conduct research and experimentation on new traffic control and safety devices. Users of this Manual are encouraged to stay abreast with these current efforts and to use such devices with care so as to avoid presenting road users with unusual or confusing situations that might be abnormal or unexpected.

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CHAPTER 6G. TYPE OF TEMPORARY TRAFFIC CONTROL ZONE ACTIVITIES

Section 6G.01 Typical Applications

Support:

01 Each TTC zone is different. Many variables, such as location of work, highway type, geometrics, vertical and horizontal alignment, intersections, interchanges, road user volumes, road vehicle mix (buses, trucks, and cars), and road user speeds affect the needs of each zone. The goal of TTC in work zones is safety with minimum disruption to road users. The key factor in promoting TTC zone safety is proper judgment.

02 Typical applications (TAs) of TTC zones are organized according to duration, location, type of work, and highway type. Table 6H-1 is an index of these typical applications. These typical applications include the use of various TTC methods, but do not include a layout for every conceivable work situation.

03 Well-designed TTC plans for planned special events will likely be developed from a combination of treatments from several of the typical applications.

Guidance:

04 *For any planned special event that will have an impact on the traffic on any street or highway, a TTC plan should be developed in conjunction with and be approved by the agency or agencies that have jurisdiction over the affected roadways.*

05 *(DC Revision) Typical applications should be altered, when necessary, to fit the conditions of a particular TTC zone. The alteration should be documented.*

Option:

06 Other devices may be added to supplement the devices shown in the typical applications, while others may be deleted. The sign spacing and taper lengths may be increased to provide additional time or space for driver response.

Support:

07 Decisions regarding the selection of the most appropriate typical application to use as a guide for a specific TTC zone require an understanding of each situation. Although there are many ways of categorizing TTC zone applications, the four factors mentioned earlier (work duration, work location, work type, and highway type) are used to characterize the typical applications illustrated in Chapter 6H

Section 6G.02 Work Duration

Support:

01 Work duration is a major factor in determining the number and types of devices used in TTC zones. The duration of a TTC zone is defined relative to the length of time a work operation occupies a spot location.

Standard:

02 **(DC Revision) The four categories of work duration and their time at a location shall be:**

1. **Mobile Operation – an operation that moves intermittently and will not occupy the immediate area for more than 5 minutes. The immediate area is defined as a 1,000± linear foot distance.**
2. **Short-Duration – an operation that occupies a location between 6 and 15 minutes.**
3. **Moderate-Duration – an operation that occupies a location between 16 and 60 minutes.**
4. **Stationary – an operation that occupies a location for more than 60 minutes, and further categorized as follows:**
   - **A. Short-Term – Daytime work lasting between 1 and 12 hours.**
   - **B. Intermediate-Term – Work that occupies a location from overnight to 3 days.**
   - **C. Long-Term – Work that occupies a location for a period of greater than 3 days.**

02A **(DC Revision) Note – For short-term and intermediate-term work durations, spring-loaded sign mounts and traffic drums shall be used. For long-term work durations, post-mounted signs and portable concrete barriers shall be used.**

Support:

03 (DC Revision) At long-term stationary TTC zones, there is ample time to install and realize benefits from the full range of TTC procedures and devices that are available for use. Generally, an increased number of channelizing devices, temporary roadways, and temporary traffic barriers are used.

Standard:

04 **(DC Revision) Since long-term operations extend into nighttime, retroreflective and/or illuminated devices shall be used in long-term stationary TTC zones. Group 2 channelizing devices shall be used in place of cones when the work crew is not present to align displaced or overturned devices.**

Guidance:

05 *Inappropriate markings in long-term stationary TTC zones should be removed and replaced with temporary markings.*

Support:

06 In intermediate-term stationary TTC zones, it might not be feasible or practical to use procedures or devices that would be desirable for long-term stationary TTC zones, such as altered pavement markings, temporary traffic barriers, and temporary roadways. The increased time to place and remove these devices in some cases could significantly lengthen the project, thus increasing exposure time.

Standard:

07 **(DC Revision) Since intermediate-term operations extend into nighttime, retroreflective and/or illuminated devices shall be used in intermediate-term stationary TTC zones. Group 2 channelizing devices shall be used in place of cones when the work crew is not present to align displaced or overturned devices.**

Support:

08 (DC Revision) Most maintenance and utility operations are short-term stationary work or of lesser duration.

09 (DC Revision) As compared to stationary operations, mobile operations, short-duration operations, and moderate duration operations are activities that might involve different treatments. Devices having greater mobility might be necessary such as signs mounted on trucks, and use of portable changeable message signs. Devices that are larger, more imposing, or more visible can be used effectively and economically. The mobility of the TTC zone is important. Maintaining safe conditions for workers and road users is a paramount goal in carrying out mobile operations.

09A (DC Revision) Short-term stationary, short-duration, and mobile operations can include, but are not limited to, both planned and unplanned maintenance activities. Unplanned maintenance activities generally consist of emergency work, such as an inoperative traffic signal, that must be addressed without formal TTC planning because the safety of the travelling public may be at risk if the work is not completed in a timely manner.

Guidance:

10 *(DC Revision) Safety in moderate-duration, short-duration or mobile operations should not be compromised by using fewer devices simply because the operation will frequently change its location.*

Option:

11 (DC Revision) Appropriately colored or marked vehicles with high-intensity rotating, flashing, oscillating, or strobe lights may be used in place of signs and channelizing devices for moderate-duration, short-duration or mobile operations. These vehicles may be augmented with signs or arrow boards.

Support:

12 During short-duration work, it often takes longer to set up and remove the TTC zone than to perform the work. Workers face hazards in setting up and taking down the TTC zone. Also, since the work time is short, delays affecting road users are significantly increased when additional devices are installed and removed.

Option:

13 Considering these factors, simplified control procedures may be warranted for short-duration work. A reduction in the number of devices may be offset by the use of other more dominant devices such as high-intensity rotating, flashing, oscillating, or strobe lights on work vehicles.

Support:

14 (DC Revision) Mobile or short-duration operations often involve frequent short stops, each less than 15 minutes, for activities such as litter cleanup, pothole patching, or utility operations, and are similar to short-duration operations.

Guidance:

15 *Warning signs and high-intensity rotating, flashing, oscillating, or strobe lights should be used on the vehicles that are participating in the mobile work.*

Option:

16 Flags and/or channelizing devices may additionally be used and moved periodically to keep them near the

mobile work area.

17 Flaggers may be used for mobile operations that often involve frequent short stops.

Guidance:

17A *(DC Revision) If the work operation requires a flagger to assist work vehicles entering or exiting the work area or to periodically control traffic, flagger signs (see Section 6F.31) should be used in addition to the typical advance warning signs for each application. If used, the flagger signs should be located at the downstream end of the advance warning area, which typically corresponds with the beginning of a transition taper.*

Support:

18 Mobile operations also include work activities where workers and equipment move along the road without stopping, usually at slow speeds. The advance warning area moves with the work area.

Guidance:

19 *When mobile operations are being performed, a shadow vehicle equipped with an arrow board or a sign should follow the work vehicle, especially when vehicular traffic speeds or volumes are high. Where feasible, warning signs should be placed along the roadway and moved periodically as work progresses.*

20 *Under high-volume conditions, consideration should be given to scheduling mobile operations work during off-peak hours.*

Standard:

21 **(DC Revision) If there are mobile operations on a high-speed travel lane of a multilane divided highway, arrow boards and/or Portable Changeable Message Signs shall be used. Additionally, if posted speeds are 45 mph or greater, a TMA shall be used on the shadow vehicle(s).**

22 **(DC Revision) Mobile operations that move at speeds greater than 20 mph, such as pavement marking operations, shall have appropriate devices on the equipment (that is, high-intensity rotating, flashing, oscillating, or strobe lights, signs, or special lighting), or shall use a separate vehicle with appropriate warning devices.**

Option:

23 For mobile operations that move at speeds of less than 3 mph, mobile signs or stationary signing that is periodically retrieved and repositioned in the advance warning area may be used.

24 (DC Revision) At higher speeds, vehicles may be used as components of TTC zones for mobile operations. Appropriately colored and marked vehicles with signs, rotating/strobe lights, truck-mounted attenuators, and arrow panels or portable changeable message signs may follow a train of moving work vehicles.

25 (DC Revision) For some continuously moving operations, such as street cleaning and snow removal, a single work vehicle with appropriate warning devices on the vehicle may be used to provide warning to approaching road users.

Guidance:

26 *(DC Revision)Where practical and when needed, the work and shadow vehicles should pull over periodically in a moving/mobile operation on a two-lane roadway to allow motor vehicle traffic to pass.*

27 *(DC Revision) Whenever adequate stopping sight distance exists to the rear, the shadow vehicles should maintain the minimum distance from the work vehicle and proceed at the same speed. The shadow vehicle should slow down in advance of vertical or horizontal curves that restrict sight distance.*

28 *(DC Revision) A truck-mounted attenuator should be used on the shadow vehicle in twolane moving/mobile operations.*

Section 6G.03 Location of Work

Support:

01 Chapter 6D and Sections 6F.74 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

02 The choice of TTC needed for a TTC zone depends upon where the work is located. As a general rule, the closer the work is to road users (including bicyclists and pedestrians), the greater the number of TTC devices that are needed. Procedures are described later in this Chapter for establishing TTC zones in the following locations:

A. Outside the shoulder,
B. On the shoulder with no encroachment,
C. On the shoulder with minor encroachment,
D. Within the median, and

E. Within the traveled way.

Standard:

03 **(DC Revision) When the work space is within the traveled way, except for short-duration and mobile operations, advance warning shall provide a general message (i.e., ROAD WORK AHEAD), to advise that work is taking place (i.e., RIGHT or LEFT LANE CLOSED AHEAD), and direct motorists with information about highway conditions (i.e., KEEP RIGHT or LEFT, and LANE ENDS MERGE RIGHT or LEFT). TTC devices shall indicate how vehicular traffic can move through the TTC zone.**

Section 6G.04 Modifications To Fulfill Special Needs

Support:

00 (DC Revision) Chapter 6D and Sections 6F.74 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

01 (DC Revision) The typical applications in Chapter 6H illustrate commonly encountered situations in which TTC devices are employed. Roadway characteristics to consider in selecting the appropriate TTC figure also include travel speed and traffic volumes. The definition of a high-speed roadway is one having a prevailing speed of 45 mph or greater; and a low speed roadway is one having prevailing speeds of less than 45 mph. High volume roadways have an average daily traffic (ADT) of 500 or more vehicles per day, while low volume roadways have less than 500 vehicles per day.

Option:

02 Other devices may be added to supplement the devices provided in the typical applications, and device spacing may be adjusted to provide additional reaction time. When conditions are less complex than those depicted in the typical applications, fewer devices may be needed.

Guidance:

03 *(DC Revision) When conditions are more complex, typical applications should be modified by giving particular attention to the provisions set forth in Chapter 6B and by incorporating appropriate devices and practices from the following list:*

1. *Additional devices:*
   - *A. Signs*
   - *B. Arrow boards*
   - *C. More channelizing devices at closer spacing (see Section 6F.74 for information regarding detectable edging for pedestrians)*
   - *D. Temporary raised pavement markers*
   - *E. High-level warning devices*
   - *F. Portable changeable message signs*
   - *G. Temporary traffic control signals (including pedestrian signals and accessible pedestrian signals)*
   - *H. Temporary traffic barriers*
   - *I. Impact attenuators*
   - *J. Screens*
   - *K. Rumble strips*
   - *L. More delineation*
2. *Upgrading of devices:*
   - *A. A full complement of standard pavement markings*
   - *B. Brighter and/or wider pavement markings*
   - *C. Larger and/or brighter signs*
   - *D. Channelizing devices with greater conspicuity*
   - *E. Temporary traffic barriers in place of channelizing devices*
3. *Improved geometrics at detours or crossovers*
4. *Increased distances:*
   - *A. Longer advance warning area*
   - *B. Longer tapers*
5. *Lighting:*
   - *A. Temporary roadway lighting*
   - *B. Steady-burn lights used with channelizing devices*
   - *C. Flashing lights for isolated hazards*

D. Illuminated signs

E. Floodlights

6. *Pedestrian routes and temporary facilities*

7. *Bicycle diversions and temporary facilities*

04 *(DC Revision) Where pedestrian or bicycle facilities are existing, typical traffic control figures should also be modified by giving particular attention to the provisions set forth in Chapter 6D, Section 6F.74, and DDOT's Safe Accommodation for Pedestrian & Bicycle Rule (D.C.M.R Title 24, Chapter 33, Section 3315) related to accessibility and detectability provisions in TTC zones.*

Support:

05 (DC Revision) The uniformity of devices and their application is always of paramount importance. As noted earlier, temporary traffic barriers are not TTC devices in themselves; however, when placed in a position identical to a line of channelizing devices, and marked or otherwise equipped with appropriate channelization features to provide guidance and warning both day and night, they serve as TTC devices.

Standard:

06 **(DC Revision) Temporary traffic barriers serving as TTC devices shall conform to requirements for such devices as set forth throughout this manual.**

Section 6G.05 Work Affecting Pedestrian and Bicycle Facilities

Support:

01 It is not uncommon, particularly in urban areas, that road work and the associated TTC will affect existing pedestrian or bicycle facilities. It is essential that the needs of all road users, including pedestrians with disabilities, are considered in TTC zones.

02 In addition to specific provisions identified in Sections 6G.06 through 6G.14, there are a number of provisions that might be applicable for all of the types of activities identified in this Chapter.

Guidance:

03 *(DC Revision) Where pedestrian or bicycle facilities are existing, the typical applications should be modified by giving particular attention to the provisions set forth in Chapter 6D, this Chapter, Section 6F.74, and DDOT's Safe Accommodation for Pedestrian & Bicycle Rule (D.C.M.R Title 24, Chapter 33, Section 3315) and in other Sections of Part 6 related to accessibility and detectability provisions in TTC zones.*

04 *Pedestrians should be separated from the worksite by appropriate devices that maintain the accessibility and detectability for pedestrians with disabilities.*

05 *Bicyclists and pedestrians should not be exposed to unprotected excavations, open utility access, overhanging equipment, or other such conditions.*

06 *(DC Revision) Except for short duration and mobile operations, when a highway shoulder is occupied, a SHOULDER WORK (W21-5) sign should be placed in advance of the activity area. When work is performed on a paved shoulder 8 feet or more in width or in a parking lane, channelizing devices should be placed on a taper having a length that conforms to the requirements of a shoulder taper. Signs should be placed such that they do not narrow any existing pedestrian passages to less than 48 inches.*

Standard:

06A **(DC Revision) Signs shall be placed such that they do not narrow any existing pedestrian passages to less than 48 inches.**

Guidance:

06B *(DC Revision) When existing accommodations for bicycle travel are disrupted or closed as part of a long term-term duration project (see Section 6G.02), user information and devices appropriate per situation encountered, should be used in order to replicate existing conditions for the needs and control of bicyclists through a TTC zone.*

06C *(DC Revision) Except for short-term durations and mobile operations (see Section 6G.02), when a highway shoulder, bike lane or parking lane is occupied and bicyclists would be sharing a travel lane with vehicular traffic, as a result of the TTC zone, a combination of Bicycle Crossing (W11-1) and SHARE THE ROAD (W16-1P) plaque should be placed in advance of the activity area. When work is performed on a paved shoulder 8 feet or more in width, or in a parking lane, channelizing devices should be placed on a taper having a length that conforms to the requirements of a shoulder taper.*

Standard:

06D **(DC Revision) Signs shall be placed such that they do not block the bicycle pathway and/or narrow any existing pedestrian passages to less than 48 inches.**

Guidance:

07 *Pedestrian detours should be avoided since pedestrians rarely observe them and the cost of providing accessibility and detectability might outweigh the cost of maintaining a continuous route. Whenever possible, work should be done in a manner that does not create a need to detour pedestrians from existing routes or crossings.*

Standard:

08 **Where pedestrian routes are closed, alternate pedestrian routes shall be provided.**

09 **(DC Revision) When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and accessible.**

Option:

10 (DC Revision) If establishing or maintaining an alternate pedestrian route is not feasible during the project, an alternate means of providing for pedestrians may be used. This may include adding free bus services through or around the project or assigning a person the responsibility to assist pedestrians with disabilities through the project limits. (See Section 6D.01 for details.)

Section 6G.06 Work Outside of the Shoulder

Support:

00 (DC Revision) Chapter 6D and Sections 6F.74 and 6G.05 contains additional information regarding the steps to be followed when pedestrian or bicycle facilities are affected by the worksite.

01 (DC Revision) When work is being performed off the roadway (beyond the shoulders, but within the right-of-way), little or no TTC might be needed. TTC generally is not needed where work is confined to an area 30 feet or more from the edge of the traveled way and out of the clear zone. However, TTC is appropriate where distracting situations exist, such as vehicles parked on the shoulder, vehicles accessing the worksite via the highway, and equipment traveling on or crossing the roadway to perform the work operations (for example, mowing). For work beyond the shoulder, see Figure 6H-1.

Guidance:

02 *Where the situations described in Paragraph 1 exist, a single warning sign, such as ROAD WORK AHEAD (W20-1), should be used. If the equipment travels on the roadway, the equipment should be equipped with appropriate flags, high-intensity rotating, flashing, oscillating, or strobe lights, and/or a SLOW MOVING VEHICLE (W21-4) sign.*

Option:

03 If work vehicles are on the shoulder, a SHOULDER WORK (W21-5) sign may be used. For mowing operations, the sign MOWING AHEAD (W21-8) may be used.

04 Where the activity is spread out over a distance of more than 2 miles, the SHOULDER WORK (W21-5) sign may be repeated every 1 mile.

05 A supplementary plaque with the message NEXT XX MILES (W7-3aP) may be used.

Guidance:

06 *A general warning sign like ROAD MACHINERY AHEAD (W21-3) should be used if workers and equipment must occasionally move onto the shoulder.*

Section 6G.07 Work on the Shoulder with No Encroachment

Support:

00 (DC Revision) Chapter 6D and Sections 6F.74 and 6G.05 contains additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

01 The provisions of this Section apply to short-term through long-term stationary operations.

Standard:

02 **(DC Revision) When paved shoulders having a width of 8 feet or more, or a parking lane are closed, at least one advance warning sign shall be used. In addition, channelizing devices shall be used to close the shoulder in advance to delineate the beginning of the work space and direct motor vehicle traffic to remain within the traveled way.**

Guidance:

02A *(DC Revision) When a highway shoulder is occupied, a "SHOULDER WORK AHEAD (W21-5)" sign, except for short-duration and mobile operations, should be placed in advance of the activity area. When work is performed on a paved shoulder 8 feet or more in width, or in a parking lane, channelizing devices should be placed on a taper having a length that conforms to the requirements of a shoulder taper.*

03 *(DC Revision) When paved shoulders having a width of 8 feet or more are closed on freeways and expressways, road users should be warned about potential disabled vehicles that cannot get off the traveled way. An initial general warning sign, (such as "ROAD WORK AHEAD" (W20-1)), should be used, followed by a "RIGHT or LEFT SHOULDER CLOSED" (W21-5a) sign. Where the end of the shoulder closure extends beyond the distance, which can be perceived by road users, a supplementary plaque bearing the message "NEXT XX FEET" (W16-4P) or "MILES" (W7-3aP) or "BLOCKS" based on the functional classification of the road or as deemed necessary by the DDOT Engineer should be placed below the SHOULDER CLOSED (W21-5a) sign. On multi-lane, divided highways, signs advising of shoulder work or the condition of the shoulder should be placed only on the side of the affected shoulder.*

04 *When an improved shoulder is closed on a high-speed roadway, it should be treated as a closure of a portion of the road system because road users expect to be able to use it in emergencies. Road users should be given ample advance warning that shoulders are closed for use as refuge areas throughout a specified length of the approaching TTC zone. The sign(s) should read SHOULDER CLOSED (W21-5a) with distances indicated. The work space on the shoulder should be closed off by a taper or channelizing devices with a length of 1/3 L using the formulas in Tables 6C-3 and 6C-4.*

05 *When the shoulder is not occupied but work has adversely affected its condition, the LOW SHOULDER (W8-9) or SOFT SHOULDER (W8-4) sign should be used, as appropriate.*

06 *Where the condition extends over a distance in excess of 1 mile, the sign should be repeated at 1-mile intervals.*

Option:

07 (DC Revision) In addition, a supplementary plaque bearing the message "NEXT XX MILES (W7-3aP)" or "NEXT XX FEET (W16-4P)" or "XX BLOCKS", based on the functional classification of the road or as deemed necessary by the DDOT Engineer, may be used. Temporary traffic barriers may be needed to inhibit encroachment of errant vehicles into the work space and to protect workers.

Standard:

07A **(DC Revision) A shadow vehicle shall be used whenever a person is required to operate equipment mounted on or in the work vehicle, such as buckets, augers, post drivers, etc. For operations on the shoulder with duration greater than 60 minutes where workers are present, a shadow vehicle shall be used. A truck-mounted attenuator (TMA) shall be used on the shadow vehicle on Limited Access highways and multi-lane roadways with posted speed limit equal to or greater than 45 mph.**

08 **When used for shoulder work, arrow boards shall operate only in the caution mode.**

Support:

09 A typical application for stationary work operations on shoulders is shown in Figure 6H-3. Short duration or mobile work on shoulders is shown in Figure 6H-4. Work on freeway shoulders is shown in Figure 6H-5.

Section 6G.08 Work on the Shoulder with Minor Encroachment

Support:

01 Chapter 6D and Sections 6F.74 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

Guidance:

02 *(DC Revision) When work takes up part of a lane, vehicular traffic volumes, vehicle mix (buses, trucks, cars, and bicycles), speed, and capacity should be analyzed to determine whether the affected lane should be closed. Unless the lane encroachment permits a remaining lane width of 10 feet for vehicular traffic or 11 feet for bus/transit traffic, the lane should be closed.*

03 *(DC Revision) Truck off-tracking should be considered when determining whether the minimum lane width of 10 feet is adequate when working on exit ramps.*

Option:

04 (DC Revision) A lane width of 10 feet may be used for short-term stationary work on low-volume (less than 500 vehicles per day), low-speed (under 45 mph) roadways when vehicular traffic does not include longer and wider heavy commercial vehicles and bus/transit vehicles.

04A (DC Revision) A lane width of 11 feet may be used for intermediate-term stationary operations, such as milling/paving operations where the restriction is limited to the areas where the work activities are occurring by moving the channelizing devices out as work progresses and then back once the work activity has past.

Support:

05 (DC Revision) Figure 6H-6 illustrates a method for handling vehicular traffic where the stationary or short duration work space encroaches slightly into the traveled way along a low-volume, low-speed roadway.

Section 6G.09 Work Within the Median

Support:

01 Chapter 6D and Sections 6F.74 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

Guidance:

02 *If work in the median of a divided highway is within 15 feet from the edge of the traveled way for either direction of travel, TTC should be used through the use of advance warning signs and channelizing devices.*

Section 6G.10 Work Within the Traveled Way of a Two-Lane Highway

Support:

01 Chapter 6D and Sections 6F.74 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

02 Detour signs are used to direct road users onto another roadway. At diversions, road users are directed onto a temporary roadway or alignment placed within or adjacent to the right-of-way. Typical applications for detouring or diverting road users on two-lane highways are shown in Figures 6H-7, 6H-8, and 6H-9. Figure 6H-7 illustrates the controls around an area where a section of roadway has been closed and a diversion has been constructed. Channelizing devices and pavement markings are used to indicate the transition to the temporary roadway.

Standard:

02A **(DC Revision) Detours and diversions shall be reviewed and approved by the DDOT Engineer prior to implementation.**

Guidance:

03 *(DC Revision) When a detour is long, Detour (M4-8, M4-9, M4-9DC1, and M4-9DC2) signs should be installed to remind and reassure road users periodically that they are still successfully following the detour.*

04 *When an entire roadway is closed, as illustrated in Figure 6H-8, a detour should be provided and road users should be warned in advance of the closure, which in this example is a closure 10 miles from the intersection. If local road users are allowed to use the roadway up to the closure, the ROAD CLOSED AHEAD, LOCAL TRAFFIC ONLY (R11-3a) sign should be used. The portion of the road open to local road users should have adequate signing, marking, and delineation.*

05 *Detours should be signed so that road users will be able to traverse the entire detour route and back to the original roadway as shown in Figure 6H-9.*

Support:

06 Techniques for controlling vehicular traffic under one-lane, two-way conditions are described in Section 6C.10.

Option:

07 (DC Revision) Flaggers may be used as shown in Typical Application for Lane Closures on a Minor Street (Figure 6H-10).

08 (DC Revision) STOP/YIELD sign control may be used on roads with low traffic volumes as shown in Figure 6H-11. Conditions should be based on an engineering study and approval of the DDOT Engineer.

09 A temporary traffic control signal may be used as shown in Figure 6H-12.

Section 6G.11 Work Within the Traveled Way of an Urban Street

Support:

01 Chapter 6D and Sections 6F.74 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

02 In urban TTC zones, decisions are needed on how to control vehicular traffic, such as how many lanes are required, whether any turns need to be prohibited at intersections, and how to maintain access to business, industrial, and residential areas.

03 Pedestrian traffic needs separate attention. Chapter 6D contains information regarding pedestrian movements near TTC zones.

03A (DC Revision) For urban conditions, it is generally better to attempt to place all advance warning signs within a one-block area rather than spreading out over several blocks; however, warning signs should be placed such that motorists must have time to recognize and react to them.

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

Standard:

03C **(DC Revision) Where the TTC zone affects the movements of pedestrians, adequate pedestrian access and walkways shall be provided. Where the TTC zone affects an accessible and detectable pedestrian facility, the accessibility and detectability shall be maintained along the alternate pedestrian route.**

04 **(DC Revision) If the TTC zone affects the movement of bicyclists, adequate access to the roadway or shared-use paths shall be provided (see Part 9 of the 2009 MUTCD).**

05 **Where transit stops are affected or relocated because of work activity, both pedestrian and vehicular access to the affected or relocated transit stops shall be provided.**

Guidance:

06 If a designated bicycle route is closed because of the work being done, a signed alternate route should be *provided. Bicyclists should not be directed onto the path used by pedestrians.*

07 Worksites within the intersection should be protected against inadvertent pedestrian incursion by providing detectable channelizing devices.

Support:

08 Utility work takes place both within and outside the roadway to construct and maintain services such as power, gas, light, water, or telecommunications. Operations often involve intersections, since that is where many of the network junctions occur. The work force is usually small, only a few vehicles are involved, and the number and types of TTC devices placed in the TTC zone is usually minimal.

Standard:

09 **(DC Revision) All TTC devices shall be retroreflective or illuminated if utility work is performed during nighttime hours (i.e., from 30 minutes prior to sunset through 30 minutes after sunrise).**

Guidance:

10 *As discussed under short-duration projects, however, the reduced number of devices in utility work zones should be offset by the use of high-visibility devices, such as high-intensity rotating, flashing, oscillating, or strobe lights on work vehicles or high-level warning devices.*

Support:

11 Figures 6H-6, 6H-10, 6H-15, 6H-18, 6H-21, 6H-22, 6H-23, 6H-26, and 6H-33 are examples of typical applications for utility operations. Other typical applications might apply as well.

Section 6G.12 Work Within the Traveled Way of a Multi-Lane, Non-Access Controlled Highway

Support:

01 Chapter 6D and Sections 6F.74 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

02 Work on multi-lane (two or more lanes of moving motor vehicle traffic in one direction) highways is divided into right-lane closures, left-lane closures, interior-lane closures, multiple-lane closures, and closures on five-lane roadways.

Standard:

03 **(DC Revision) When a lane is closed on a multi-lane road for other than a mobile operation, a transition area containing a merging taper shall be used and an arrow board display shall be used.**

Guidance:

04 *When justified by an engineering study, temporary traffic barriers (see Section 6F.70) should be used to prevent incursions of errant vehicles into hazardous areas or work space.*

Standard:

04A **(DC Revision) When temporary traffic barriers are placed immediately adjacent to the travel way, they shall be equipped with appropriate channelizing devices, delineation, and/or other TTC devices. For lane closures, the merging taper shall use channelizing devices and the temporary traffic barrier shall be placed beyond the transition area.**

Support:

04B (DC Revision) It must be recognized that although temporary traffic barriers are shown in several or the typical applications in this Manual, they should not be considered to be TTC devices in themselves.

05 Figure 6H-34 illustrates a lane closure in which temporary traffic barriers are used.

05A (DC Revision) There are four primary functions of temporary traffic barriers:

A. To keep vehicular traffic from entering work areas, such as excavations or material storage sites;
B. To separate workers, bicyclists, and pedestrians from vehicular traffic;
C. To separate opposing directions of vehicular traffic;
D. To separate vehicular traffic, bicyclists, and pedestrians from the work areas such as false work for bridges and other exposed objects.

Option:

06 When the right lane is closed, TTC similar to that shown in Figure 6H-33 may be used for undivided or divided four-lane roads.

Guidance:

07 *If morning and evening peak hour vehicular traffic volumes in the two directions are uneven and the greater volume is on the side where the work is being done in the right-hand lane, consideration should be given to closing the inside lane for opposing vehicular traffic and making the lane available to the side with heavier vehicular traffic, as shown in Figure 6H-31.*

07A *(DC Revision) Conflicting pavement markings should be removed for long-term projects. For short-term and intermediateterm projects, where this is not practical, the channelizing devices in the affected area where the pavement markings conflict should be placed at maximum spacing of half the normal spacing based on the posted speed limit. Temporary markings should be installed where needed.*

08 *If the larger vehicular traffic volume changes to the opposite direction at a different time of the day, the TTC should be changed to allow two lanes for opposing vehicular traffic by moving the devices from the opposing lane to the center line. When it is necessary to create a temporary center line that is not consistent with the pavement markings, channelizing devices should be used and closely spaced.*

Support:

08A (DC Revision) Peak Hours in the District of Columbia are defined as the hours of 6:30 A.M. to 9:30 A.M. and 3:30 P.M. to 6:30 P.M., Monday through Friday, except public holidays. “Off-peak hours” occur during those hours and days not identified as “peak hours.”

08B (DC Revision) Per the 2013 DDOT Standard Specification for Highways and Structures, on arterial streets, no public travel lane may be obstructed during the hours of 5:30 A.M. to 9:30 A.M., and 3:30 P.M. to 7:00 P.M., Monday through Friday, except public holidays. Saturday work must be approved in advance.

Option:

09 When closing a left lane on a multi-lane undivided road, as vehicular traffic flow permits, the two interior lanes may be closed, as shown in Figure 6H-30, to provide drivers and workers additional lateral clearance and to provide access to the work space.

Standard:

10 **When only the left lane is closed on undivided roads, channelizing devices shall be placed along the center line as well as along the adjacent lane.**

Guidance:

11 *(DC Revision) When an interior lane is closed, an adjacent lane should also be considered for closure (when available and practical) to provide additional space for vehicles and materials and to facilitate the movement of equipment within the work space.*

12 *When multiple lanes in one direction are closed, a capacity analysis should be made to determine the number of lanes needed to accommodate motor vehicle traffic needs. Vehicular traffic should be moved over one lane at a time. As shown in Figure 6H-37, the tapers should be separated by a distance of 2L, with L being determined by the formulas in Tables 6C-3 and 6C-4.*

Option:

13 If operating speeds are 40 mph or less and the space approaching the work area does not permit moving traffic over one lane at a time, a single continuous taper may be used.

Standard:

14 **When a directional roadway is closed, inapplicable WRONG WAY signs and markings, and other existing traffic control devices at intersections within the temporary two-lane, two-way operations section shall be covered, removed, or obliterated.**

Option:

15 (DC Revision) When half the road is closed on an undivided highway, both directions of vehicular traffic may be accommodated as shown in Figure 6H-32. When both interior lanes are closed, temporary traffic controls may be used as indicated in Figure 6H-37 for both directions of travel. When a roadway must be

closed on a divided highway, a median crossover may be used (see Section 6G.16).

Support:

16 TTC for lane closures on five-lane roads is similar to other multi-lane undivided roads. Figure 6H-32 can be adapted for use on five-lane roads. Figure 6H-35 can be used on a five-lane road for short duration and mobile operations.

Standard:

17 **(DC Revision) When work is being performed over a roadway open to traffic (on bridges, overhead signs, traffic signals, etc.) the travel lane(s), shoulder, or parking lane that the work operation is over shall be closed, unless it is physically impossible for materials, equipment or personnel could fall into the open lane(s) or shoulder.**

Support:

18 (DC Revision) There are hazards involved when working in open travel lanes, especially in a bucket truck. The chance of dropping something into traffic, the chance of a tractor-trailer or over-height load striking the bottom of the bucket and ejecting the workers, and the chance the operation is a distraction to passing motorists. Therefore, this practice is not allowed.

Option:

19 (DC Revision) A mobile closure may be an acceptable method of TTC depending on traffic volumes and location of the overhead work.

Standard:

20 **(DC Revision) If the center lane closure must encroach on the remaining lanes, a minimum 11 foot travel lane(s) shall be maintained for the remaining travel lane(s).**

21 **(DC Revision) A center lane shall not be closed when work is only being performed in an adjacent lane unless the lane closure encroaches into the center lane resulting in a travel lane width of less than 11 feet.**

Section 6G.13 Work within the Traveled Way at an Intersection

Support:

01 Chapter 6D and Sections 6F.74 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

02 The typical applications for intersections are classified according to the location of the work space with respect to the intersection area (as defined by the extension of the curb or edge lines). The three classifications are near side, far side, and in-the-intersection. Work spaces often extend into more than one portion of the intersection. For example, work in one quadrant often creates a near-side work space on one street and a far-side work space on the cross street. In such instances, an appropriate TTC plan is obtained by combining features shown in two or more of the intersection and pedestrian typical applications.

03 TTC zones in the vicinity of intersections might block movements and interfere with normal road user flows. Such conflicts frequently occur at more complex signalized intersections having such features as traffic signal heads over particular lanes, lanes allocated to specific movements, multiple signal phases, signal detectors for actuated control, and accessible pedestrian signals and detectors.

Guidance:

04 *(DC Revision) The effect of the work upon signal operation should be considered, and temporary corrective actions should be taken, if necessary, such as revising signal phasing and/or timing to provide adequate capacity, maintaining or adjusting signal detectors, and relocating signal heads to provide adequate visibility as described in Part 4 of the 2009 MUTCD.*

04A *(DC Revision) The design and construction of any traffic signal or modification to an existing traffic signal should include keeping the existing signal in operation while the construction or modification work is being performed.*

Standard:

05 **(DC Revision) When work will occur near an intersection where operational, capacity, or pedestrian accessibility problems are anticipated, the DDOTEngineer shall be contacted.**

Guidance:

05A *(DC Revision) When work is scheduled at or near non-signalized intersections, where operational and capacity problems are anticipated, the DDOT Engineer should be contacted.*

06 *For work at an intersection, advance warning signs, devices, and markings should be used on all cross*

streets, as appropriate. The typical applications depict urban intersections on arterial streets. Where the posted speed limit, the off-peak 85th-percentile speed prior to the work starting, or the anticipated speed exceeds 40 mph, additional warning signs should be used in the advance warning area.

07 *Pedestrian crossings near TTC sites should be separated from the worksite by appropriate barriers that maintain the accessibility and detectability for pedestrians with disabilities.*

Support:

08 Near-side work spaces, as depicted in Figure 6H-21, are simply handled as a midblock lane closure. A problem that might occur with near-side lane closure is a reduction in capacity, which during certain hours of operation could result in congestion and backups.

Option:

09 When near-side work spaces are used, an exclusive turn lane may be used for through vehicular traffic.

10 Where space is restricted in advance of near-side work spaces, as with short block spacing, two warning signs may be used in the advance warning area, and a third action-type warning or a regulatory sign (such as Keep Left) may be placed within the transition area.

Support:

11 Far-side work spaces, as depicted in Figures 6H-22 through 6H-25, involve additional treatment because road users typically enter the activity area by straight-through and left- or right-turning movements.

Guidance:

12 *(DC Revision) When a lane through an intersection must be closed on the far side, it should also be closed on the near-side approach to preclude merging movements within the intersection. In addition, if multiple turn lanes feed into the far side closure, one lane of the dual turn lane should be closed.*

Option:

13 (DC Revision) If, however, there are a significant number of vehicles turning from a near-side lane that is closed on the far side, the near-side lane may be converted to an exclusive turn lane.

Support:

14 (DC Revision) Figures 6H-26 and 6H-27 of the typical applications provide guidance on applicable procedures for work performed within the intersection(s).

Option:

15 If the work is within the intersection, any of the following strategies may be used:

A. A small work space so that road users can move around it, as shown in Figure 6H-26;
B. Flaggers or uniformed law enforcement officers to direct road users, as shown in Figure 6H-27;
C. Work in stages so the work space is kept to a minimum; and
D. Road closures or upstream diversions to reduce road user volumes.

Guidance:

16 *Depending on road user conditions, a flagger(s) and/or a uniformed law enforcement officer(s) should be used to control road users.*

Standard:

17 **(DC Revision) Certified flaggers shall not direct vehicles through the intersection during a red signal phase, or stop vehicles during a green signal phase at an intersection since they are not authorized to do so.**

Section 6G.14 Work Within the Traveled Way of a Freeway or Expressway

Support:

01 (DC Revision) Problems of TTC might occur under the special conditions encountered where vehicular traffic must be moved through or around TTC zones on high-speed, high-volume roadways. Although the general principles outlined in the previous Sections of this Manual are applicable to all types of highways, high-speed, access- controlled highways need special attention in order to safely and efficiently accommodate vehicular traffic while also protecting road users and workers. The road user volumes, road vehicle mix (buses, trucks, cars, and bicycles, if permitted), and speed of vehicles on these facilities require that careful TTC procedures be implemented, for example, to induce critical merging maneuvers well in advance of work spaces and in a manner that creates minimum turbulence and delay in the vehicular traffic stream. These situations often require more conspicuous devices than specified for normal rural highway or urban street use. However, the same important basic considerations of uniformity and standardization of general principles apply for all roadways.

02 Work under high-speed, high-volume vehicular traffic on a controlled access highway is complicated by the roadway design and operational features. The presence of a median that establishes separate roadways for directional vehicular traffic flow might prohibit the closing of one of the roadways or the diverting of vehicular traffic to the other roadway. Lack of access to and from adjacent roadways prohibits rerouting of vehicular traffic away from the work space in many cases. Other conditions exist where work must be limited to night hours, thereby necessitating increased use of warning lights, illumination of work spaces, and advance warning systems.

03 (DC Revision) TTC for a typical lane closure on a divided highway is shown in Figure 6H-33. Temporary traffic controls for short duration and mobile operations on multi-lane, divided highways are shown in Figure 6H-35. A typical application for shifting vehicular traffic lanes around a work space is shown in Figure 6H-36. TTC for multiple and interior lane closures on a freeway is shown in Figures 6H-37 and 6H-38.

Guidance:

04 *(DC Revision) Closing an interior lane only on a directional roadway with three or more lanes is strongly discouraged because of worker safety and driver expectancy concerns associated with permitting high-speed traffic on both sides of the work space. When an interior lane is closed, the adjacent lane should also be considered for closure as shown in Figure 6H-37. When the capacity of the other lanes is needed based on an engineering study, the method shown in Figure 6H-38 should be used.*

Standard:

05 **(DC Revision) When work is being performed over a roadway open to traffic (on bridges, overhead signs, traffic signals, etc.) the travel lane(s) or shoulder that the work operation is over shall be closed, unless it is physically impossbible for materials, equipment or personnel could fall into the open lane(s) or shoulder.**

Support:

06 (DC Revision) There are hazards involved when working in open travel lanes, especially in a bucket truck. The chance of dropping something into traffic, the chance of a tractor-trailer or over-height load striking the bottom of the bucket and ejecting the workers, and the chance the operation is a distraction to passing motorist. Therefore, this practice is not allowed.

Option:

07 (DC Revision) A mobile closure may be an acceptable method of TTC depending on traffic volumes and location of the overhead work.

Section 6G.15 Two-Lane, Two-Way Traffic on One Roadway of a Normally Divided Highway

Support:

01 Two-lane, two-way operation on one roadway of a normally divided highway is a typical procedure that requires special consideration in the planning, design, and work phases, because unique operational problems (for example, increasing the risk of head-on crashes) can arise with the two-lane, two-way operation.

Standard:

02 **When two-lane, two-way traffic control must be maintained on one roadway of a normally divided highway, opposing vehicular traffic shall be separated with either temporary traffic barriers (concrete safety-shape or approved alternate), channelizing devices, or a temporary raised island throughout the length of the two-way operation. The use of markings and complementary signing, by themselves, shall not be used.**

Support:

03 (DC Revision) Figure 6H-39 shows the procedure for two-lane, two-way operation. Treatments for entrance and exit ramps within the two-way roadway segment of this type of work are shown in Figures 6H-40 and 6H-41. Modifications to any of these layouts must first be reviewed and approved by the DDOT Engineer prior to their usage.

Section 6G.16 Crossovers

Guidance:

01 *The following are considered good guiding principles for the design of crossovers:*

A. Tapers for lane drops should be separated from the crossovers, as shown in Figure 6H-39.

B. Crossovers should be designed for speeds no lower than 10 mph below the posted speed, the off-peak 85th-percentile speed prior to the work starting, or the anticipated operating speed of the

roadway, unless unusual site conditions require that a lower design speed be used.

C. A good array of channelizing devices, delineators, and full-length, properly placed pavement markings should be used to provide drivers with a clearly defined travel path.

D. The design of the crossover should accommodate all vehicular traffic, including trucks and buses.

Support:

02 Temporary traffic barriers and the excessive use of TTC devices cannot compensate for poor geometric and roadway cross-section design of crossovers.

Section 6G.17 Interchanges

Guidance:

01 *Access to interchange ramps on limited-access highways should be maintained even if the work space is in the lane adjacent to the ramps. Access to exit ramps should be clearly marked and delineated with channelizing devices. For long-term projects, conflicting pavement markings should be removed and new ones placed. Early coordination with officials having jurisdiction over the affected cross streets and providing emergency services should occur before ramp closings.*

Option:

02 If access is not possible, ramps may be closed by using signs and Type 3 Barricades. As the work space changes, the access area may be changed, as shown in Figure 6H-42. A TTC zone in the exit ramp may be handled as shown in Figure 6H-43.

03 When a work space interferes with an entrance ramp, a lane may need to be closed on the freeway (see Figure 6H-44). A TTC zone in the entrance ramp may require shifting ramp vehicular traffic (see Figure 6H-44).

Section 6G.18 Work in the Vicinity of a Grade Crossing

Standard:

01 **(DC Revision) When highway-rail at-grade crossings exist either within or in the vicinity of a TTC zone, lane restrictions, flagging, or other operations shall not create conditions where vehicles can be queued across the tracks. If the queuing of vehicles across the tracks cannot be avoided, a uniformed law enforcement officer or flagger shall be provided at the upstream side of the crossing to prevent vehicles from stopping within the grade crossing, considered to be 50 feet on either side of the closet and farthest rail, on the tracks, even if automatic warning devices are in place.**

Support:

02 (DC Revision) Figure 6H-46 shows work in the vicinity of a highway-rail grade crossing.

03 (DC Revision) Section 8A.08 of the 2009 MUTCD contains additional information regarding temporary traffic control zones in the vicinity of highway-rail grade crossings.

Guidance:

04 *Early coordination with the railroad company or light rail transit agency should occur before work starts.*

Section 6G.19 Temporary Traffic Control During Nighttime Hours

Support:

01 Chapter 6D and Sections 6F.74 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

Standard:

01A **(DC Revision) Nighttime hours shall be defined as the time from 30 minutes prior to sunset to 30 minutes after sunrise on the next calendar day.**

Support:

02 Conducting highway construction and maintenance activities during night hours could provide an advantage when traditional daytime traffic control strategies cannot achieve an acceptable balance between worker and public safety, traffic and community impact, and constructability. The two basic advantages of working at night are reduced traffic congestion and less involvement with business activities. However, the two basic conditions that must normally be met for night work to offer any advantage are reduced traffic volumes and easy set up and removal of the traffic control patterns on a nightly basis.

03 Shifting work activities to night hours, when traffic volumes are lower and normal business is less active, might offer an advantage in some cases, as long as the necessary work can be completed and the worksite restored to essentially normal operating conditions to carry the higher traffic volume during non-construction

hours.

04 Although working at night might offer advantages, it also includes safety issues. Reduced visibility inherent in night work impacts the performance of both drivers and workers. Because traffic volumes are lower and congestion is minimized, speeds are often higher at night necessitating greater visibility at a time when visibility is reduced. Finally, the incidence of impaired (alcohol or drugs), fatigued, or drowsy drivers might be higher at night.

05 Working at night also involves other factors, including construction productivity and quality, social impacts, economics, and environmental issues. A decision to perform construction or maintenance activities at night normally involves some consideration of the advantages to be gained compared to the safety and other issues that might be impacted.

Guidance:

06 *Considering the safety issues inherent to night work, consideration should be given to enhancing traffic controls (see Section 6G.04) to provide added visibility and driver guidance, and increased protection for workers.*

07 *In addition to the enhancements listed in Section 6G.04, consideration should be given to providing additional lights and retroreflective markings to workers, work vehicles, and equipment.*

Option:

08 Where reduced traffic volumes at night make it feasible, the entire roadway may be closed by detouring traffic to alternate facilities, thus removing the traffic risk from the activity area.

Guidance:

08A *(DC Revision) Because typical street and highway lighting is rarely adequate to provide sufficient levels of illumination for work tasks, temporary lighting should be provided where workers are active to supply sufficient illumination to reasonably and safely perform the work tasks.*

08B *(DC Revision) Temporary lighting for nighttime work should be designed such that glare does not interfere with driver visibility, or create visibility problems for truck drivers, equipment operators, flaggers, or other workers.*

09 *Consideration should be given to stationing uniformed law enforcement officers and lighted patrol cars at night work locations where there is a concern that high speeds or impaired drivers might result in undue risks for workers or other drivers.*

Standard:

10 **(DC Revision) Except in emergencies, temporary lighting providing a minimum horizontal luminance of 5 foot candles (or 50 lux) shall be provided at all flagger stations during nighttime operation.**

Guidance:

10A *(DC Revision) For flagging operations during nighttime hours, a horizontal luminance of 50 lux (or 5 foot candles) can typically be achieved by a light plant featuring four 1,000 watt metal halide light fixtures, positioned with 15 feet of the flagging station at a minimum mounting height of 15 feet. At a minimum, one light plant is to be dedicated to the flagger operation. Light fixtures are to be positioned so they do not cause glare problems for vehicles approaching from any direction.*

Support:

11 (DC Revision) 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 and activities around equipment. An average horizontal luminance of 10 foot candles can be adequate for activities around equipment. Tasks requiring high levels of precision and extreme care can require an average horizontal luminance of 20 foot candles.

Standard:

12 **(DC Revision) Floodlighting shall not produce a disabling glare condition for approaching road users, flaggers, or workers.**

13 **(DC Revision) The adequacy of the floodlight placement and elimination of potential glare shall be determined by driving through and observing the floodlighted area from each direction on all approaching roadways after the initial floodlight setup, at nighttime, and periodically during each shift.**

Guidance:

14 *(DC Revision) Consideration should be given to the use of non-glare type lighting such as non-glare*

balloon lights for nighttime activities.

15 *(DC Revision) Advance warning signs used during nighttime hours should be reviewed on a periodic basis during the shift to ensure moisture/condensation has not obscured the retroreflectivity or visibility of the sign text.*

Standard:

16 **(DC Revision) Group 2 channelizing devices shall be used in all unmanned work zone locations, and drums shall be used in all merging and shifting tapers on Limited Access highways for nighttime operations.**

Section 6G.20 Steel Plate Conspicuity and Warning

Support:

01 (DC Revision) Steel plates are occasionally used in areas where an excavation is made in the roadway for repairs or utility work, providing temporary protection to motorists and pedestrians and continued movement of traffic. This situation provided a challenge to motorcyclists when they traverse a steel plate unexpectedly in the roadway.

Standard:

02 **(DC Revision) Steel plates installed in connection with temporary repairs on roadways open to traffic shall be marked with durable, highly reflective white Type B, Class VI pavement marking tape, no less than 4 inches in width, and shall be recommended for turning movements by the manufacturer.**

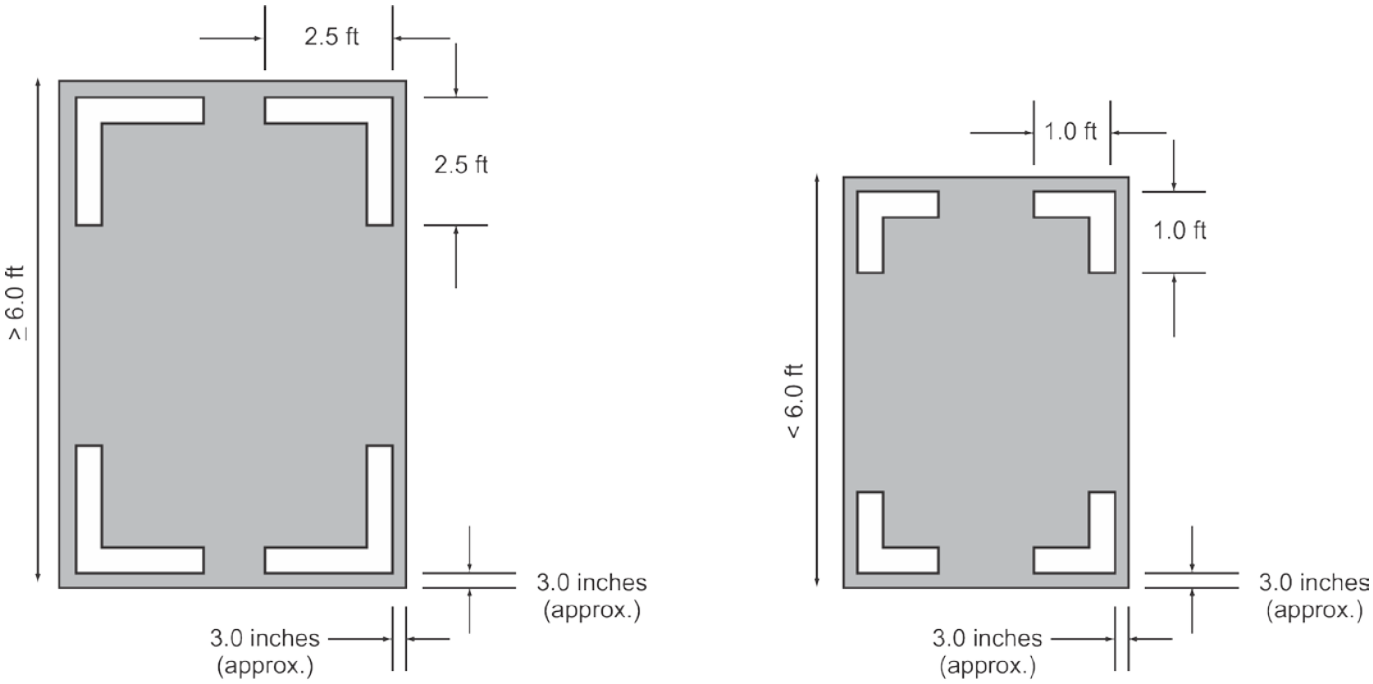
03 **(DC Revision) Placement of the reflective white pavement marking shall be as shown in Figure 6G-1. The markings shall be maintained throughout the use of the plate in condition that provides sufficient retroreflectivity to distinguish the corners of the steel plate. Replacement of the markings shall be based on a visual assessment performed periodically at night by a moving inspection vehicle. Any leg of the marking that has lost fifty percent or more of its conspicuity shall be replaced.**

04 **(DC Revision) A Steel Plate Ahead (W8-24) sign shall be placed in advance of the temporary steel plate to warn approaching motorists of the changed roadway conditions (see Section 6F.46).**

Option:

05 (DC Revision) Additional warning signs may be needed due to the complexity of the work location and other field conditions.

Figure 6G-1. Steel Plate Conspicuity Markings



Left: Steel plates with any side greater than or equal to 6 feet in length
Right: Street plates with all sides less than 6 feet in length

Section 6G.21 Work Within the Traveled Way at a Roundabout

Support:

01 (DC Revision) Each roundabout is unique and the traffic control must be developed to meet the specific conditions of the location and the work operation. A detour could possibly better serve traffic movement and must be considered as an alternative to flagger controlled operations. The typical traffic control shown in Figures 6H-47 through 6H-49 can also be applied to traffic circles.

Standard:

02 **(DC Revision) A single flagger shall control only one lane of approaching traffic. For multi-lane roundabouts with a single lane closure, one of the two approach lanes shall be closed in advance of the roundabout.**

Guidance:

03 *(DC Revision) Consideration should be given to using law enforcement instead of certified flaggers.*

04 *(DC Revision) When designing the traffic control and installing the TTC devices for work activities at roundabouts, accommodations for the turning radius of tractor trailer vehicles or other large vehicles should be considered and the work zone designed accordingly.*

Option:

05 (DC Revision) Periodic adjustments to the channelizing devices may be allowed in an active work zone to accommodate the turning movements of tractor trailer vehicles or other large vehicles through the temporary traffic control zone.

Section 6G.22 Detours and Diversions

Support:

01 (DC Revision) Detour signs are used to direct road users onto another roadway. At diversions, road users are directed onto a temporary roadway or alignment placed within or adjacent to the right-of-way. Typical applications for detouring road users are shown in Figures 6H-8, 6H-9, 6H-19, and 6H-20. Figure 6H-7 illustrates the controls around an area where a section of roadway has been closed and a diversion has been constructed. Channelizing devices and pavement markings are used to indicate the transition to the temporary roadway.

Option:

02 (DC Revision) Detours may be established either daily or nightly for performing work activities such as surface rehabilitation work and then removed during peak travel periods. Detours may also be established for long periods of time such as bridge removal and repair projects.

Support:

03 (DC Revision) A Short-Term Detour occupies a location for more than 2 hours within a single work period, but not longer than 3 consecutive days and uses the M4-9 sign series to direct traffic along an alternate route.

04 (DC Revision) A Long-Term Detour occupies a location longer than 3 consecutive days, or on a periodic basis (less than 24 consecutive hours) longer than 3 days and uses a DETOUR (M4-8) sign above a route shield assembly (i.e., Route marker, cardinal direction, auxiliary sign and advance turn/direction arrow auxiliary signs) or the cardinal direction, route marker over the M4-9 sign series to direct traffic along an alternate route (see Section 6F.59 Detour Signs and Figures 6H-9 and 6H-20).

Standard:

05 **(DC Revision) Detours and diversions shall be reviewed and approved by the DDOT Engineer prior to implementation.**

Guidance:

06 *(DC Revision) When a detour is long, Detour Signs (see Section 6F.59) should be installed to remind and reassure road users periodically that they are still successfully following the detour.*

07 *(DC Revision) When an entire roadway is closed as illustrated in Figure 6H-8, a detour should be provided and road users should be warned in advance of the closure. If local road users are allowed to use the roadway up to the closure, the ROAD CLOSED – LOCAL TRAFFIC ONLY (R11-3a) sign should be used. The portion of the road open to local road users should have adequate signing, marking and delineation.*

08 *(DC Revision) Detours should be signed so that road users are able to traverse the entire detour route and back to the original roadway as shown in Figures 6H-9 and 6H-20.*

Section 6G.23 Movable Barriers

Support:

01 (DC Revision) Figure 6H-45 shows a temporary reversible lane using movable barriers.

Standard:

02 **(DC Revision) Modification of Figure 6H-45 shall be reviewed and approved by the DDOT Engineer prior to its use.**

Option:

03 (DC Revision) If the work activity in Figure 6H-45 permits, a movable barrier may be used and relocated to the shoulder during non-work periods or peak-period vehicular traffic conditions.

Section 6G.24 Installing/Removing Temporary Traffic Control

Guidance:

01 *(DC Revision) Care must be exercised when installing and removing TTC devices. Installing TTC begins and ends as a mobile operation. A shadow vehicle or shadow vehicle with a TMA should be used to protect workers installing and removing TTC devices from a work vehicle such as signs, arrow boards, and channelizing devices.*

Standard:

02 **(DC Revision) TTC devices shall not be stored, installed or removed from a shadow vehicle or a shadow vehicle with a TMA. Temporary traffic control devices shall be stored, installed or removed from a work operation vehicle.**

Guidance:

03 *(DC Revision) On a two-lane roadway, where pull-off areas are limited, a TTC Spotter using a red flag and proper flagger procedure should temporarily stop traffic while TTC devices are being installed. The spotter must be highly visible to oncoming traffic. At nighttime, road flares, a red glow-cone flashlight, or a red traffic wand can be used to increase the visibility of the flagger.*

04 *(DC Revision) On a multi-lane roadway a pick-up truck with a trailer-mounted arrow board should be placed on the shoulder to direct traffic out of the closed lane. A shadow vehicle with an arrow board or amber light closes the lane while TTC devices are being installed or removed. The shadow vehicle should be 80 feet to*

120 feet in advance of the work operation vehicle.

Standard:

05 **(DC Revision) A shadow vehicle with a TMA shall be used to protect the workers and their work vehicle installing and removing TTC devices on multi-lane roadway with a posted speed of 45 mph or greater.**

Guidance:

06 *(DC Revision) Stationary lane closures on a multi-lane roadway should be installed with the flow of traffic in the following sequence:*

- *A. Install all advance warning signs, beginning with the ROAD WORK AHEAD (W20-1) sign and ending with the END ROAD WORK (G20-2) sign. Install all signs beginning with the opposite side which will be closed (for a right lane closure; first, install all signs on the left side (shoulder) and then install all signs on the right side (shoulder)).*
- *B. Install a shoulder taper if required.*
- *C. Install an arrow board on the shoulder prior to the merging taper or as close to the beginning of the merging taper as possible.*
- *D. Install channelizing devices to form a merging taper. Using a shadow vehicle (with or without a TMA, depending on the type of roadway) is recommended during installation.*
- *E. Install traffic control devices along the buffer space.*
- *F. Continue placing devices along the work space at the appropriate spacing.*
- *G. Install devices for the termination area. Install an END ROAD WORK sign, if necessary.*
- *H. Review the lane closure by performing a drive-through inspection, correcting any deficiencies and documenting necessary adjustments.*

07 *(DC Revision) All TTC devices for a stationary lane closure on a multi-lane roadway, except advance warning signs, should be removed against the flow of traffic in the following sequence:*

- *A. Remove the channelizing devices starting from the end of the activity area working back to the widest part of the merging taper.*
- *B. Place the removal vehicle on the shoulder, and remove the channelizing devices from the merging taper by hand onto the work vehicle.*
- *C. Remove the arrow board.*

08 *(DC Revision) Advance warning signs should be removed with the flow of traffic beginning with the ROAD WORK AHEAD sign and ending with the END ROAD WORK sign. Remove signs beginning with the lane closure side (for a right lane closure; first, remove all signs from the right side (shoulder) and then remove all signs left side (shoulder).*

09 *(DC Revision) Workers running across an open travel lane of traffic to install TTC devices is a dangerous practice that should not be performed.*

Option:

10 (DC Revision) When traffic delays have exceeded expectations, a worker on each shoulder may disassemble the advance warning signs and their portable signs support in reverse order to allow delayed traffic to clear. The disassembled signs and their supports may be stored beyond the shoulder until such time that traffic delays have dispersed and signs can be removed safely.

11 (DC Revision) A TTC Spotter may be used in this operation.

Section 6G.25 Work During Inclement Weather

Support:

01 (DC Revision) Inclement weather (rain, snow, fog, etc.) creates the following conditions for road users: lack of visibility to the road and TTC devices; greater distance required to slow and stop a motor vehicle; an increase in the difficulty of controlling a motor vehicle; and an increase in distraction and anxiety for road users while traveling on the roadway.

Guidance:

02 *(DC Revision) Therefore, planned work activities should be avoided, if possible, during inclement weather conditions.*

Option:

(DC Revision) Emergency operations, however, may be performed where inaction would be worse than allowing the condition to remain unattended.

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CHAPTER 6H. TYPICAL APPLICATIONS

Section 6H.01 Typical Applications

Support:

00A (DC Revision) Whenever the acronym "TTC" is used in this Chapter, it refers to temporary traffic control.

Standard:

00B **(DC Revision) The needs and control of all road users (motorists, bicyclists, motorcyclist, and pedestrians within the highway, including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA), Title II, Paragraph 35.130) through a TTC zone shall be an essential part of highway construction, utility work, maintenance operations, and the management of traffic incidents.**

Support:

01 Chapter 6G contains discussions of typical TTC activities. This Chapter presents typical applications for a variety of situations commonly encountered. While not every situation is addressed, the information illustrated can generally be adapted to a broad range of conditions. In many instances, an appropriate TTC plan is achieved by combining features from various typical applications. For example, work at an intersection might present a near-side work zone for one street and a far-side work zone for the other street. These treatments are found in two different typical applications, while a third typical application shows how to handle pedestrian crosswalk closures. For convenience in using the typical application diagrams, Tables 6C-1 and 6C-4 are reproduced in this Chapter as Tables 6H-3 and 6H-4, respectively.

02 (DC Revision) Procedures for establishing TTC zones vary with such conditions as road configuration, location of the work, work activity, duration of work, road user volumes, road vehicle mix (buses, trucks, cars, motorcycles, and bicycles), and road user speeds. Examples are presented in this Chapter showing how to apply principles and standards. Applying these guidelines to actual situations and adjusting to field conditions requires engineering judgement. In general, the procedures illustrated represent minimum solutions for the situations depicted.

03 In general, the procedures illustrated represent minimum solutions for the situations depicted. Except for the notes (which are clearly classified using headings as being Standard, Guidance, Option, or Support), the information presented in the typical applications can generally be regarded as Guidance.

Option:

04 Other devices may be added to supplement the devices and device spacing may be adjusted to provide additional reaction time or delineation. Fewer devices may be used based on field conditions.

Support:

05 Figures and tables found throughout Part 6 provide information for the development of TTC plans. Also, Table 6H-3 is used for the determination of sign spacing and other dimensions for various area and roadway types.

06 Table 6H-1 is an index of the 46 typical applications. Typical applications are shown on the right-hand page with notes on the facing page to the left. The legend for the symbols used in the typical applications is provided in Table 6H-2. In many of the typical applications, sign spacing and other dimensions are indicated by letters using the criteria provided in Table 6H-3. The formulas for determining taper lengths are provided in Table 6H-4. Most of the typical applications show TTC devices for only one direction.

07 (DC Revision) The following TTC applications illustrate mobile, short duration, short-term and intermediate-term stationary work activities utilizing portable (self-erecting) sign stands placed on the shoulder.

Standard:

08 **(DC Revision) For long-term stationary work activities or as directed by the DDOT Engineer, post-mounted signs placed outside of the shoulder per Figure 6F-1 shall be required.**

Table 6H-1. Index to Typical Applications

Typical Application Description	Typical Application Number
Work Outside of the Shoulder (see Section 6G.06)	
Work Beyond the Shoulder	TA-1
Blasting Zone	TA-2
Work on the Shoulder (see Sections 6G.07 and 6G.08)	
Work on the Shoulders	TA-3
Short Duration or Mobile Operation on a Shoulder	TA-4
Shoulder Closure on a Freeway	TA-5
Shoulder Work with Minor Encroachment	TA-6
Work Within the Traveled Way of a Two-Lane Highway (see Section 6G.10)	
Road Closed with a Diversion	TA-7
Roads Closed with an Off-Site Detour	TA-8
Overlapping Routes with a Detour	TA-9
Lane Closure on a Two-Lane Road Using Flaggers	TA-10
Lane Closure on a Two-Lane Road with Low Traffic Volumes	TA-11
Lane Closure on a Two-Lane Road Using Traffic Control Signals	TA-12
Temporary Road Closure	TA-13
Haul Road Crossing	TA-14
Work in the Center of a Road with Low Traffic Volumes	TA-15
Surveying Along the Center Line of a Road with Low Traffic Volumes	TA-16
Mobile Operations on a Two-Lane Road	TA-17
Work Within the Traveled Way of an Urban Street (see Section 6G.11)	
Lane Closure on a Minor Street	TA-18
Detour for One Travel Direction	TA-19
Detour for a Closed Street	TA-20
Work Within the Traveled Way at an Intersection and on Sidewalks (see Section 6G.13)	
Lane Closure on the Near Side of an Intersection	TA-21
Right-Hand Lane Closure on the Far Side of an Intersection	TA-22
Left-Hand Lane Closure on the Far Side of an Intersection	TA-23
Half Road Closure on the Far Side of an Intersection	TA-24
Multiple Lane Closures at an Intersection	TA-25
Closure in the Center of an Intersection	TA-26
Closure at the Side of an Intersection	TA-27
Sidewalk Detour or Diversion	TA-28
Crosswalk Closures and Pedestrian Detours	TA-29
Work Within the Traveled Way of a Multi-Lane, Non-Access Controlled Highway (see Section 6G.12)	
Interior Lane Closure on a Multi-Lane Street	TA-30
Lane Closure on a Street with Uneven Directional Volumes	TA-31
Half Road Closure on a Multi-Lane, High-Speed Highway	TA-32
Stationary Lane Closure on a Divided Highway	TA-33
Lane Closure with a Temporary Traffic Barrier	TA-34
Mobile Operation on a Multi-Lane Road	TA-35
Work Within the Traveled Way of a Freeway or Expressway (see Section 6G.14)	
Lane Shift on a Freeway	TA-36
Double Lane Closure on a Freeway	TA-37
Interior Lane Closure on a Freeway	TA-38
Median Crossover on a Freeway	TA-39
Median Crossover for an Entrance Ramp	TA-40
Median Crossover for an Exit Ramp	TA-41
Work in the Vicinity of an Exit Ramp	TA-42
Partial Exit Ramp Closure	TA-43
Work in the Vicinity of an Entrance Ramp	TA-44
Temporary Reversible Lane Using Movable Barriers	TA-45
Work in the Vicinity of a Grade Crossing (see Section 6G.18)	
Work in the Vicinity of a Grade Crossing	TA-46
Work Within a Roundabout	
Traffic Circle with Outer-most Lane Closure	
Traffic Circle with Center Lane Closure	
Traffic Circle with Inner-most Lane Closure	

Table 6H-2. Meaning of Symbols on Typical Application Diagrams

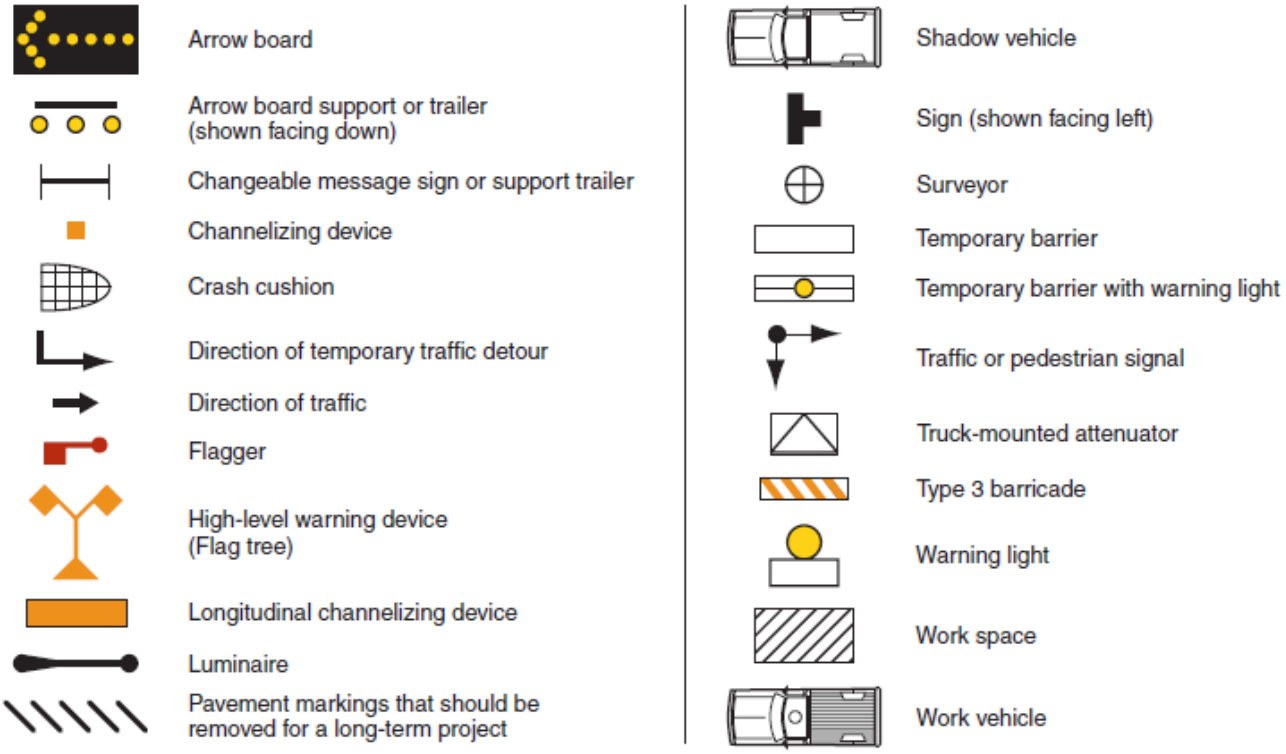


Table 6H-3. Meaning of Letter Codes on Typical Application Diagrams

Road Type	Distance Between Signs*		
	A	B	C
Urban (25 mph)	150 feet	150 feet	150 feet
Urban (30 mph)	200 feet	200 feet	200 feet
Urban (35 mph)	250 feet	250 feet	250 feet
Urban (40 mph)	350 feet	350 feet	350 feet
Urban (45 mph)	550 feet	550 feet	550 feet
Urban (50 mph)	600 feet	600 feet	600 feet
Urban (55 mph)	700 feet	700 feet	700 feet
Expressway / Freeway	1,000 feet	1,500 feet	2,640 feet

* The column headings A, B, and C are the dimensions shown in Figures 6H-1 through 6H-46 and the DDOT Utility Typicals in Appendix C. The A dimension is the distance from the transition or point of restriction to the first sign. The B dimension is the distance between the first and second signs. The C dimension is the distance between the second and third signs. (The “first sign” is the sign in a three-sign series that is closest to the TTC zone. The “third sign” is the sign that is furthest upstream from the TTC zone.)

Table 6H-4. Formulas for Determining Taper Length

Taper Lengths (*L*)					
Speed Limit (S)	Width of offset (W)				Remarks (Formula)
	9'	10'	11'	12'	
25 mph	95'	105'	115'	125'	$L = WS^2/60$
30 mph	135'	150'	165'	180'	$L = WS^2/60$
35 mph	185'	205'	225'	245'	$L = WS^2/60$
40 mph	240'	270'	295'	320'	$L = WS^2/60$
45 mph	405'	450'	495'	540'	$L = WS$
50 mph	450'	500'	550'	600'	$L = WS$
55 mph	495'	550'	605'	660'	$L = WS$

Notes for Figure 6H-1—Typical Application 1
Work Beyond the Shoulder

Guidance:

1. *If the work space is in the median of a divided highway, an advance warning sign should also be placed on the left side of the directional roadway.*
2. *(DC Revision) Where drivers emerging from an intersecting roadway will not encounter an advance warning sign prior to the work zone, additional signs should be placed on the intersecting road.*

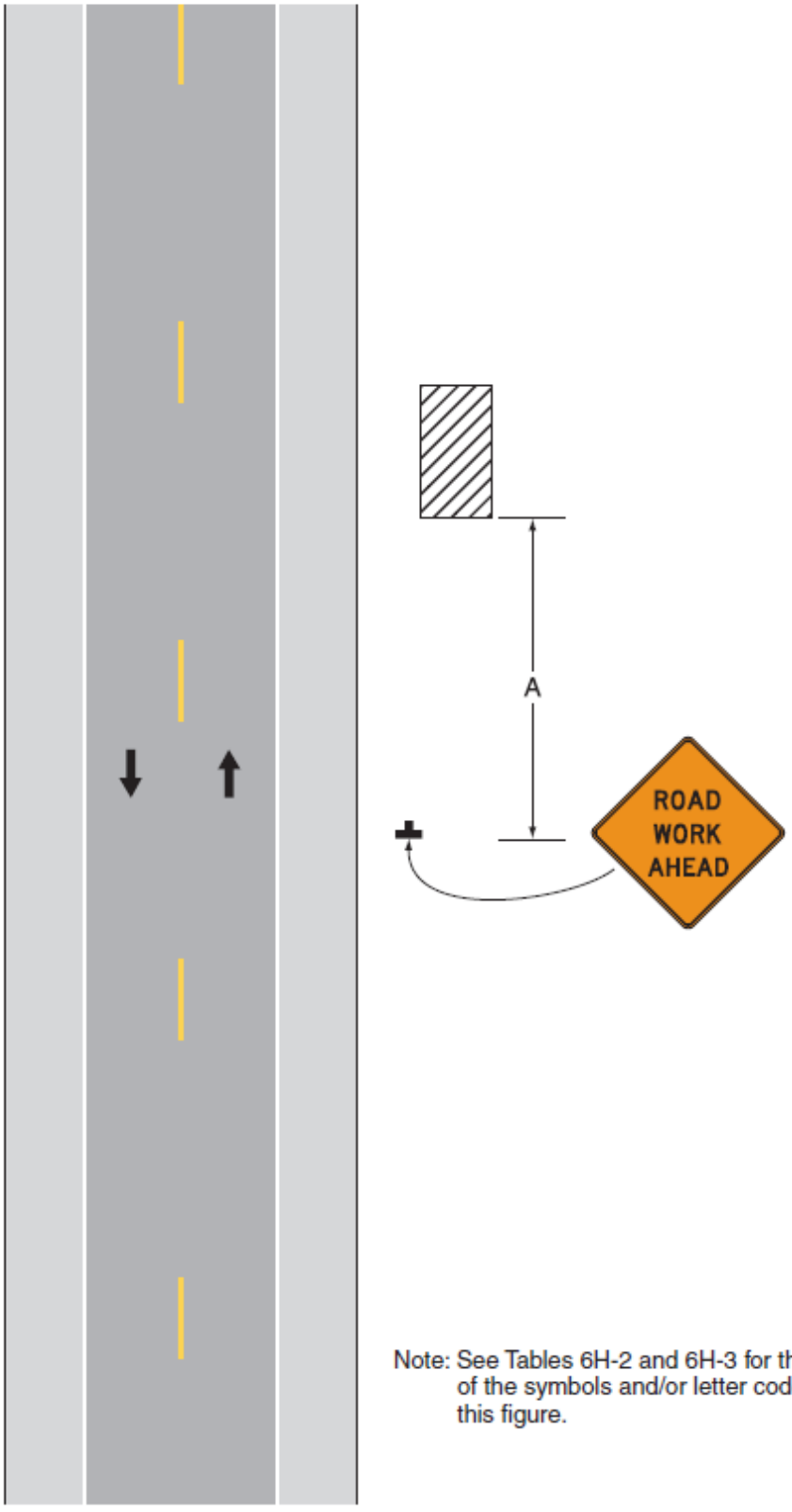
Option:

3. (DC Revision) The ROAD WORK AHEAD sign or Workers (W21-1a) sign may be replaced with other appropriate signs such as the SHOULDER WORK sign. The SHOULDER WORK sign may be used for work adjacent to the shoulder.
4. (DC Revision) The ROAD WORK AHEAD sign or Workers (W21-1a) sign may be omitted where the work space is behind a barrier, more than 24 inches behind the curb, or 15 feet or more from the edge of any roadway.
5. For short-term, short duration or mobile operation, all signs and channelizing devices may be eliminated if a vehicle with activated high-intensity rotating, flashing, oscillating, or strobe lights is used.
6. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.

Standard:

7. **Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.**

Figure 6H-1. Work Beyond the Shoulder (TA-1)



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Typical Application 1

Notes for Figure 6H-2—Typical Application 2
Blasting Zone

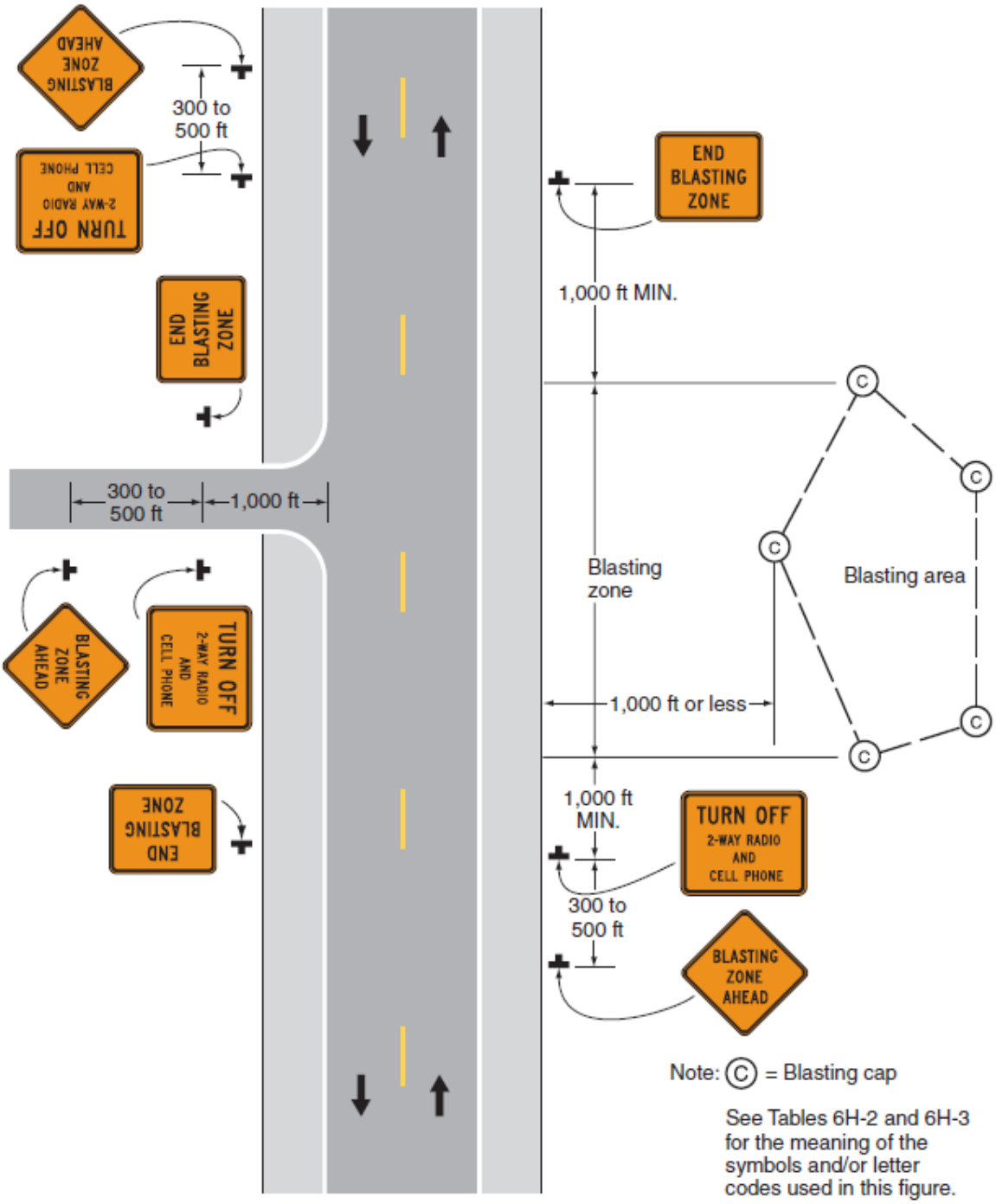
Standard:

1. **Whenever blasting caps are used within 1,000 feet of a roadway, the signing shown shall be used.**
2. **The signs shall be covered or removed when there are no explosives in the area or the area is otherwise secure.**
3. **Whenever a side road intersects the roadway between the BLASTING ZONE AHEAD sign and the END BLASTING ZONE sign, or a side road is within 1,000 feet of any blasting cap, similar signing, as on the mainline, shall be installed on the side road.**
4. **Prior to blasting, the blaster in charge shall determine whether road users in the blasting zone will be endangered by the blasting operation. If there is danger, road users shall not be permitted to pass through the blasting zone during blasting operations.**
5. **(DC Revision) On divided highways having a median wider than 8 feet, right and left sign assemblies shall be required.**

Guidance:

6. *On a divided highway, the signs should be mounted on both sides of the directional roadways.*

Figure 6H-2. Blasting Zone (TA-2)



Typical Application 2

Notes for Figure 6H-3—Typical Application 3
Work on the Shoulders

Guidance:

1. *(DC Revision) A SHOULDER WORK/ ROAD WORK sign should be placed on the left side of the roadway for a divided or one-way street only if the left shoulder is affected.*

Option:

2. (DC Revision) The Workers symbol signs may be used instead of SHOULDER WORK/ ROAD WORK signs.

Guidance:

3. *(DC Revision) For long-term stationary work (more than 3 days) on divided highways having a median wider than 8 feet, sign assembles on both side of the roadway should be required as shown (ROAD WORK AHEAD (W20-1), RIGHT SHOULDER CLOSED AHEAD (W21-5bR)), even though only one shoulder (or parking lane) is being closed. For operations less than 3 days in duration, sign assemblies would only be required on the side where the shoulder (or parking lane) is being closed and a RIGHT SHOULDER CLOSED AHEAD (W21-5Br) sign should be added to that sign.*

Option:

4. The SHOULDER WORK AHEAD sign on an intersecting roadway may be omitted where drivers emerging from that roadway will encounter another advance warning sign prior to this activity area.
5. For short duration operations of 60 minutes or less, all signs and channelizing devices may be eliminated if a vehicle with activated high-intensity rotating, flashing, oscillating, or strobe lights is used.
6. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.

Standard:

7. **Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.**
8. **(DC Revision) If the shoulder (or parking lane) closure is located within a passing zone, ROAD WORK AHEAD and END ROAD WORK signs shall be placed for traffic approaching in the opposite direction.**
9. **(DC Revision) For long-term, intermediate-term, and short-term operations, a truck-mounted attenuator shall be used on roadways with a posted speed limit (or 85th percentile speed) greater than 40 mph.**

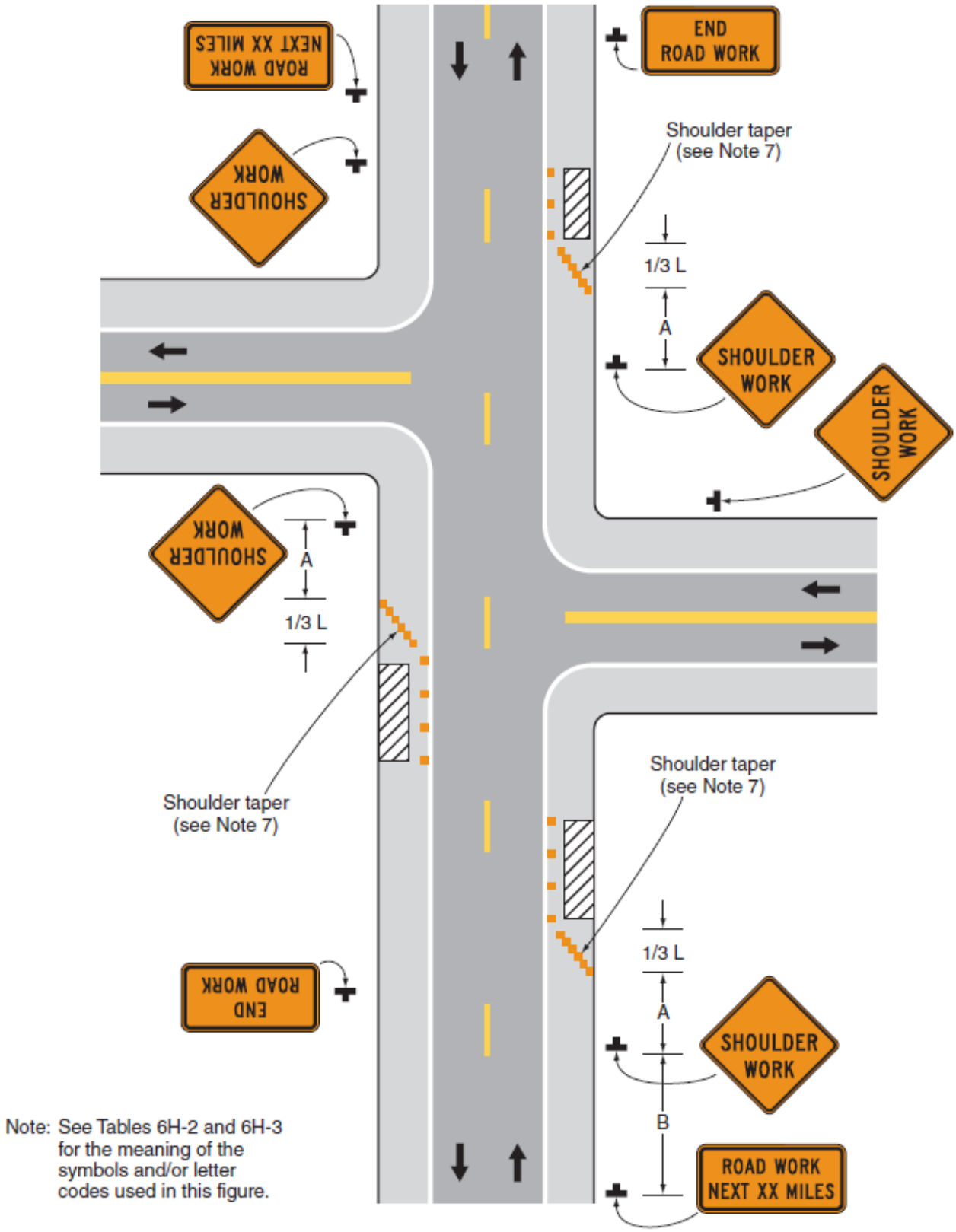
Option:

10. (DC Revision) If the shoulder (or parking lane) closure is located within a no-passing zone, ROAD WORK AHEAD AND END ROAD WORK signs may be placed for traffic approaching in the opposite direction based on engineering judgement.
11. (DC Revision) For short duration operation along roadways with a posted speed limit of 85th-percentile speed greater than 40 mph, a truck-mounted attenuator may be omitted if a vehicle with activated high-intensity rotating, flashing, oscillating, or strobe lights is used or if the shoulder width is less than the width of a truck-mounted attenuator.
12. (DC Revision) Truck-mounted attenuators may be used for all operations along roadways with a posted speed limit (or 85th-percentile speed) less than or equal to 40 mph.

Standard:

13. **(DC Revision) When a side road intersects the highway within the TTC zone, additional traffic control devices shall be placed as needed.**
14. **When paved shoulders having a width of 8 feet or more are closed, at least one advance warning sign shall be used. In addition, channelizing devices shall be used to close the shoulder in advance to delineate the beginning of the work space and direct vehicular traffic to remain within the traveled way.**

Figure 6H-3. Work on the Shoulders (TA-3)



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Typical Application 3

Notes for Figure 6H-4—Typical Application 4
Short Duration or Mobile Operation on a Shoulder

Guidance:

1. *(DC Revision) In those situations where multiple work locations within a limited distance make it practical to place stationary signs, the distance between the advance warning sign and the work should not exceed one block in urban low-speed areas, or one mile on high-speed roads.*
2. *In those situations where the distance between the advance signs and the work is 2 miles to 5 miles, a Supplemental Distance plaque should be used with the ROAD WORK AHEAD sign.*
3. *(DC Revision) Where drivers emerging from an intersecting roadway will not encounter the shadow vehicle prior to the work area, a stationary warning should be placed on the intersecting road.*

Option:

4. The ROAD WORK NEXT XX MILES sign may be used instead of the ROAD WORK AHEAD sign if the work locations occur over a distance of more than 2 miles.
5. (DC Revision) "UTILITY WORK AHEAD" sign may be used in low-speed urban areas or "SHOULDER WORK AHEAD" sign may be used along highways with shoulders.
6. Stationary warning signs may be omitted for short duration or mobile operations if the work vehicle displays high-intensity rotating, flashing, oscillating, or strobe lights.
7. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.

Standard:

8. **(DC Revision) Each vehicle involved in the mobile operation shall have at least one rotating amber light or high intensity amber strobe light.**
9. **Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.**
10. **If an arrow board is used for an operation on the shoulder, the caution mode shall be used.**
11. **Vehicle-mounted signs shall be mounted in a manner such that they are not obscured by equipment or supplies. Sign legends on vehicle-mounted signs shall be covered or turned from view when work is not in progress.**
12. **(DC Revision) The work and shadow vehicles shall be equipped with truck-mounted attenuators for operations on roadways with a posted speed limit (or 85th-percentile speed) greater than 40 mph.**

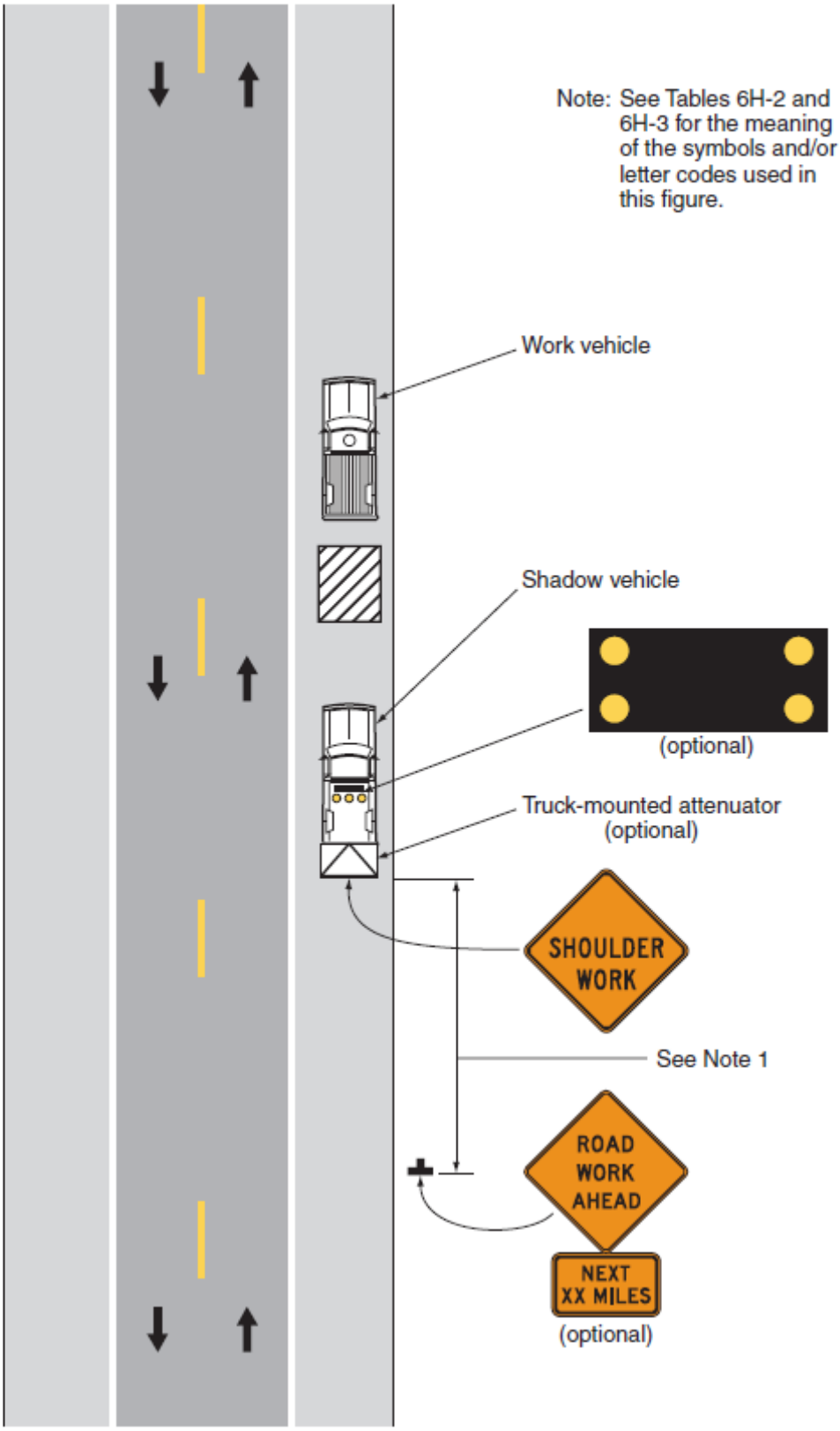
Option:

13. (DC Revision) Truck-mounted attenuators may be omitted from specialized work vehicles, such as sweeper, vacuum, and pothole patching trucks, and other work vehicles that cannot support the installation of a truck-mounted attenuator.
14. (DC Revision) For short-duration operations along roadways with a posted speed limit (or 85th-percentile speed) greater than 40 mph, truck-mounted attenuators may be omitted if a vehicle with activated high-intensity rotating, flashing, oscillating, or strobe lights is used, or if the shoulder width is less than the width of a truck-mounted attenuator.
15. (DC Revision) Truck-mounted attenuators may be used for all operations along roadways with a posted speed limit (or 85th-percentile speed) less than or equal to 40 mph.
16. (DC Revision) Additional shadow vehicles may be used in both directions to provide additional warning or to reduce vehicle speeds in advance of the work area. Law enforcement vehicles may also be used for this purpose.

Support:

17. (DC Revision) 72-hour advanced parking restrictions are required for mobile operations, except in the event of an emergency.

Figure 6H-4. Short-Duration or Mobile Operation on a Shoulder (TA-4)



Typical Application 4

Notes for Figure 6H-5—Typical Application 5
Shoulder Closure on a Freeway

Guidance:

1. *SHOULDER CLOSED signs should be used on limited-access highways where there is no opportunity for disabled vehicles to pull off the roadway.*
2. *If drivers cannot see a pull-off area beyond the closed shoulder, information regarding the length of the shoulder closure should be provided in feet or miles, as appropriate.*
3. *(DC Revision) Where drivers emerging from an intersection roadway will not encounter the shadow vehicle prior to the work area, a stationary warning sign should be placed on the intersecting road.*
4. *The use of a temporary traffic barrier should be based on engineering judgment.*

Standard:

5. **Temporary traffic barriers, if used, shall comply with the provisions of Section 6F.85.**

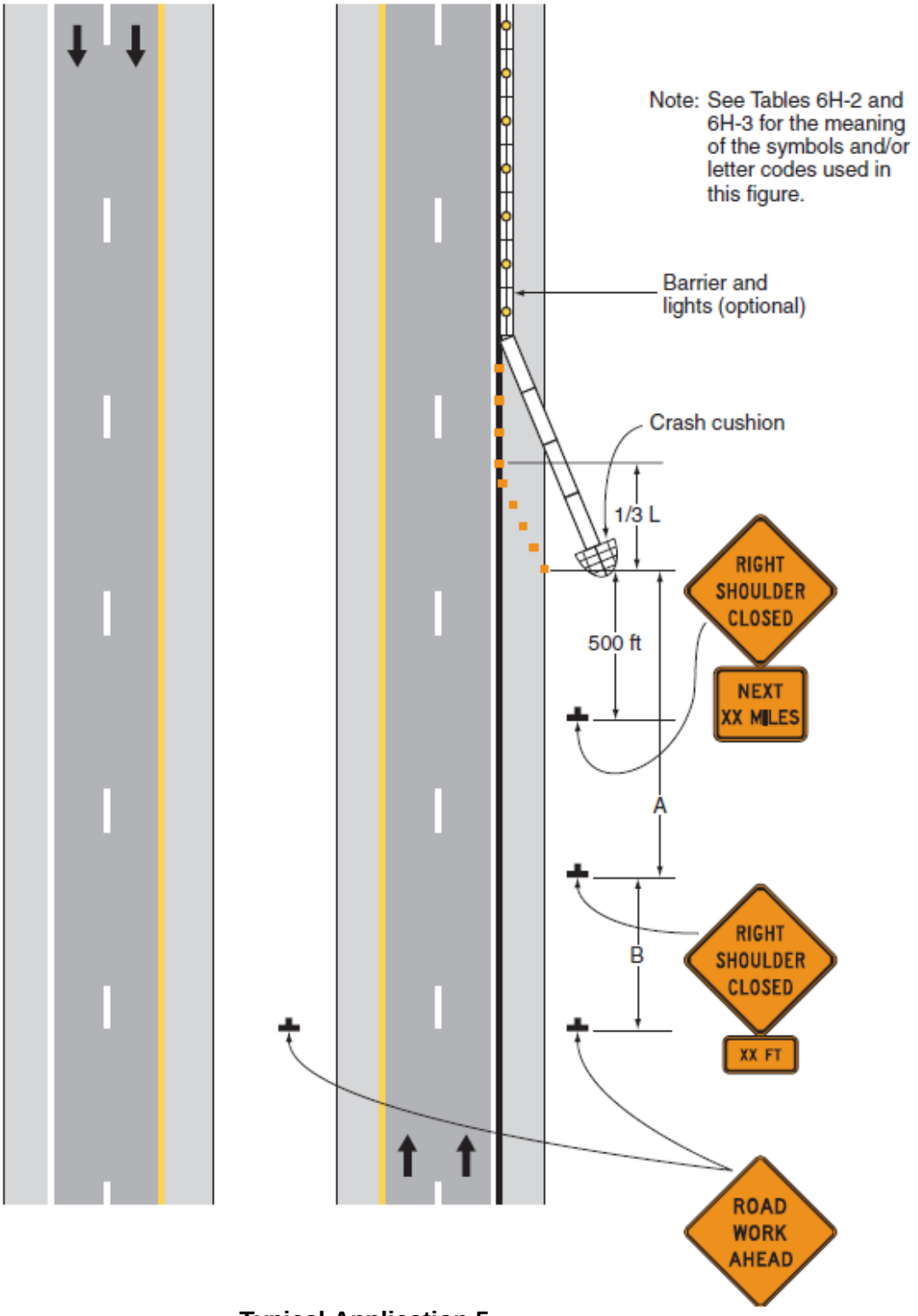
Option:

6. The barrier shown in this typical application is an example of one method that may be used to close a shoulder of a long-term project.
7. The warning lights shown on the barrier may be used.

Standard:

8. **(DC Revision) 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. (See Section 6F.85 for more details.)**

Figure 6H-5. Shoulder Closure on a Freeway (TA-5)



Typical Application 5

Notes for Figure 6H-6—Typical Application 6
Shoulder Work with Minor Encroachment

Guidance:

1. *All lanes should be a minimum of 10 feet in width as measured to the near face of the channelizing devices.*
2. *The treatment shown should be used on a minor road having low speeds. For higher-speed traffic conditions, a lane closure should be used.*
3. *(DC Revision) Where drivers emerging from an intersection roadway will not encounter the shadow vehicle prior to the work area, a stationary warning sign should be placed on the intersecting road.*

Option:

4. For short-term use on low-volume, low-speed roadways with vehicular traffic that does not include longer and wider heavy commercial vehicles, a minimum lane width of 9 feet may be used.
5. Where the opposite shoulder is suitable for carrying vehicular traffic and of adequate width, lanes may be shifted by use of closely-spaced channelizing devices, provided that the minimum lane width of 10 feet is maintained.
6. Additional advance warning may be appropriate, such as a ROAD NARROWS sign.

Option:

7. Temporary traffic barriers may be used along the work space.
8. The shadow vehicle may be omitted if a taper and channelizing devices are used.
9. A truck-mounted attenuator may be used on the shadow vehicle.
10. For short-duration work, the taper and channelizing devices may be omitted if a shadow vehicle with activated high-intensity rotating, flashing, oscillating, or strobe lights is used.
11. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.

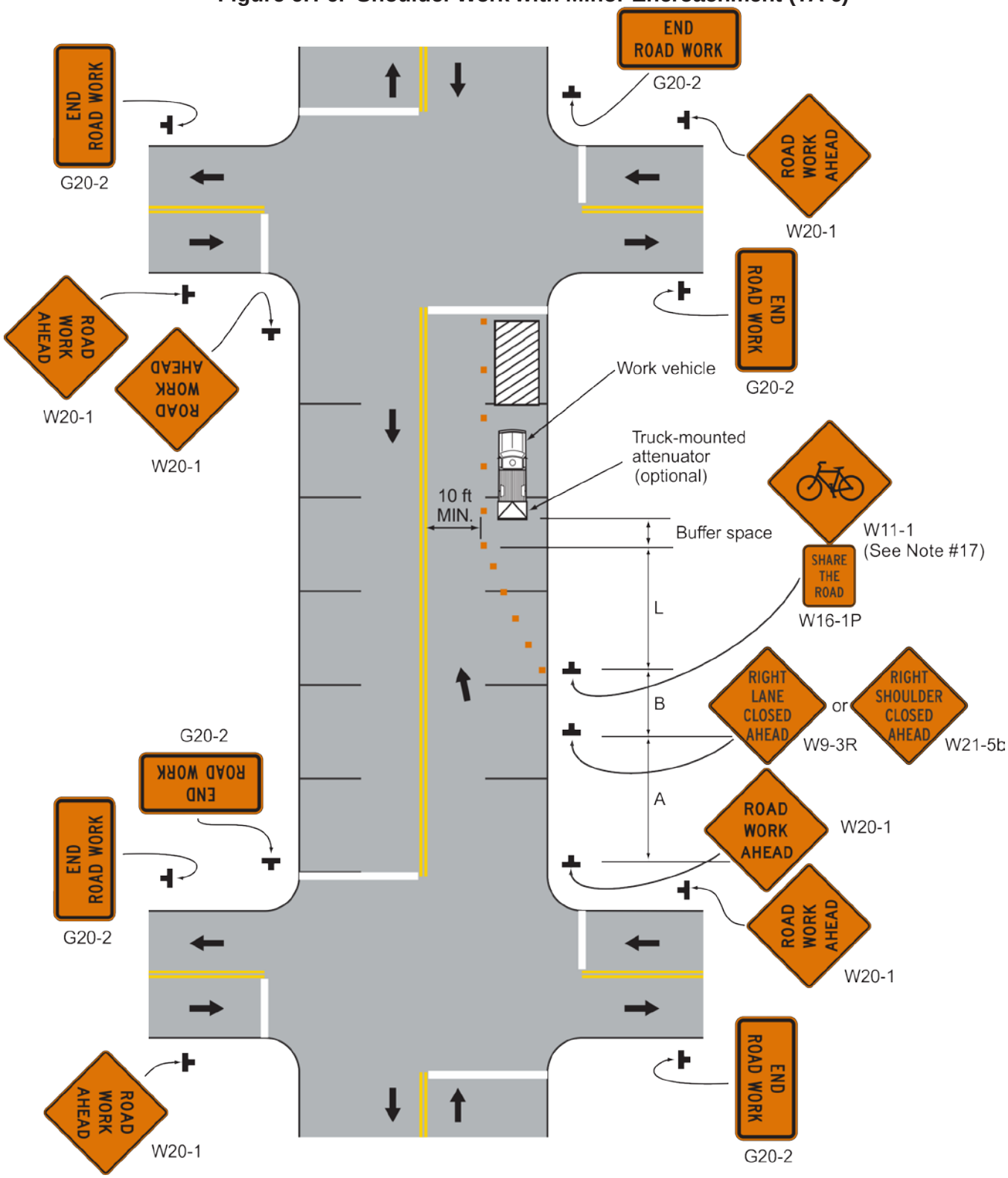
Standard:

12. **Vehicle-mounted signs shall be mounted in a manner such that they are not obscured by equipment or supplies. Sign legends on vehicle-mounted signs shall be covered or turned from view when work is not in progress.**
13. **Shadow and work vehicles shall display high-intensity rotating, flashing, oscillating, or strobe lights.**
14. **Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.**
15. **When existing accommodations for bicycle travel are disrupted or closed in a long-term duration project (see Section 6G.02) and the roadway width is inadequate for allowing bicyclists and motor vehicles to travel side by side, a separate path shall be provided for bicyclists.**

Guidance:

16. *. All advance warning signs should be placed so that the path of travel for bicycles is not blocked, while maintaining visibility for road users.*
17. *When existing accommodations for bicycle travel are disrupted or closed in a long-term duration project (see Section 6G.02) and the roadway width is inadequate for allowing bicyclists and motor vehicles to travel side by side, the Bicycle Warning (W11-1) sign and the SHARE THE ROAD (W16-1P) plaque should be used to advise motorists of the presence of bicyclists in the travel way lanes.*
18. *Except for short durations and mobile operations, when a highway shoulder is occupied and bicyclists would be sharing a lane with vehicular traffic, as a result of the TTC zone, speed reduction countermeasures should be used to reduce traffic speeds in the TTC zone. Refer to Sections 6C.01 and 6D.03.*
19. *Except for short durations and mobile operations, when a highway shoulder is occupied and bicyclists would be sharing a lane with vehicular traffic, as a result of the TTC zone, before narrowing the outside lane other measures such as widening the outside shoulder to allow bicyclists and motor vehicles to travel side by side through the TTC zone should be considered.*
20. *If traffic volumes make it feasible, the two left lanes should be merged into one lane to avoid using the shoulder as a traveled way lane and allowing continued use for emergency purposes and bicycle travel.*

Figure 6H-6. Shoulder Work with Minor Encroachment (TA-6)



Notes for Figure 6H-7—Typical Application 7
Road Closure with a Diversion

Support:

1. Signs and object markers are shown for one direction of travel only.

Standard:

2. **Devices similar to those depicted shall be placed for the opposite direction of travel.**
3. **Pavement markings no longer applicable to the traffic pattern of the roadway shall be removed or obliterated before any new traffic patterns are open to traffic.**
4. **Temporary barriers and end treatments shall be crashworthy.**

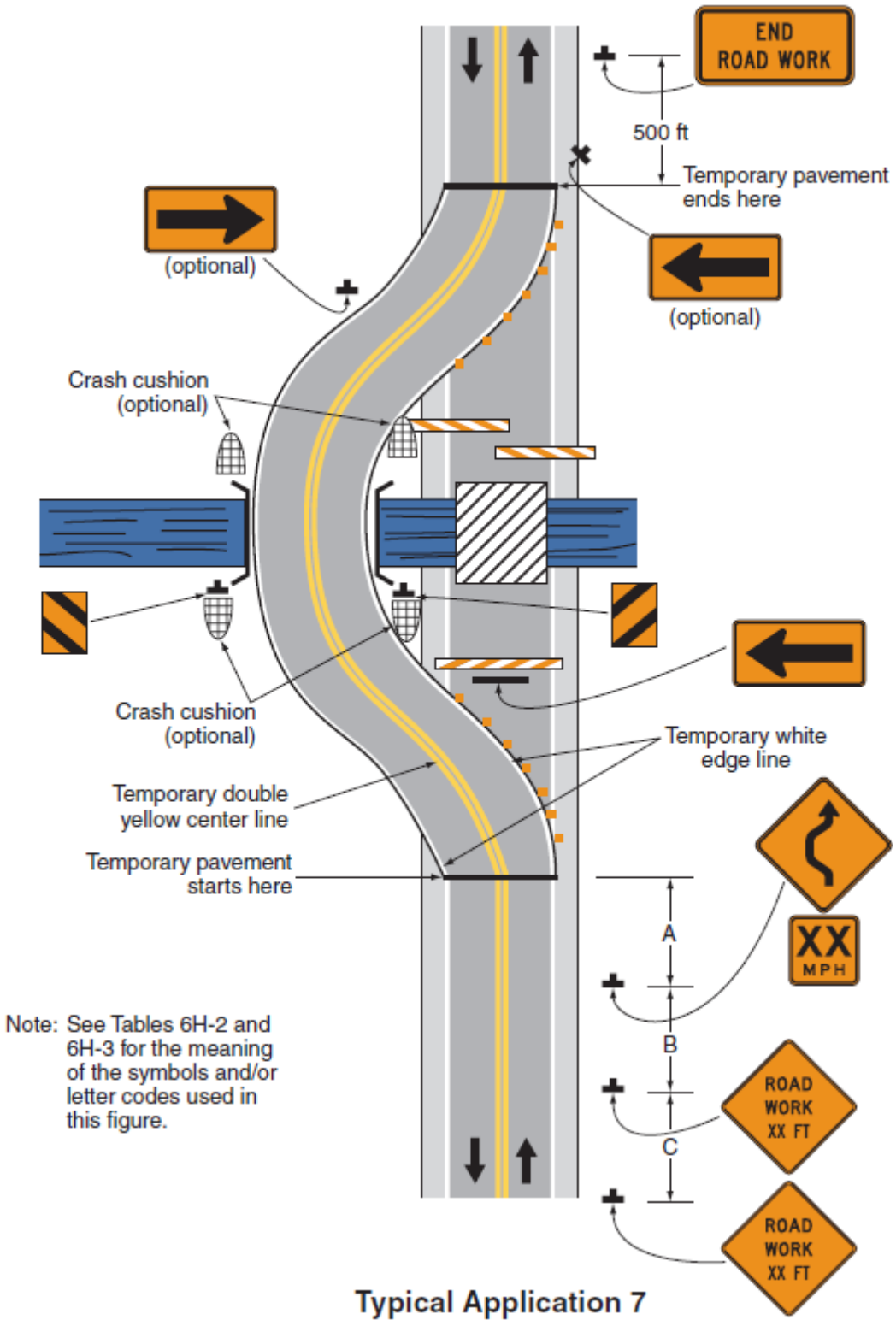
Guidance:

5. *If the tangent distance along the temporary diversion is more than 600 feet, a Reverse Curve sign, left first, should be used instead of the Double Reverse Curve sign, and a second Reverse Curve sign, right first, should be placed in advance of the second reverse curve back to the original alignment.*
6. *When the tangent section of the diversion is more than 600 feet, and the diversion has sharp curves with recommended speeds of 30 mph or less, Reverse Turn signs should be used.*
7. *Where the temporary pavement and old pavement are different colors, the temporary pavement should start on the tangent of the existing pavement and end on the tangent of the existing pavement.*

Option:

8. Flashing warning lights and/or flags may be used to call attention to the warning signs.
9. On sharp curves, large arrow signs may be used in addition to other advance warning signs.
10. Delineators or channelizing devices may be used along the diversion.

Figure 6H-7. Road Closure with a Diversion (TA-7)



Typical Application 7

Notes for Figure 6H-8—Typical Application 8
Road Closure with an Off-Site Detour

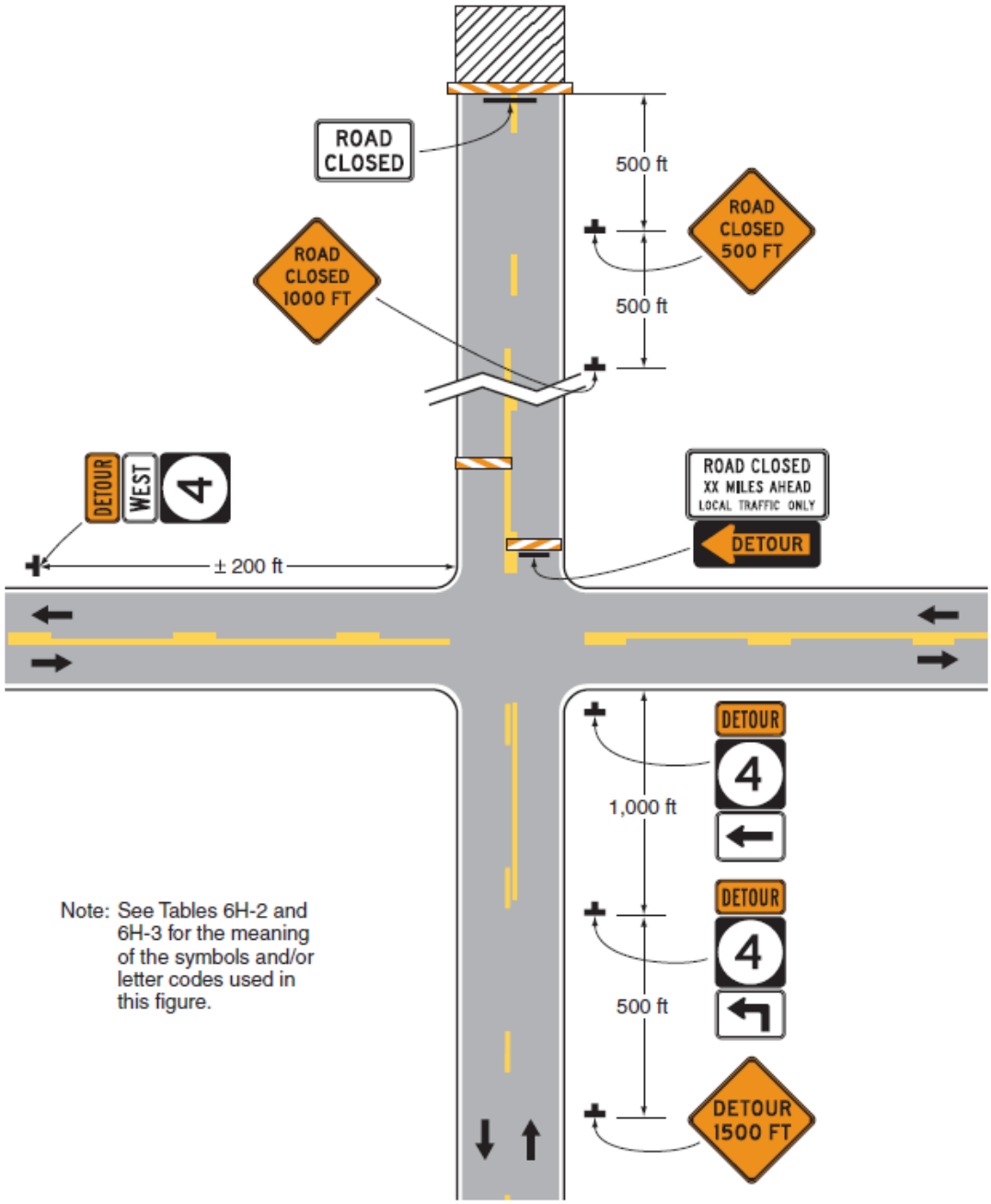
Guidance:

1. *Regulatory traffic control devices should be modified as needed for the duration of the detour.*

Option:

2. If the road is opened for some distance beyond the intersection and/or there are significant origin/ destination points beyond the intersection, the ROAD CLOSED and DETOUR signs on Type 3 Barricades may be located at the edge of the traveled way.
3. A Route Sign Directional assembly may be placed on the far left corner of the intersection to augment or replace the one shown on the near right corner.
4. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
5. Cardinal direction plaques may be used with route signs.

Figure 6H-8. Road Closure with an Off-Site Detour (TA-8)



Typical Application 8

Notes for Figure 6H-9—Typical Application 9
Overlapping Routes with a Detour

Support:

1. TTC devices are shown for one direction of travel only.

Standard:

2. **Devices similar to those depicted shall be placed for the opposite direction of travel.**

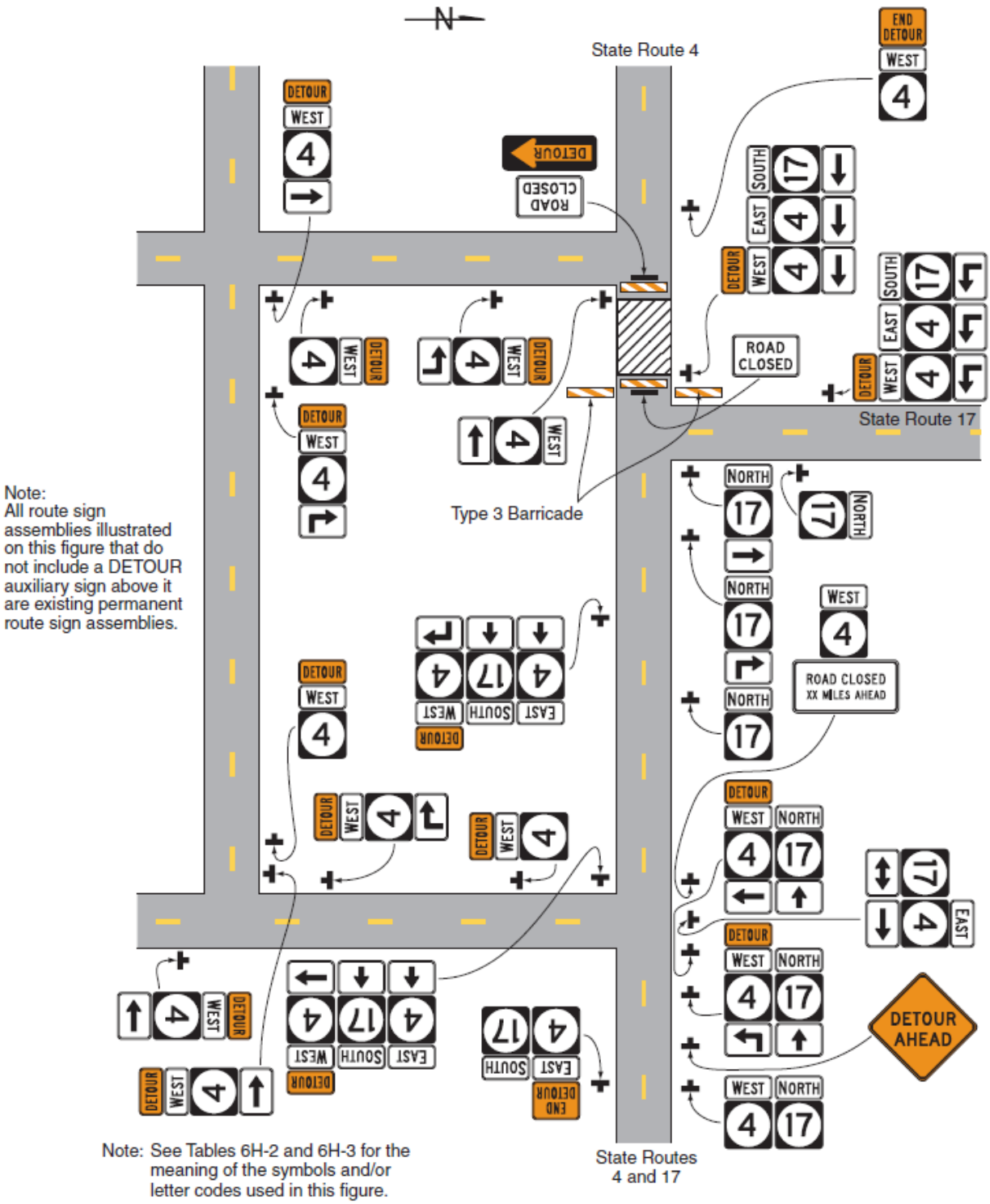
Guidance:

3. *STOP or YIELD signs displayed to side roads should be installed as needed along the temporary route*.

Option:

4. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
5. Flashing warning lights may be used on the Type 3 Barricades.
6. Cardinal direction plaques may be used with route signs.

Figure 6H-9. Overlapping Routes with a Detour (TA-9)



Typical Application 9

Notes for Figure 6H-10—Typical Application 10
Lane Closure on a Two-Lane Road Using Flaggers

Option:

1. For low-volume situations with short work zones on straight roadways where the flagger is visible to road users approaching from both directions, a single flagger, positioned to be visible to road users approaching from both directions, may be used (see Chapter 6E).
2. The ROAD WORK AHEAD and the END ROAD WORK signs may be omitted for short-duration operations.
3. Flashing warning lights and/or flags may be used to call attention to the advance warning signs. A BE PREPARED TO STOP sign may be added to the sign series.

Guidance:

4. *The buffer space should be extended so that the two-way traffic taper is placed before a horizontal (or crest vertical) curve to provide adequate sight distance for the flagger and a queue of stopped vehicles.*

Standard:

5. **At night, flagger stations shall be illuminated, except in emergencies.**

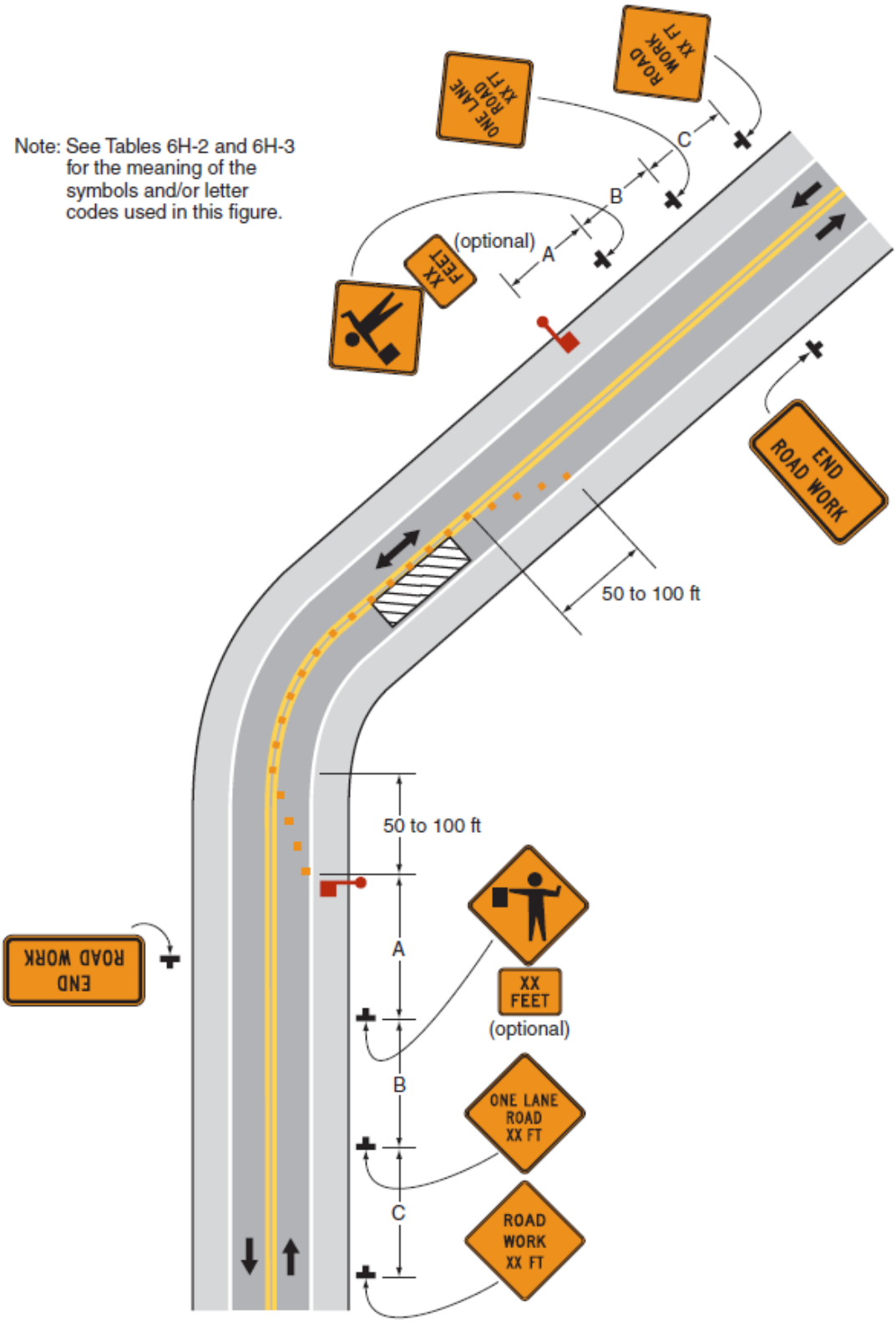
Guidance:

6. *When used, the BE PREPARED TO STOP sign should be located between the Flagger sign and the ONE LANE ROAD sign.*
7. *When a grade crossing exists within or upstream of the transition area and it is anticipated that queues resulting from the lane closure might extend through the grade crossing, the TTC zone should be extended so that the transition area precedes the grade crossing.*
8. *When a grade crossing equipped with active warning devices exists within the activity area, provisions should be made for keeping flaggers informed as to the activation status of these warning devices.*
9. *When a grade crossing exists within the activity area, drivers operating on the left-hand side of the normal center line should be provided with comparable warning devices as for drivers operating on the right-hand side of the normal center line.*
10. *Early coordination with the railroad company or light rail transit agency should occur before work starts.*

Option:

11. A flagger or a uniformed law enforcement officer may be used at the grade crossing to minimize the probability that vehicles are stopped within 15 feet of the grade crossing, measured from both sides of the outside rails.

Figure 6H-10. Lane Closure on a Two-Lane Road Using Flaggers (TA-10)



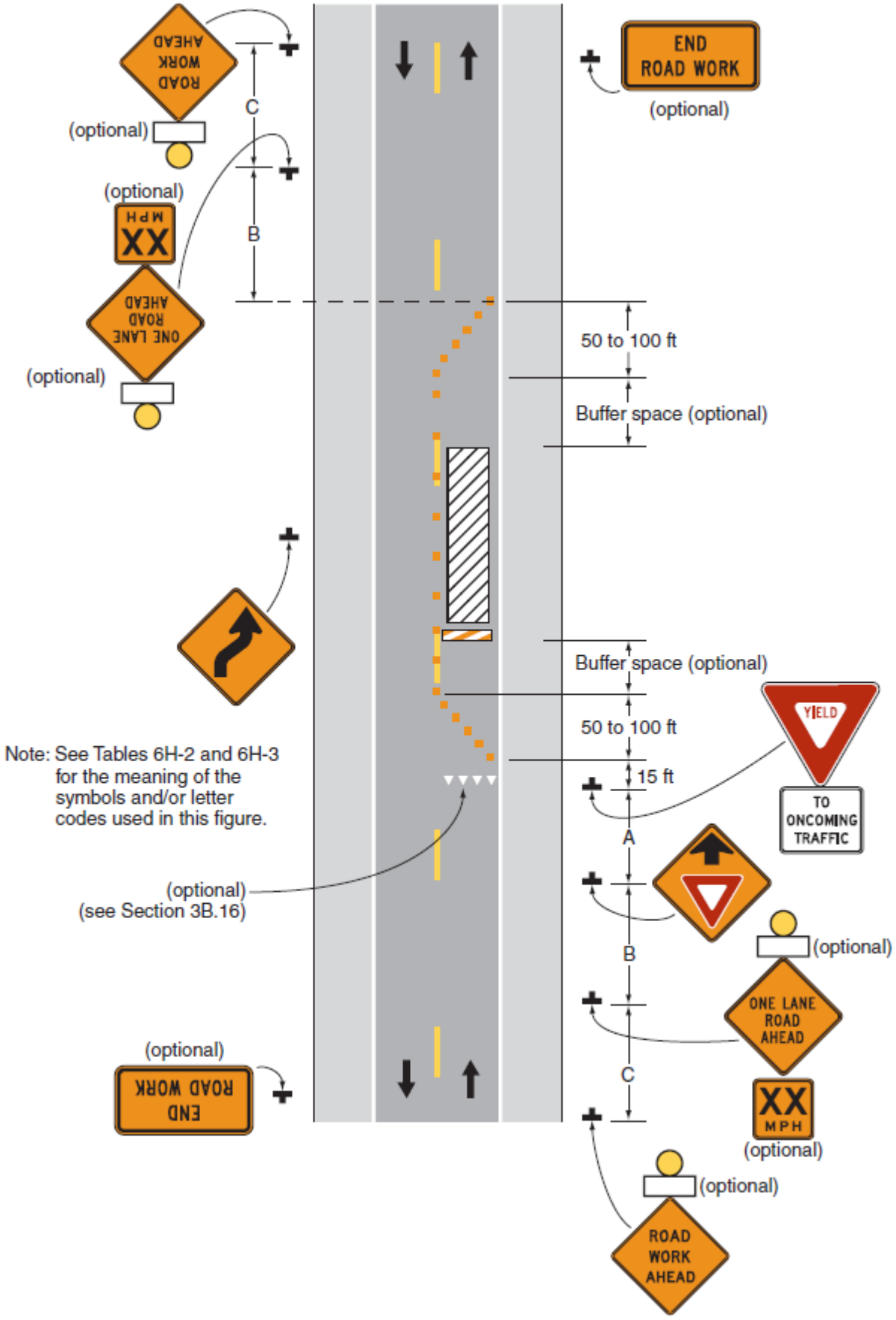
Typical Application 10

Notes for Figure 6H-11—Typical Application 11
Lane Closure on a Two-Lane Road with Low Traffic Volumes

Option:

1. This TTC zone application may be used as an alternate to the TTC application shown in Figure 6H-10 (using flaggers) when the following conditions exist:
2. Vehicular traffic volume is such that sufficient gaps exist for vehicular traffic that must yield.
3. Road users from both directions are able to see approaching vehicular traffic through and beyond the worksite and have sufficient visibility of approaching vehicles.
4. The Type B flashing warning lights may be placed on the ROAD WORK AHEAD and the ONE LANE ROAD AHEAD signs whenever a night lane closure is necessary.

Figure 6H-11. Lane Closure on a Two-Lane Road with Low Traffic Volumes (TA-11)



Typical Application 11

Notes for Figure 6H-12—Typical Application 12
Lane Closure on a Two-Lane Road Using Traffic Control Signals

Standard:

1. **Temporary traffic control signals shall be installed and operated in accordance with the provisions of Part 4. Temporary traffic control signals shall meet the physical display and operational requirements of conventional traffic control signals.**
2. **Temporary traffic control signal timing shall be established by authorized officials. Durations of red clearance intervals shall be adequate to clear the one-lane section of conflicting vehicles.**
3. **When the temporary traffic control signal is changed to the flashing mode, either manually or automatically, red signal indications shall be flashed to both approaches.**
4. **Stop lines shall be installed with temporary traffic control signals for intermediate and long-term closures. Existing conflicting pavement markings and raised pavement marker reflectors between the activity area and the stop line shall be removed. After the temporary traffic control signal is removed, the stop lines and other temporary pavement markings shall be removed and the permanent pavement markings restored.**
5. **Safeguards shall be incorporated to avoid the possibility of conflicting signal indications at each end of the TTC zone.**

Guidance:

6. *Where no-passing lines are not already in place, they should be added.*
7. *Adjustments in the location of the advance warning signs should be made as needed to accommodate the horizontal or vertical alignment of the roadway, recognizing that the distances shown for sign spacing are minimums. Adjustments in the height of the signal heads should be made as needed to conform to the vertical alignment.*

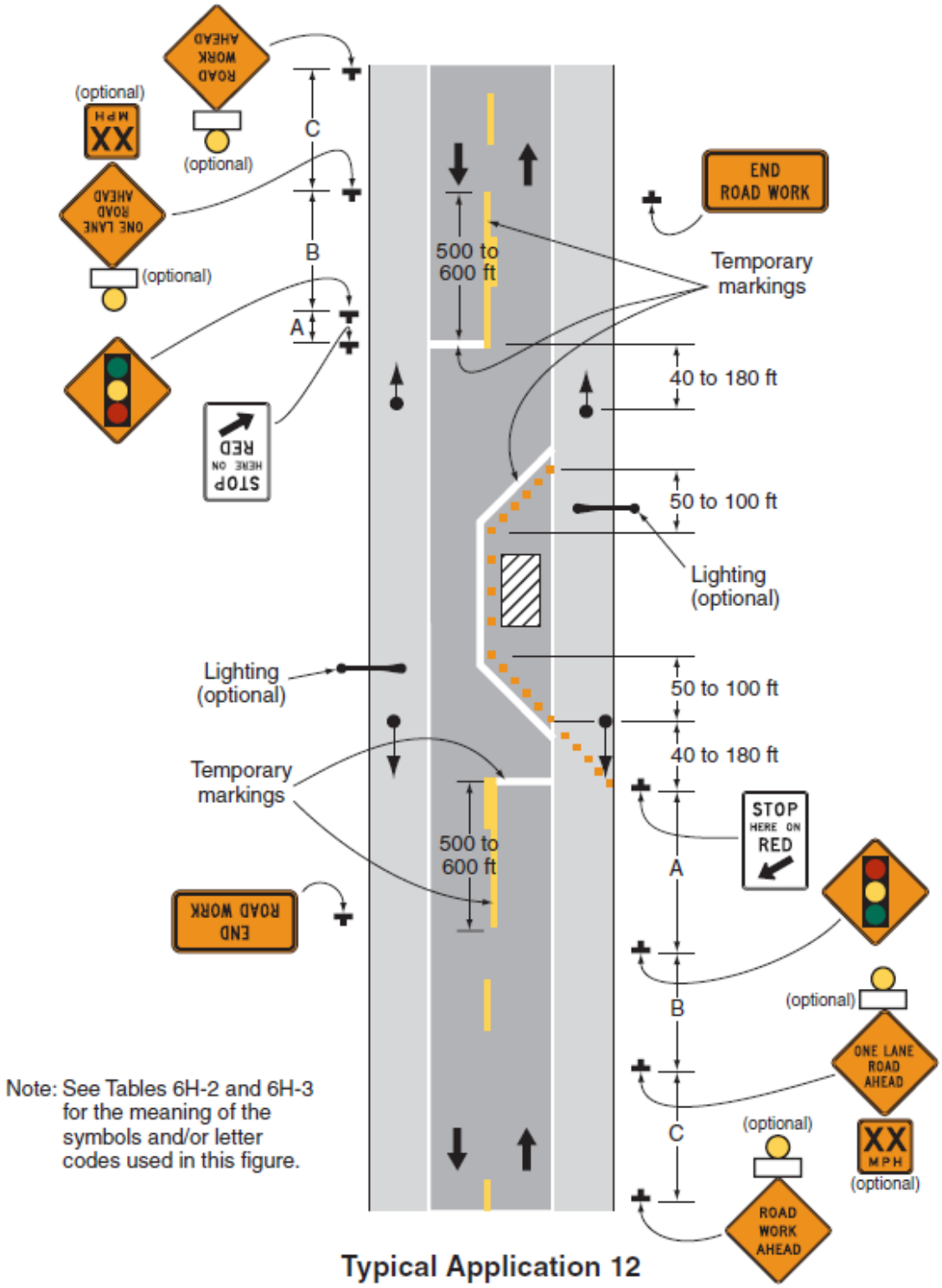
Option:

8. Flashing warning lights shown on the ROAD WORK AHEAD and the ONE LANE ROAD AHEAD signs may be used.
9. Removable pavement markings may be used.

Support:

10. Temporary traffic control signals are preferable to flaggers for long-term projects and other activities that would require flagging at night.
11. The maximum length of activity area for one-way operation under temporary traffic control signal control is determined by the capacity required to handle the peak demand.

Figure 6H-12. Lane Closure on a Two-Lane Road Using Traffic Control Signals (TA-12)



Typical Application 12

Notes for Figure 6H-13—Typical Application 13
Temporary Road Closure

Support:

1. Conditions represented are a planned closure not exceeding 20 minutes during the daytime.

Standard:

2. **A flagger or uniformed law enforcement officer shall be used for this application. The flagger, if used for this application, shall follow the procedures provided in Sections 6E.07 and 6E.08.**

Guidance:

3. *The uniformed law enforcement officer, if used for this application, should follow the procedures provided in Sections 6E.07 and 6E.08.*

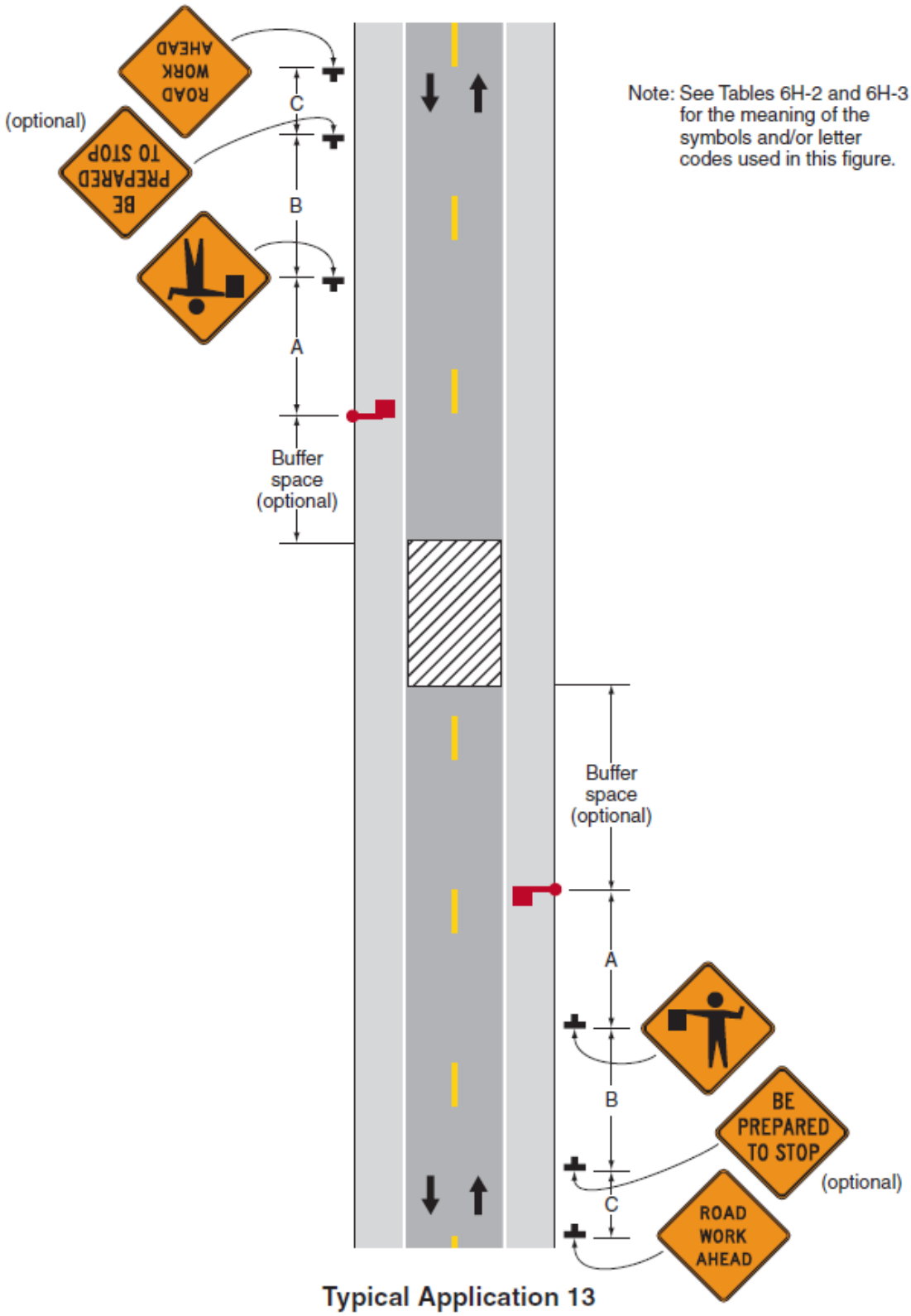
Option:

4. A BE PREPARED TO STOP sign may be added to the sign series.

Guidance:

5. *When used, the BE PREPARED TO STOP sign should be located before the Flagger symbol sign.*

Figure 6H-13. Temporary Road Closure (TA-13)



Typical Application 13

Notes for Figure 6H-14—Typical Application 14
Haul Road Crossing

Guidance:

1. Floodlights should be used to illuminate haul road crossings where existing light is inadequate.
2. Where no-passing lines are not already in place, they should be added.

Standard:

3. The traffic control method selected shall be used in both directions.

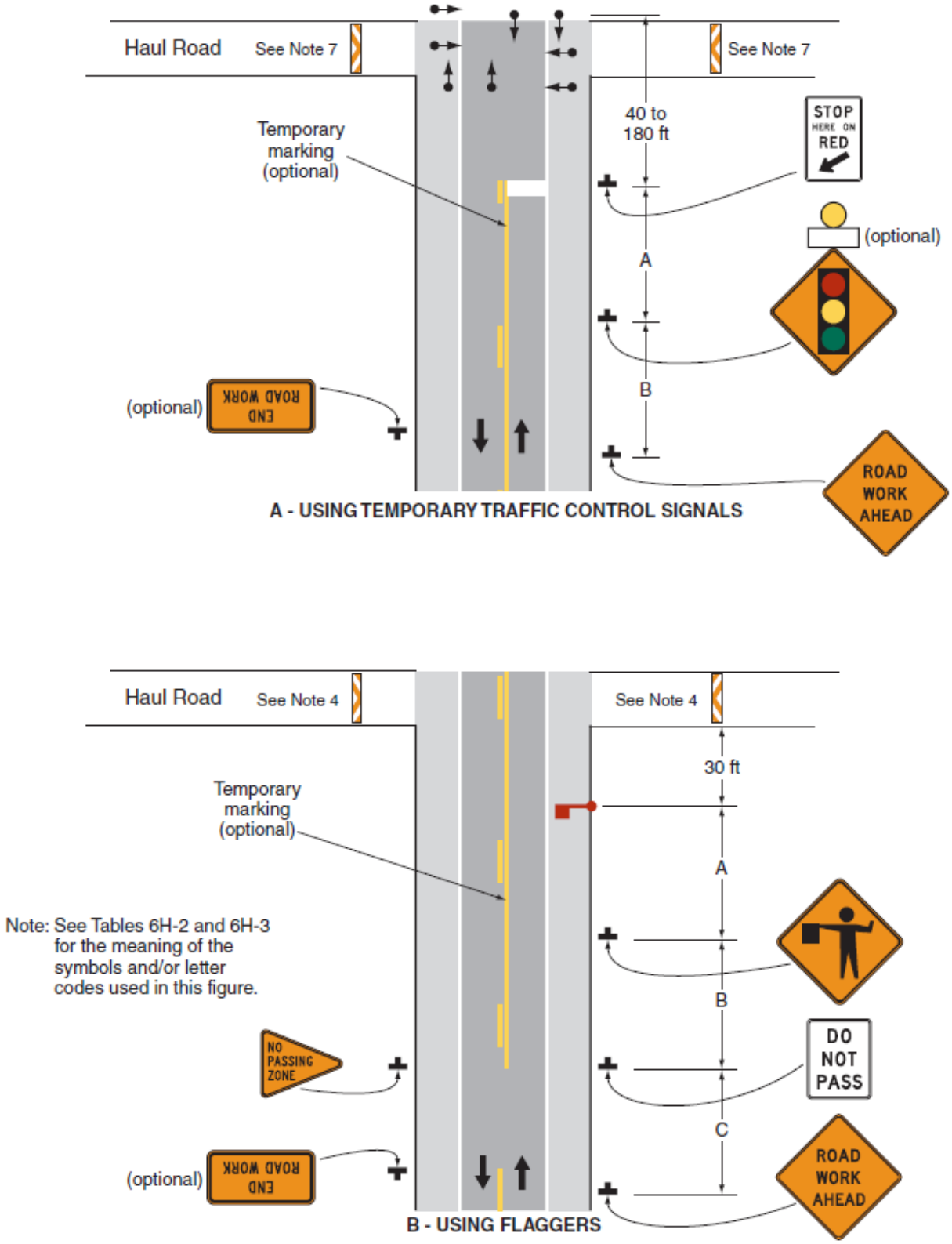
Flagging Method

4. When a road used exclusively as a haul road is not in use, the haul road shall be closed with Type 3 Barricades and the Flagger symbol signs covered.
5. The flagger shall follow the procedures provided in Sections 6E.07 and 6E.08.
6. At night, flagger stations shall be illuminated, except in emergencies.

Signalized Method

7. When a road used exclusively as a haul road is not in use, the haul road shall be closed with Type 3 Barricades. The signals shall either flash yellow on the main road or be covered, and the Signal Ahead and STOP HERE ON RED signs shall be covered or hidden from view.
8. The temporary traffic control signals shall control both the highway and the haul road and shall meet the physical display and operational requirements of conventional traffic control signals as described in Part 4. Traffic control signal timing shall be established by authorized officials.
9. Stop lines shall be used on existing highway with temporary traffic control signals.
10. Existing conflicting pavements markings between the stop lines shall be removed. After the temporary traffic control signal is removed, the stop lines and other temporary pavement markings shall be removed and the permanent pavement markings restored.

Figure 6H-14. Haul Road Crossing (TA-14)



Notes for Figure 6H-15—Typical Application 15
Work in the Center of a Road with Low Traffic Volumes

Guidance:

1. *The lanes on either side of the center work space should have a minimum width of 10 feet as measured from the near edge of the channelizing devices to the edge of the pavement or the outside edge of the paved shoulder.*

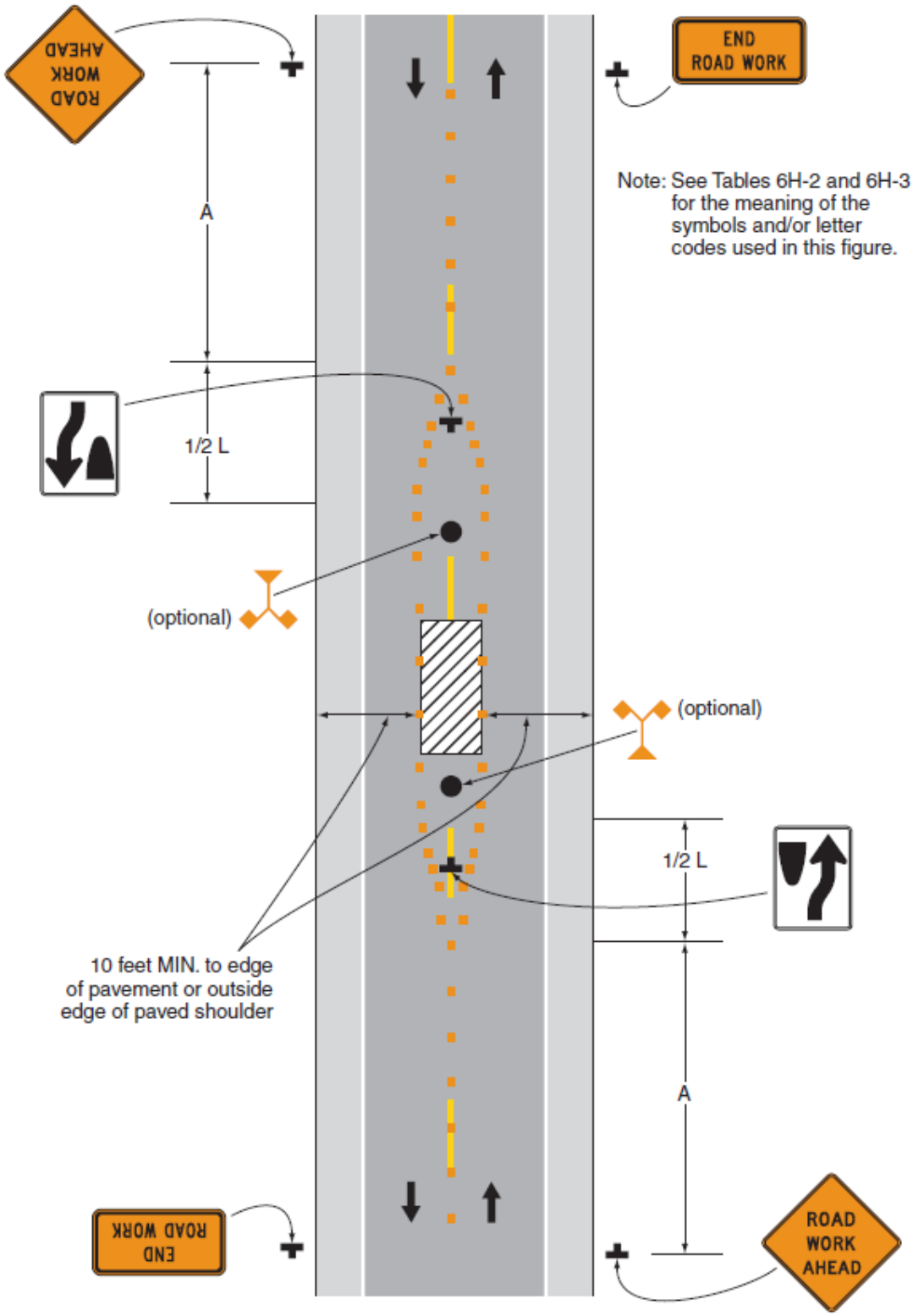
Option:

2. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
3. If the closure continues overnight, warning lights may be used on the channelizing devices.
4. A lane width of 9 feet may be used for short-term stationary work on low-volume, low-speed roadways when motor vehicle traffic does not include longer and wider heavy commercial vehicles.
5. A work vehicle displaying high-intensity rotating, flashing, oscillating, or strobe lights may be used instead of the channelizing devices forming the tapers or the high-level warning devices.
6. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.

Standard:

7. **Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.**

Figure 6H-15. Work in the Center of a Road with Low Traffic Volumes (TA-15)



Typical Application 15

Notes for Figure 6H-16—Typical Application 16
Surveying Along the Center Line of a Road with Low Traffic Volumes

Guidance:

1. *The lanes on either side of the center work space should have a minimum width of 10 feet as measured from the near edge of the channelizing devices to the edge of the pavement or the outside edge of the paved shoulder.*
2. *Cones should be placed 6 to 12 inches on either side of the center line.*
3. *A flagger should be used to warn workers who cannot watch road users.*

Standard:

4. **For surveying on the center line of a high-volume road, one lane shall be closed using the information illustrated in Figure 6H-10.**

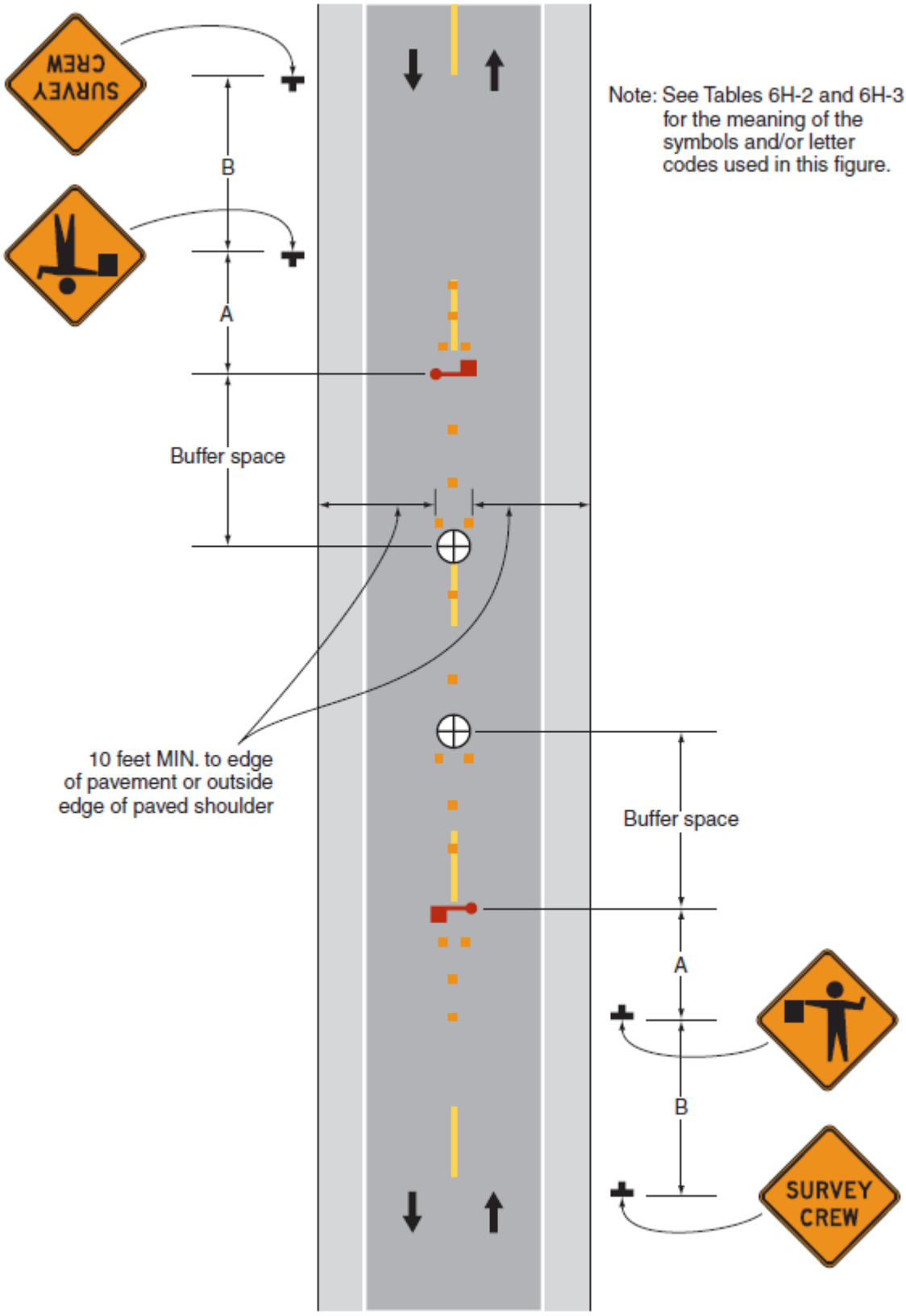
Option:

5. A high-level warning device may be used to protect a surveying device, such as a target on a tripod.
6. Cones may be omitted for a cross-section survey.
7. ROAD WORK AHEAD signs may be used in place of the SURVEY CREW AHEAD signs.
8. Flags may be used to call attention to the advance warning signs.
9. If the work is along the shoulder, the flagger may be omitted.
10. For a survey along the edge of the road or along the shoulder, cones may be placed along the edge line.
11. A BE PREPARED TO STOP sign may be added to the sign series.

Guidance:

12. *When used, the BE PREPARED TO STOP sign should be located before the Flagger symbol sign.*

Figure 6H-16. Surveying Along the Center Line of a Road with Low Traffic Volumes (TA-16)



Typical Application 16

Notes for Figure 6H-17—Typical Application 17
Mobile Operations on a Two-Lane Road

Standard:

1. **Vehicle-mounted signs shall be mounted in a manner such that they are not obscured by equipment or supplies. Sign legends on vehicle-mounted signs shall be covered or turned from view when work is not in progress.**
2. **Shadow and work vehicles shall display high-intensity rotating, flashing, oscillating, or strobe lights.**
3. **If an arrow board is used, it shall be used in the caution mode.**

Guidance:

4. *Where practical and when needed, the work and shadow vehicles should pull over periodically to allow vehicular traffic to pass.*
5. *Whenever adequate stopping sight distance exists to the rear, the shadow vehicle should maintain the minimum distance from the work vehicle and proceed at the same speed. The shadow vehicle should slow down in advance of vertical or horizontal curves that restrict sight distance.*
6. *The shadow vehicles should also be equipped with two high-intensity flashing lights mounted on the rear, adjacent to the sign.*

Option:

7. The distance between the work and shadow vehicles may vary according to terrain, paint drying time, and other factors.
8. Additional shadow vehicles to warn and reduce the speed of oncoming or opposing vehicular traffic may be used. Law enforcement vehicles may be used for this purpose.
9. A truck-mounted attenuator may be used on the shadow vehicle or on the work vehicle.
10. If the work and shadow vehicles cannot pull over to allow vehicular traffic to pass frequently, a DO NOT PASS sign may be placed on the rear of the vehicle blocking the lane.

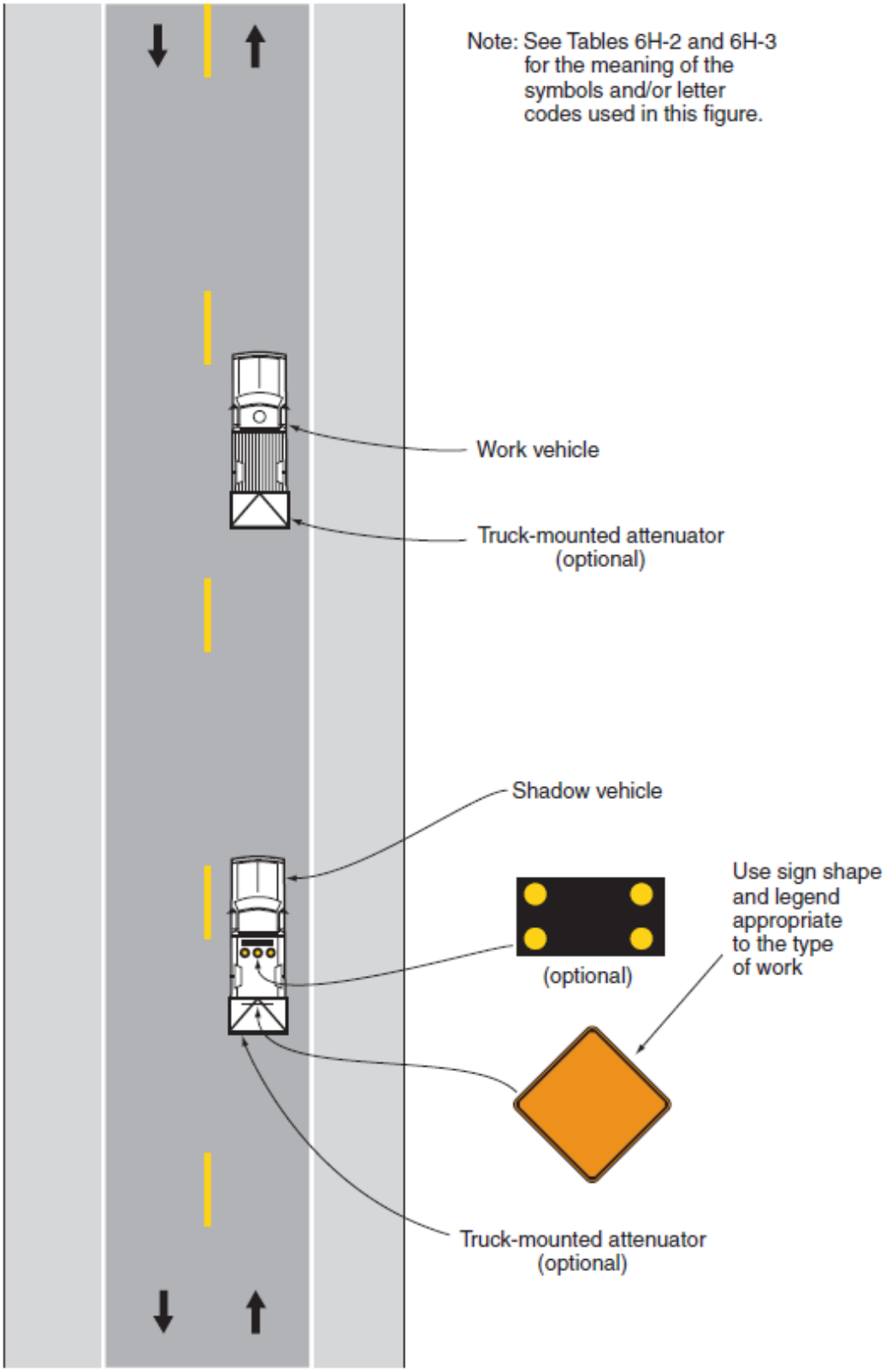
Support:

11. Shadow vehicles are used to warn motor vehicle traffic of the operation ahead.

Standard:

12. **Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.**

Figure 6H-17. Mobile Operations on a Two-Lane Road (TA-17)



Typical Application 17

Notes for Figure 6H-18—Typical Application 18
Lane Closure on a Minor Street

Standard:

1. **This TTC shall be used only for low-speed facilities having low traffic volumes.**

Option:

2. Where the work space is short, where road users can see the roadway beyond, and where volume is low, vehicular traffic may be self-regulating.

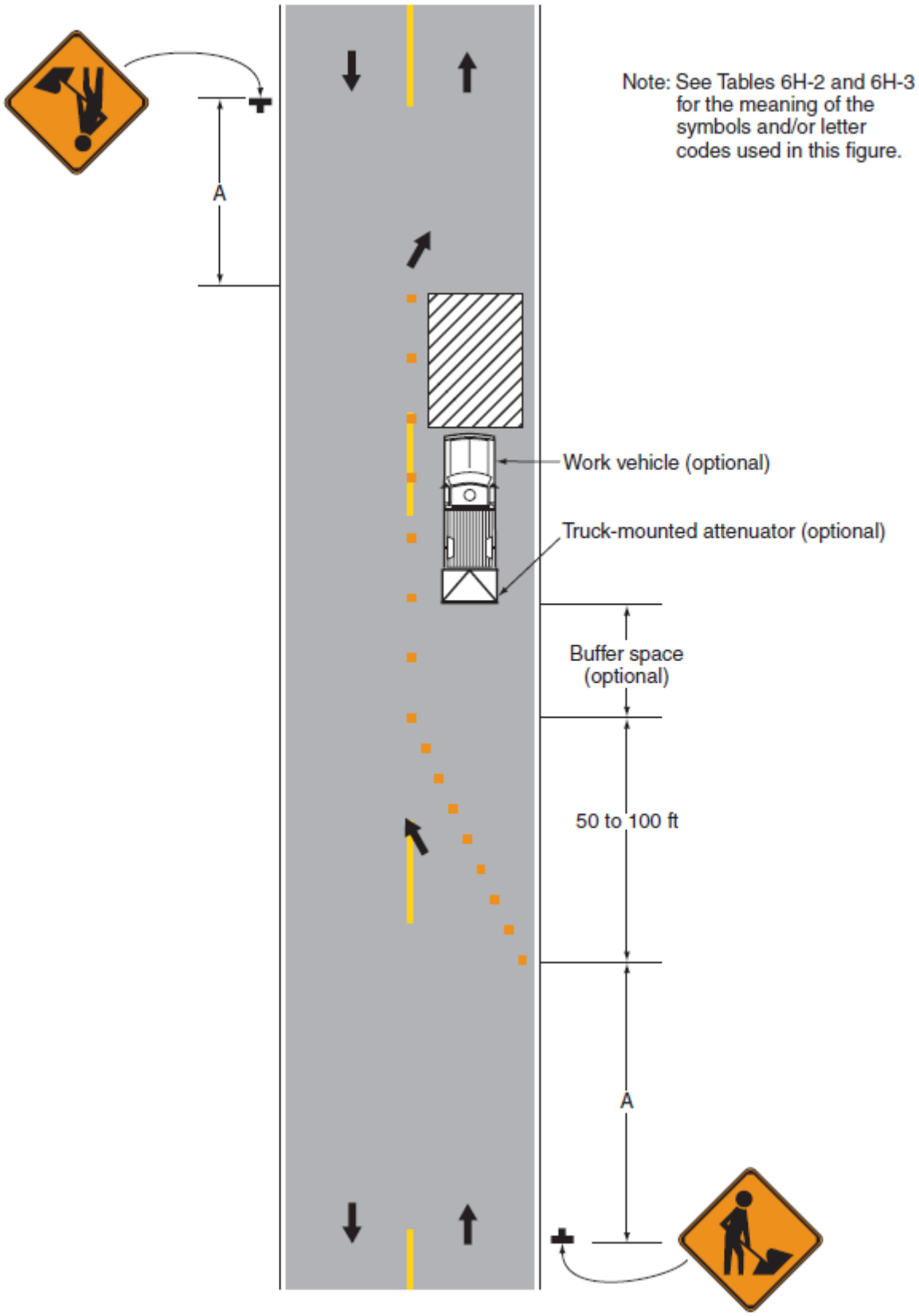
Standard:

3. **Where vehicular traffic cannot effectively self-regulate, one or two flaggers shall be used as illustrated in Figure 6H-10.**

Option:

4. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
5. A truck-mounted attenuator may be used on the work vehicle and the shadow vehicle.

Figure 6H-18. Lane Closure on a Minor Street (TA-18)



Typical Application 18

Notes for Figure 6H-19—Typical Application 19
Detour for One Travel Direction

Option:

1. The STREET CLOSED legend may be used in place of ROAD CLOSED.
2. Additional DO NOT ENTER signs may be used at intersections with intervening streets.
3. Warning lights may be used on Type 3 Barricades.
4. Detour signs may be located on the far side of intersections.
5. A Street Name sign may be mounted with the Detour sign. The Street Name sign may be either white on green or black on orange.
6. For long-term duration projects (see Section 6G.02), the shared roadway bicycle marking may be used along detours with on-street parking and inadequate lane width.

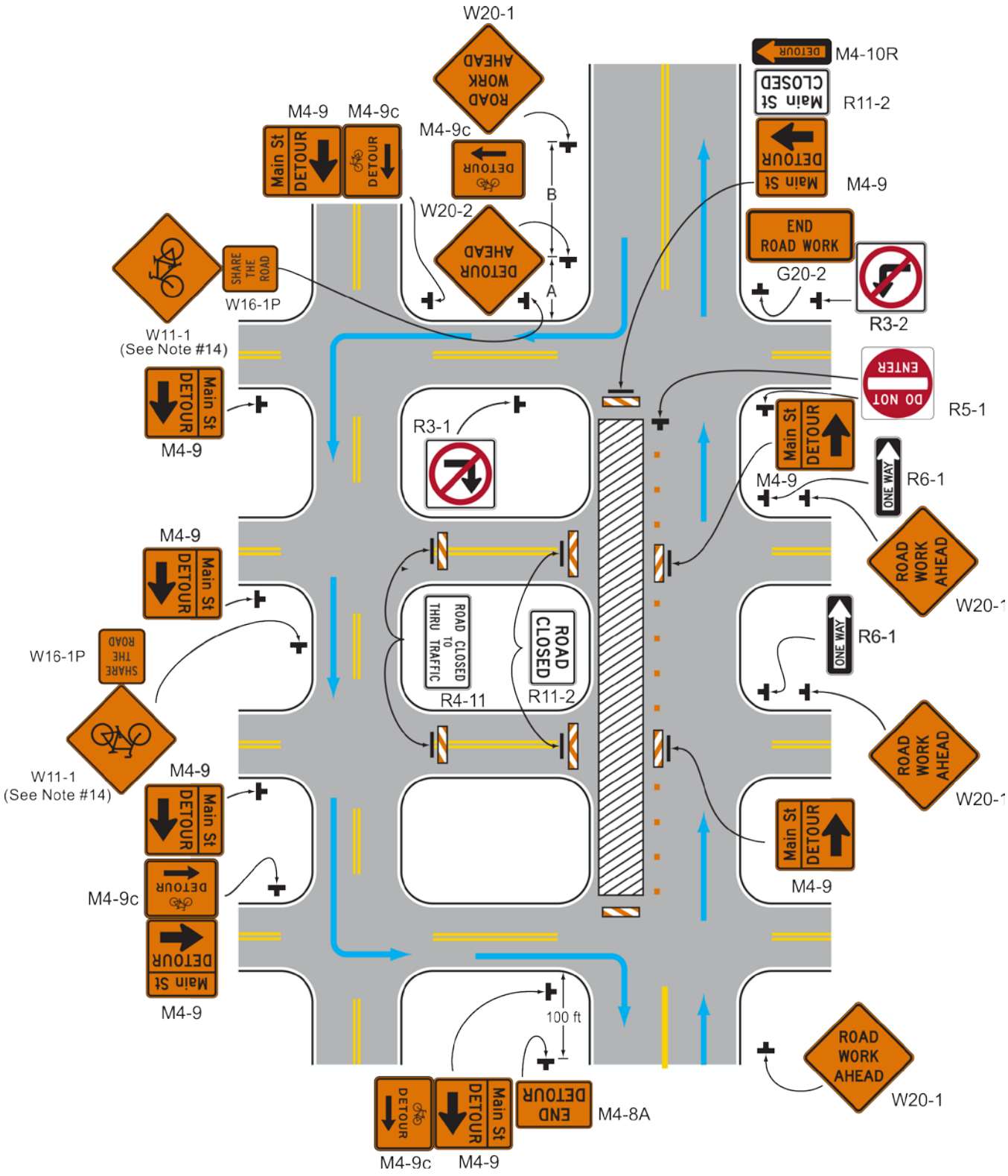
Standard:

7. **When used, the Street Name sign shall be placed above the Detour sign.**
8. **When existing accommodations for bicycle travel are disrupted or closed in a long-term duration project (see Section 6G.02) and the roadway width is inadequate for allowing bicyclists and motor vehicles to travel side by side, a separate path shall be provided for bicyclists.**

Guidance:

9. *This plan should be used for streets without posted route numbers.*
10. *On multi-lane streets, Detour signs with an Advance Turn Arrow should be used in advance of a turn.*
11. *The DETOUR (M4-8) sign should be placed on tangent sections at intervals not to exceed 1300 feet and at major intersections.*
12. *All advance warning signs should be placed so that the path of travel for bicycles is not blocked, while maintaining visibility for road users.*
13. *When the detour is applicable to bicyclists and not pedestrians, the Bicycle Detour (M4-9c) sign should be used instead of the Pedestrian/Bicycle Detour (M4-9a) sign.*
14. *When existing accommodations for bicycle travel are disrupted or closed in a long-term duration project (see Section 6G.02) and the roadway width is inadequate for allowing bicyclists and motor vehicles to travel side by side, the Bicycle Warning (W11-1) sign and the SHARE THE ROAD (W16-1P) plaque should be used to advise motorists of the presence of bicyclists in the travel way lanes.*

Figure 6H-19. Detour for One Travel Direction (TA-19)



Notes for Figure 6H-20—Typical Application 20
Detour for a Closed Street

Guidance:

1. *This plan should be used for streets without posted route numbers.*
2. *On multi-lane streets, Detour signs with an Advance Turn Arrow should be used in advance of a turn.*

Option:

3. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
4. Flashing warning lights may be used on Type 3 Barricades.
5. Detour signs may be located on the far side of intersections. A Detour sign with an advance arrow may be used in advance of a turn.
6. A Street Name sign may be mounted with the Detour sign. The Street Name sign may be either white on green or black on orange.

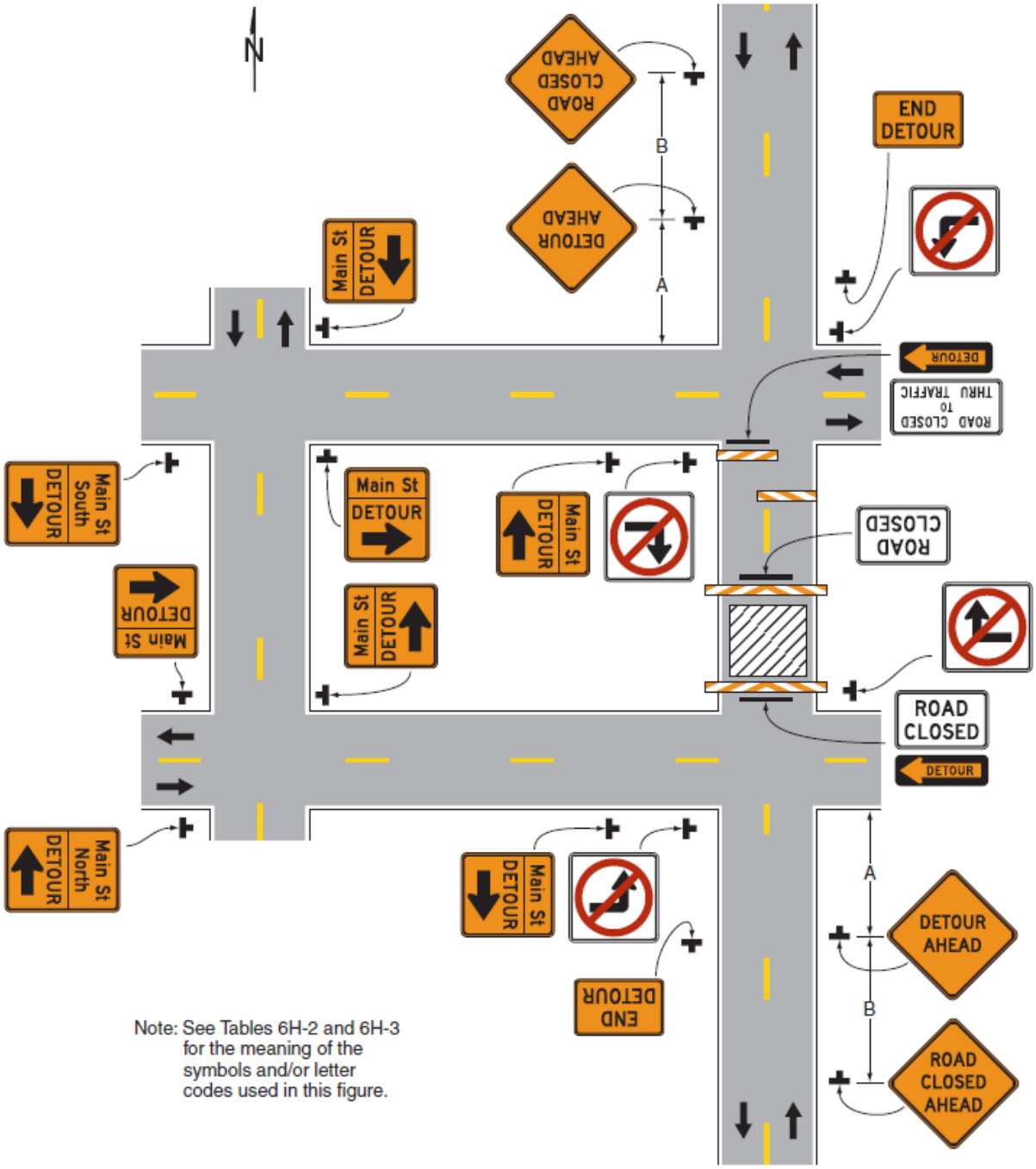
Standard:

7. **When used, the Street Name sign shall be placed above the Detour sign.**

Support:

8. See Figure 6H-9 for the information for detouring a numbered highway.

Figure 6H-20. Detour for a Closed Street (TA-20)



Typical Application 20

Notes for Figure 6H-21—Typical Application 21
Lane Closure on the Near Side of an Intersection

Standard:

1. **The merging taper shall direct vehicular traffic into either the right-hand or left-hand lane, but not both.**

Guidance:

2. *In this typical application, a left taper should be used so that right-turn movements will not impede through motor vehicle traffic. However, the reverse should be true for left-turn movements.*
3. *If the work space extends across a crosswalk, the crosswalk should be closed using the information and devices shown in Figure 6H-29.*

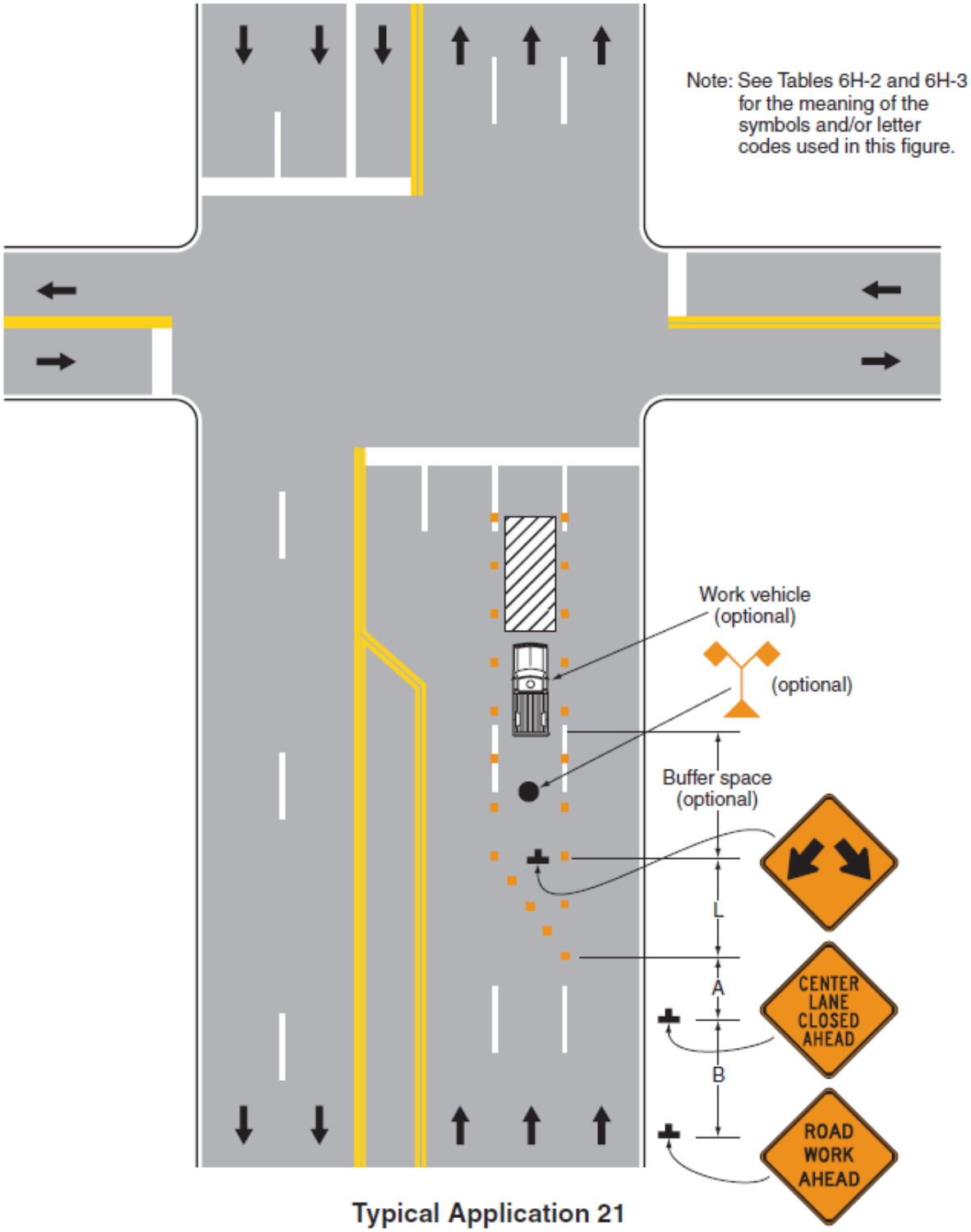
Option:

4. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
5. A shadow vehicle with a truck-mounted attenuator may be used.
6. A work vehicle with high-intensity rotating, flashing, oscillating, or strobe lights may be used with the high-level warning device.
7. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.

Standard:

8. **Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.**

Figure 6H-21. Lane Closure on the Near Side of an Intersection (TA-21)



Typical Application 21

Notes for Figure 6H-22—Typical Application 22
Right-Hand Lane Closure on the Far Side of an Intersection

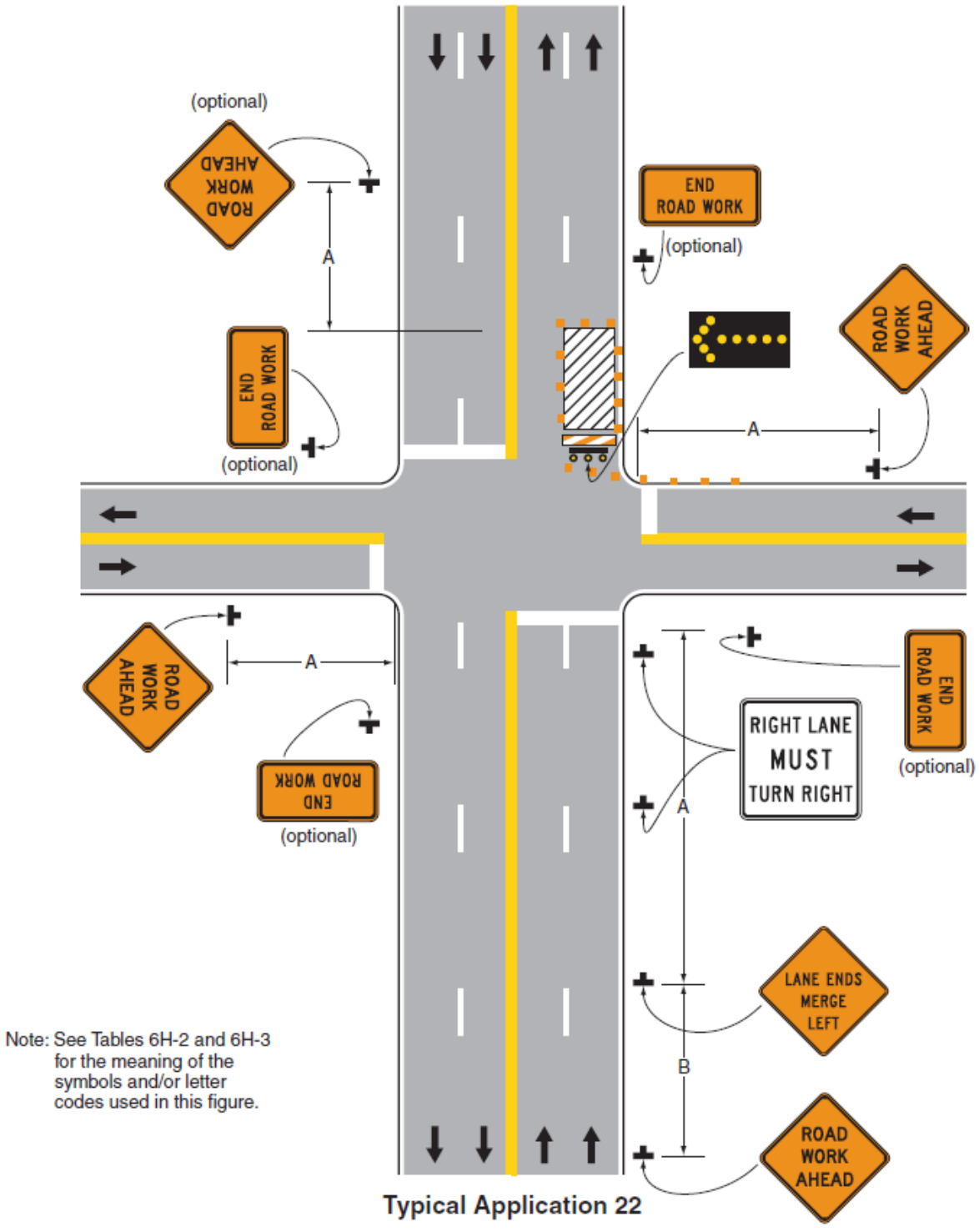
Guidance:

1. *If the work space extends across a crosswalk, the crosswalk should be closed using the information and devices shown in Figure 6H-29.*

Option:

2. The normal procedure is to close on the near side of the intersection any lane that is not carried through the intersection. However, when this results in the closure of a right-hand lane having significant right turning movements, then the right-hand lane may be restricted to right turns only, as shown. This procedure increases the through capacity by eliminating right turns from the open through lane.
3. For intersection approaches reduced to a single lane, left-turning movements may be prohibited to maintain capacity for through vehicular traffic.
4. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
5. Where the turning radius is large, it may be possible to create a right-turn island using channelizing devices or pavement markings.

Figure 6H-22. Right-Hand Lane Closure on the Far Side of an Intersection (TA-22)



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Typical Application 22

Notes for Figure 6H-23—Typical Application 23
Left-Hand Lane Closure on the Far Side of an Intersection

Guidance:

1. *If the work space extends across a crosswalk, the crosswalk should be closed using the information and devices shown in Figure 6H-29.*

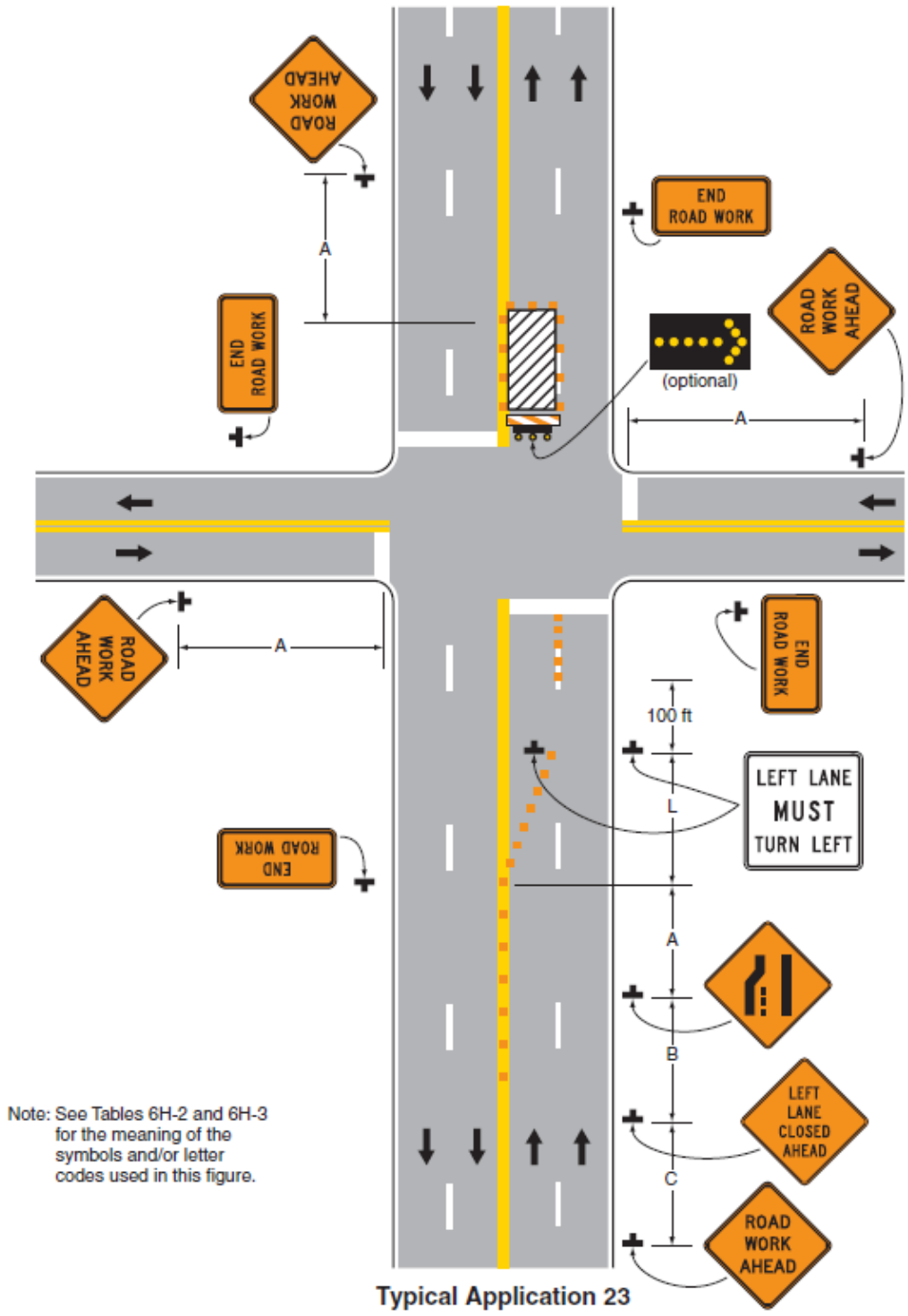
Option:

2. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
3. The normal procedure is to close on the near side of the intersection any lane that is not carried through the intersection. However, when this results in the closure of a left lane having significant left-turning movements, then the left lane may be reopened as a turn bay for left turns only, as shown.

Support:

4. By first closing off the left lane and then reopening it as a turn bay, the left-turn bay allows storage of turning vehicles so that the movement of through traffic is not impeded. A left-turn bay that is long enough to accommodate all turning vehicles during a traffic signal cycle will provide the maximum benefit for through traffic. Also, an island is created with channelizing devices that allows the LEFT LANE MUST TURN LEFT sign to be repeated on the left adjacent to the lane that it controls.

Figure 6H-23. Left-Hand Lane Closure on the Far Side of an Intersection (TA-23)



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Typical Application 23

Notes for Figure 6H-24—Typical Application 24
Half Road Closure on the Far Side of an Intersection

Guidance:

1. *If the work space extends across a crosswalk, the crosswalk should be closed using the information and devices shown in Figure 6H-29.*
2. *When turn prohibitions are implemented, two turn prohibition signs should be used, one on the near side and, space permitting, one on the far side of the intersection.*

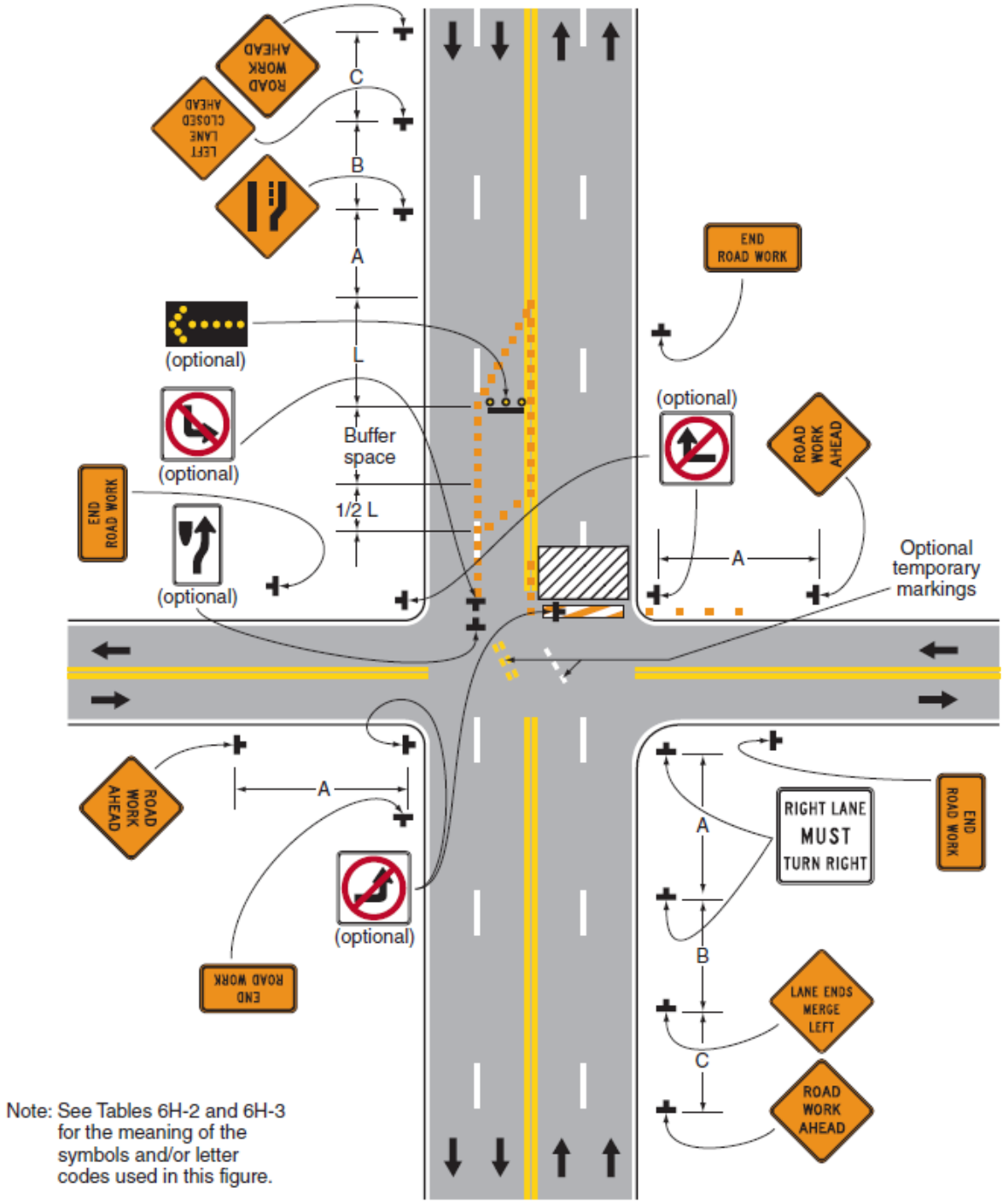
Option:

3. A buffer space may be used between opposing directions of vehicular traffic as shown in this application.
4. The normal procedure is to close on the near side of the intersection any lane that is not carried through the intersection. However, if there is a significant right-turning movement, then the right-hand lane may be restricted to right turns only, as shown.
5. Where the turning radius is large, a right-turn island using channelizing devices or pavement markings may be used.
6. There may be insufficient space to place the back-to-back Keep Right sign and No Left Turn symbol signs at the end of the row of channelizing devices separating opposing vehicular traffic flows. In this situation, the No Left Turn symbol sign may be placed on the right and the Keep Right sign may be omitted.
7. For intersection approaches reduced to a single lane, left-turning movements may be prohibited to maintain capacity for through vehicular traffic.
8. Flashing warning lights and/or flags may be used to call attention to advance warning signs.
9. Temporary pavement markings may be used to delineate the travel path through the intersection.

Support:

10. Keeping the right-hand lane open increases the through capacity by eliminating right turns from the open through lane.
11. A temporary turn island reinforces the nature of the temporary exclusive right-turn lane and enables a second RIGHT LANE MUST TURN RIGHT sign to be placed in the island.

Figure 6H-24. Half Road Closure on the Far Side of an Intersection (TA-24)



Typical Application 24

Notes for Figure 6H-25—Typical Application 25
Multiple Lane Closures at an Intersection

Guidance:

1. *If the work space extends across a crosswalk, the crosswalk should be closed using the information and devices shown in Figure 6H-29.*
2. *If the left through lane is closed on the near-side approach, the LEFT LANE MUST TURN LEFT sign should be placed in the median to discourage through vehicular traffic from entering the left-turn bay.*

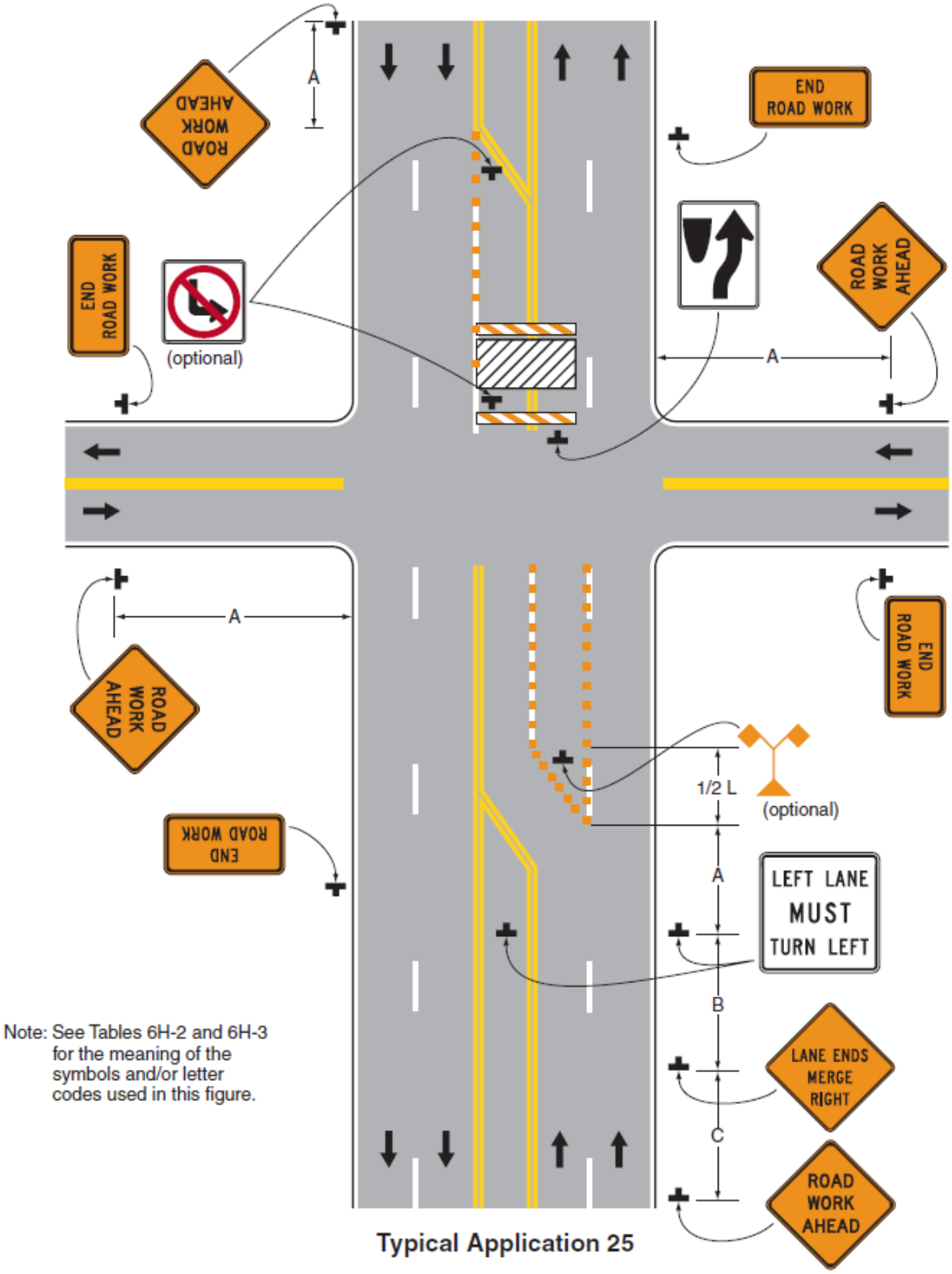
Support:

3. The normal procedure is to close on the near side of the intersection any lane that is not carried through the intersection.

Option:

4. If the left-turning movement that normally uses the closed turn bay is small and/or the gaps in opposing vehicular traffic are frequent, left turns may be permitted on that approach.
5. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.

Figure 6H-25. Multiple Lane Closures at an Intersection (TA-25)



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Typical Application 25

Notes for Figure 6H-26—Typical Application 26
Closure in the Center of an Intersection

Guidance:

1. *All lanes should be a minimum of 10 feet in width as measured to the near face of the channelizing devices.*

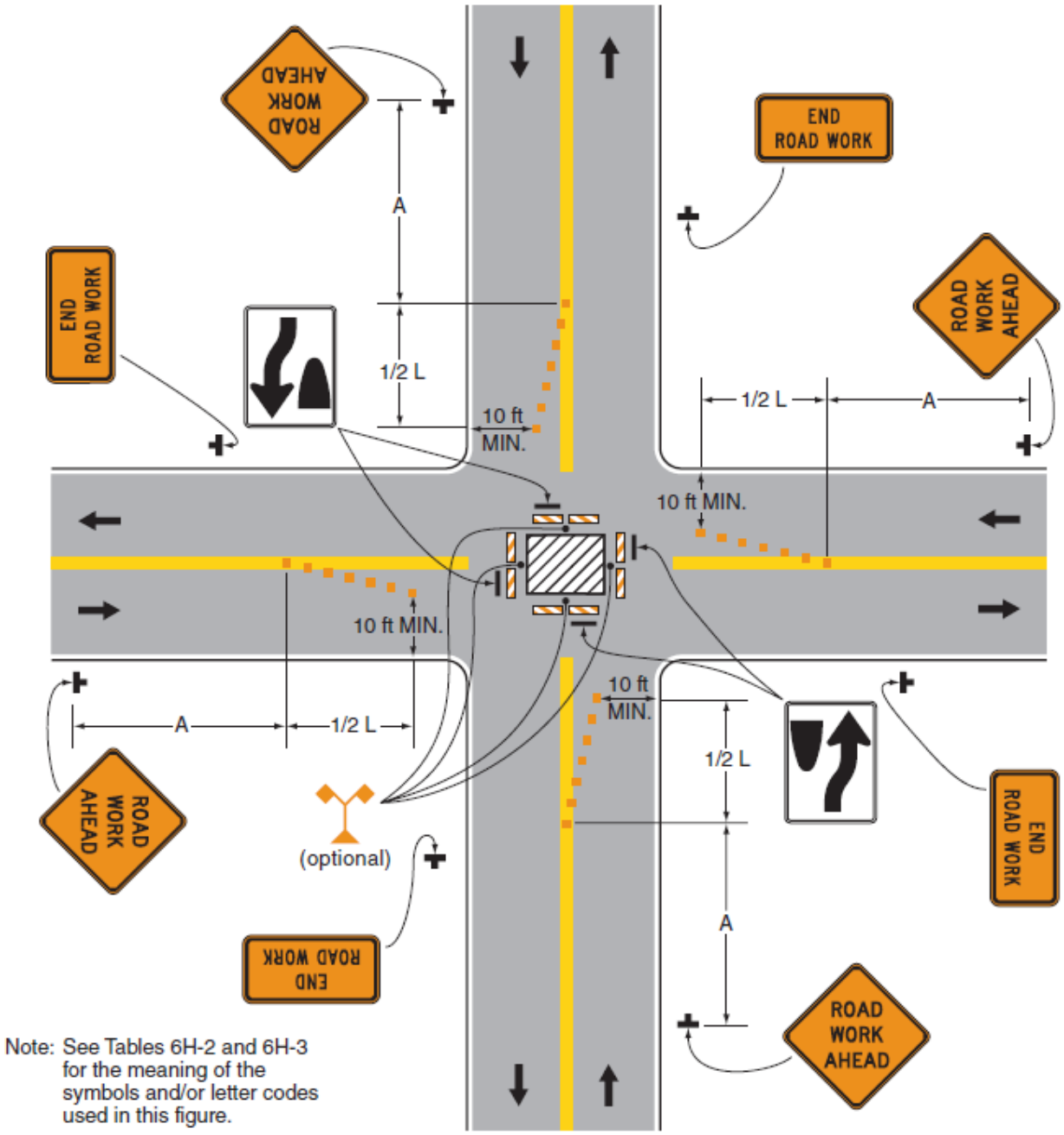
Option:

2. A high-level warning device may be placed in the work space, if there is sufficient room.
3. For short-term use on low-volume, low-speed roadways with vehicular traffic that does not include longer and wider heavy commercial vehicles, a minimum lane width of 9 feet may be used.
4. Flashing warning lights and/or flags may be used to call attention to advance warning signs.
5. Unless the streets are wide, it may be physically impossible to turn left, especially for large vehicles. Left turns may be prohibited as required by geometric conditions.
6. For short-duration work operations, the channelizing devices may be eliminated if a vehicle displaying high-intensity rotating, flashing, oscillating, or strobe lights is positioned in the work space.
7. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.

Standard:

8. **Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.**

Figure 6H-26. Closure in the Center of an Intersection (TA-26)



Typical Application 26

Notes for Figure 6H-27—Typical Application 27
Closure at the Side of an Intersection

Guidance:

1. *The situation depicted can be simplified by closing one or more of the intersection approaches. If this cannot be done, and/or when capacity is a problem, through vehicular traffic should be directed to other roads or streets.*
2. *Depending on road user conditions, flagger(s) or uniformed law enforcement officer(s) should be used to direct road users within the intersection.*

Standard:

3. **At night, flagger stations shall be illuminated, except in emergencies.**

Option:

4. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
5. For short-duration work operations, the channelizing devices may be eliminated if a vehicle displaying high-intensity rotating, flashing, oscillating, or strobe lights is positioned in the work space.
6. A BE PREPARED TO STOP sign may be added to the sign series.

Guidance:

7. *When used, the BE PREPARED TO STOP sign should be located before the Flagger symbol sign.*
8. *ONE LANE ROAD AHEAD signs should also be used to provide adequate advance warning.*

Support:

9. Turns can be prohibited as required by vehicular traffic conditions. Unless the streets are wide, it might be physically impossible to make certain turns, especially for large vehicles.

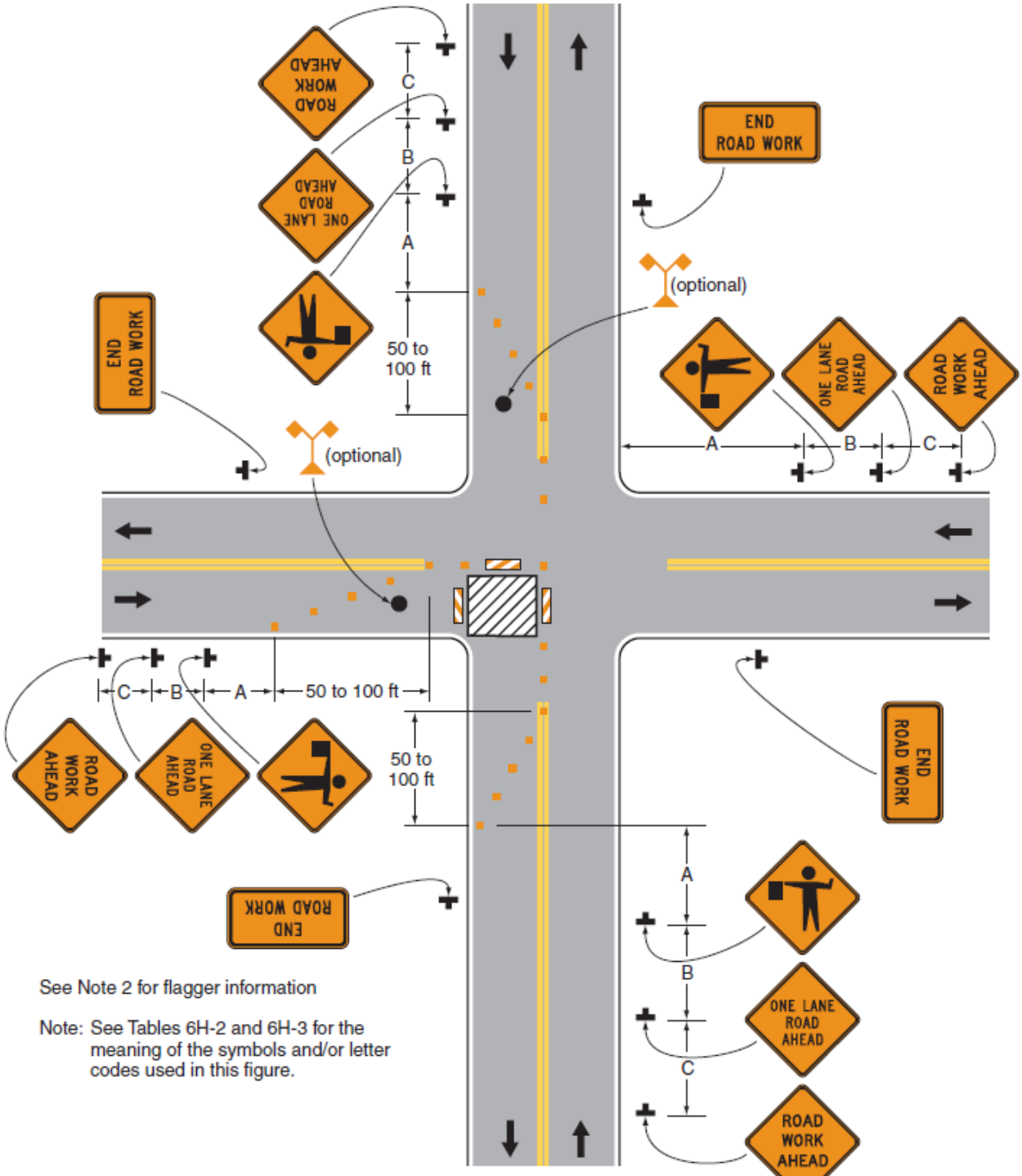
Option:

10. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.

Standard:

11. **Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.**

Figure 6H-27. Closure at the Side of an Intersection (TA-27)



See Note 2 for flagger information

Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Typical Application 27

Notes for Figure 6H-28—Typical Application 28
Sidewalk Detour or Diversion

Standard:

1. **When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.**

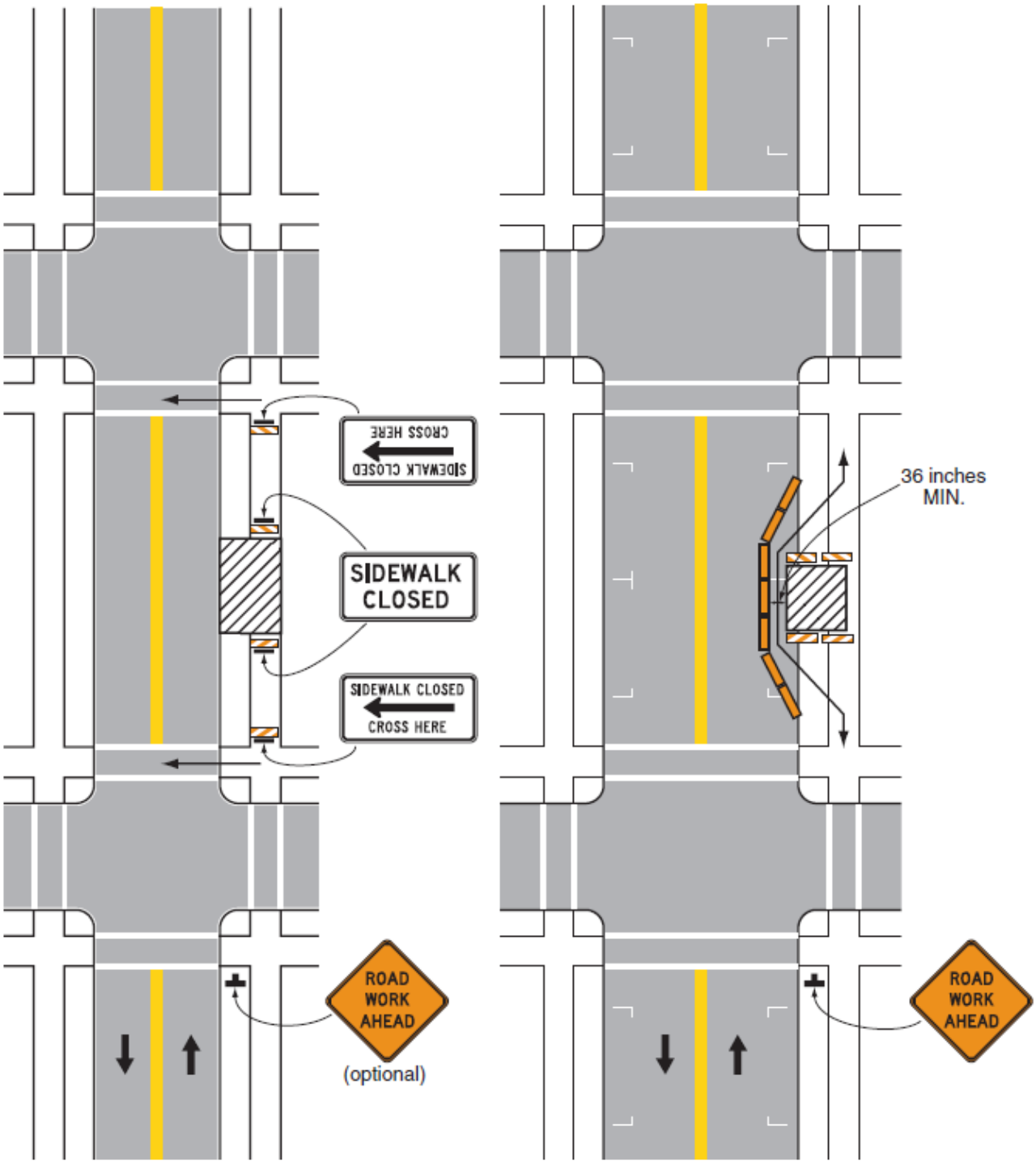
Guidance:

2. *(DC Revision) Where high speeds are anticipated, a temporary traffic barrier and, if necessary, an impact attenuator should be used to separate the temporary sidewalks from vehicular traffic.*
3. *Audible information devices should be considered where midblock closings and changed crosswalk areas cause inadequate communication to be provided to pedestrians who have visual disabilities.*

Option:

4. Street lighting may be considered.
5. Only the TTC devices related to pedestrians are shown. Other devices, such as lane closure signing or ROAD NARROWS signs, may be used to control vehicular traffic.
6. For nighttime closures, Type A Flashing warning lights may be used on barricades that support signs and close sidewalks.
7. Type C Steady-Burn or Type D 360-degree Steady-Burn warning lights may be used on channelizing devices separating the temporary sidewalks from vehicular traffic flow.
8. Signs, such as KEEP RIGHT (LEFT), may be placed along a temporary sidewalk to guide or direct pedestrians.

Figure 6H-28. Sidewalk Detour or Diversion (TA-28)



Typical Application 28

Notes for Figure 6H-29—Typical Application 29
Crosswalk Closures and Pedestrian Detours

Standard:

1. **When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.**
2. **Curb parking shall be prohibited for at least 50 feet in advance of the midblock crosswalk.**

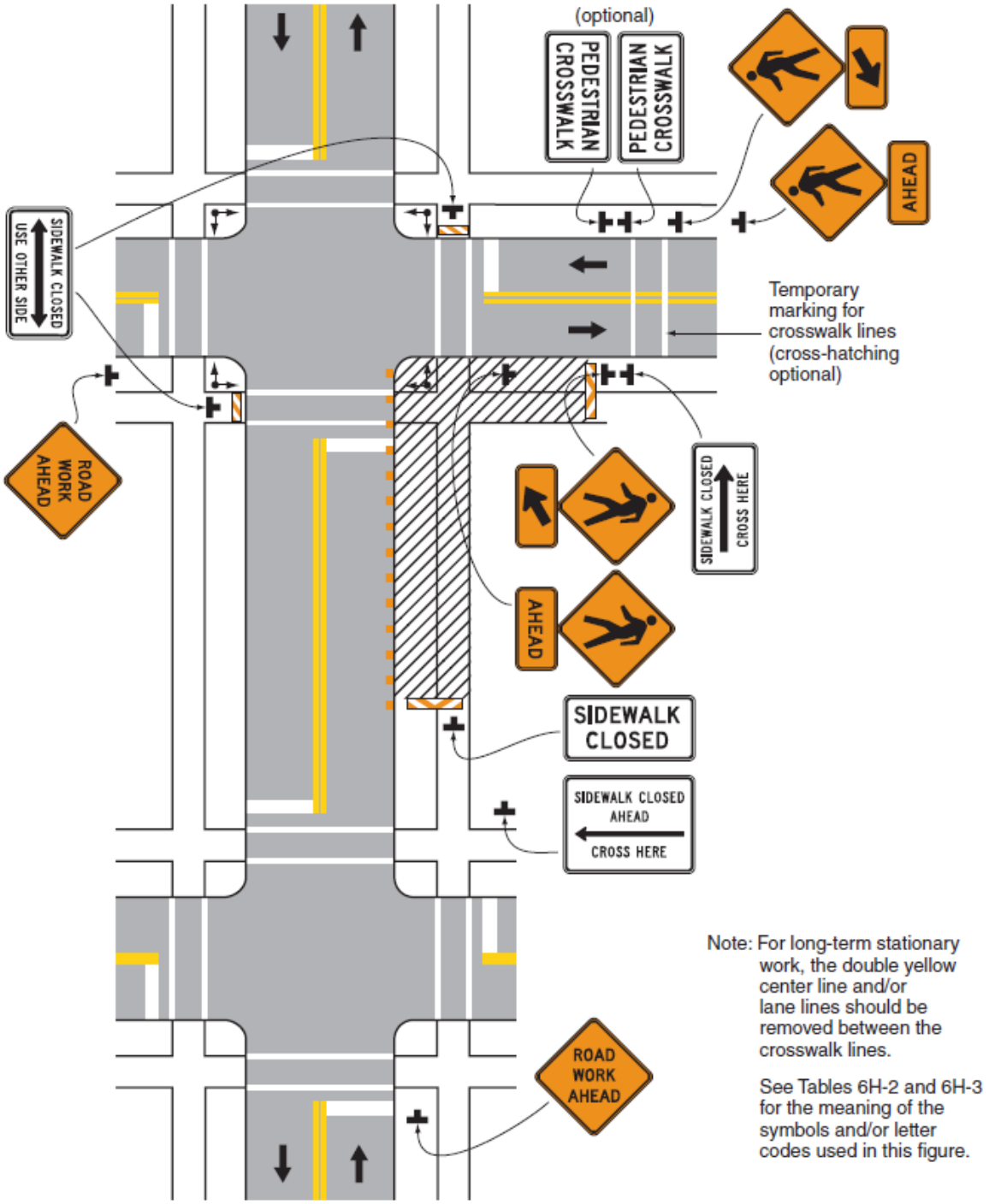
Guidance:

3. *Audible information devices should be considered where midblock closings and changed crosswalk areas cause inadequate communication to be provided to pedestrians who have visual disabilities.*
4. *Pedestrian traffic signal displays controlling closed crosswalks should be covered or deactivated.*

Option:

5. Street lighting may be considered.
6. Only the TTC devices related to pedestrians are shown. Other devices, such as lane closure signing or ROAD NARROWS signs, may be used to control vehicular traffic.
7. For nighttime closures, Type A Flashing warning lights may be used on barricades supporting signs and closing sidewalks.
8. Type C Steady-Burn or Type D 360-degree Steady-Burn warning lights may be used on channelizing devices separating the work space from vehicular traffic.
9. In order to maintain the systematic use of the fluorescent yellow-green background for pedestrian, bicycle, and school warning signs in a jurisdiction, the fluorescent yellow-green background for pedestrian, bicycle, and school warning signs may be used in TTC zones.

Figure 6H-29. Crosswalk Closures and Pedestrian Detours (TA-29)



Typical Application 29

Notes for Figure 6H-30—Typical Application 30
Interior Lane Closure on a Multi-Lane Street

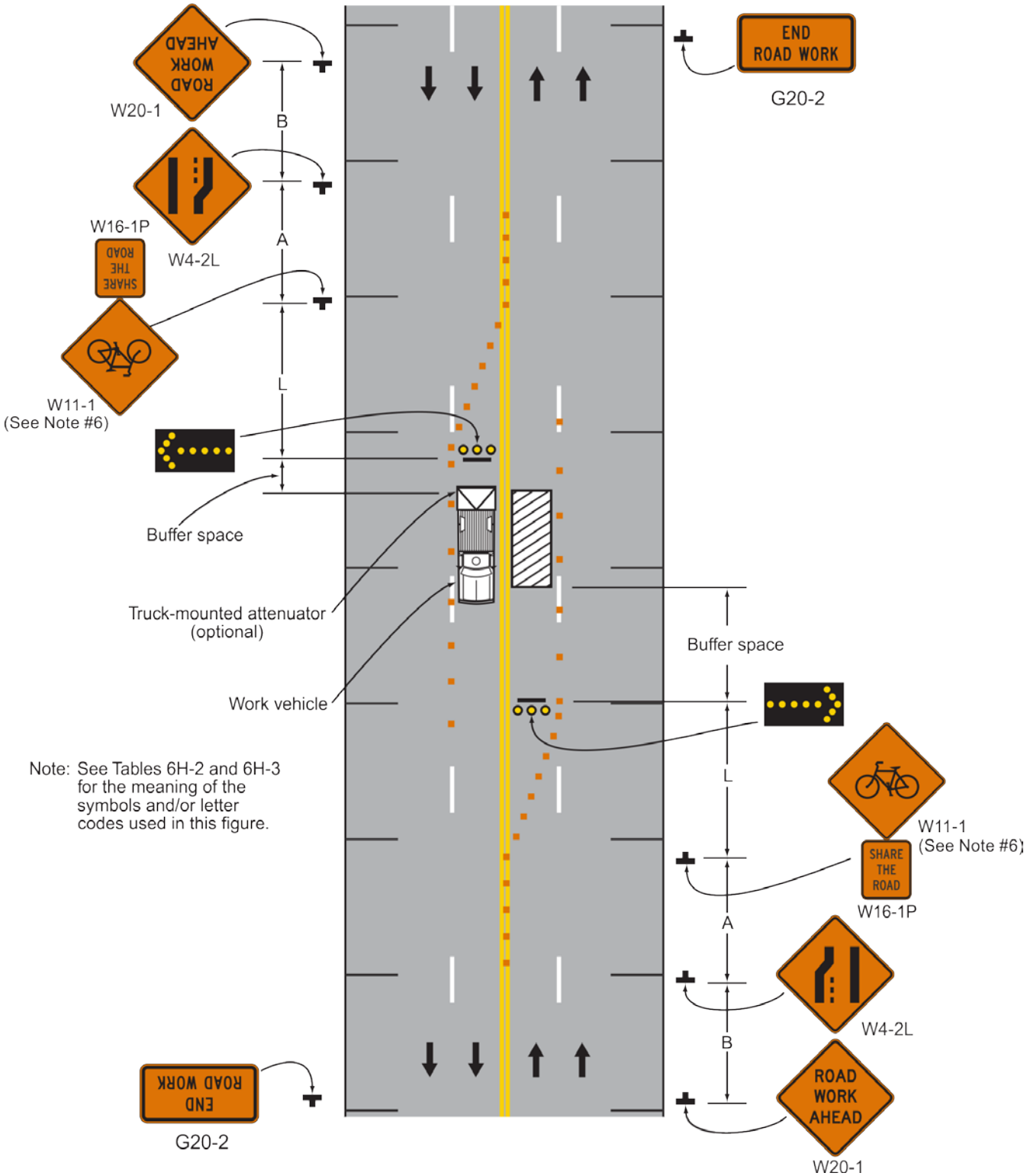
Option:

1. The closure of the adjacent interior lane in the opposing direction may not be necessary, depending upon the activity being performed and the work space needed for the operation.
2. Shadow vehicles with a truck-mounted attenuator may be used.

Guidance:

3. *This information applies to low-speed, low-volume urban streets. Where speed or volume is higher, additional signing such as LEFT LANE CLOSED XX FT should be used between the signs shown.*
4. *All advance warning signs should be placed so that the path of travel for bicycles is not blocked, while maintaining visibility for road users.*
5. *If bicyclists are able to use the shoulder throughout the TTC zone, the Bicycle Crossing (W11-1) sign and the SHARE THE ROAD (W16-1P) plaque should be omitted*
6. *When existing accommodations for bicycle travel are disrupted or closed in a long-term duration project (see Section 6G.02) and the roadway width is inadequate for allowing bicyclists and motor vehicles to travel side by side, the Bicycle Crossing (W11-1) sign and the SHARE THE ROAD (W16-1P) plaque should be used to advise motorists of the presence of bicyclists in the travel way lanes.*

Figure 6H-30. Interior Lane Closure on a Multi-Lane Street (TA-30)



Notes for Figure 6H-31—Typical Application 31
Lane Closure on a Street with Uneven Directional Volumes

Standard:

1. **The illustrated information shall be used only when the vehicular traffic volume indicates that two lanes of vehicular traffic shall be maintained in the direction of travel for which one lane is closed.**

Option:

2. The procedure may be used during a peak period of vehicular traffic and then changed to provide two lanes in the other direction for the other peak.

Guidance:

3. *For high speeds, a LEFT LANE CLOSED XX FT sign should be added for vehicular traffic approaching the lane closure, as shown in Figure 6H-32.*
4. *Conflicting pavement markings should be removed for long-term projects. For short-term and intermediate-term projects where this is not practical, the channelizing devices in the area where the pavement markings conflict should be placed at a maximum spacing of 1/2 S feet where S is the speed in mph. Temporary markings should be installed where needed.*
5. *If the lane shift has curves with recommended speeds of 30 mph or less, Reverse Turn signs should be used.*
6. *Where the shifted section is long, a Reverse Curve sign should be used to show the initial shift and a second sign should be used to show the return to the normal alignment.*
7. *If the tangent distance along the temporary diversion is less than 600 feet, the Double Reverse Curve sign should be used at the location of the first Two Lane Reverse Curve sign. The second Two Lane Reverse Curve sign should be omitted.*

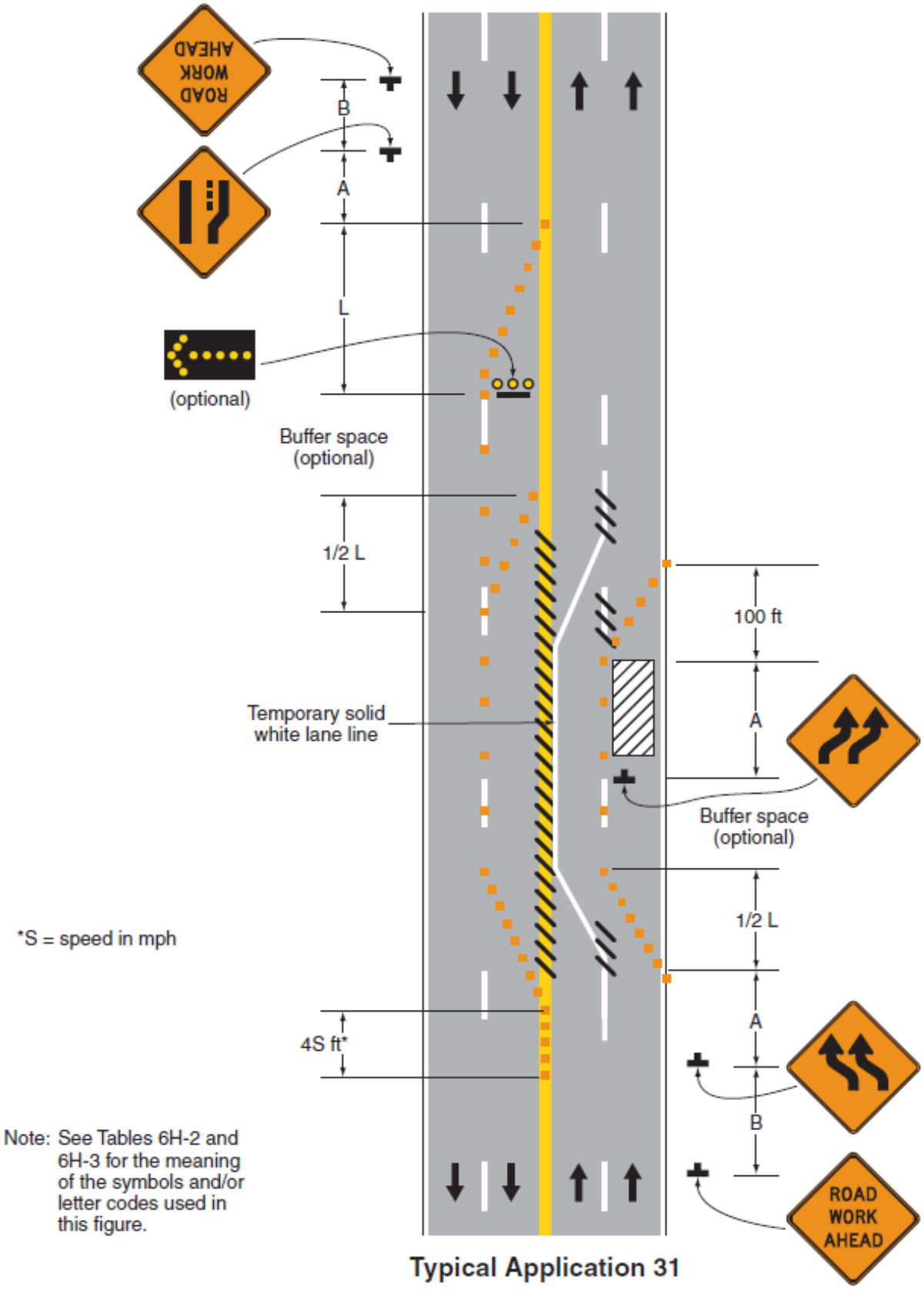
Standard:

8. **The number of lanes illustrated on the Reverse Curve or Double Reverse Curve signs shall be the same as the number of through lanes available to road users, and the direction of the reverse curves shall be appropriately illustrated.**

Option:

9. A longitudinal buffer space may be used in the activity area to separate opposing vehicular traffic.
10. 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.
11. Where more than three lanes are being shifted, the Reverse Curve (or Turn) sign may be rectangular.
12. A work vehicle or a shadow vehicle may be equipped with a truck-mounted attenuator.

Figure 6H-31. Lane Closures on a Street with Uneven Directional Volumes (TA-31)



Typical Application 31

Notes for Figure 6H-32—Typical Application 32
Half Road Closure on a Multi-Lane, High-Speed Highway

Standard:

1. **Pavement markings no longer applicable shall be removed or obliterated as soon as practical. Except for intermediate-term and short-term situations, temporary markings shall be provided to clearly delineate the temporary travel path. For short-term and intermediate-term situations where it is not feasible to remove and restore pavement markings, channelization shall be made dominant by using a very close device spacing.**

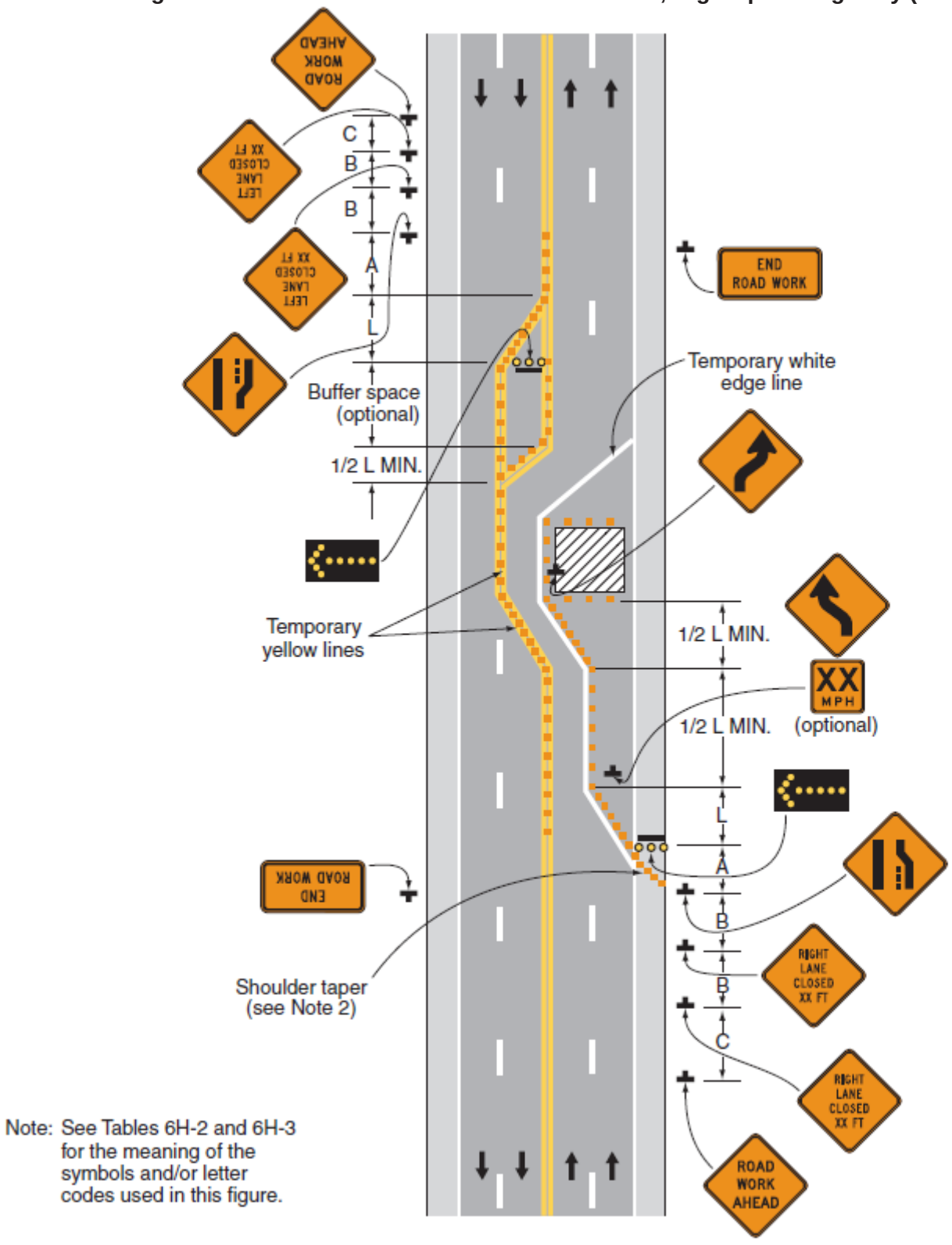
Guidance:

2. *When paved shoulders having a width of 8 feet or more are closed, channelizing devices should be used to close the shoulder in advance of the merging taper to direct vehicular traffic to remain within the traveled way.*
3. *Where channelizing devices are used instead of pavement markings, the maximum spacing should be 1/2 S feet where S is the speed in mph.*
4. *If the tangent distance along the temporary diversion is less than 600 feet, a Double Reverse Curve sign should be used instead of the first Reverse Curve sign, and the second Reverse Curve sign should be omitted.*

Option:

5. Warning lights may be used to supplement channelizing devices at night.
6. A truck-mounted attenuator may be used on the work vehicle and/or the shadow vehicle.

Figure 6H-32. Half Road Closure on a Multi-Lane, High-Speed Highway (TA-32)



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Typical Application 32

Notes for Figure 6H-33—Typical Application 33
Stationary Lane Closure on a Divided Highway

Standard:

1. **This information also shall be used when work is being performed in the lane adjacent to the median on a divided highway. In this case, the LEFT LANE CLOSED signs and the corresponding Lane Ends signs shall be substituted.**
2. **When a side road intersects the highway within the TTC zone, additional TTC devices shall be placed as needed.**

Guidance:

3. *When paved shoulders having a width of 8 feet or more are closed, channelizing devices should be used to close the shoulder in advance of the merging taper to direct vehicular traffic to remain within the traveled way.*

Option:

4. A truck-mounted attenuator may be used on the work vehicle and/or shadow vehicle.

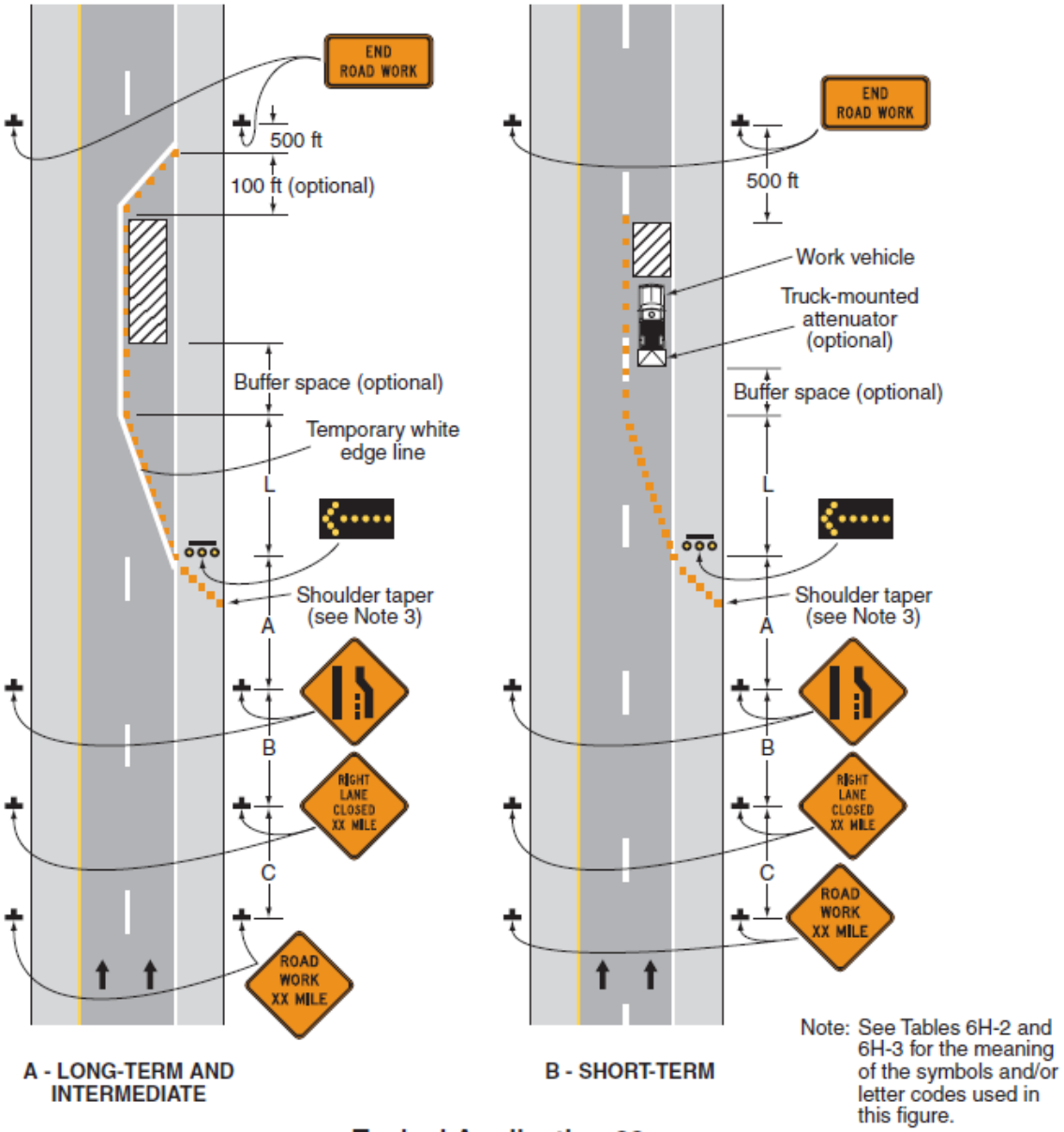
Support:

5. Where conditions permit, restricting all vehicles, equipment, workers, and their activities to one side of the roadway might be advantageous.

Standard:

6. **An arrow board shall be used when a freeway lane is closed. When more than one freeway lane is closed, a separate arrow board shall be used for each closed lane.**

Figure 6H-33. Stationary Lane Closure on a Divided Highway (TA-33)



Typical Application 33

Notes for Figure 6H-34—Typical Application 34
Lane Closure with a Temporary Traffic Barrier

Standard:

1. **This information also shall be used when work is being performed in the lane adjacent to the median on a divided highway. In this case, the LEFT LANE CLOSED signs and the corresponding Lane Ends signs shall be substituted.**

Guidance:

2. *For long-term lane closures on facilities with permanent edge lines, a temporary edge line should be installed from the upstream end of the merging taper to the downstream end of the downstream taper, and conflicting pavement markings should be removed.*
3. *The use of a barrier should be based on engineering judgment.*

Standard:

4. **Temporary traffic barriers, if used, shall comply with the provisions of Section 6F.85.**
5. **The barrier shall not be placed along the merging taper. The lane shall first be closed using channelizing devices and pavement markings.**

Option:

6. Type C Steady-Burn warning lights may be placed on channelizing devices and the barrier parallel to the edge of pavement for nighttime lane closures.
7. The barrier shown in this typical application is an example of one method that may be used to close a lane for a long-term project. If the work activity permits, a movable barrier may be used and relocated to the shoulder during non-work periods or peak-period vehicular traffic conditions, as appropriate.

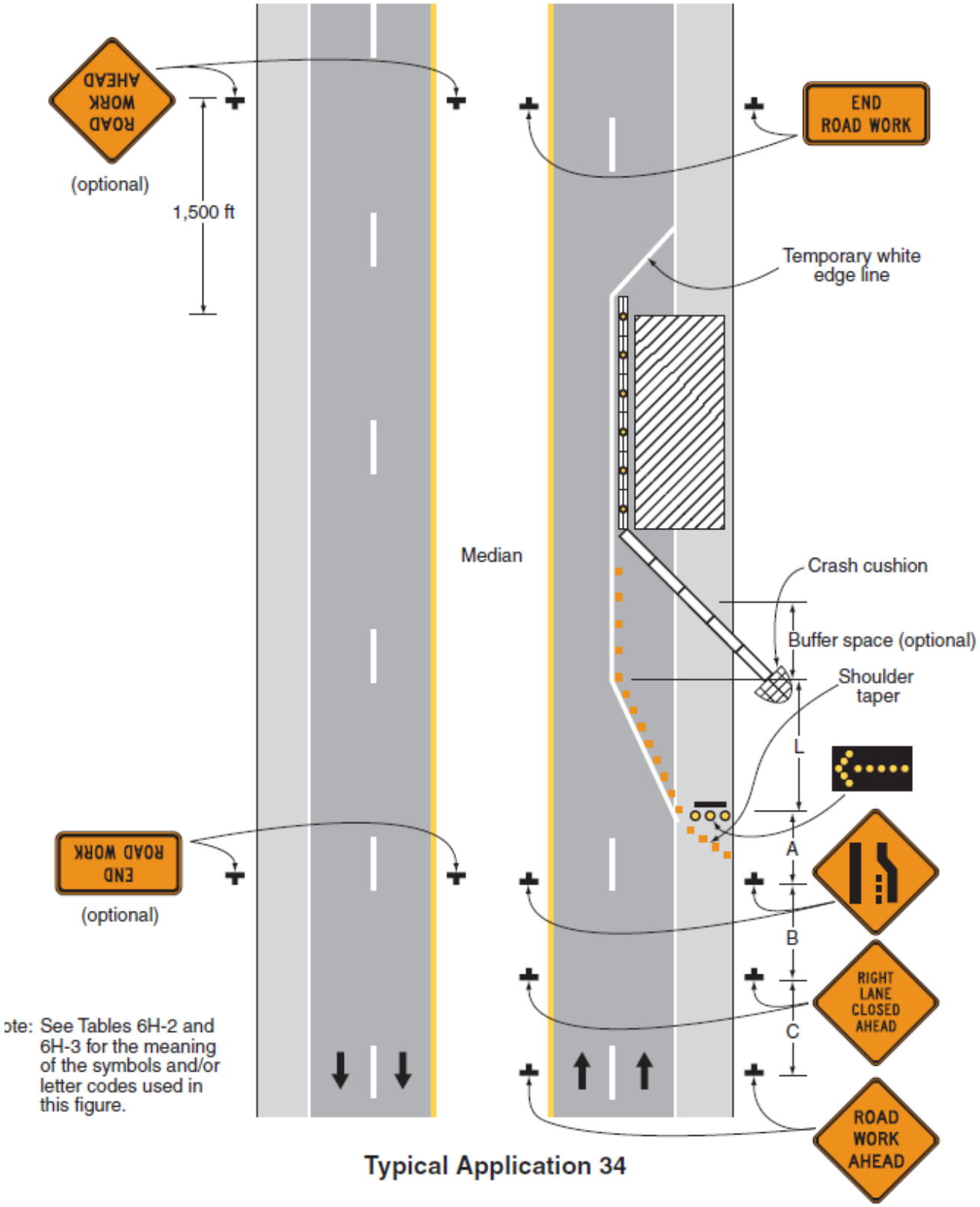
Standard:

8. **If a movable barrier is used, the temporary white edge line shown in the typical application shall not be used. During the period when the right-hand lane is opened, the sign legends and the channelization shall be changed to indicate that only the shoulder is closed, as illustrated in Figure 6H-5. The arrow board, if used, shall be placed at the downstream end of the shoulder taper and shall display the caution mode.**

Guidance:

9. *If a movable barrier is used, the shift should be performed in the following manner. When closing the lane, the lane should be initially closed with channelizing devices placed along a merging taper using the same information employed for a stationary lane closure. The lane closure should then be extended with the movable-barrier transfer vehicle moving with vehicular traffic. When opening the lane, the movable-barrier transfer vehicle should travel against vehicular traffic from the termination area to the transition area. The merging taper should then be removed using the same information employed for a stationary lane closure.*

Figure 6H-34. Lane Closure with a Temporary Traffic Barrier (TA-34)



Typical Application 34

Notes for Figure 6H-35—Typical Application 35
Mobile Operation on a Multi-Lane Road

Standard:

1. **Arrow boards shall, as a minimum, be Type B, with a size of 60 x 30 inches.**
2. **Vehicle-mounted signs shall be mounted in a manner such that they are not obscured by equipment or supplies. Sign legends on vehicle-mounted signs shall be covered or turned from view when work is not in progress.**
3. **Shadow and work vehicles shall display high-intensity rotating, flashing, oscillating, or strobe lights.**
4. **An arrow board shall be used when a freeway lane is closed. When more than one freeway lane is closed, a separate arrow board shall be used for each closed lane.**

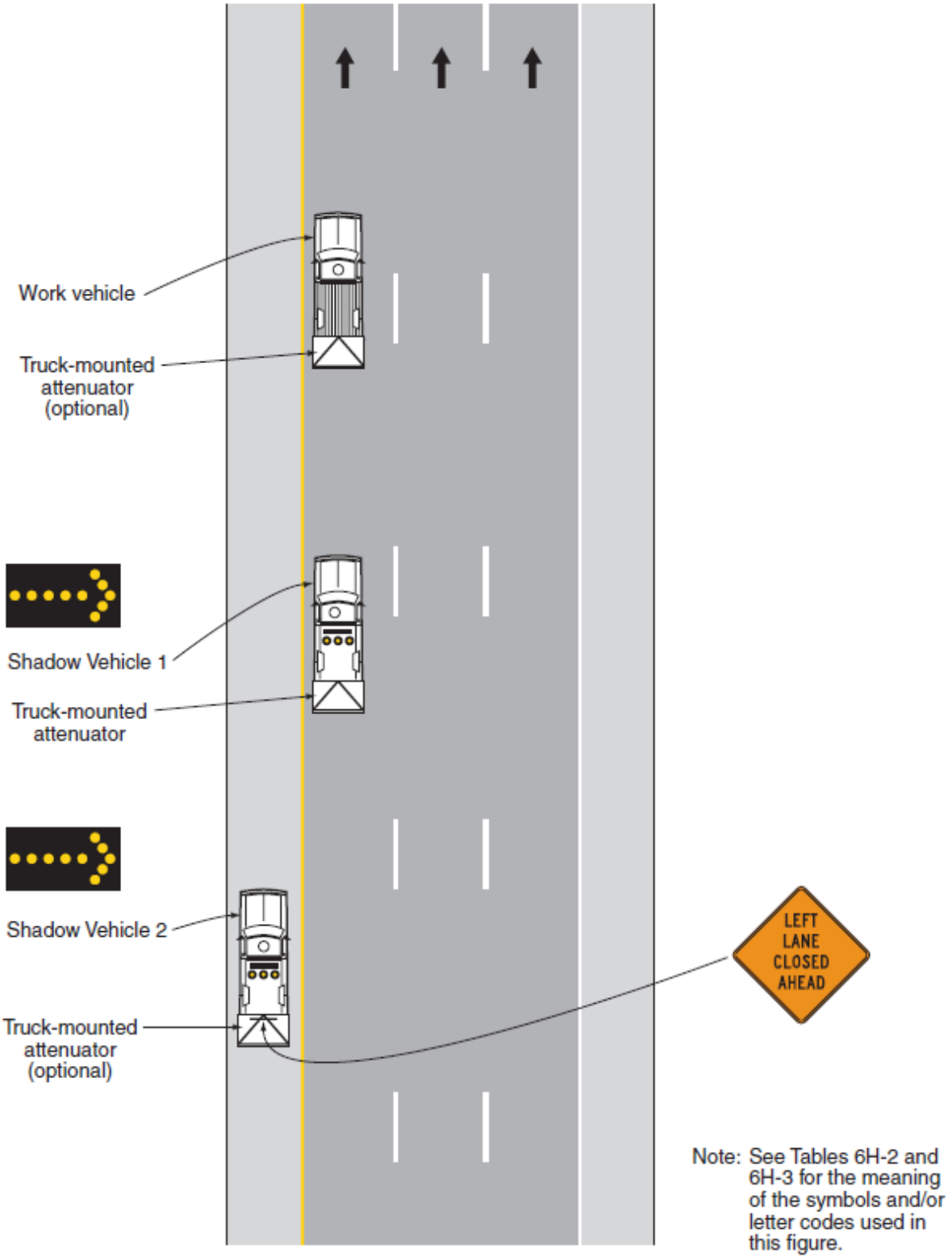
Guidance:

5. *Vehicles used for these operations should be made highly visible with appropriate equipment, such as flags, signs, or arrow boards.*
6. *Shadow Vehicle 1 should be equipped with an arrow board and truck-mounted attenuator.*
7. *Shadow Vehicle 2 should be equipped with an arrow board. An appropriate lane closure sign should be placed on Shadow Vehicle 2 so as not to obscure the arrow board.*
8. *Shadow Vehicle 2 should travel at a varying distance from the work operation so as to provide adequate sight distance for vehicular traffic approaching from the rear.*
9. *The spacing between the work vehicles and the shadow vehicles, and between each shadow vehicle should be minimized to deter road users from driving in between.*
10. *Work should normally be accomplished during off-peak hours.*
11. *When the work vehicle occupies an interior lane (a lane other than the far right or far left) of a directional roadway having a right-hand shoulder 10 feet or more in width, Shadow Vehicle 2 should drive the right-hand shoulder with a sign indicating that work is taking place in the interior lane.*

Option:

12. A truck-mounted attenuator may be used on Shadow Vehicle 2.
13. On high-speed roadways, a third shadow vehicle (not shown) may be used with Shadow Vehicle 1 in the closed lane, Shadow Vehicle 2 straddling the edge line, and Shadow Vehicle 3 on the shoulder.
14. Where adequate shoulder width is not available, Shadow Vehicle 3 may also straddle the edge line.

Figure 6H-35. Mobile Operation on a Multi-Lane Road (TA-35)



Typical Application 35

Notes for Figure 6H-36—Typical Application 36
Lane Shift on a Freeway

Guidance:

1. *The lane shift should be used when the work space extends into either the right-hand or left-hand lane of a divided highway and it is not practical, for capacity reasons, to reduce the number of available lanes.*

Support:

2. When a lane shift is accomplished by using (1) geometry that meets the design speed at which the permanent highway was designed, (2) full normal cross-section (full lane width and full shoulders), and (3) complete pavement markings, then only the initial general work-zone warning sign is required.

Guidance:

3. *When the conditions in Note 2 are not met, the information shown in the typical application should be employed and all the following notes apply.*

Standard:

4. **Temporary traffic barriers, if used, shall comply with the provisions of Section 6F.85.**
5. **The barrier shall not be placed along the shifting taper. The lane shall first be shifted using channelizing devices and pavement markings.**

Guidance:

6. *A warning sign should be used to show the changed alignment.*

Standard:

7. **The number of lanes illustrated on the Reverse Curve signs shall be the same as the number of through lanes available to road users, and the direction of the reverse curves shall be appropriately illustrated.**

Option:

8. 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.
9. Where more than three lanes are being shifted, the Reverse Curve (or Turn) sign may be rectangular.

Guidance:

10. *Where the shifted section is longer than 600 feet, one set of Reverse Curve signs should be used to show the initial shift and a second set should be used to show the return to the normal alignment. If the tangent distance along the temporary diversion is less than 600 feet, a Double Reverse Curve sign should be used instead of the first Reverse Curve sign, and the second Reverse Curve sign should be omitted.*
11. *If a STAY IN LANE sign is used, then solid white lane lines should be used.*

Standard:

12. **The minimum width of the shoulder lane shall be 10 feet.**
13. **For long-term stationary work, existing conflicting pavement markings shall be removed and temporary markings shall be installed before traffic patterns are changed.**

Option:

14. For short-term stationary work, lanes may be delineated by channelizing devices or removable pavement markings instead of temporary markings.

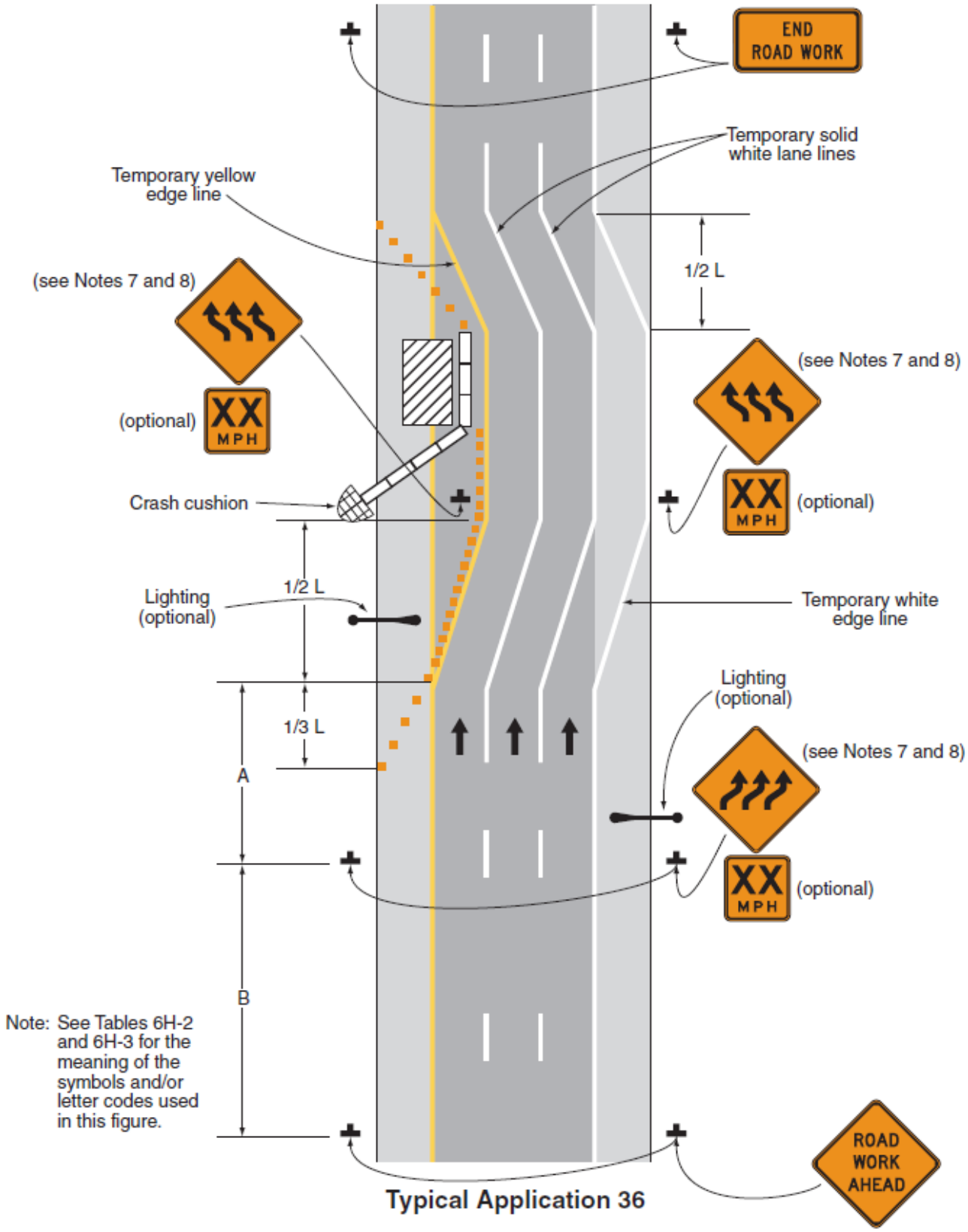
Guidance:

15. *If the shoulder cannot adequately accommodate trucks, trucks should be directed to use the travel lanes.*
16. *The use of a barrier should be based on engineering judgment.*

Option:

17. Type C Steady-Burn warning lights may be placed on channelizing devices and the barrier parallel to the edge of the pavement for nighttime lane closures.

Figure 6H-36. Lane Shift on a Freeway (TA-36)



Notes for Figure 6H-37—Typical Application 37
Double Lane Closure on a Freeway

Standard:

1. **An arrow board shall be used when a freeway lane is closed. When more than one freeway lane is closed, a separate arrow board shall be used for each closed lane.**

Guidance:

2. *Ordinarily, the preferred position for the second arrow board is in the closed exterior lane at the upstream end of the second merging taper. However, the second arrow board should be placed in the closed interior lane at the downstream end of the second merging taper in the following situations:*
3. *When a shadow vehicle is used in the interior closed lane, and the second arrow board is mounted on the shadow vehicle;*
4. *If alignment or other conditions create any confusion as to which lane is closed by the second arrow board; and When the first arrow board is placed in the closed exterior lane at the downstream end of the first merging taper (the alternative position when the shoulder is narrow).*

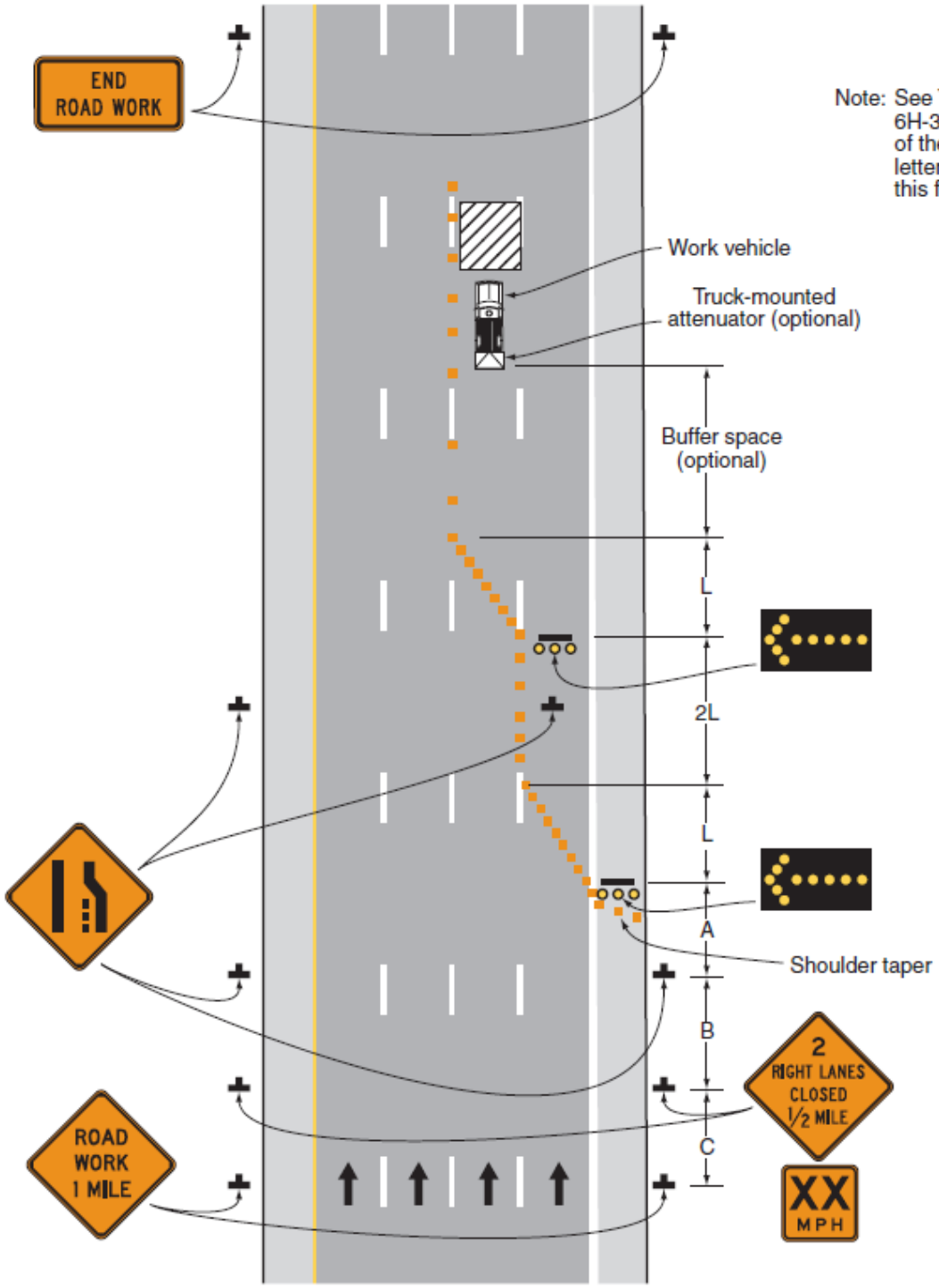
Option:

5. Flashing warning lights and/or flags may be used to call attention to the initial warning signs.
6. A truck-mounted attenuator may be used on the shadow vehicle.
7. If a paved shoulder having a minimum width of 10 feet and sufficient strength is available, the left and adjacent interior lanes may be closed and vehicular traffic carried around the work space on the right-hand lane and a right-hand shoulder.

Guidance:

8. *When a shoulder lane is used that cannot adequately accommodate trucks, trucks should be directed to use the normal travel lanes.*

Figure 6H-37. Double Lane Closure on a Freeway (TA-37)



Typical Application 37

Notes for Figure 6H-38—Typical Application 38
Interior Lane Closure on a Freeway

Standard:

1. **An arrow board shall be used when a freeway lane is closed. When more than one freeway lane is closed, a separate arrow board shall be used for each closed lane.**
2. **If temporary traffic barriers are installed, they shall comply with the provisions and requirements in Section 6F.85.**
3. **The barrier shall not be placed along the shifting taper. The lane shall first be shifted using channelizing devices and pavement markings.**
4. **For long-term stationary work, existing conflicting pavement markings shall be removed and temporary markings shall be installed before traffic patterns are changed.**

Guidance:

5. *For a long-term closure, a barrier should be used to provide additional safety to the operation in the closed interior lane. A buffer space should be used at the upstream end of the closed interior lane.*
6. *The first arrow board displaying an arrow pointing to the right should be on the left-hand shoulder at the beginning of the taper. The arrow board displaying a double arrow should be centered in the closed interior lane and placed at the downstream end of the shifting taper.*
7. *If the two arrow boards create confusion, the 2L distance between the end of the merging taper and beginning of the shift taper should be extended so that road users can focus on one arrow board at a time.*
8. *The placement of signs should not obstruct or obscure arrow boards.*
9. *For long-term use, the dashed lane lines should be made solid white in the two-lane section.*

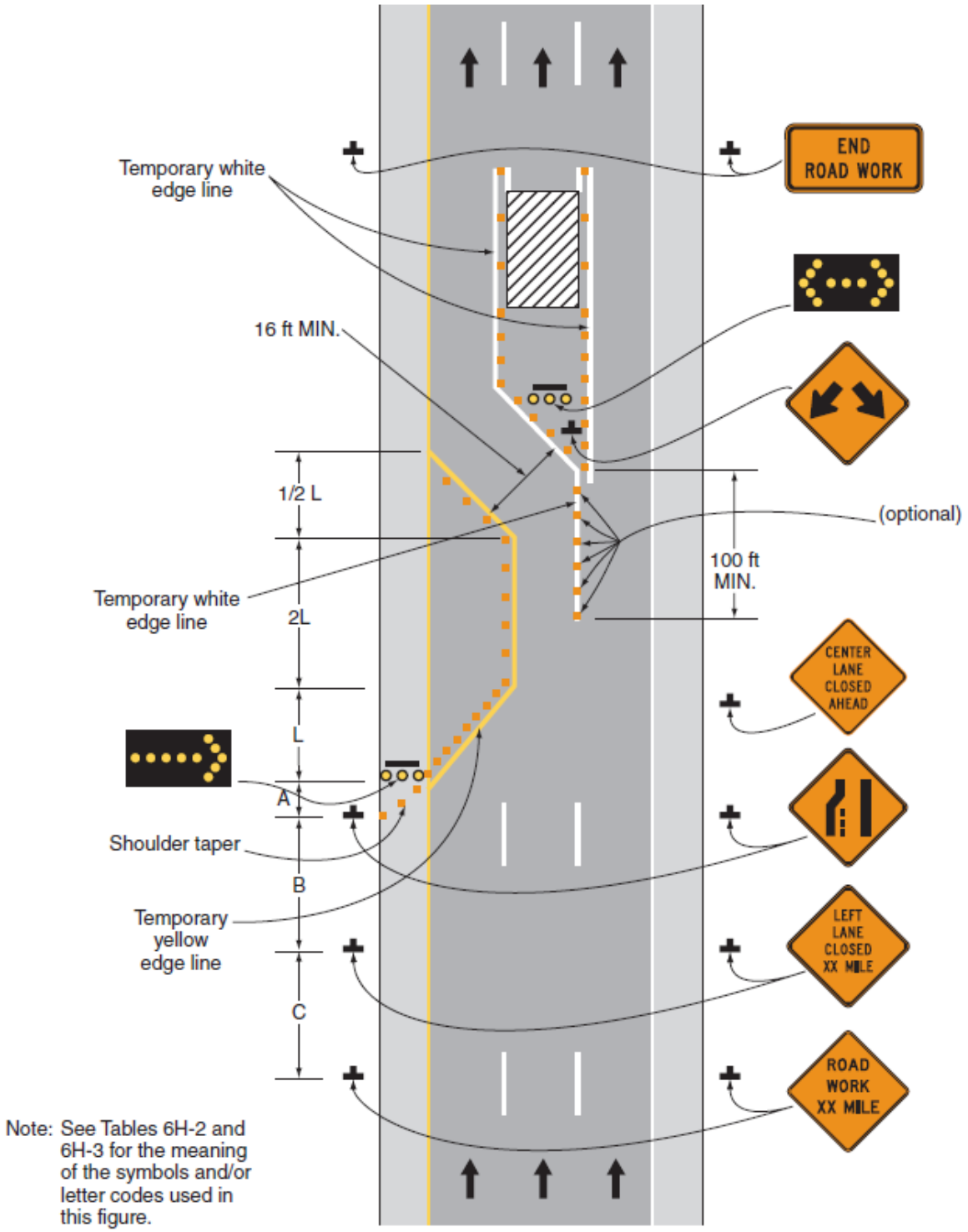
Option:

10. As an alternative to initially closing the left-hand lane, as shown in the typical application, the right-hand lane may be closed in advance of the interior lane closure with appropriate channelization and signs.
11. A short, single row of channelizing devices in advance of the vehicular traffic split to restrict vehicular traffic to their respective lanes may be added.
12. DO NOT PASS signs may be used.
13. If a paved shoulder having a minimum width of 10 feet and sufficient strength is available, the left-hand and center lanes may be closed and motor vehicle traffic carried around the work space on the right-hand lane and a right-hand shoulder.

Guidance:

14. *When a shoulder lane is used that cannot adequately accommodate trucks, trucks should be directed to use the normal travel lanes.*

Figure 6H-38. Interior Lane Closure on a Freeway (TA-38)



Typical Application 38

Notes for Figure 6H-39—Typical Application 39
Median Crossover on a Freeway

Standard:

1. **Channelizing devices or temporary traffic barriers shall be used to separate opposing vehicular traffic.**
2. **An arrow board shall be used when a freeway lane is closed. When more than one freeway lane is closed, a separate arrow board shall be used for each closed lane.**

Guidance:

3. *For long-term work on high-speed, high-volume highways, consideration should be given to using a temporary traffic barrier to separate opposing vehicular traffic.*

Option:

4. When a temporary traffic barrier is used to separate opposing vehicular traffic, the Two-Way Traffic, Do Not Pass, KEEP RIGHT, and DO NOT ENTER signs may be eliminated.
5. The alignment of the crossover may be designed as a reverse curve.

Guidance:

6. *When the crossover follows a curved alignment, the design criteria contained in the AASHTO "Policy on the Geometric Design of Highways and Streets" (see Section 1A.11) should be used.*
7. *When channelizing devices have the potential of leading vehicular traffic out of the intended traffic space, 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 as depicted.*
8. *Where channelizing devices are used, the Two-Way Traffic signs should be repeated every 1 mile.*

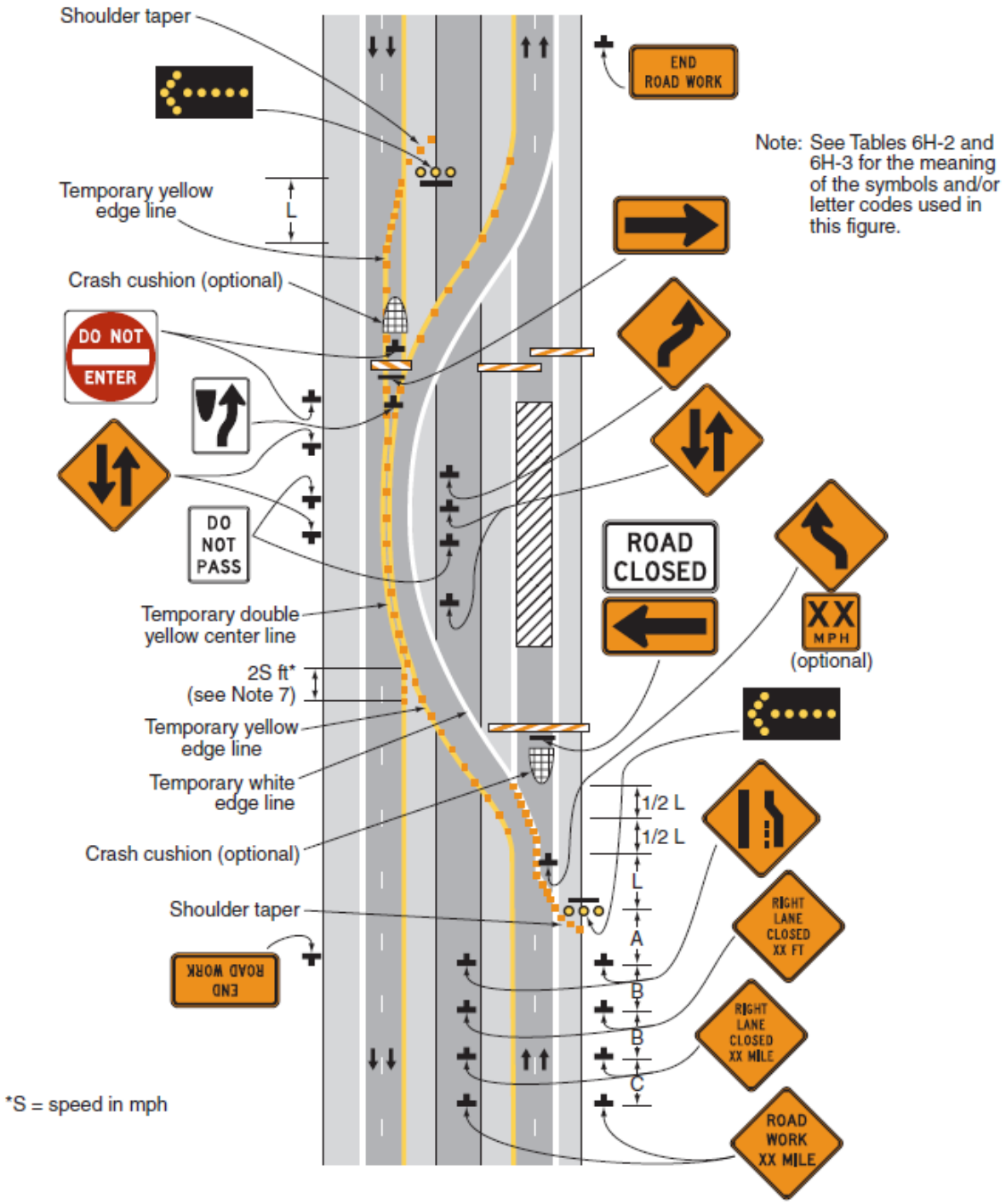
Option:

9. NEXT XX MILES Supplemental Distance plaques may be used with the Two-Way Traffic signs, where XX is the distance to the downstream end of the two-way section.

Support:

10. When the distance is sufficiently short that road users entering the section can see the downstream end of the section, they are less likely to forget that there is opposing vehicular traffic.
11. The sign legends for the four pairs of signs approaching the lane closure for the non-crossover direction of travel are not shown. They are similar to the series shown for the crossover direction, except that the left lane is closed.

Figure 6H-39. Median Crossover on a Freeway (TA-39)



Typical Application 39

Notes for Figure 6H-40—Typical Application 40
Median Crossover for an Entrance Ramp

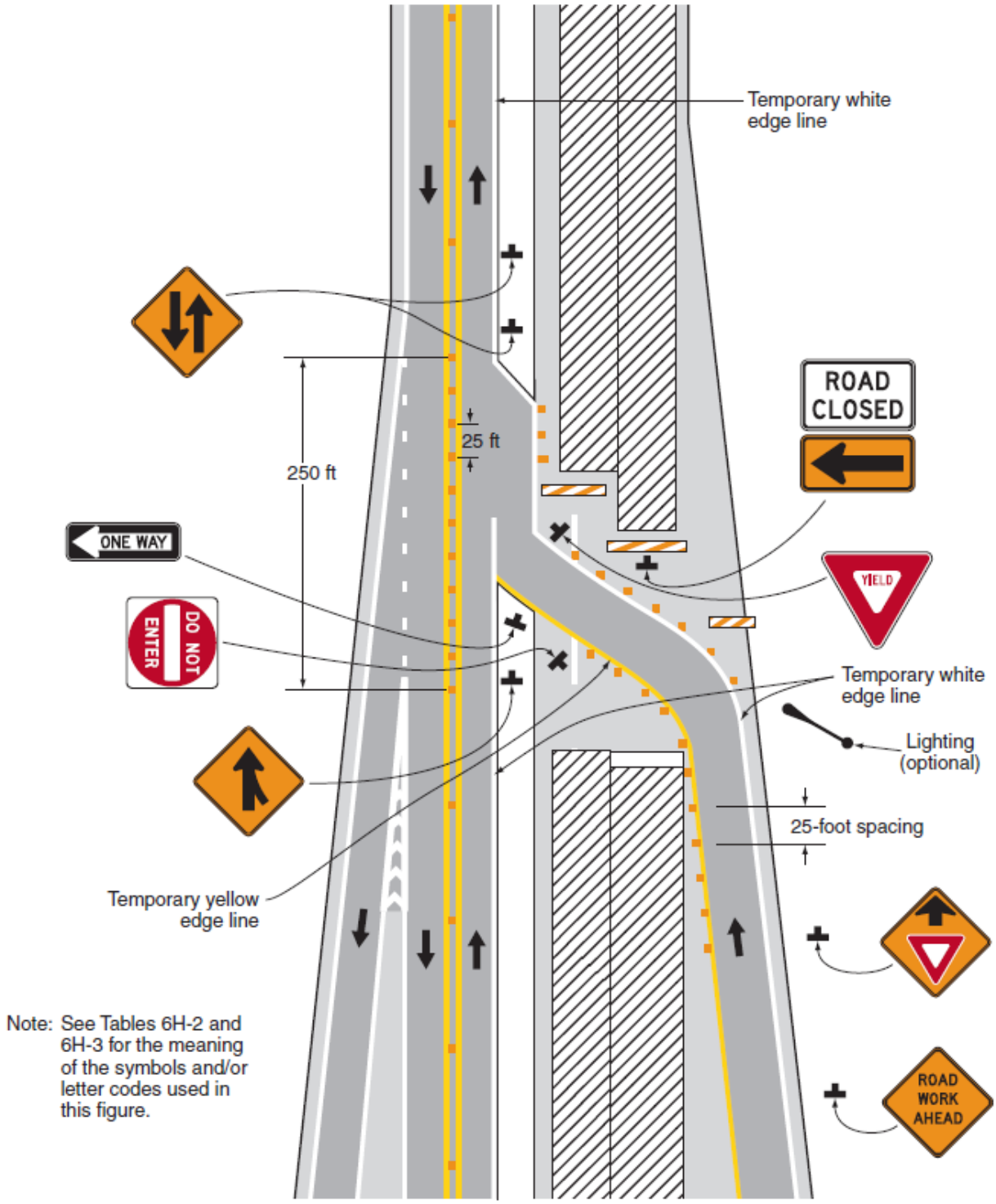
Guidance:

1. *The typical application illustrated should be used for carrying an entrance ramp across a closed directional roadway of a divided highway.*
2. *A temporary acceleration lane should be used to facilitate merging.*
3. *When used, the YIELD or STOP sign should be located far enough forward to provide adequate sight distance of oncoming mainline vehicular traffic to select an acceptable gap, but should not be located so far forward that motorists will be encouraged to stop in the path of the mainline traffic. If needed, yield or stop lines should be installed across the ramp to indicate the point at which road users should yield or stop. Also, a longer acceleration lane should be provided beyond the sign to reduce the gap size needed.*

Option:

4. If vehicular traffic conditions allow, the ramp may be closed.
5. A broken edge line may be carried across the temporary entrance ramp to assist in defining the through vehicular traffic lane.
6. When a temporary traffic barrier is used to separate opposing vehicular traffic, the Two-Way Traffic signs and the DO NOT ENTER signs may be eliminated.

Figure 6H-40. Median Crossover for an Entrance Ramp (TA-40)



Typical Application 40

Notes for Figure 6H-41—Typical Application 41
Median Crossover for an Exit Ramp

Guidance:

1. *This typical application should be used for carrying an exit ramp across a closed directional roadway of a divided highway. The design criteria contained in the AASHTO "Policy on the Geometric Design of Highways and Streets" (see Section 1A.11) should be used for determining the curved alignment.*
2. *The guide signs should indicate that the ramp is open, and where the temporary ramp is located. Conversely, if the ramp is closed, guide signs should indicate that the ramp is closed.*
3. *When the exit is closed, a black on orange EXIT CLOSED sign panel should be placed diagonally across the interchange/intersection guide signs and channelizing devices should be placed to physically close the ramp.*
4. *In the situation (not shown) where channelizing devices are placed along the mainline roadway, the devices' spacing should be reduced in the vicinity of the off ramp to emphasize the opening at the ramp itself. Channelizing devices and/or temporary pavement markings should be placed on both sides of the temporary ramp where it crosses the median and the closed roadway.*
5. *Advance guide signs providing information related to the temporary exit should be relocated or duplicated adjacent to the temporary roadway.*

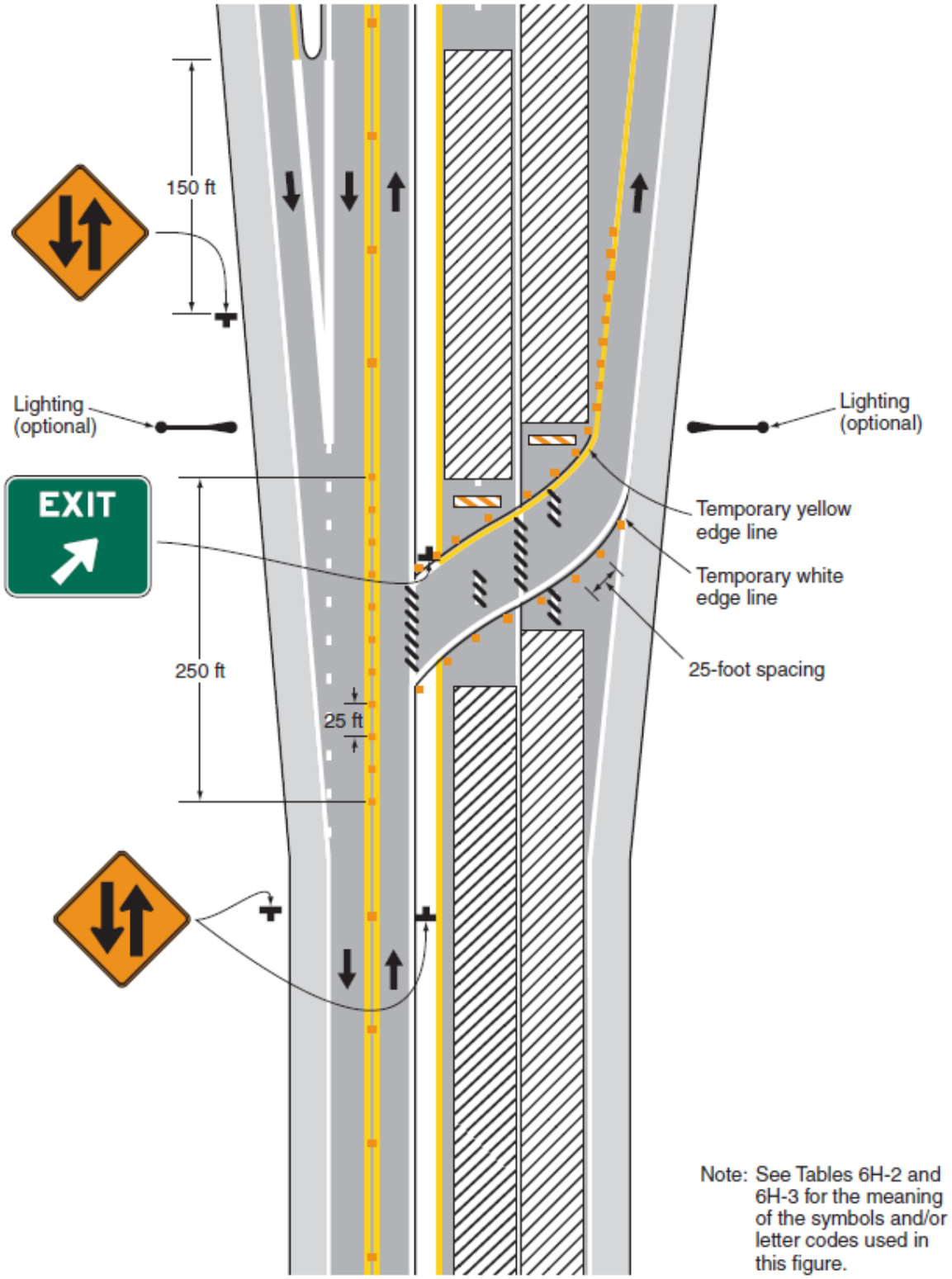
Standard:

6. **A temporary EXIT sign shall be located in the temporary gore. For better visibility, it shall be mounted a minimum of 7 feet from the pavement surface to the bottom of the sign.**

Option:

7. Guide signs referring to the exit may need to be relocated to the median.
8. The temporary EXIT sign placed in the temporary gore may be either black on orange or white on green.
9. In some instances, a temporary deceleration lane may be useful in facilitating the exiting maneuver.
10. When a temporary traffic barrier is used to separate opposing vehicular traffic, the Two-Way Traffic signs may be omitted.

Figure 6H-41. Median Crossover for an Exit Ramp (TA-41)



Typical Application 41

Notes for Figure 6H-42—Typical Application 42
Work in the Vicinity of an Exit Ramp

Guidance:

1. *The guide signs should indicate that the ramp is open, and where the temporary ramp is located. However, if the ramp is closed, guide signs should indicate that the ramp is closed.*
2. *When the exit ramp is closed, a black on orange EXIT CLOSED sign panel should be placed diagonally across the interchange/intersection guide signs.*
3. *The design criteria contained in the AASHTO "Policy on the Geometric Design of Highways and Streets" (see Section 1A.11) should be used for determining the alignment.*

Standard:

4. **A temporary EXIT sign shall be located in the temporary gore. For better visibility, it shall be mounted a minimum of 7 feet from the pavement surface to the bottom of the sign.**

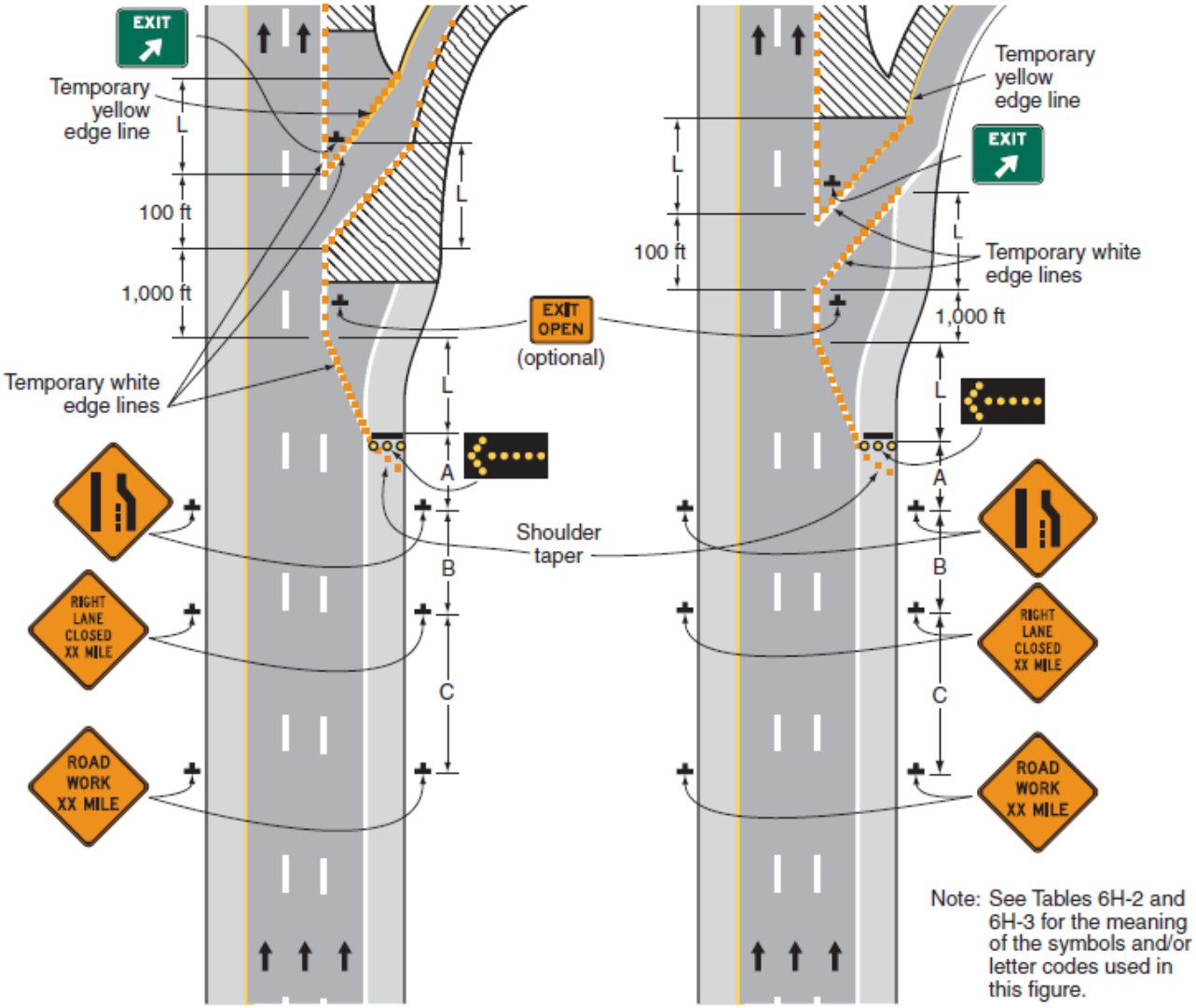
Option:

5. The temporary EXIT sign placed in the temporary gore may be either black on orange or white on green.
6. An alternative procedure that may be used is to channelize exiting vehicular traffic onto the right-hand shoulder and close the lane as necessary.

Standard:

7. **An arrow board shall be used when a freeway lane is closed. When more than one freeway lane is closed, a separate arrow board shall be used for each closed lane.**

Figure 6H-42. Work in the Vicinity of an Exit Ramp (TA-42)



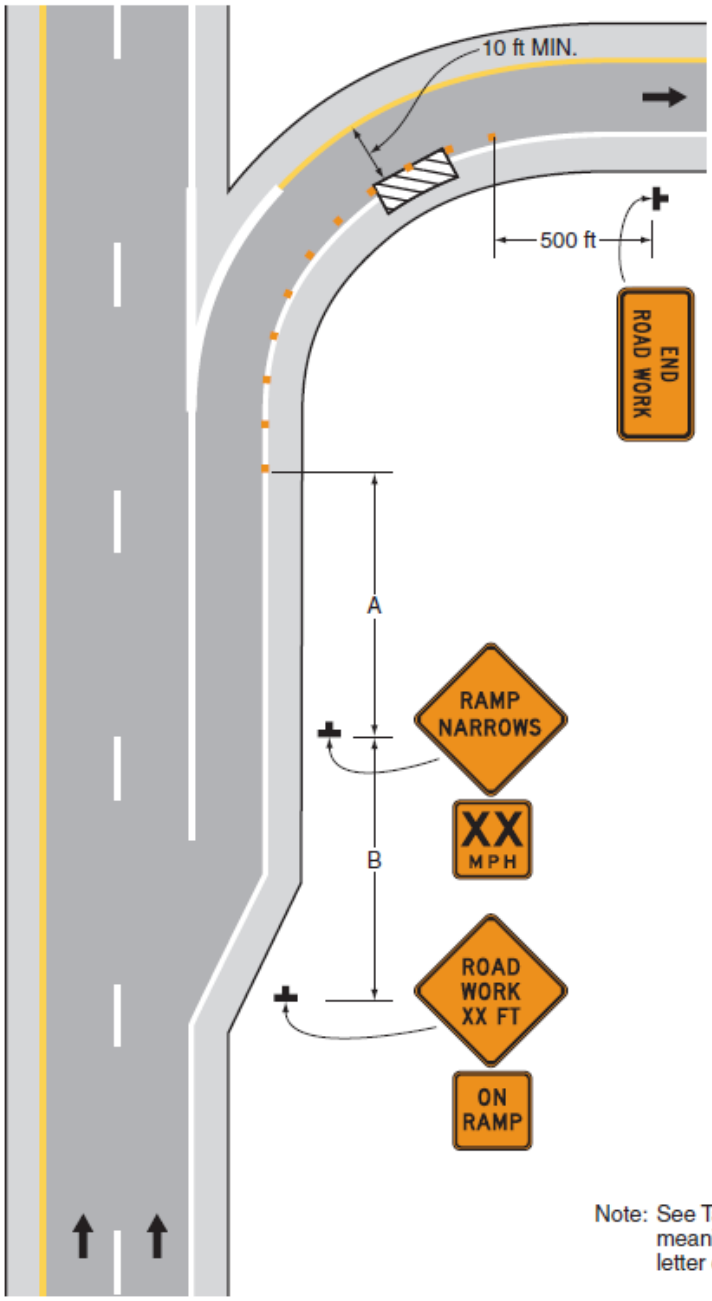
Typical Application 42

Notes for Figure 6H-43—Typical Application 43
Partial Exit Ramp Closure

Guidance:

1. *Truck off-tracking should be considered when determining whether the minimum lane width of 10 feet is adequate (see Section 6G.08).*

Figure 6H-43. Partial Exit Ramp Closure (TA-43)



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Typical Application 43

Notes for Figure 6H-44—Typical Application 44
Work in the Vicinity of an Entrance Ramp

Guidance:

1. *An acceleration lane of sufficient length should be provided whenever possible as shown on the left diagram.*

Standard:

2. **For the information shown on the diagram on the right-hand side of the typical application, where inadequate acceleration distance exists for the temporary entrance, the YIELD sign shall be replaced with STOP signs (one on each side of the approach).**

Guidance:

3. *When used, the YIELD or STOP sign should be located so that ramp vehicular traffic has adequate sight distance of oncoming mainline vehicular traffic to select an acceptable gap in the mainline vehicular traffic flow, but should not be located so far forward that motorists will be encouraged to stop in the path of the mainline traffic. Also, a longer acceleration lane should be provided beyond the sign to reduce the gap size needed. If insufficient gaps are available, consideration should be given to closing the ramp.*
4. *Where STOP signs are used, a temporary stop line should be placed across the ramp at the desired stop location.*
5. *The mainline merging taper with the arrow board at its starting point should be located sufficiently in advance so that the arrow board is not confusing to drivers on the entrance ramp, and so that the mainline merging vehicular traffic from the lane closure has the opportunity to stabilize before encountering the vehicular traffic merging from the ramp.*
6. *If the ramp curves sharply to the right, warning signs with advisory speeds located in advance of the entrance terminal should be placed in pairs (one on each side of the ramp).*

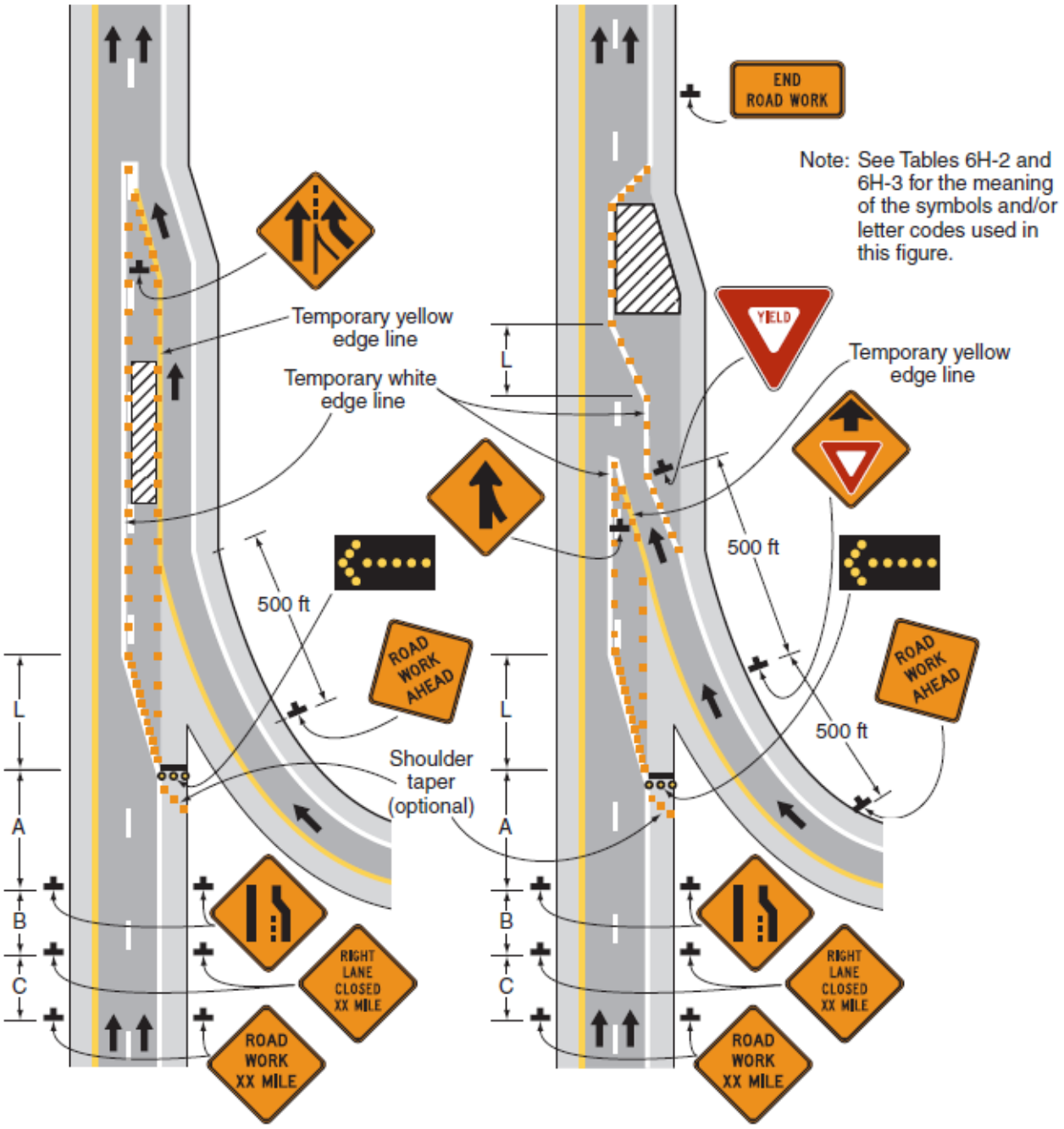
Option:

7. A Stop Beacon (see 2009 MUTCD, Section 4L.05) or a Type B high-intensity warning flasher with a red lens may be placed above the STOP sign.
8. Where the acceleration distance is significantly reduced, a supplemental plaque may be placed below the Yield Ahead sign reading NO MERGE AREA.

Standard:

9. **An arrow board shall be used when a freeway lane is closed. When more than one freeway lane is closed, a separate arrow board shall be used for each closed lane.**

Figure 6H-44. Work in the Vicinity of an Entrance Ramp (TA-44)



Typical Application 44

Notes for Figure 6H-45—Typical Application 45
Temporary Reversible Lane Using Movable Barriers

Support:

1. This application addresses one of several uses for movable barriers (see Section 6F.85) in highway work zones. In this example, one side of a 6-lane divided highway is closed to perform the work operation, and vehicular traffic is carried in both directions on the remaining 3-lane roadway by means of a median crossover.

   To accommodate unbalanced peak-period vehicular traffic volumes, the direction of travel in the center lane is switched to the direction having the greater volume, with the transfer typically being made twice daily. Thus, there are four vehicular traffic phases described as follows:

   a. Phase A—two travel lanes northbound and one lane southbound;
   b. Transition A to B—one travel lane in each direction;
   c. Phase B—one travel lane northbound and two lanes southbound; and
   d. Transition B to A—one travel lane in each direction.

   The typical application on the left illustrates the placement of devices during Phase A. The typical application on the right shows conditions during the transition (Transition A to B) from Phase A to Phase B.

Guidance:

2. *(DC Revisions) For the reversible-lane situation depicted, the ends of the movable barrier should terminate in a protected area or an impact attenuator should be provided. During Phase A, the transfer vehicle should be parked behind the downstream end of the movable barrier for southbound traffic as shown in the typical application on the left. During Phase B, the transfer vehicle should be parked behind between the downstream ends of the movable barriers at the north end of the TTC zone as shown in the typical application on the right.*

   The transition shift from Phase A to B should be as follows:

   a. Change the signs in the northbound advance warning area and transition area from a LEFT LANE CLOSED AHEAD to a 2 LEFT LANES CLOSED AHEAD. Change the mode of the second northbound arrow board from Caution to Right Arrow.
   b. Place channelizing devices to close the northbound center lane.
   c. Move the transfer vehicle from south to north to shift the movable barrier from the west side to the east side of the reversible lane.
   d. Remove the channelizing devices closing the southbound center lane.
   e. Change the signs in the southbound transition area and advance warning area from a 2 LEFT LANES CLOSED AHEAD to a LEFT LANE CLOSED AHEAD. Change the mode of the second southbound arrow board from Right Arrow to Caution.

3. *Where the lane to be opened and closed is an exterior lane (adjacent to the edge of the traveled way or the work space), the lane closure should begin by closing the lane with channelizing devices placed along a merging taper using the same information employed for a stationary lane closure. The lane closure should then be extended with the movable-barrier transfer vehicle moving with vehicular traffic. When opening the lane, the transfer vehicle should travel against vehicular traffic. The merging taper should be removed in a method similar to a stationary lane closure.*

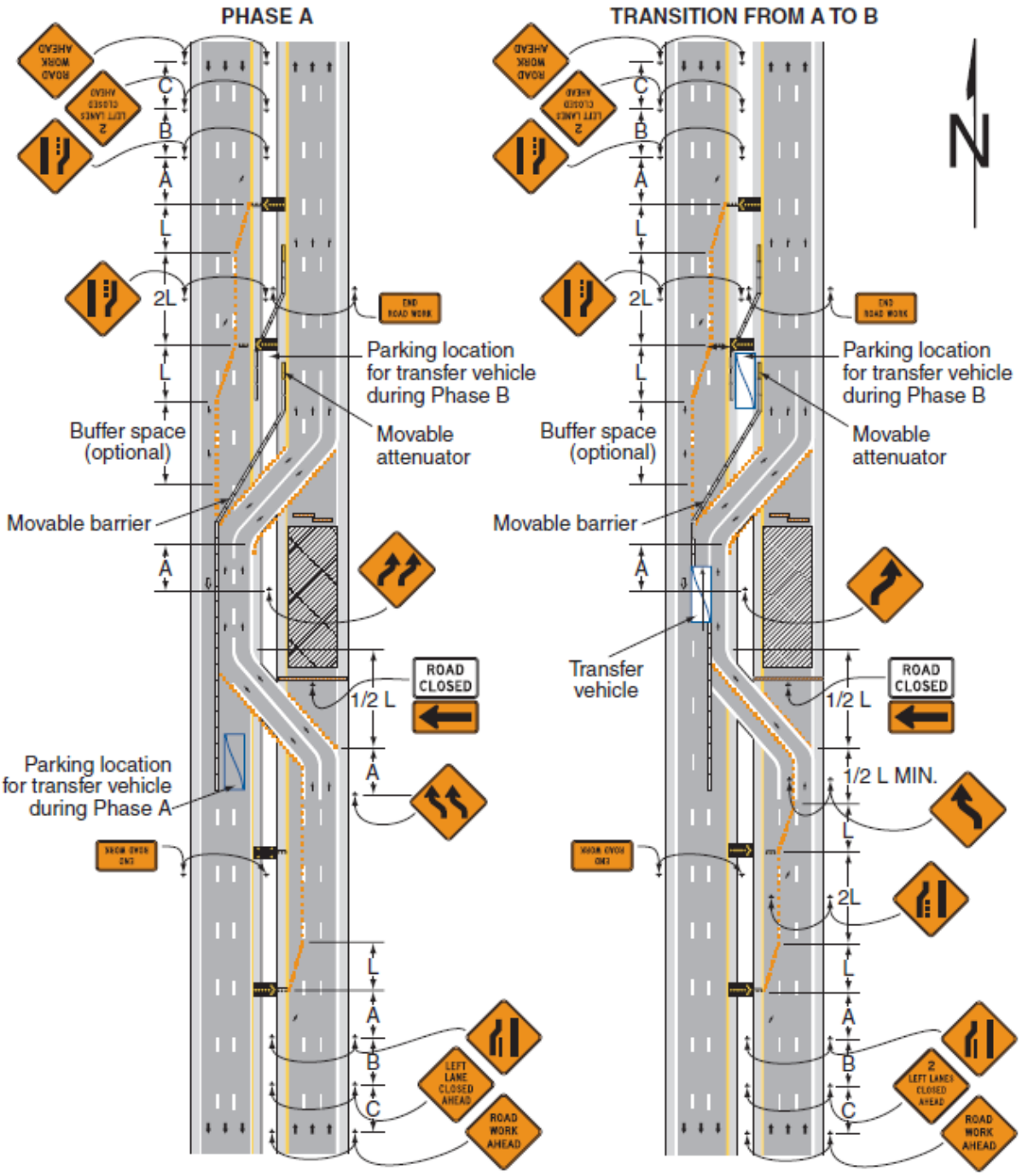
Option:

4. The procedure may be used during a peak period of vehicular traffic and then changed to provide two lanes in the other direction for the other peak.
5. A longitudinal buffer space may be used in the activity area to separate opposing vehicular traffic.
6. A work vehicle or a shadow vehicle may be equipped with a truck-mounted attenuator.

Standard:

7. **An arrow board shall be used when a freeway lane is closed. When more than one freeway lane is closed, a separate arrow board shall be used for each closed lane.**

Figure 6H-45. Temporary Reversible Lane Using Movable Barriers (TA-45)



Typical Application 45

Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure. Although leader lines point to the signs on the right-hand side of the roadway, most of these signs should be installed on both sides of the roadway.

Notes for Figure 6H-46—Typical Application 46
Work in the Vicinity of a Grade Crossing

Guidance:

1. *When grade crossings exist either within or in the vicinity of roadway work activities, extra care should be taken to minimize the probability of conditions being created, by lane restrictions, flagging, or other operations, where vehicles might be stopped within the grade crossing, considered as being 15 feet on either side of the closest and farthest rail.*

Standard:

2. **If the queuing of vehicles across active rail tracks cannot be avoided, a uniformed law enforcement officer or flagger shall be provided at the grade crossing to prevent vehicles from stopping within the grade crossing (as described in Note 1), even if automatic warning devices are in place.**

Guidance:

3. *Early coordination with the railroad company or light rail transit agency should occur before work starts.*
4. *In the example depicted, the buffer space of the activity area should be extended upstream of the grade crossing (as shown) so that a queue created by the flagging operation will not extend across the grade crossing.*
5. *The DO NOT STOP ON TRACKS sign should be used on all approaches to a grade crossing within the limits of a TTC zone.*

Option:

6. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
7. A BE PREPARED TO STOP sign may be added to the sign series.

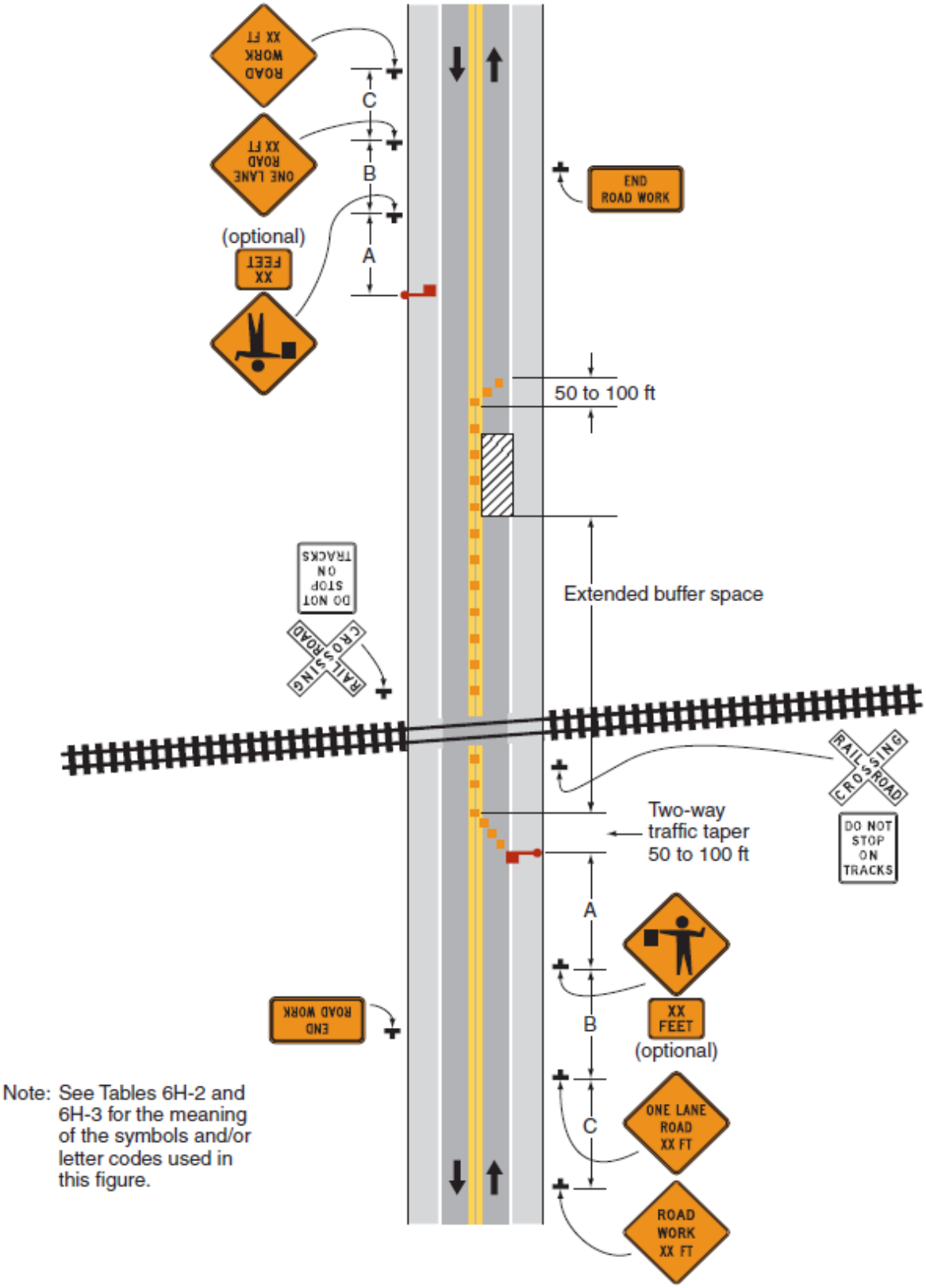
Guidance:

8. *When used, the BE PREPARED TO STOP sign should be located before the Flagger symbol sign.*

Standard:

9. At night, flagger stations shall be illuminated, except in emergencies.

Figure 6H-46. Work in the Vicinity of a Grade Crossing (TA-46)



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Typical Application 46

Notes for Figure 6H-47—Typical Application 47
Traffic Circle with Outer-most Lane Closure

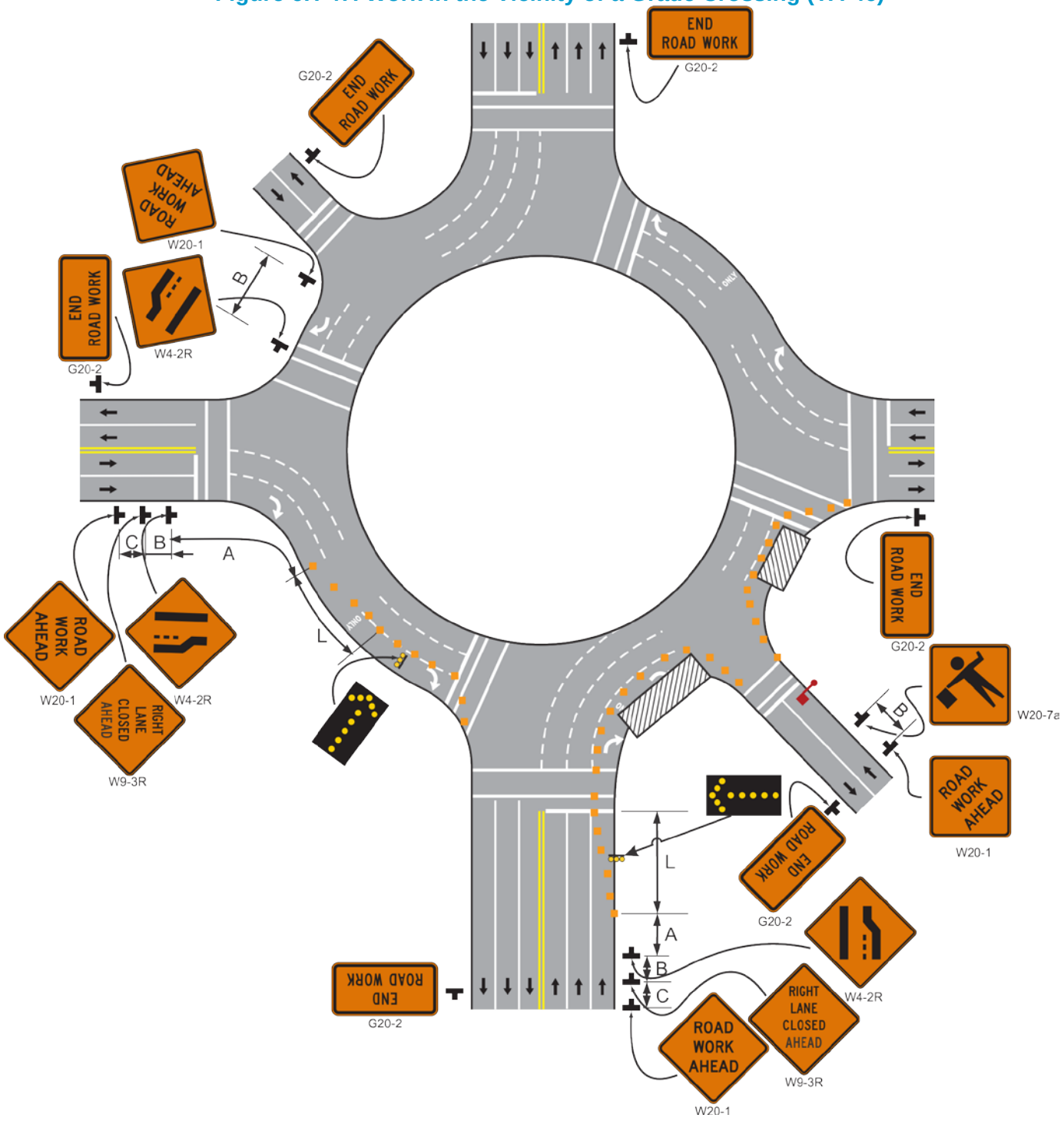
Standard:

1. **ROAD WORK AHEAD and END ROAD WORK signs shall be placed at location where they are visible to motorists entering/exiting the traffic circle.**
2. **An arrow board shall be used during the lane closure.**
3. **Warning sign shall be used to indicate the lane closure.**

Option:

4. A flagger may be used at the leg of the road closest to the work zone.
5. Vehicle hazard warning signals may be used to supplement high-intensity amber, rotating, oscillating, or strobe lights.

Figure 6H-47. Work in the Vicinity of a Grade Crossing (TA-46)



Typical Application 47

Notes for Figure 6H-48—Typical Application 48
Traffic Circle with Center Lane Closure

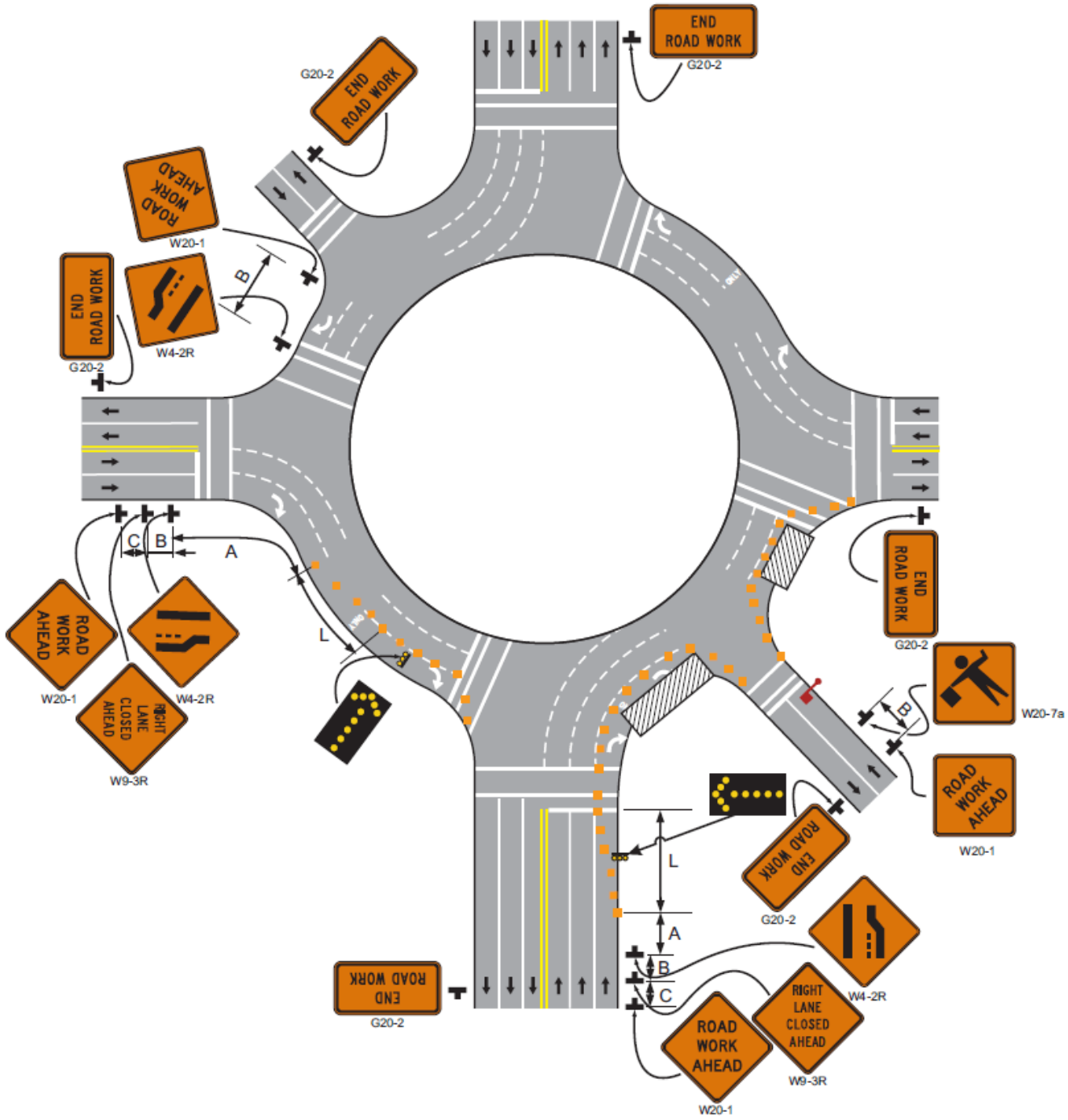
Standard:

1. **ROAD WORK AHEAD and END ROAD WORK signs shall be placed at location where they are visible to motorists entering/exiting the traffic circle.**
2. **An arrow board shall be used during the lane closure.**
3. **Warning sign shall be used to indicate the lane closure.**

Option:

4. Vehicle hazard warning signals may be used to supplement high-intensity amber, rotating, oscillating, or strobe lights.

Figure 6H-48. Work in the Vicinity of a Grade Crossing (TA-48)



Typical Application 48

Notes for Figure 6H-49—Typical Application 49
Traffic Circle with Inner-most Lane Closure

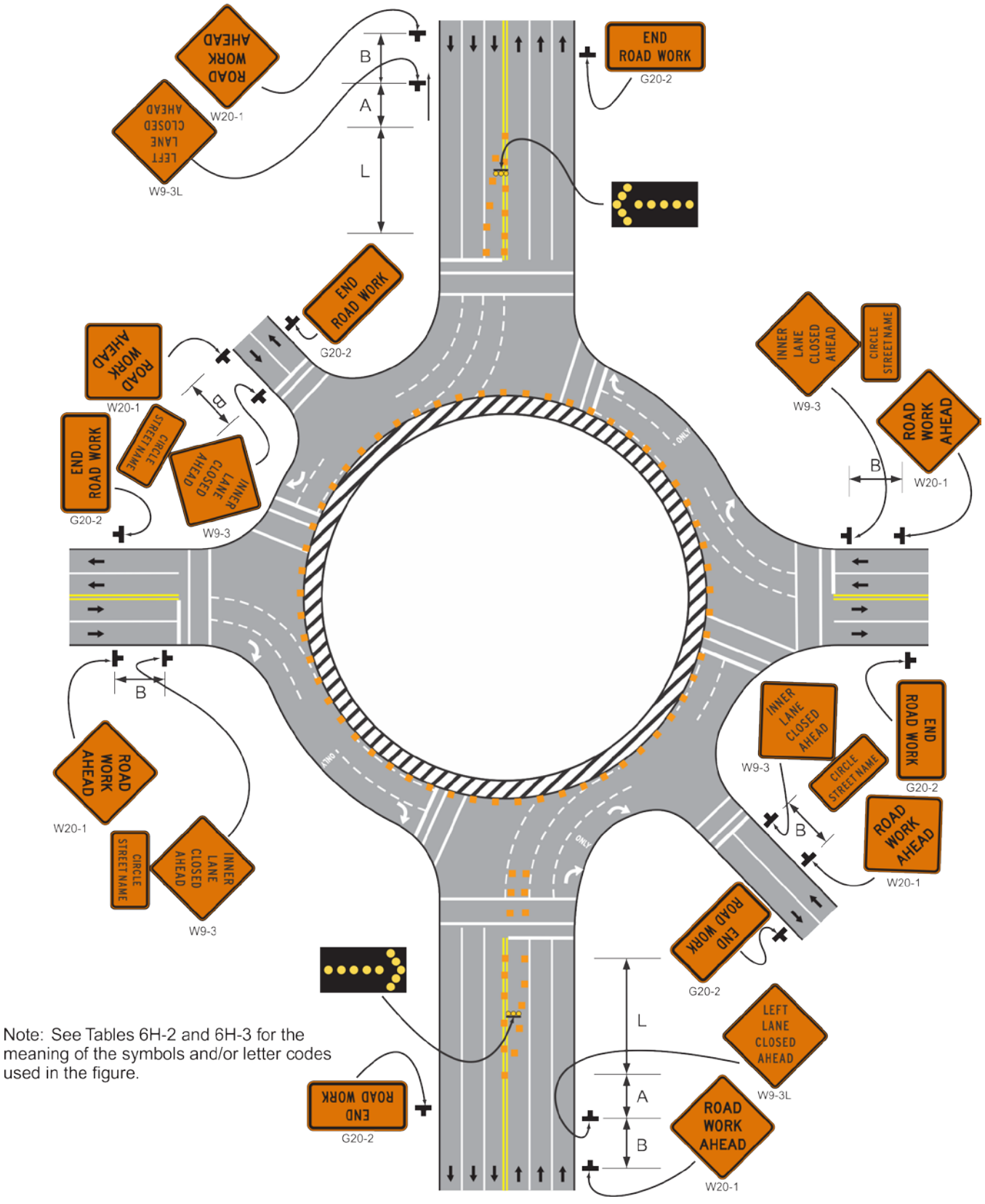
Standard:

1. **ROAD WORK AHEAD and END ROAD WORK signs shall be placed at location where they are visible to motorists entering/exiting the traffic circle.**
2. **An arrow board shall be used during the lane closure.**
3. **Warning sign shall be used to indicate the lane closure.**

Option:

4. Vehicle hazard warning signals may be used to supplement high-intensity amber, rotating, oscillating, or strobe lights.

Figure 6H-49. Work in the Vicinity of a Grade Crossing (TA-49)



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in the figure.

Typical Application 49

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

Section 6I.01 General

Support:

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

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

03 A traffic incident management area is an area of a highway where temporary traffic controls are installed, as authorized by a public authority or the official having jurisdiction of the roadway, in response to a road user incident, natural disaster, hazardous material spill, or other unplanned incident. It is a type of TTC zone and extends from the first warning device (such as a sign, light, or cone) to the last TTC device or to a point where vehicles return to the original lane alignment and are clear of the incident.

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

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

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

C. Minor—expected duration under 30 minutes.

05 The primary functions of TTC at a traffic incident management area are to inform road users of the incident and to provide guidance information on the path to follow through the incident area. Alerting road users and establishing a well-defined path to guide road users through the incident area will serve to protect the incident responders and those involved in working at the incident scene and will aid in moving road users expeditiously past or around the traffic incident, will reduce the likelihood of secondary traffic crashes, and will preclude unnecessary use of the surrounding local road system. Examples include a stalled vehicle blocking a lane, a traffic crash blocking the traveled way, a hazardous material spill along a highway, and natural disasters such as floods and severe storm damage.

Guidance:

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

07 *(DC Revision) On-scene responder organizations should train their personnel in TTC practices for accomplishing their tasks in and near traffic and in the requirements for traffic incident management contained in this Manual. On-scene responders should take measures to move the incident off the traveled roadway or to provide for appropriate warning. All on-scene responders and news media personnel should constantly be aware of their visibility to oncoming traffic and wear high-visibility apparel. See Section 6D.03 for details on high-visibility apparel requirements.*

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

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

Standard:

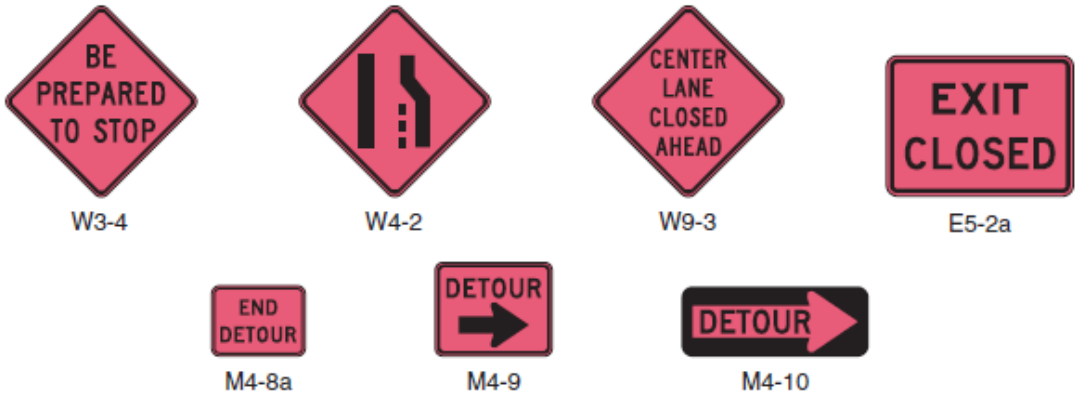
10 **(DC Revision) Warning and guide signs used for TTC traffic incident management situations shall have a black legend and border on a fluorescent pink background (see Figure 6I-1).**

Support:

11 While some traffic incidents might be anticipated and planned for, emergencies and disasters might pose more severe and unpredictable problems. The ability to quickly install proper temporary traffic controls might greatly reduce the effects of an incident, such as secondary crashes or excessive traffic delays. An essential part of fire, rescue, spill clean-up, highway agency, and enforcement activities is the proper control of road users through the traffic incident management area in order to protect responders, victims, and other personnel at the site. These operations might need corroborating legislative authority for the implementation

and enforcement of appropriate road user regulations, parking controls, and speed zoning. It is desirable for these statutes to provide sufficient flexibility in the authority for, and implementation of, TTC to respond to the needs of changing conditions found in traffic incident management areas.

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



Option:

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

Section 6I.02 Major Traffic Incidents

Support:

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

Guidance:

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

Support:

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

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

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

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

Guidance:

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

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

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

enforcement officers.

Option:

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

Guidance:

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

Option:

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

Guidance:

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

Section 6I.03 Intermediate Traffic Incidents

Support:

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

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

Guidance:

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

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

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

Option:

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

Guidance:

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

Option:

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

Guidance:

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

Section 6I.04 Minor Traffic Incidents

Support:

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

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

Guidance:

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

quickly as possible.

Section 6I.05 Use of Emergency-Vehicle Lighting

Support:

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

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

Guidance:

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

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

WORK ZONE MANAGEMENT MANUAL

FOR THE DISTRICT OF COLUMBIA

PART FIVE:

APPENDICES

District Department of Transportation

January 2016

DDOT WORK ZONE MANAGEMENT MANUAL

APPENDIX A - PEDESTRIAN SAFETY & WORK ZONE STANDARDS – COVERED AND OPEN WALKWAYS

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District Department of Transportation

PEDESTRIAN SAFETY AND WORK ZONE STANDARDS

Covered and Open Walkways

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District Department of Transportation

PEDESTRIAN SAFETY AND WORK ZONE STANDARDS

Table Of Contents

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DEPARTMENT OF TRANSPORTATION
ADMINISTRATIVE ISSUANCE SYSTEM

DEPARTMENTAL ORDER NO. 2008-OD-02 DATE: December 14, 2007

SUBJECT: District Department of Transportation Pedestrian Safety and Work Zone Standards

I. PURPOSE

To provide guidance and standards to District Department of Transportation employees for reviewing construction of protected walkways on the sidewalks and roadways of the District of Columbia as part of a required traffic control plan and to provide guidance on the preferred methods for routing pedestrians safely through work zones occupying public space in the District of Columbia.

II. AUTHORITY

Sections 3b 5(3) and 5(4) of the Department of Transportation Establishment Act of 2002 (D.C. Official Code §§ 50-921.02(b), and 50-921.04(3), 50-921.04(4))

III. POLICY

The District Department of Transportation (DDOT) is responsible for regulating the temporary occupancy of public space during construction on both private property and public space. As a part of this responsibility, DDOT reviews and approves traffic control plans governing the safe routing of pedestrians and vehicles around the work zone in public space.

To ensure that work zones adjacent to sidewalks minimize disruption to the normal pedestrian pathways while providing adequate protection for pedestrians, DDOT shall review all traffic control plans that include a covered walkway on the sidewalk or the roadway or that include an open walkway on the sidewalk or in the roadway and are submitted with applications for public space permits to ensure that the plan is consistent with the standards in the District Guideline and Standards for Traffic Control: Work Zone Safety Pocket Guide and the District Temporary Traffic Manual: Work Zone Manual 2006 Edition.

It is the general policy of DDOT that, in accordance with the Manual on Uniform Traffic Control Devices, 2003 Edition, traffic control plans should replicate the existing pedestrian pathway as nearly as practical and that the pedestrian pathway should not be severed or moved for non-construction activities such as parking for vehicles or the storage of materials or equipment. All traffic control plans

submitted with applications for public space permits shall include a schedule of work. The proposed traffic control plan shall provide a pedestrian pathway consistent with the phase of work as outlined in the District Guideline and Standards for Traffic Control: Work Zone Safety Pocket Guide, the District Temporary Traffic Manual: Work Zone Manual 2006 Edition and the attached document titled Pedestrian Protections and Phases of Construction.

Modification from this policy is allowed based on site-specific conditions. Modification must be requested in writing when submitting the traffic control plan and public space permit application. The request must explain the nature of the modification requested and the site-specific conditions that require the modification.

IV. ISSUANCE APPLICABILITY

This Departmental issuance shall be distributed to each DDOT employee for his or her review based on the applicability of this policy to his or her job.

V. EFFECTIVE DATE

This policy shall take effect immediately upon the execution of this Order.

12/4/07

Emeka Moneme Date

Covered Walkways on the Sidewalk

1. **Specifications and Drawings:** Specifications and drawings of the covered walkway must be submitted with the traffic control plan and the public space occupancy permit application. The drawings must show the side view, front view and cross section of the covered walkway and must be stamped and signed by a Professional Engineer licensed by the District of Columbia. If and when DDOT publishes specifications and standard drawings stamped and signed by the Chief Engineer, these drawings may be used with the application. A traffic control plan for the construction of the covered walkway must also be provided with the application.

2. **ADA Compliance:** All covered walkways constructed under this section must provide an accessible pedestrian route in accordance with the requirements of the Americans with Disabilities Act (ADA). This includes, but is not limited to: constructing structural floors when required (see number 3 below) that have a surface that is firm, stable and slip resistant, and that is compliant in slope, counter slope, vertical clearances, turning radii and surface discontinuities; providing compliant ramps connecting the structural floor to an existing pedestrian accessible route; and implementing sufficient measures to ensure the safety and welfare of the pedestrian(s) traversing the site. All ramps with a rise greater than six inches (6 in) shall be constructed with handrails on both sides of the ramp.

3. **Floor:** Structural floors are not required unless needed to cross an opening or an obstruction in the sidewalk, to comply with requirements of the ADA, or as directed by DDOT. Otherwise, the sidewalk may serve as the floor of the covered walkway. Any structural floor provided shall be constructed of planking closely laid and made tight. The floor shall be designed for a live load of three hundred pounds per square foot (300 psf), shall be treated with a non-slip coating, provide adequate drainage, and shall comply with the ADA requirements (see item 2 above).

4. **Roof:** Roofs of covered walkways shall consist of planking no less than the industry standard nominal thickness of two inches (2 in), closely laid, made water tight, and covered with exterior grade fire resistant plywood. All sill plates and posts shall be Ground Contact rated pressure-preservative treated material. All fasteners shall be galvanized steel. The roof shall be designed to carry a live load of at least 200 pounds per square foot (200 psf). For covered walkways adjacent to buildings 100 feet or less in height, the roof shall be designed to carry a live load of at least 150 pounds per square foot (150 psf).

5. **Height:** Covered walkways shall have a clear and unobstructed ceiling height of not less than eight feet (8 ft).

6. **Width:** Covered walkways shall have a clear unobstructed width of not less than eight feet (8 ft) in the Central Business District and six feet (6 ft) in all other areas. Width is to be measured from wall to wall and not from handrail to wall or handrail to handrail. Covered walkways shall not allow unprotected passage along the sidewalk on either side of the covered walkway.

7. **Lighting:** The interior of the covered walkway shall be lighted at all times. Lights shall be installed on the ceiling and the level of illumination shall be the equivalent of that produced by 100 watt, 1,700 lumen minimum, standard incandescent lamps enclosed in vandal-resistant fixtures and spaced fifteen feet (15 ft) apart and eight feet (8 ft) above the floor level. Lights must be left on overnight. Lighting shall be inspected nightly, and burned out or inoperative

lights shall be replaced or repaired by the next business day. Lighting shall comply with the National Electrical Code and the District of Columbia Electrical Code.

8. **Structural Members:** The structural members of the covered walkway shall be adequately braced and connected to prevent displacement or distortion of the frame work.

9. **Construction Facing Side:** The side of the covered walkway facing the construction area shall be completely enclosed with plywood, except that the side may have openings, at the discretion of the permit holder and adequately protected by screening, that allow pedestrians to view the work site.

10. **Roadway Facing Side:** The side of the covered walkway facing the roadway shall not be built within or on any tree box and shall be set back from the face of curb by a minimum of one (1) foot. The side of the covered walkway facing the roadway may be constructed of chain link, plywood (only to the height of 3' 6" from grade), or bracings. Within forty five feet (45 ft) of the intersection of two streets the side(s) facing the roadway shall be constructed to maintain an unobstructed line of sight for drivers in the roadway and pedestrians using the covered walkway. The intersection of two streets is the point of intersection of the curb lines extended. If the covered walkway is constructed with a structural floor, the side of the covered walkway facing the roadway shall be either continuous non-flexible material to a height of 3' 6" or it shall be provided with continuous upper and lower railings running the length of the covered walkway at heights sufficient to prevent pedestrians from straying off the structural floor.

11. **Building Entry:** If the building is actively in use while the covered walkway is in place, the covered walkway shall be designed to maintain ADA accessible entry to and exit from the building. It shall have signs or stenciling indicating the names of the stores or businesses that can be accessed directly from the covered walkway. Hand written signs are not to be used in a covered walkway.

12. **Hand Rail:** A continuous handrail shall be installed along at least one side of the covered walkway to aid pedestrians. The handrail shall comply with the requirements of ADA. Current requirements are that the top of the handrails shall be between thirty four inches and thirty eight inches (34 in-38 in) from grade; the clearance between the handrail gripping surface and the adjacent surface shall be a minimum of one and one half inches (1 ½ in); the rails cannot be obstructed along their top or sides; and handrails shall extend horizontally above the landing for twelve inches (12 in) minimum beyond the top and bottom of ramp runs. Extensions shall return to a wall, guard, or the landing surface, or shall be continuous with an adjacent rail.

13. **Transit Access:** The covered walkway shall be designed to maintain ADA compliant access from the sidewalk to any Metrorail entrance, operating bus stop, or bus shelter.

14. **Directional Signs:** The covered walkway shall have signs or stenciling at all entry points, including those from a Metrorail entrance or operating bus stop, indicating the next intersection and street names in either direction of travel through the covered walkway. Hand written signs are not to be used in a covered walkway.

15. **Alternate Materials:** Steel or other materials having equivalent strength and suitability may be used in lieu of wood to construct covered walkways. If alternate materials are selected then they must satisfy the requirements of ADA in the application in which they will be used.

16. **Postings, Graffiti, Advertising:** Other than signs allowed under Title 12A section 3107.8 of the District of Columbia Municipal Code, the walls, roof, and floor of the covered walkway shall be maintained free of postings, graffiti or advertising of any type. Any such material shall be removed or appropriately covered by the permit holder within 24 hours or the next business day. Failure to remove or cover the material may result in suspension or revocation of the public space permit and/or a stop work order for the site until the covered walkway is brought into compliance.

17. **Sidewalk Fixtures:** The covered walkway shall be designed to incorporate any existing sidewalk fixture, such as fire hydrants, light poles, traffic signal devices, parking meters, trash receptacles, bus stops and bus shelters, and benches. The covered walkway cannot cover or obstruct in any way traffic operation signage and signals, including those related to parking. If the covered walkway cannot be constructed without the removal of an existing sidewalk fixture, the permit holder shall provide in writing to DDOT details about: which fixture(s) are to be removed; where they will be stored pending the completion of the work; and how they will be restored upon removal of the covered walkway. Approval by DDOT must be obtained in writing prior to the removal of any fixture.

18. **Tree Protection:** Under no circumstances shall a street tree be removed, pruned, or disfigured for the construction or razing of the covered walkway except under a valid tree removal permit issued by the District Department of Transportation. No trees shall be used as an attachment point to support the covered walkway. Damage to any tree caused by the construction or placement of the covered walkway subjects the permit holder to fines. The covered walkway shall be constructed to provide adequate tree and tree root protection as specified in DDOT's Standard Specifications for Highways and Structures.

19. **Removal:** The covered walkway shall be removed immediately upon completion of the building construction/repair work, or the end of any potential hazard to pedestrians. Removal of the covered walkway shall be done without damage to any tree or the tree canopy. A traffic control plan for the razing of the covered walkway must also be provided and approved by DDOT prior to removal of the covered walkway.

20. **Modification Requests:** All standards noted above are subject to modification based on site-specific conditions. This request must be submitted in writing along with the traffic control plan and public space permit application; and must explain the modification and the site-specific conditions that require the modification. Once approved no modifications are allowed without the prior written approval of the work zone technician that approved the traffic control plan. In cases where, in the professional judgment of the site superintendent or his or her designee, field modification is required to prevent an imminent threat to public health or safety, field modifications are allowed. In such cases the work zone technician that approved the traffic control plan must be notified of the change within 24 hours and a traffic control plan showing the change must be submitted to that work zone technician within 72 hours. The work zone technician must either approve or disapprove the request in writing. If the change is approved, then the new traffic control plan becomes a part of the permit already issued for the original traffic control plan. If the work zone technician determines that the change is not required then the superintendent or his or her designee must return the work zone to its original approved condition.

Covered Walkways in the Roadway

1. **Specifications and Drawings:** Specifications and drawings of the covered walkway must be submitted with the traffic control plan and the public space permit application for occupancy of public space. The drawings must show the side view, front view and cross section of the covered walkway and must be stamped and signed by a Professional Engineer licensed by the District of Columbia. If and when DDOT publishes specifications and standard drawings stamped and signed by the Chief Engineer, these drawings may be used when applying for a public space permit. A traffic control plan for the construction of the covered walkway must also be provided with the application.
2. **ADA Compliance:** All covered walkways constructed under this section must provide an accessible pedestrian route in accordance with the requirements of the Americans with Disabilities Act (ADA). This includes, but is not limited to: constructing structural floors when required (see number 4 below) that have a surface that is firm, stable and slip resistant, and that is compliant in slope, vertical clearances, turning radii and surface discontinuities; implementing sufficient measures to ensure the safety and welfare of the pedestrian(s) traversing the site; and provide an ADA-compliant ramp from the curb to the covered walkway at both ends. All ramps with a rise greater than six inches (6 in) shall be constructed with handrails on both sides of the ramp.
3. **Floor:** If the floor (roadway surface) is uneven, the roadway shall be leveled using asphalt patching. Temporary metal plates are not to be used at any point as the floor of a covered walkway in the roadway. If temporary metal plates are required they must be covered with an ADA compliant platform.
4. **Roof:** The roof of the covered walkway shall consist of planking no less than the industry standard nominal thickness of two inches (2 in), closely laid, made water tight, and covered with exterior grade fire resistant plywood. All sill plates and posts shall be Ground Contact rated pressure-preservative treated material. All fasteners shall be galvanized steel. The roof shall be designed to carry a live load of at least 200 pounds per square foot (200 psf). For covered walkways adjacent to buildings 100 feet or less in height, the roof shall be designed to carry a live load of at least 150 pounds per square foot (150 psf).
5. **Height:** Roadway covered walkways shall have a clear and unobstructed ceiling height of not less than eight feet (8 ft).
6. **Width:** Roadway covered walkways in the must have a clear unobstructed width of 5 feet. When practical 6 feet is the DDOT preferred width.
7. **Lighting:** The interior of the covered walkway in the roadway shall be lighted at all times. Lights shall be installed on the ceiling and the level of illumination shall be the equivalent of that produced by 100 watt, 1,700 lumen minimum, standard incandescent lamps enclosed in vandal-resistant fixtures and spaced fifteen feet (15 ft) apart and eight feet (8 ft) above the floor level. Lights must be left on overnight. Lighting shall be inspected nightly, and burned out or inoperative lights shall be replaced or repaired by the next business day. Lighting shall comply with the National Electrical Code and the District of Columbia Electrical Code.
8. **Structural Members:** The structural members of the covered walkway shall be adequately braced and connected to prevent displacement or distortion of the frame work.

9. **Construction Facing Side:** The side of the covered walkway facing the construction area shall be completely enclosed with plywood, except that the side may have openings, at the discretion of the permit holder and adequately protected by screening, that allow pedestrians to view the work site. When there is no hazard to pedestrians in the covered walkway from material in the construction site, the construction side of the covered walkway may be constructed of chain link fencing, with light debris mesh when necessary. No light debris mesh shall be installed within 30 feet of the intersection of two roadways.

10. **Roadway Facing Side:** The side of the covered walkway facing the travel lanes of the roadway must have either jersey barriers or equivalent NCHRP 350 certified water filled barriers. The wall of the covered walkway facing the travel lanes may be attached to the top of the jersey/water filled barriers or may rest on the roadbed inside of the jersey/water filled barriers. Barriers are to have reflectors placed in accordance with DDOT traffic control standards

11. **Building Entry:** If the building is actively in use while the covered walkway is in place, the covered walkway shall be designed to maintain ADA accessible entry to and exit from the building. It shall have signs or stenciling indicating the names of the stores or businesses that can be accessed directly from the covered walkway. Hand written signs are not to be used in a covered walkway.

12. **Hand Rail:** A continuous handrail shall be installed along at least one side of the covered walkway to aid pedestrians. The handrail shall comply with the requirements of ADA. Current requirements are that the top of the handrails shall be between thirty four inches and thirty eight inches (34 in-38 in) from grade; the clearance between the handrail gripping surface and the adjacent surface shall be a minimum of one and one half inches (1 ½ in); the rails cannot be obstructed along their top or sides; and handrails shall extend horizontally above the landing for twelve inches (12 in) minimum beyond the top and bottom of ramp runs. Extensions shall return to a wall, guard, or the landing surface, or shall be continuous with an adjacent rail.

13. **Transit Access:** The covered walkway shall be designed to maintain ADA compliant access from the sidewalk to any Metrorail entrance, operating bus stop, or bus shelter.

14. **Directional Signs:** The covered walkway must provide proper signage (Manual on Uniform Traffic Control Devices (MUTCD) compliant) that directs pedestrians to a particular pathway. The covered walkway shall have signs or stenciling at all entry points, including those from a Metrorail entrance or operating bus stop, indicating the next intersection and street names in either direction of travel through the covered walkway. Hand written signs are not to be used in a covered walkway.

15. **Alternate Materials:** Steel or other materials having equivalent strength and suitability may be used in lieu of wood to construct covered walkways. If alternate materials are selected then they must satisfy the requirements of ADA in the application in which they will be used.

16. **Postings, Graffiti, Advertising:** Other than signs allowed under Title 12A section 3107.8 of the District of Columbia Municipal Code, the walls, roof, and floor of the covered walkway shall be maintained free of postings, graffiti or advertising of any type. Any such material shall be removed or appropriately covered by the permit holder within 24 hours or the next business day. Failure to remove or cover the material may result in suspension or revocation of the public space permit and/or a stop work order for the site until the covered walkway is brought into compliance.

17. **Sidewalk Fixtures and Catchbasins:** The covered walkway shall be designed to incorporate any existing sidewalk fixture, such as fire hydrants, light poles, traffic signal devices, parking meters, trash receptacles, vaults and manholes, bus stops and bus shelters, and benches. The covered walkway cannot cover or obstruct in any way traffic operation signage and signals, including those related to parking. The covered walkway cannot block access or drainage to catchbasins. If the covered walkway cannot be constructed without the removal of an existing sidewalk fixture, the permit holder shall provide in writing to DDOT details about: which fixture(s) are to be removed; where they will be stored pending the completion of the work; and how they will be restored upon removal of the covered walkway. Approval by DDOT must be obtained in writing prior to the removal of any fixture.

18. **Tree Protection:** Under no circumstances shall a street tree be removed, pruned, or disfigured for the construction or razing of the covered walkway except under a valid tree removal permit issued by the District Department of Transportation. No trees shall be used as an attachment point to support the covered walkway. Damage to any tree caused by the construction or placement of the covered walkway subjects the permit holder to fines. The covered walkway shall be constructed to provide adequate tree and tree root protection as specified in DDOT's Standard Specifications for Highways and Structures.

19. **Removal:** The covered walkway shall be removed immediately upon completion of the building construction/repair work, or the end of any potential hazard to pedestrians. Removal of the covered walkway shall be done without damage to any tree or the tree canopy. A traffic control plan for the razing of the covered walkway must also be provided and approved by DDOT prior to removal of the covered walkway.

20. **Roadway Occupancy:** DDOT shall consider requests for occupancy of additional roadway lanes and/or the shifting of roadway lanes on a case-by-case basis.

21. **Modification Requests:** All standards noted above are subject to modification based on site-specific conditions. Requests for modification must be made in writing with the submission of the traffic control plan and must explain the exact modification requested and the site-specific conditions for requesting the modification. Once approved no modifications are allowed without the prior written approval of the work zone technician that approved the traffic control plan. In cases where, in the professional judgment of the site superintendent or his or her designee, field modification is required to prevent an imminent threat to public health or safety, field modifications are allowed. In such cases the work zone technician that approved the traffic control plan must be notified of the change within 24 hours and a traffic control plan showing the change must be submitted to that work zone technician with 72 hours. The work zone technician must either approve or disapprove the request in writing. If the change is approved, then the new traffic control plan becomes a part of the permit already issued for the original traffic control plan. If the work zone technician determines that the change is not required, then the superintendent or his or her designee must return the work zone to its original approved condition.

Open Walkways on the Sidewalk

1. **Construction Facing Side:** The open walkway must be separated from the adjacent work zone by a chain link fence or other similar barrier. Any gate in the fence must swing inward toward the work zone. The fence must be properly anchored but cannot be bolted or attached in any similar manner into the sidewalk. Light debris mesh shall be used when necessary. No light debris mesh shall be installed within 30 feet of the intersection of two roadways.
2. **Width**: Must maintain a minimum of 8 feet unobstructed sidewalk width in the Central Business District, 6 feet in all other areas.
3. **Modification Requests:** All standards noted above are subject to modification based on site-specific conditions. Requests for modification must be made in writing with the submission of the traffic control plan and must explain the exact modification requested and the site-specific conditions for requesting the modification. Once approved, no modifications are allowed without the prior written approval of the work zone technician that approved the traffic control plan. In cases where, in the professional judgment of the site superintendent or his or her designee, field modification is required to prevent an imminent threat to public health or safety, field modifications are allowed. In such cases the work zone technician that approved the traffic control plan must be notified of the change within 24 hours and a traffic control plan showing the change must be submitted to that work zone technician with 72 hours. The work zone technician must either approve or disapprove the request in writing. If the change is approved, then the new traffic control plan becomes a part of the permit already issued for the original traffic control plan. If the work zone technician determines that the change is not required, then the superintendent or his or her designee must return the work zone to its original approved condition.

Open Walkways in the Roadway

1. **Construction Facing Side:** The open walkway must be separated from the work zone by a chain link fence or other similar barrier. Any gate in the fence must swing inward toward the work zone. The fence must be properly anchored but cannot be bolted or attached in any similar manner into the roadway. Light debris mesh shall be used when necessary. No light debris mesh shall be installed within 30 feet of the intersection of two roadways.
2. **Roadway Facing Side:** Must have either jersey barriers or equivalent NCHRP 350 certified water filled barriers on the roadway side. Barriers are to have reflectors placed in accordance with DDOT traffic control standards.
3. **Width**: Must maintain a minimum of 5 feet unobstructed width; where practical DDOT's preference is 6 feet unobstructed width.
4. **ADA Compliance:** Must provide ramp to comply with ADA access requirements. The ADA requirement for pitch side-to-side does not have to be met in the case of temporary open walkways in the roadway.
5. **Floor:** If required due to an uneven surface, the roadway shall be leveled using asphalt patching. Temporary metal plates are not to be used at any point as the floor of an open walkway in the roadway.
6. **Directional Signs:** Must provide proper signage (MUTCD-compliant) which directs pedestrians to a particular pathway.
7. **Modification Requests:** All standards noted above are subject to modification based on site-specific conditions. Requests for modification must be made in writing with the submission of the traffic control plan and must explain the exact modification requested and the site-specific conditions for requesting the modification. Once approved no modifications are allowed without the prior written approval of the work zone technician that approved the traffic control plan. In cases where, in the professional judgment of the site superintendent or his or her designee, field modification is required to prevent an imminent threat to public health or safety, field modifications are allowed. In such cases the work zone technician that approved the traffic control plan must be notified of the change within 24 hours and a traffic control plan showing the change must be submitted to that work zone technician with 72 hours. The work zone technician must either approve or disapprove the request in writing. If the change is approved, then the new traffic control plan becomes a part of the permit already issued for the original traffic control plan. If the work zone technician determines that the change is not required, then the superintendent or his or her designee must return the work zone to its original approved condition.

Complete Closure of the Sidewalk

1. **Directional Signs at Crosswalks:** Provide MUTCD-compliant signs at nearest crosswalk on both sides of the work zone notifying pedestrians the sidewalk is closed ahead and directing them to cross.
2. **Signs at Ends of Work Zones:** Provide MUTCD-compliant signs at ends of work zone notifying pedestrians of sidewalk closure.
3. **Audible Signals:** DDOT encourages the contracting and development communities to use audible signals at the approach sides of a sidewalk closure. Audible signals alert pedestrians with visual impairments that the sidewalk is closed ahead. Audible signals are not a requirement of sidewalk closures.
4. **Special Approval:** When closing a sidewalk adjacent to a roadway with more than two travel lanes and where at least one end of the sidewalk closure is more than 150 feet from the nearest signalized crosswalk, the Traffic Control Plan showing the closure of the sidewalk requires the written approval of the District Department of Transportation Pedestrian Program Coordinator or work zone technician assigned to review the traffic control plan.
5. **Modification Requests:** All standards noted above are subject to modification based on site-specific conditions. Requests for modification must be made in writing with the submission of the traffic control plan and must explain the exact modification requested and the site-specific conditions for requesting the modification. Once approved no modifications are allowed without the prior written approval of the work zone technician that approved the traffic control plan. In cases where, in the professional judgment of the site superintendent or his or her designee, field modification is required to prevent an imminent threat to public health or safety, field modifications are allowed. In such cases the work zone technician that approved the traffic control plan must be notified of the change within 24 hours and a traffic control plan showing the change must be submitted to that work zone technician with 72 hours. The work zone technician must either approve or disapprove the request in writing. If the change is approved, then the new traffic control plan becomes a part of the permit already issued for the original traffic control plan. If the work zone technician determines that the change is not required, then the superintendent or his or her designee must return the work zone to its original approved condition.

Pedestrian Protection by Phase of Construction

	Pedestrian Protection				
Phase of Construction	**Covered Walkway -Sidewalk-**	**Covered Walkway -Roadway-**	**Open Walkway -Sidewalk-**	**Open Walkway -Roadway-**	**Sidewalk Closure**
Raze					**P**
Facade Demolition	**2†**	**2†**			**P**
Sheeting & Shoring & Excavation	**P***	**2***	**P***	**2***	
Concrete or Steel Frame Construction		**P**			**2**
Skin or Façade Construction		**P**			**2**
Post Skin	**P**		**P**	**2**	
Sidewalk and Streetscape Work				**P****	**2****
Utility Work or other Work in ROW				**P****	**2****

P = DDOT preferred method

2 = Next alternative

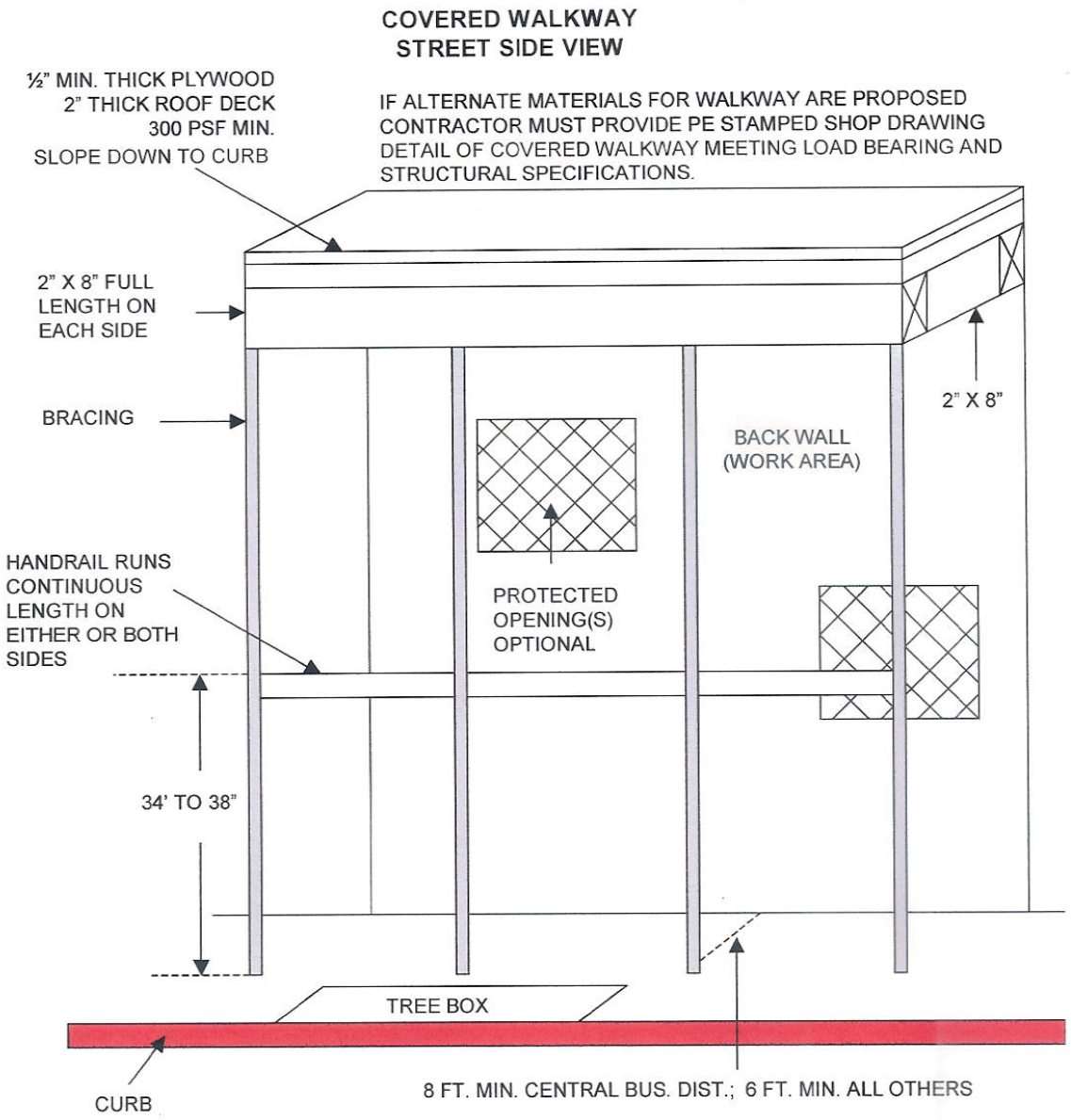
***** For intermittent closures due to lifting overhead, a flagger should be used at both ends of the walkway

****** These closures are expected to last no longer than 4 to 8 weeks

† When minimal overhead danger is present, covered walkways are the preferred method

Note: This represents the general policy of the District Department of Transportation. A site-specific modification is allowed. This request must be submitted in writing along with the traffic control plan and public space permit application; and must explain the modification and the site-specific conditions that require the modification.

Covered Walkway Standard Drawings



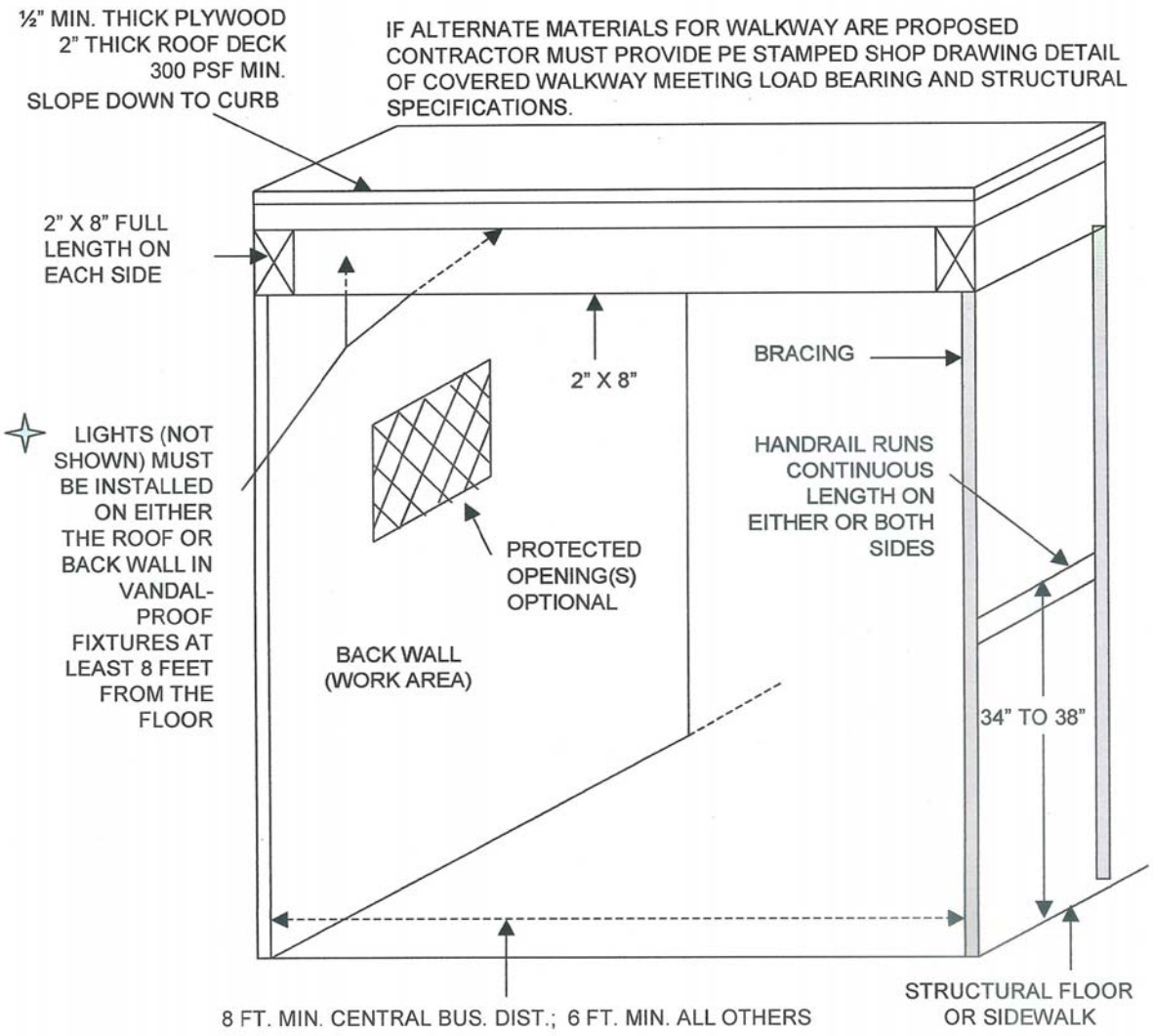
✦ IF A STRUCTURAL FLOOR IS INSTALLED THE WALKWAY MUST INCLUDE ADA-COMPLIANT CONTINUOUS RAILINGS AS PER COVERED WALKWAY STANDARDS

✦ LIGHTS (NOT SHOWN) MUST BE INSTALLED ON EITHER THE ROOF OR BACK WALL IN VANDAL-PROOF FIXTURES 8 FEET MIN. FROM THE FLOOR

COVERED WALKWAY - STREET SIDE VIEW
APPROVED BY

Ver. 05/07

COVERED WALKWAY
SIDEWALK END VIEW

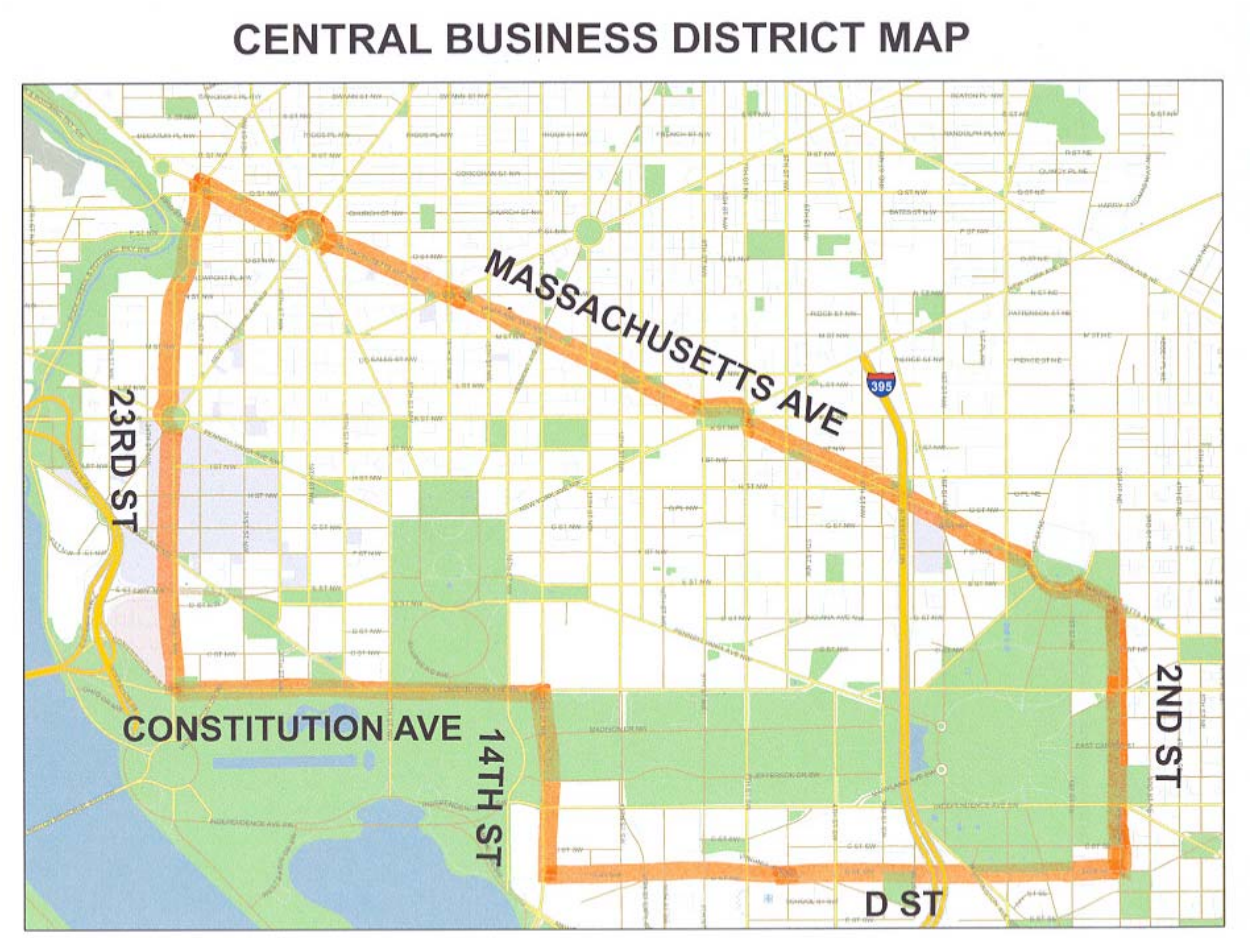


IF A STRUCTURAL FLOOR IS INSTALLED WALKWAY MUST INCLUDE ADA-COMPLIANT CONTINUOUS RAILINGS AS PER COVERED WALKWAY STANDARDS

COVERED WALKWAY - SIDEWALK END VIEW
APPROVED BY

Ver. 05/07

Central Business District Map



Note: Covered walkways on the sidewalk shall have a clear unobstructed width of not less than eight feet (8 ft) in the Central Business District and six feet (6 ft) in all other areas.

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DDOT WORK ZONE MANAGEMENT MANUAL

APPENDIX B - WORK ZONE UTILITY TYPICAL APPLICATIONS

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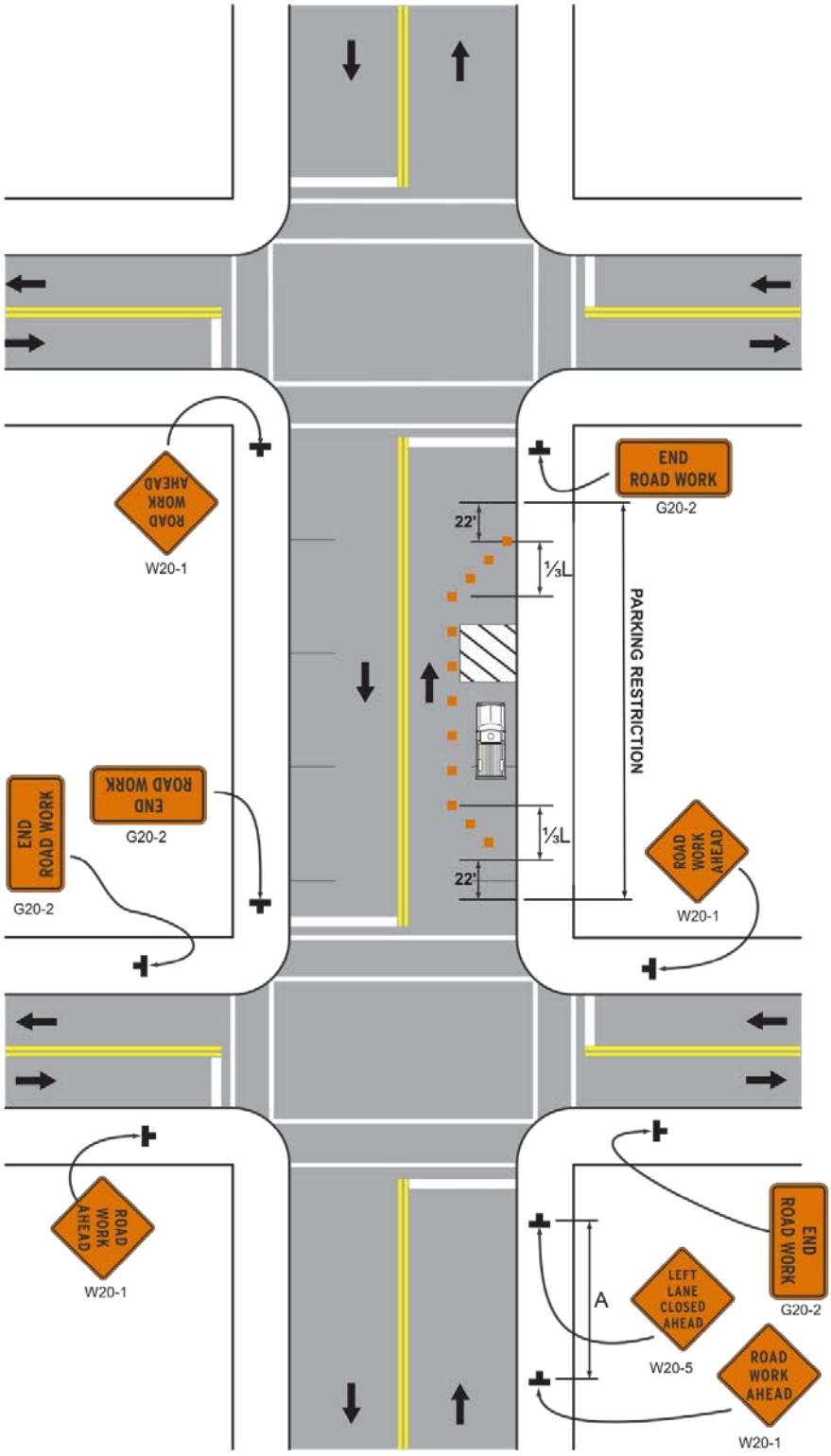
Parking Lane Closure (UTA-1)



STANDARD NOTES:

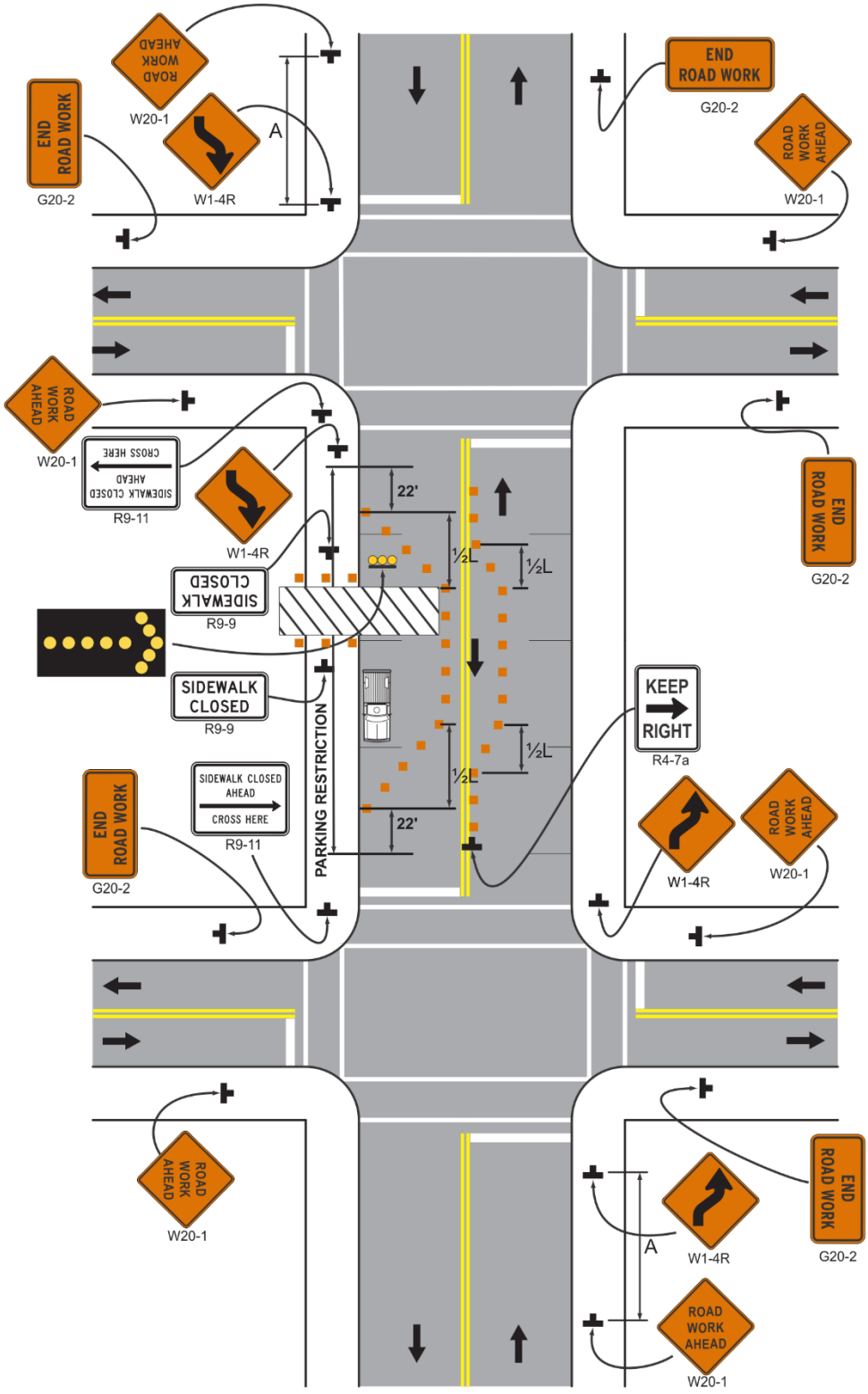
- PARKING IS TO BE RESTRICTED 72 HOURS IN ADVANCE UNLESS THERE IS AN EMERGENCY.
- SIGNS SHALL BE INSTALLED PRIOR TO THE COMMENCEMENT OF ALL WORK AND REMOVED IMMEDIATELY AFTER COMPLETION OF ACTIVITIES.
- IF A SIGN IS NO LONGER REQUIRED IT WILL BE REMOVED.
- SIGNS SHALL BE MOUNTED ON SPRING LOADED SIGN STANDS.
- THE SPACING OF TRAFFIC CONES IS TO BE 10'.
- IN CASE OF ONE WAY ROADWAY OMIT OPPOSITE SIGNAGE HAVE SIGNS ON BOTH SIDES OF ROADWAY APPROACHING WORK AHEAD.
- IF A BUS ROUTE TRAVEL LANE MUST BE MINIMUM 11FT. IN WIDTH.

Notes: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

See Table 6H-4 for the taper length (L)

Utility Typical Application 1

Travel Lane, Parking Lane, and Sidewalk Closure (UTA-2)



STANDARD NOTES:

- PARKING IS TO BE RESTRICTED 72 HOURS IN ADVANCE UNLESS THERE IS AN EMERGENCY.
- SIGNS SHALL BE INSTALLED PRIOR TO THE COMMENCEMENT OF ALL WORK AND REMOVED IMMEDIATELY AFTER COMPLETION OF ACTIVITIES.
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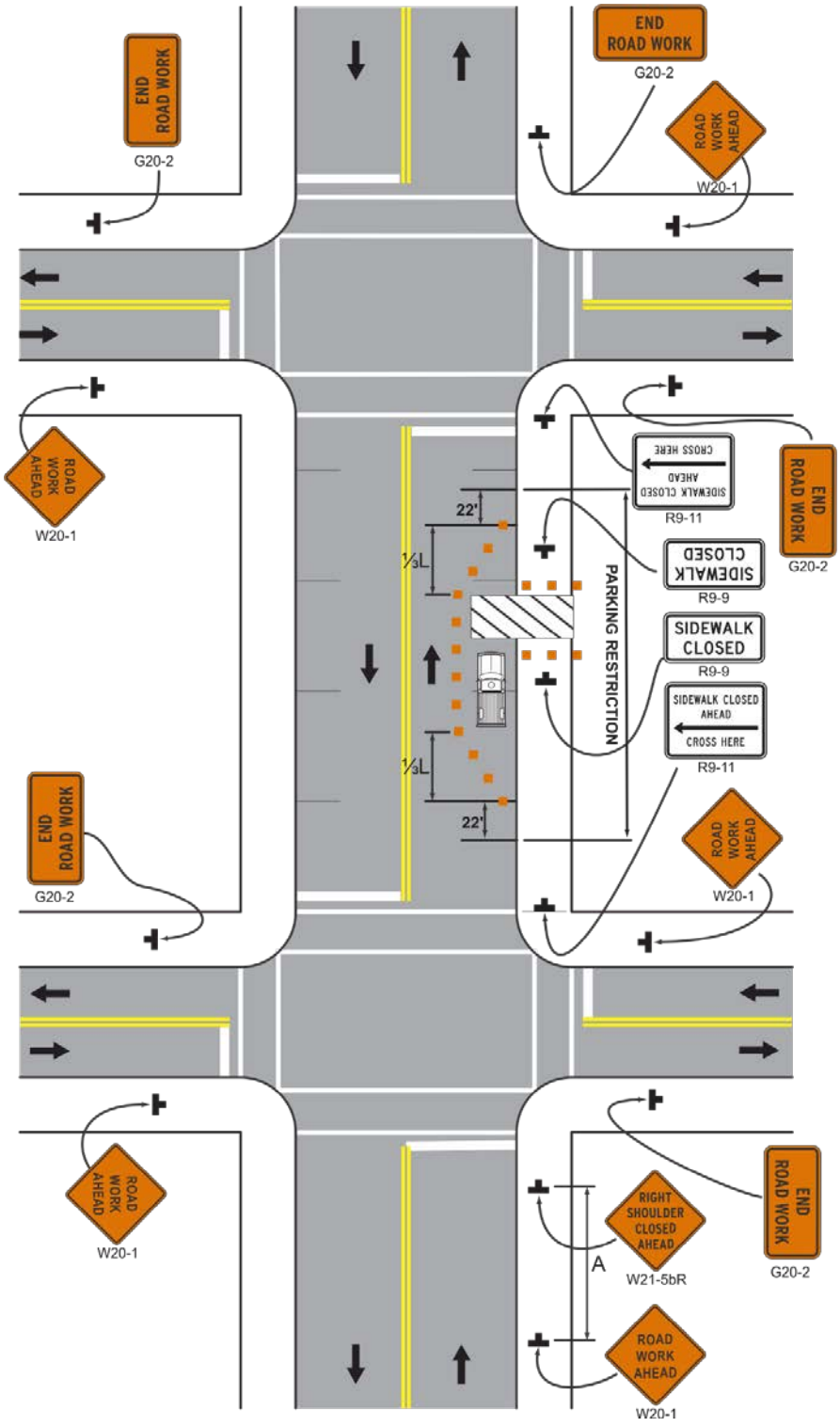
- IF A BUS ROUTE TRAVEL LANE MUST BE MINIMUM 11FT. IN WIDTH.

Notes: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

See Table 6H-4 for the taper length (L)

Utility Typical Application 2

Parking Lane/Sidewalk Closure (UTA-3)



STANDARD NOTES:

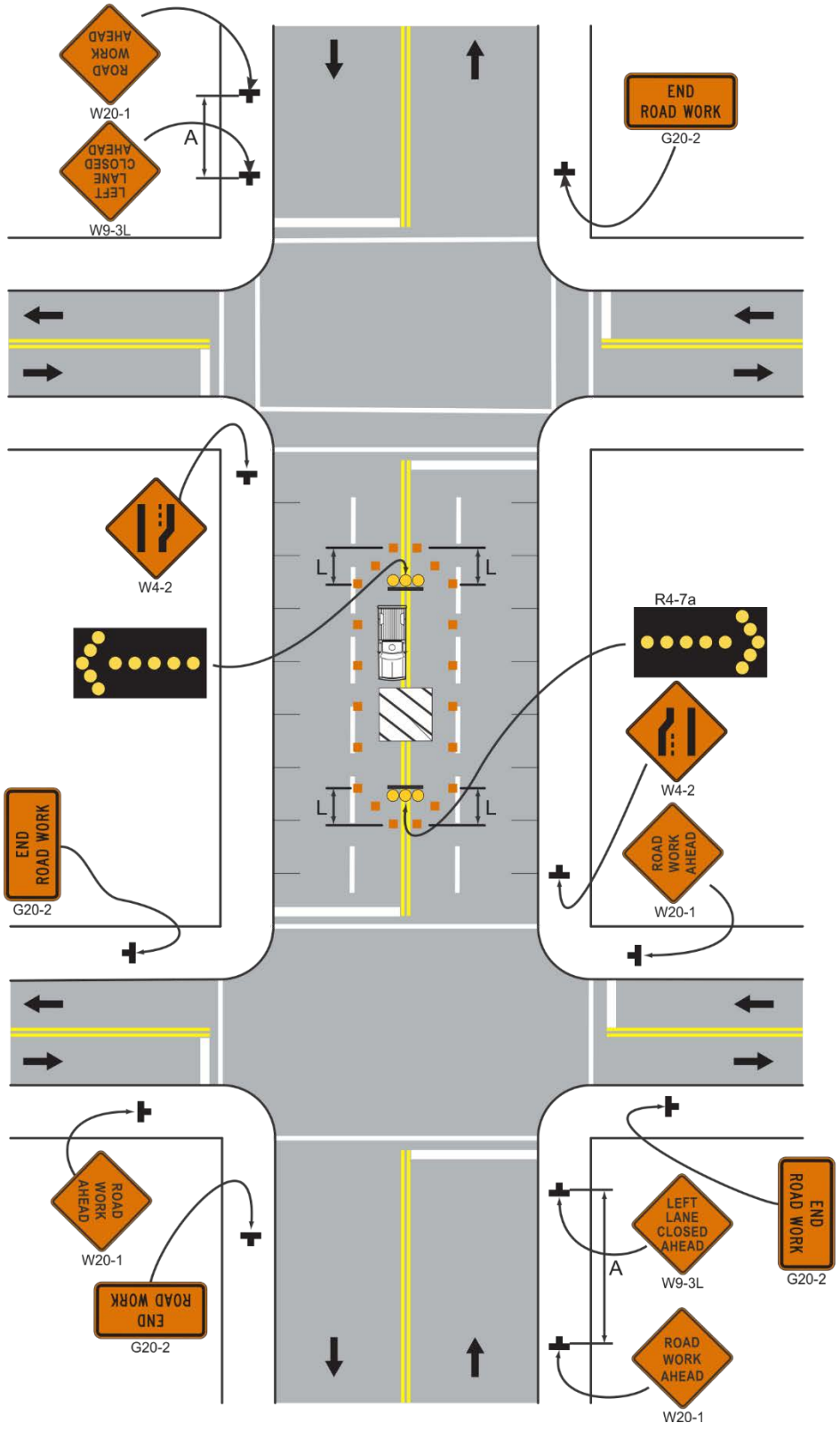
- PARKING IS TO BE RESTRICTED 72 HOURS IN ADVANCE UNLESS THERE IS AN EMERGENCY.
- SIGNS SHALL BE INSTALLED PRIOR TO THE COMMENCEMENT OF ALL WORK AND REMOVED IMMEDIATELY AFTER COMPLETION OF ACTIVITIES.
- IF A SIGN IS NO LONGER REQUIRED IT WILL BE REMOVED.
- SIGNS SHALL BE MOUNTED ON SPRING LOADED SIGN STANDS.
- THE SPACING OF TRAFFIC CONES IS TO BE 10'.
- IN CASE OF ONE WAY ROADWAY OMIT OPPOSITE SIGNAGE HAVE SIGNS ON BOTH SIDES OF ROADWAY APPROACHING WORK AHEAD.
- IF A BUS ROUTE TRAVEL LANE MUST BE MINIMUM 11FT. IN WIDTH.

Notes: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

See Table 6H-4 for the taper length (L)

Utility Typical Application 3

Interior Lane Closure on Multilane, Two-Way Street (UTA-5)



STANDARD NOTES:

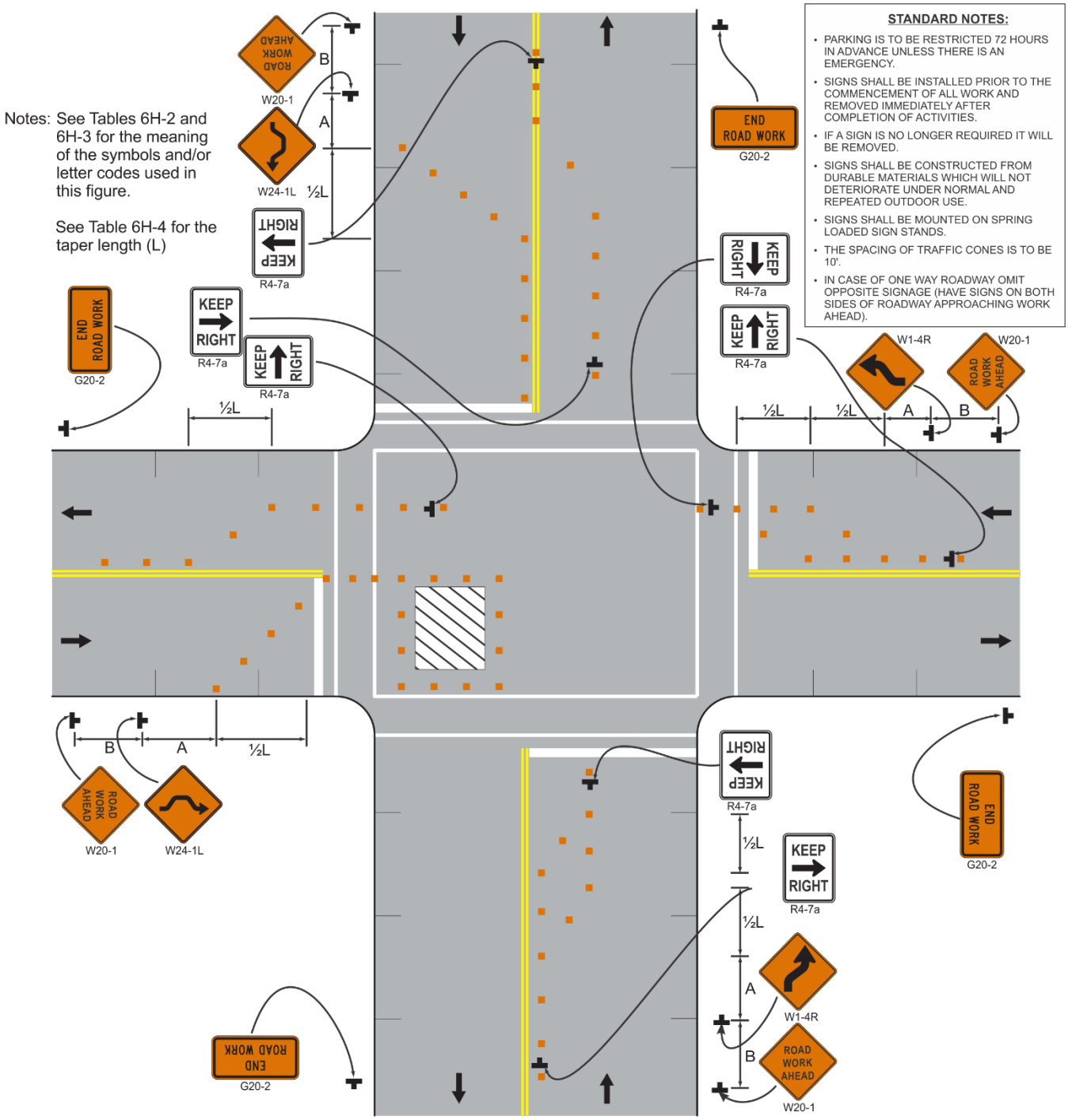
- PARKING IS TO BE RESTRICTED 72 HOURS IN ADVANCE UNLESS THERE IS AN EMERGENCY.
- SIGNS SHALL BE INSTALLED PRIOR TO THE COMMENCEMENT OF ALL WORK AND REMOVED IMMEDIATELY AFTER COMPLETION OF ACTIVITIES.
- IF A SIGN IS NO LONGER REQUIRED IT WILL BE REMOVED.
- SIGNS SHALL BE MOUNTED ON SPRING LOADED SIGN STANDS.
- THE SPACING OF TRAFFIC CONES IS TO BE 10'.
- IN CASE OF ONE WAY ROADWAY OMIT OPPOSITE SIGNAGE HAVE SIGNS ON BOTH SIDES OF ROADWAY APPROACHING WORK AHEAD.
- IF A BUS ROUTE TRAVEL LANE MUST BE MINIMUM 11FT. IN WIDTH.

Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

See Table 6H-4 for the taper length (L)

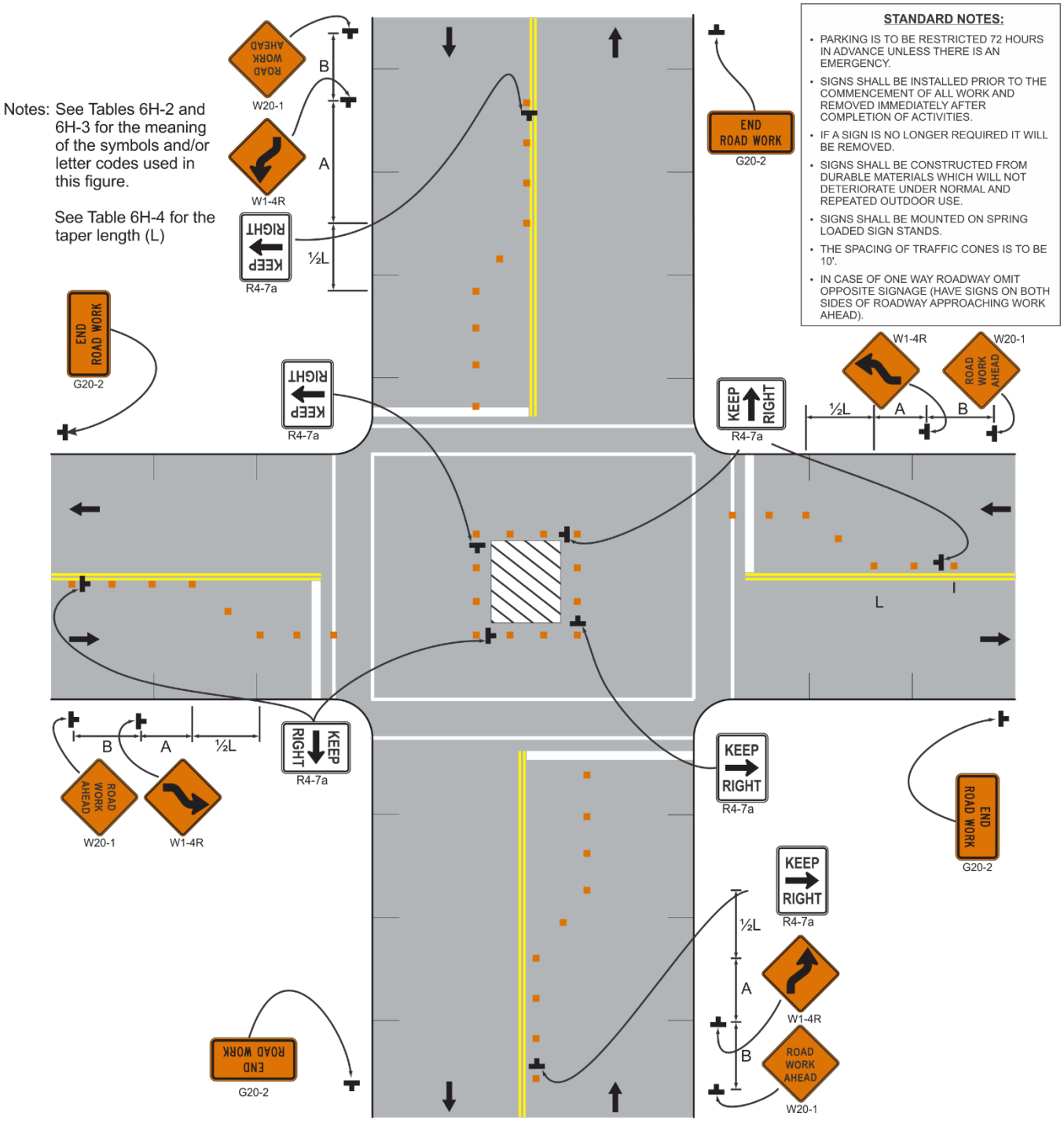
Utility Typical Application 5

Closure at Side of Intersection (UTA-6)



Utility Typical Application 6

Closure in Center of Intersection (UTA-7)



Utility Typical Application 7

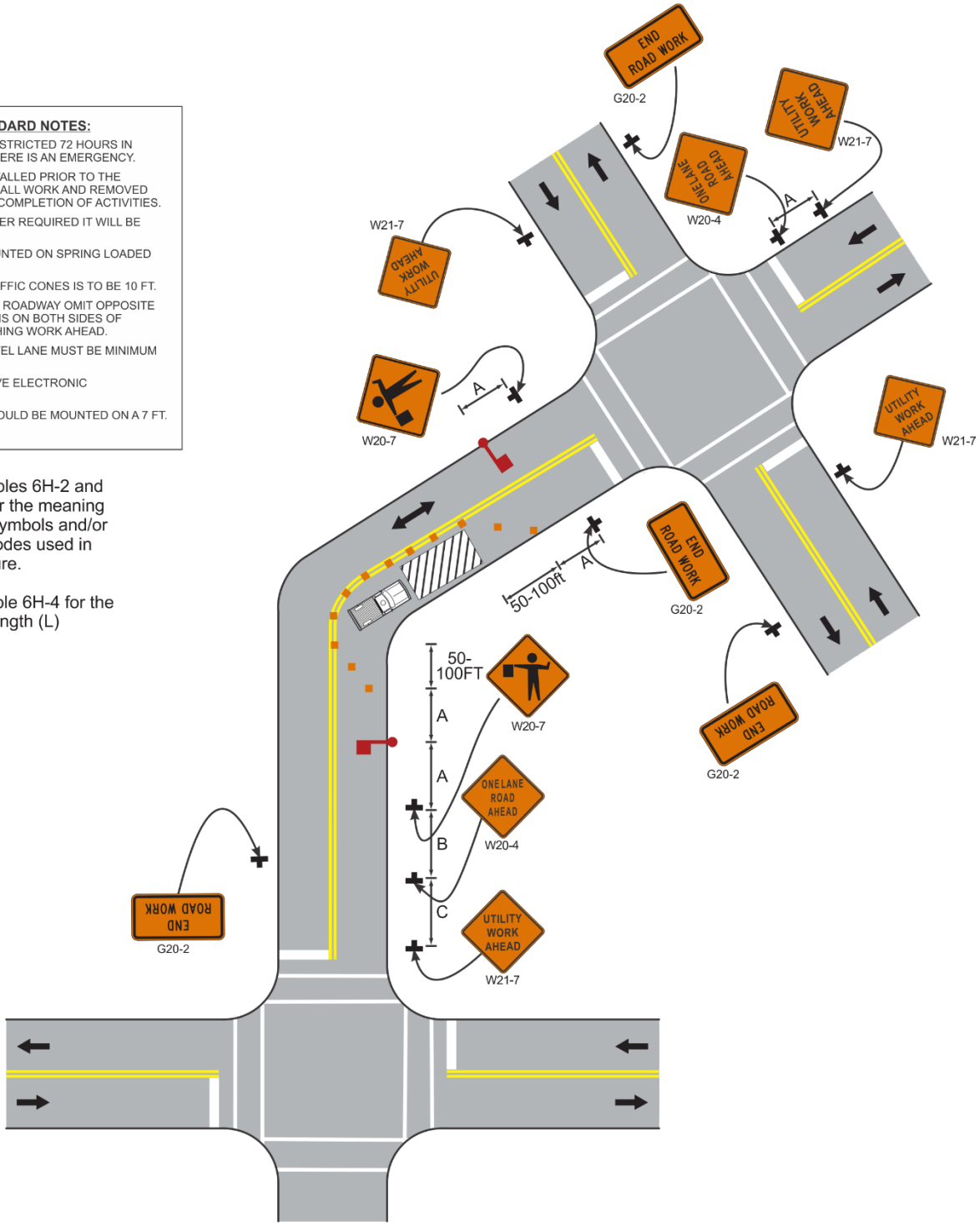
Two-Way Road And No Existing Parking with Flaggers (UTA-8)

STANDARD NOTES:

- PARKING IS TO BE RESTRICTED 72 HOURS IN ADVANCE UNLESS THERE IS AN EMERGENCY.
- SIGNS SHALL BE INSTALLED PRIOR TO THE COMMENCEMENT OF ALL WORK AND REMOVED IMMEDIATELY AFTER COMPLETION OF ACTIVITIES.
- IF A SIGN IS NO LONGER REQUIRED IT WILL BE REMOVED
- SIGNS SHALL BE MOUNTED ON SPRING LOADED STANDS.
- THE SPACING OF TRAFFIC CONES IS TO BE 10 FT.
- IN CASE OF ONE-WAY ROADWAY OMIT OPPOSITE SIGNAGE. HAVE SIGNS ON BOTH SIDES OF ROADWAY APPROACHING WORK AHEAD.
- IF A BUS ROUTE TRAVEL LANE MUST BE MINIMUM 11 FT. IN WIDTH.
- FLAGGERS MUST HAVE ELECTRONIC COMMUNICATION.
- STOP/SLOW SIGN SHOULD BE MOUNTED ON A 7 FT. POLE.

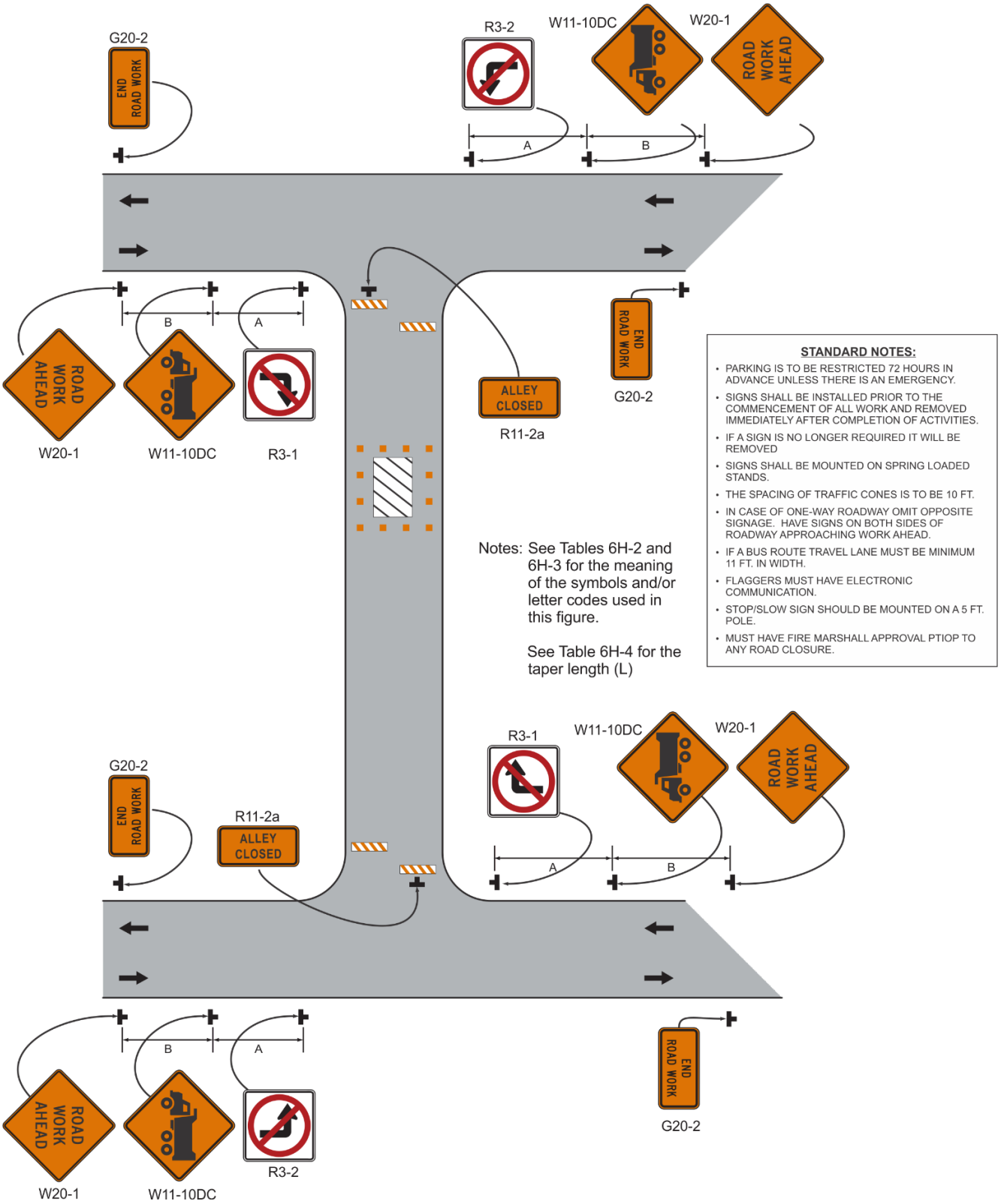
Notes: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

See Table 6H-4 for the taper length (L)



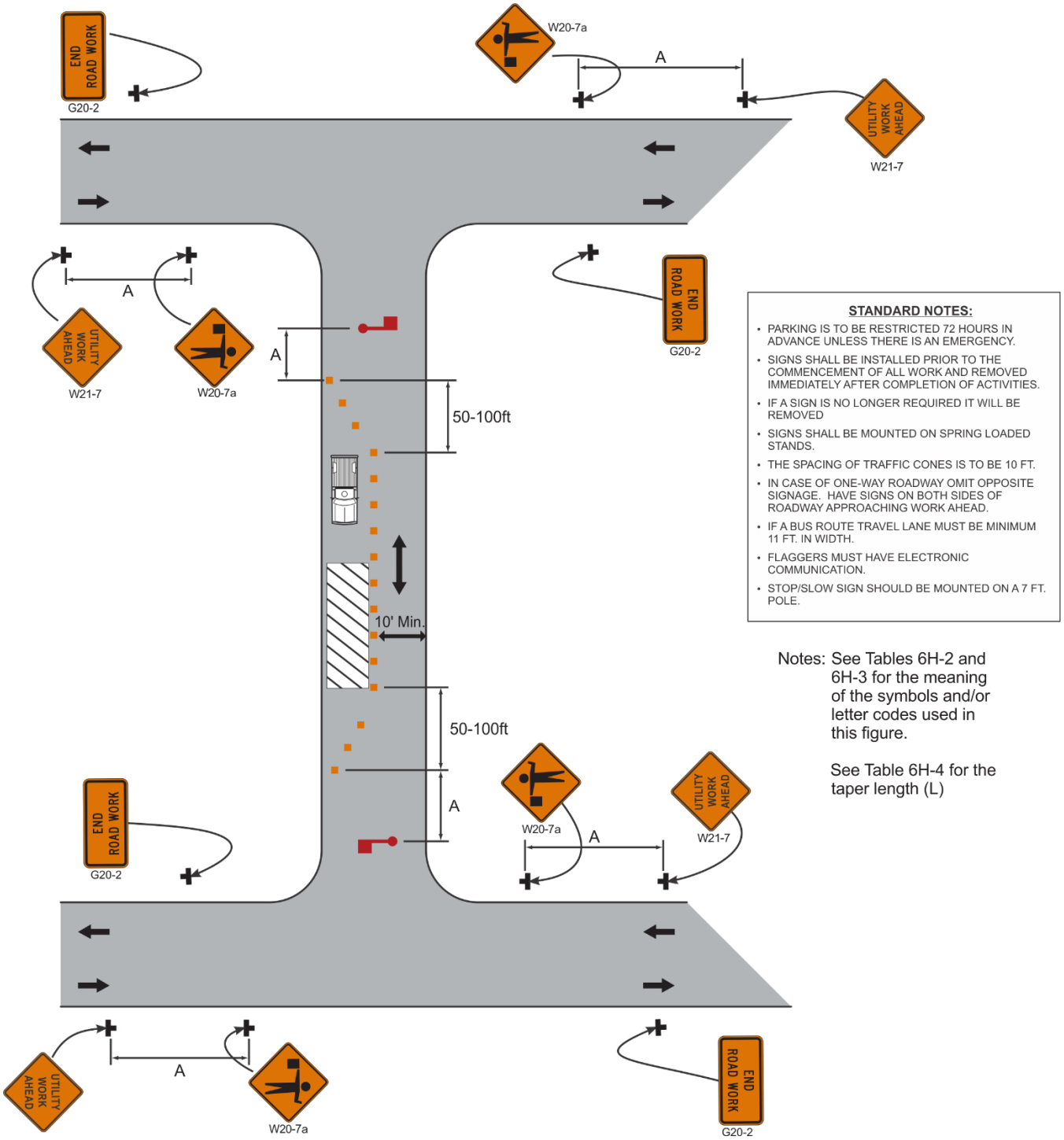
Utility Typical Application 8

Alley Closure (UTA-9)



Utility Typical Application 9

Maintaining Through Traffic in Alley (UTA-10)



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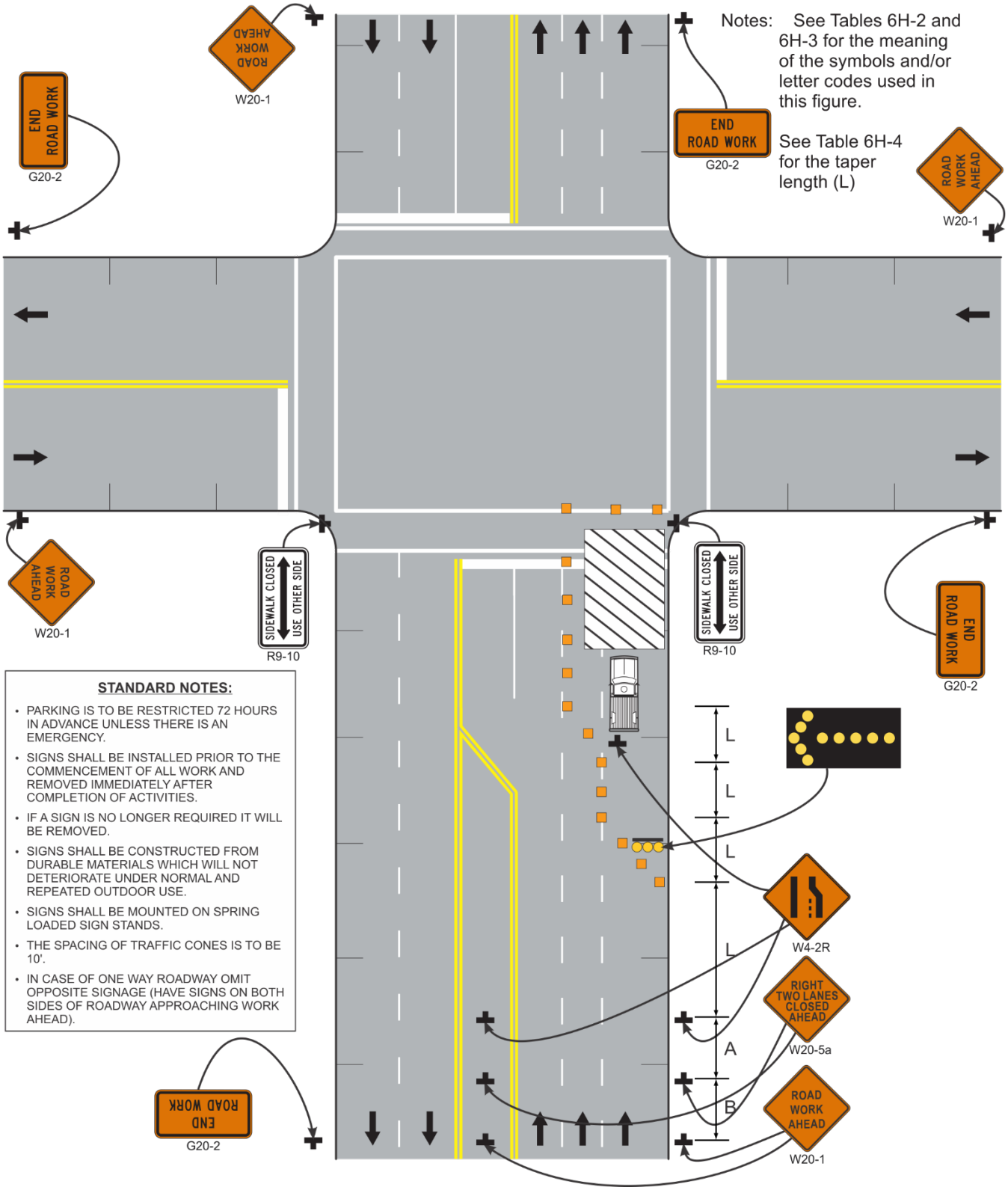
- IF A SIGN IS NO LONGER REQUIRED IT WILL BE REMOVED
- SIGNS SHALL BE MOUNTED ON SPRING LOADED STANDS.
- THE SPACING OF TRAFFIC CONES IS TO BE 10 FT.
- IN CASE OF ONE-WAY ROADWAY OMIT OPPOSITE SIGNAGE. HAVE SIGNS ON BOTH SIDES OF ROADWAY APPROACHING WORK AHEAD.
- IF A BUS ROUTE TRAVEL LANE MUST BE MINIMUM 11 FT. IN WIDTH.
- FLAGGERS MUST HAVE ELECTRONIC COMMUNICATION.
- STOP/SLOW SIGN SHOULD BE MOUNTED ON A 7 FT. POLE.

Notes: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

See Table 6H-4 for the taper length (L)

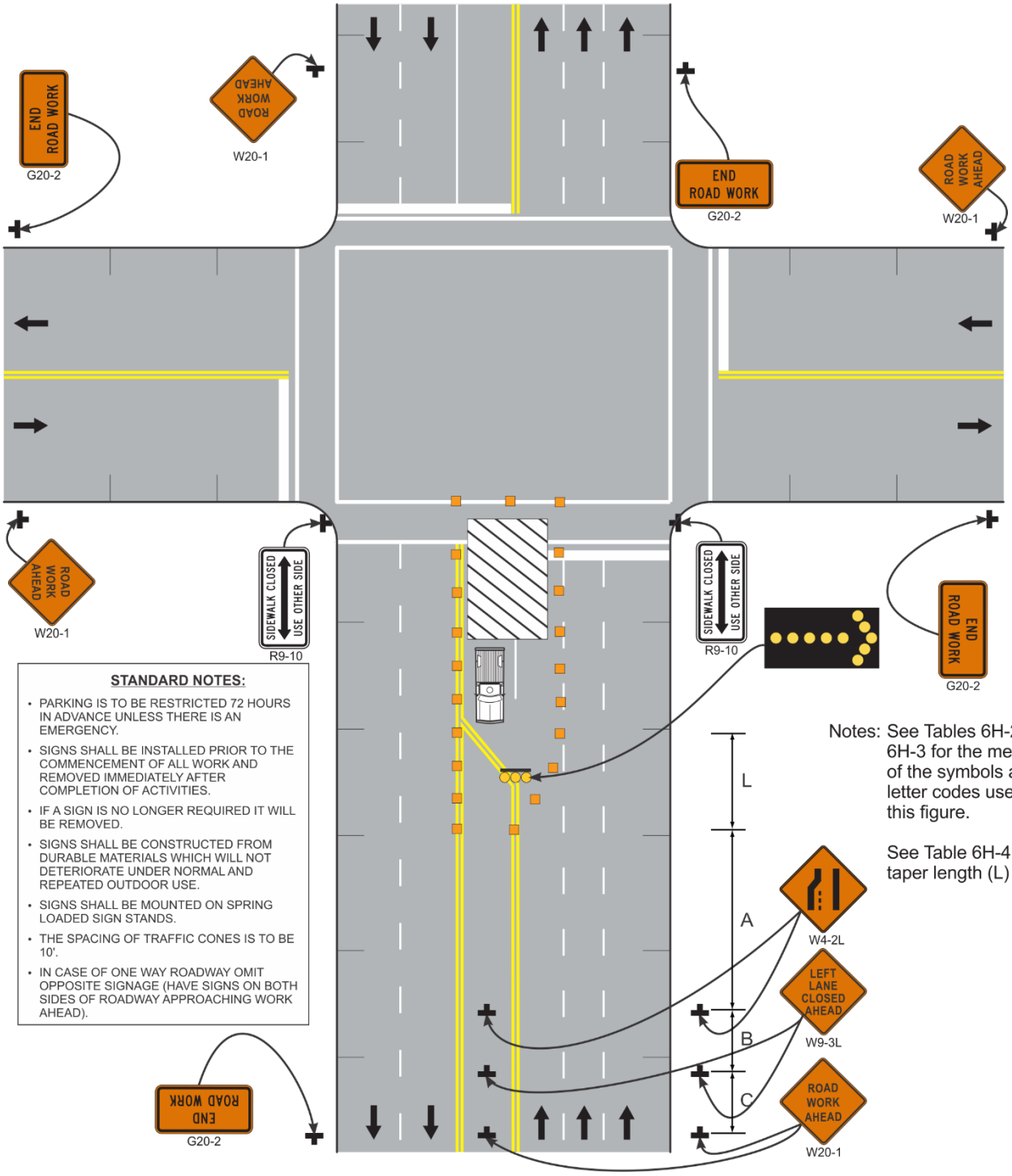
Utility Typical Application 10

Right Lane Closures with No Parking Permitted (UTA-11)



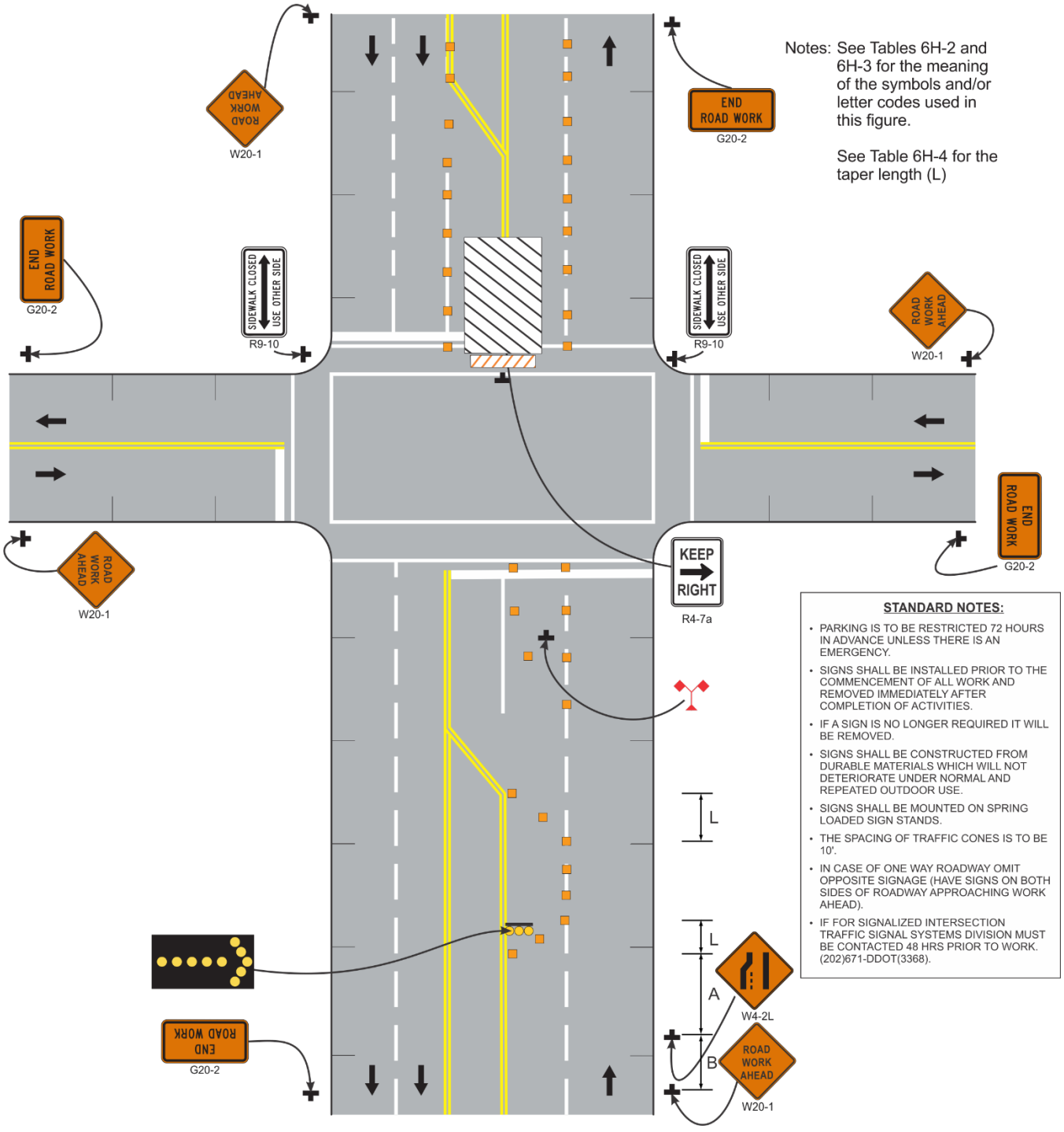
Utility Typical Application 11

Approaching Left Lane Closure with Parking Permitted (UTA-12)



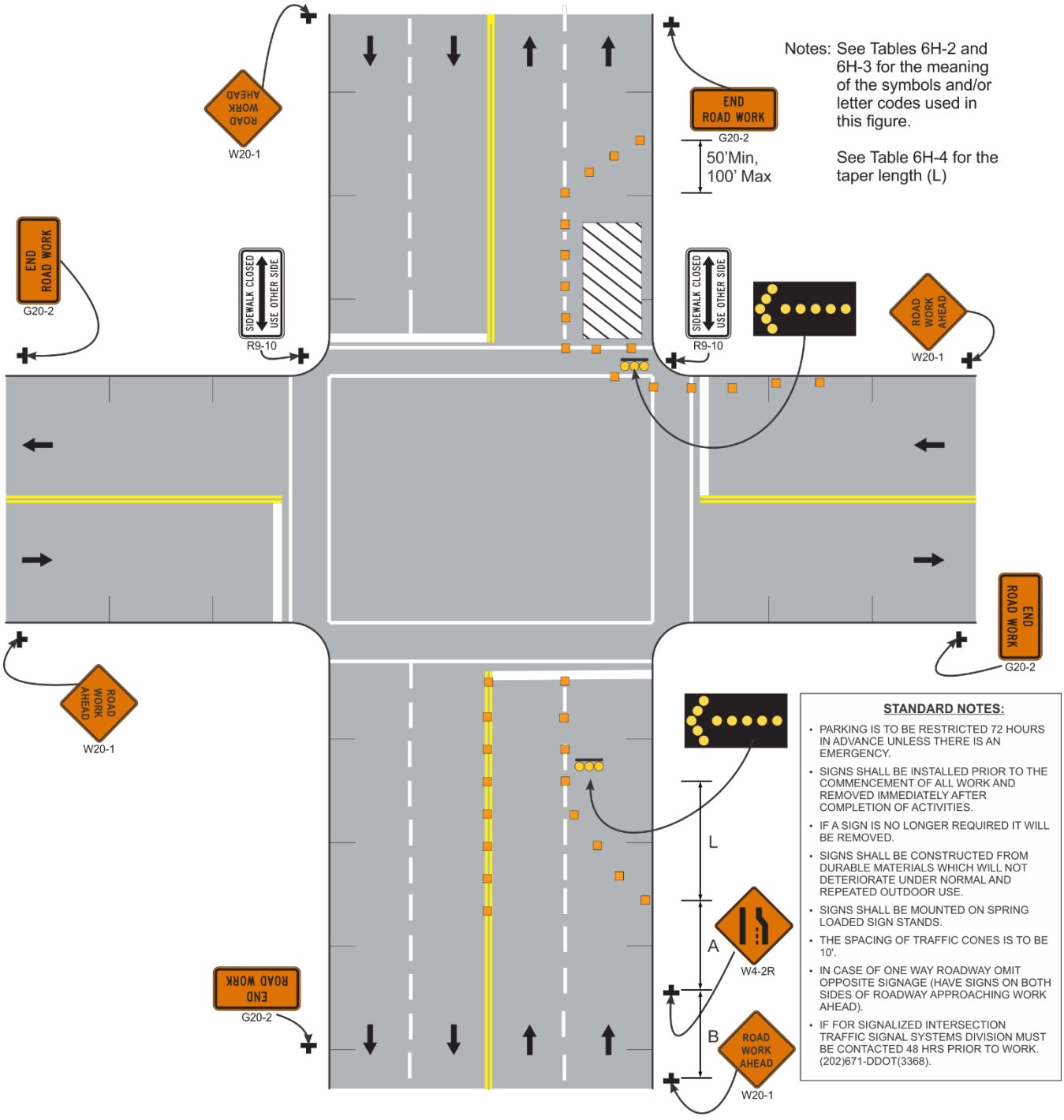
Utility Typical Application 12

Multiple Lane Closure at Intersection (UTA-13)



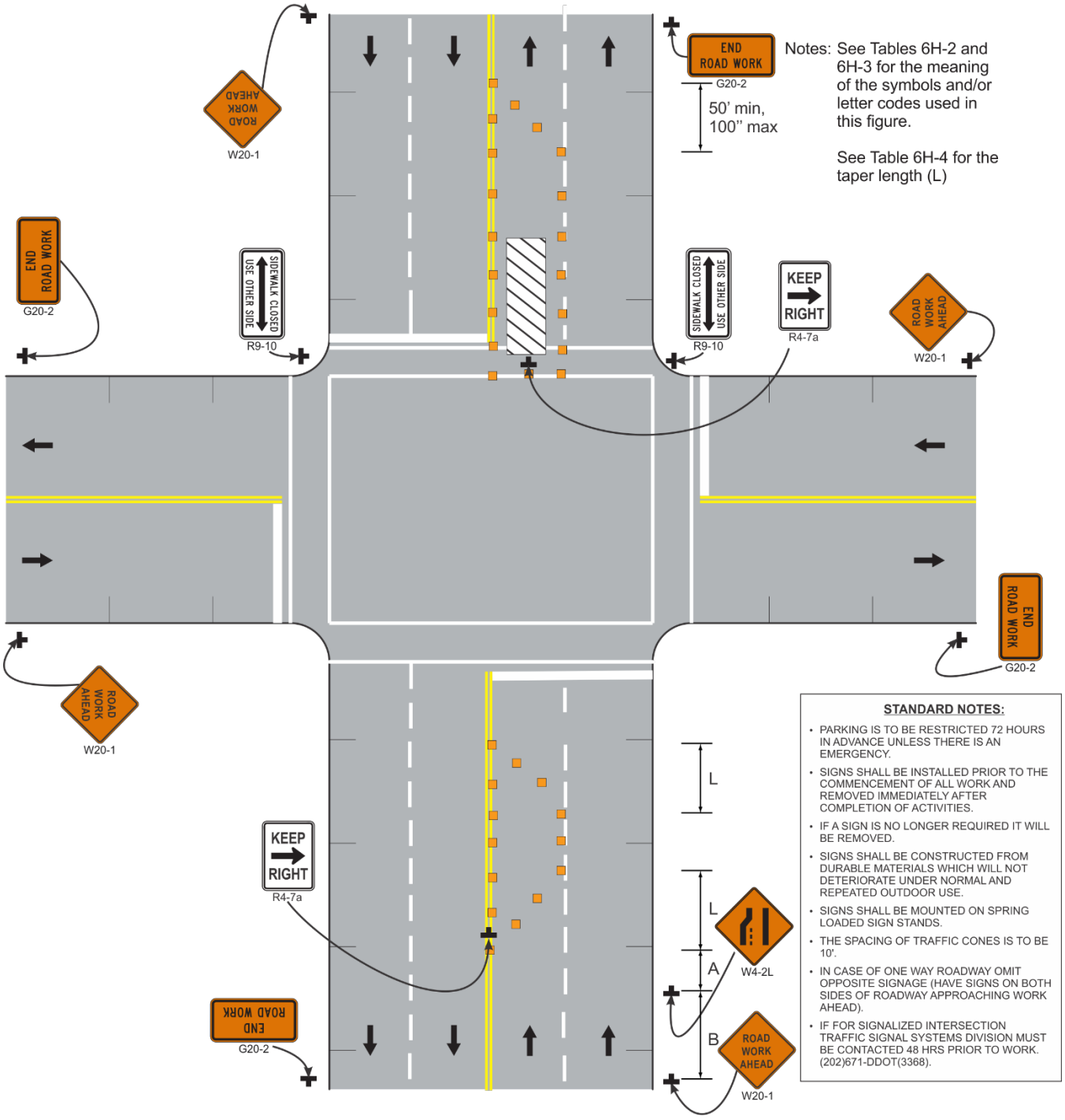
Utility Typical Application 13

Right Lane Closure Far Side of Intersection (UTA-14)



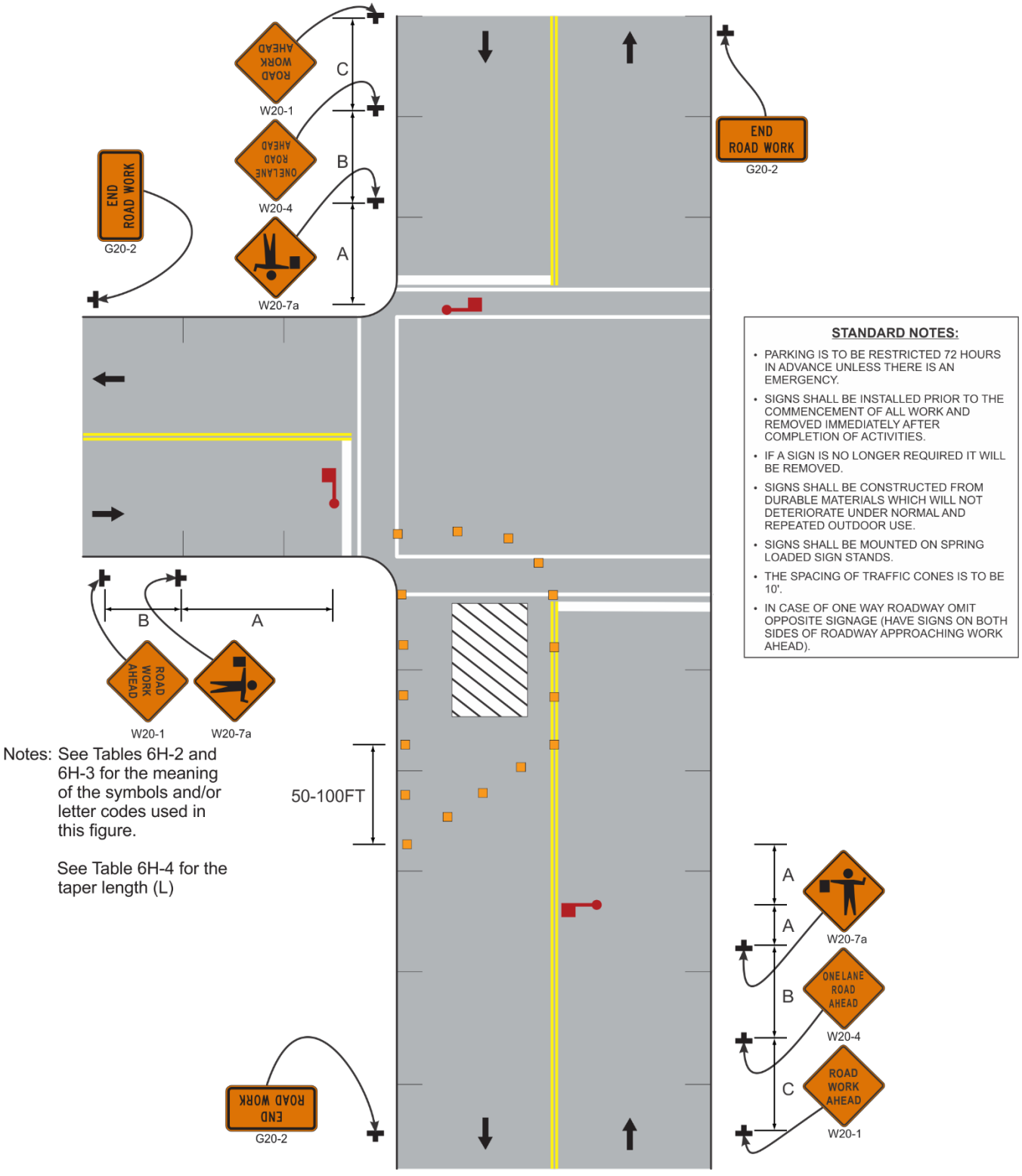
Utility Typical Application 14

Left Lane Closure on Far Side of Intersection (UTA-15)



Utility Typical Application 15

Flagging Control at 3-Leg Intersection (1) (UTA-16)

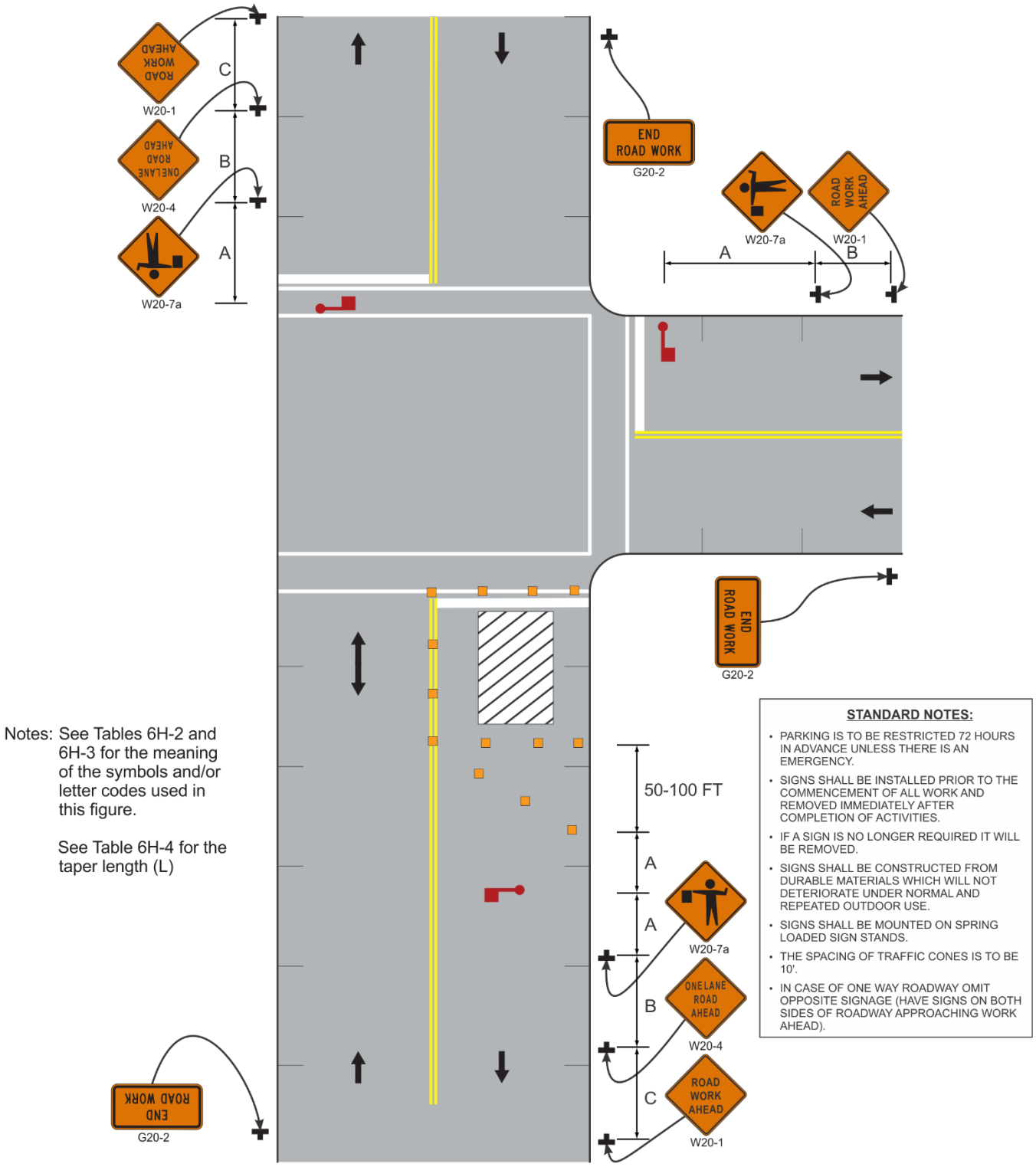


Notes: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

See Table 6H-4 for the taper length (L)

Utility Typical Application 16

Flagging Control at 3-Leg Intersection (2) (UTA-17)



Notes: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

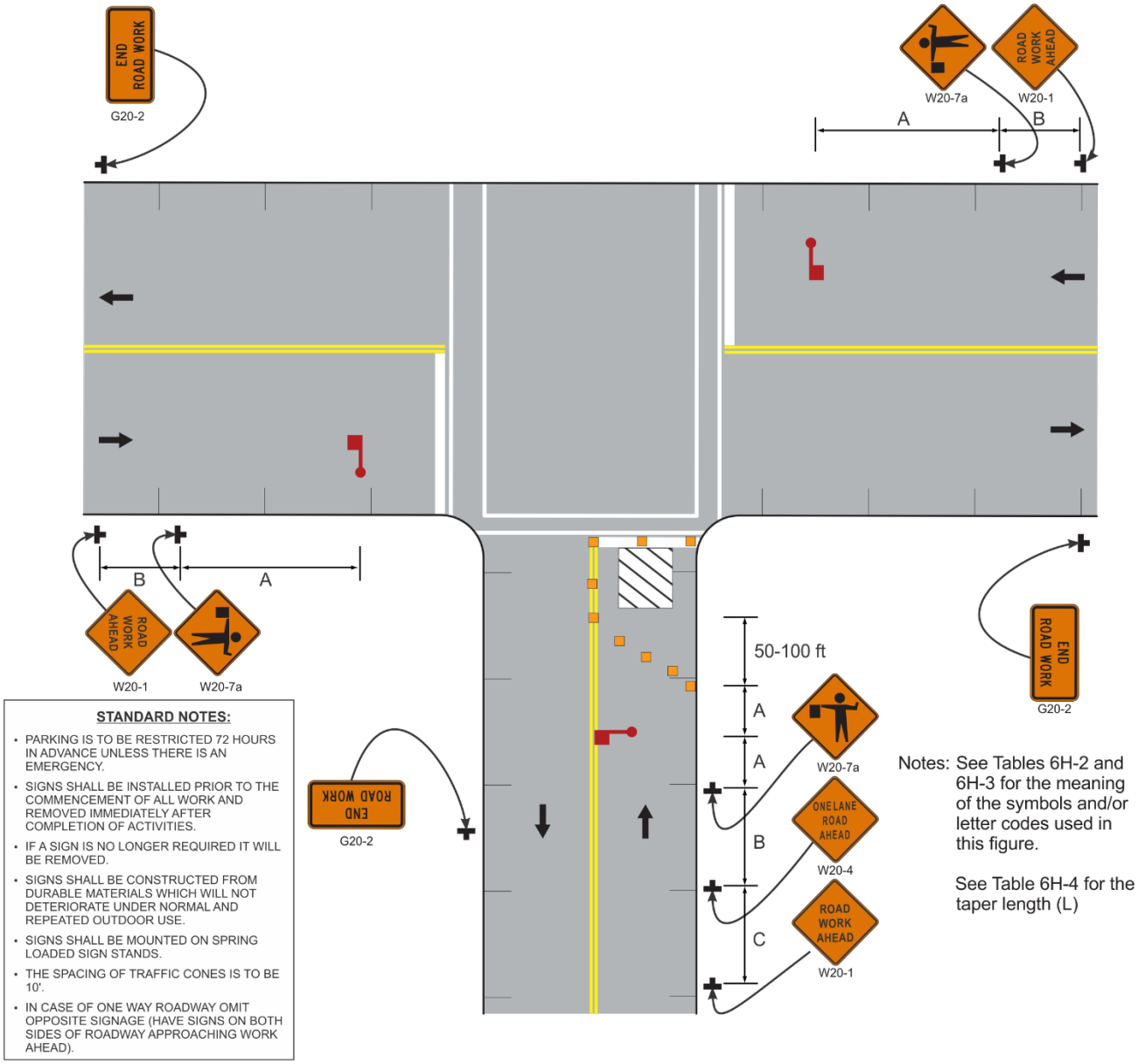
See Table 6H-4 for the taper length (L)

STANDARD NOTES:

- PARKING IS TO BE RESTRICTED 72 HOURS IN ADVANCE UNLESS THERE IS AN EMERGENCY.
- SIGNS SHALL BE INSTALLED PRIOR TO THE COMMENCEMENT OF ALL WORK AND REMOVED IMMEDIATELY AFTER COMPLETION OF ACTIVITIES.
- IF A SIGN IS NO LONGER REQUIRED IT WILL BE REMOVED.
- SIGNS SHALL BE CONSTRUCTED FROM DURABLE MATERIALS WHICH WILL NOT DETERIORATE UNDER NORMAL AND REPEATED OUTDOOR USE.
- SIGNS SHALL BE MOUNTED ON SPRING LOADED SIGN STANDS.
- THE SPACING OF TRAFFIC CONES IS TO BE 10'.
- IN CASE OF ONE WAY ROADWAY OMIT OPPOSITE SIGNAGE (HAVE SIGNS ON BOTH SIDES OF ROADWAY APPROACHING WORK AHEAD).

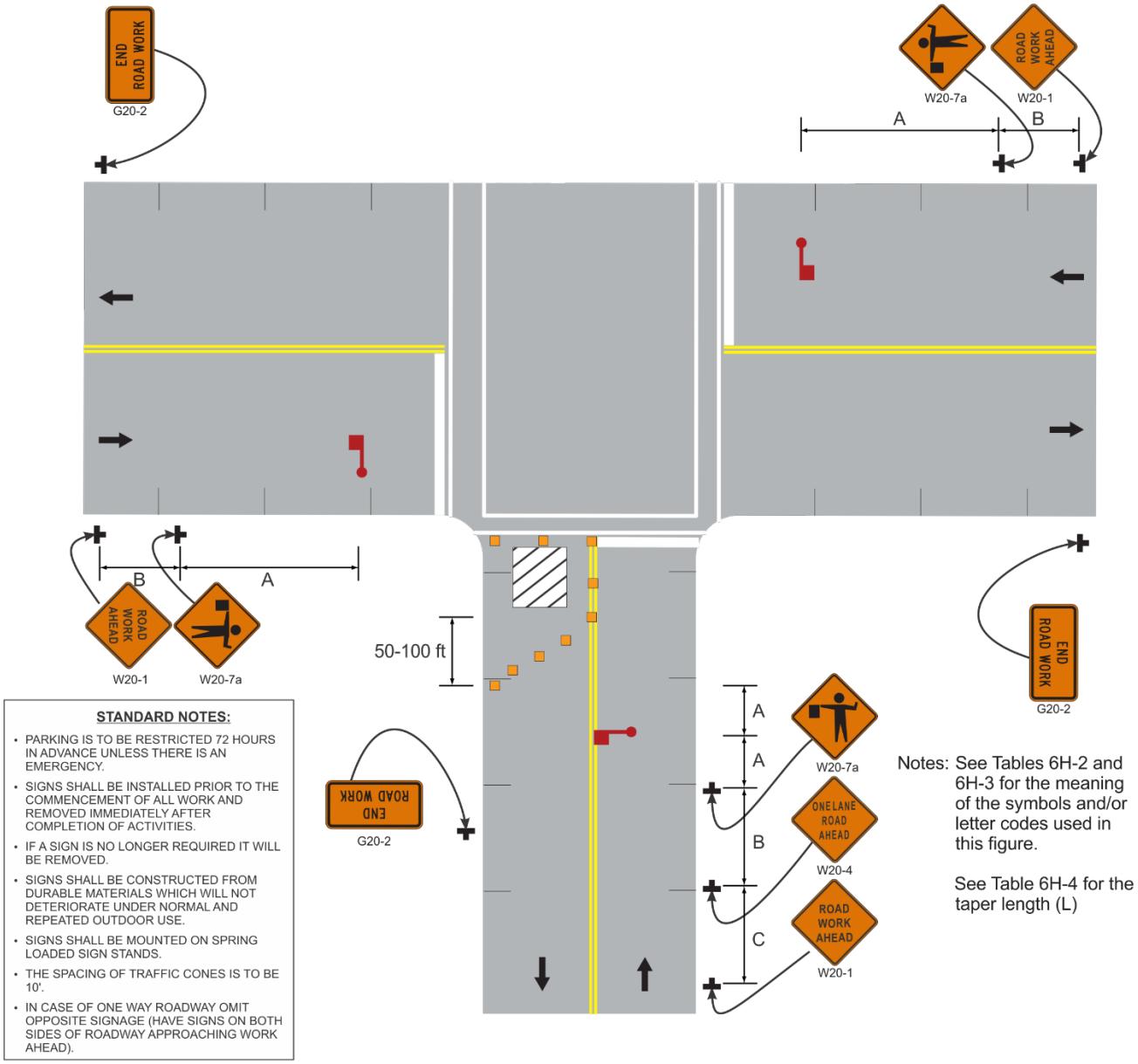
Utility Typical Application 17

Flagging Control at 3-Leg Intersection (3) (UTA-18)



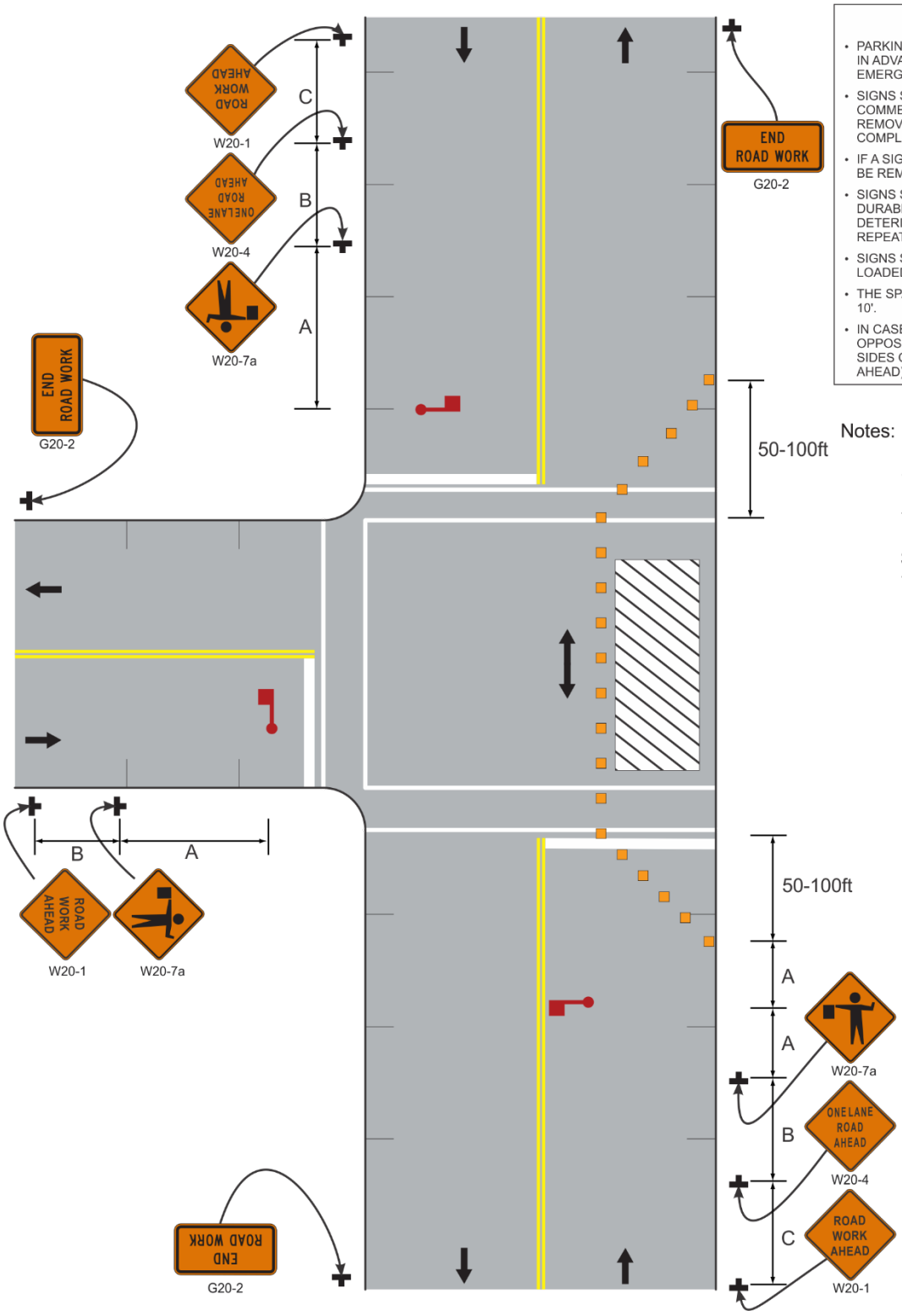
Utility Typical Application 18

Flagging Control at 3-Leg Intersection (4) (UTA-19)



Utility Typical Application 19

Flagging Control at 3-Leg Intersection Far-Side Closure (UTA-20)



STANDARD NOTES:

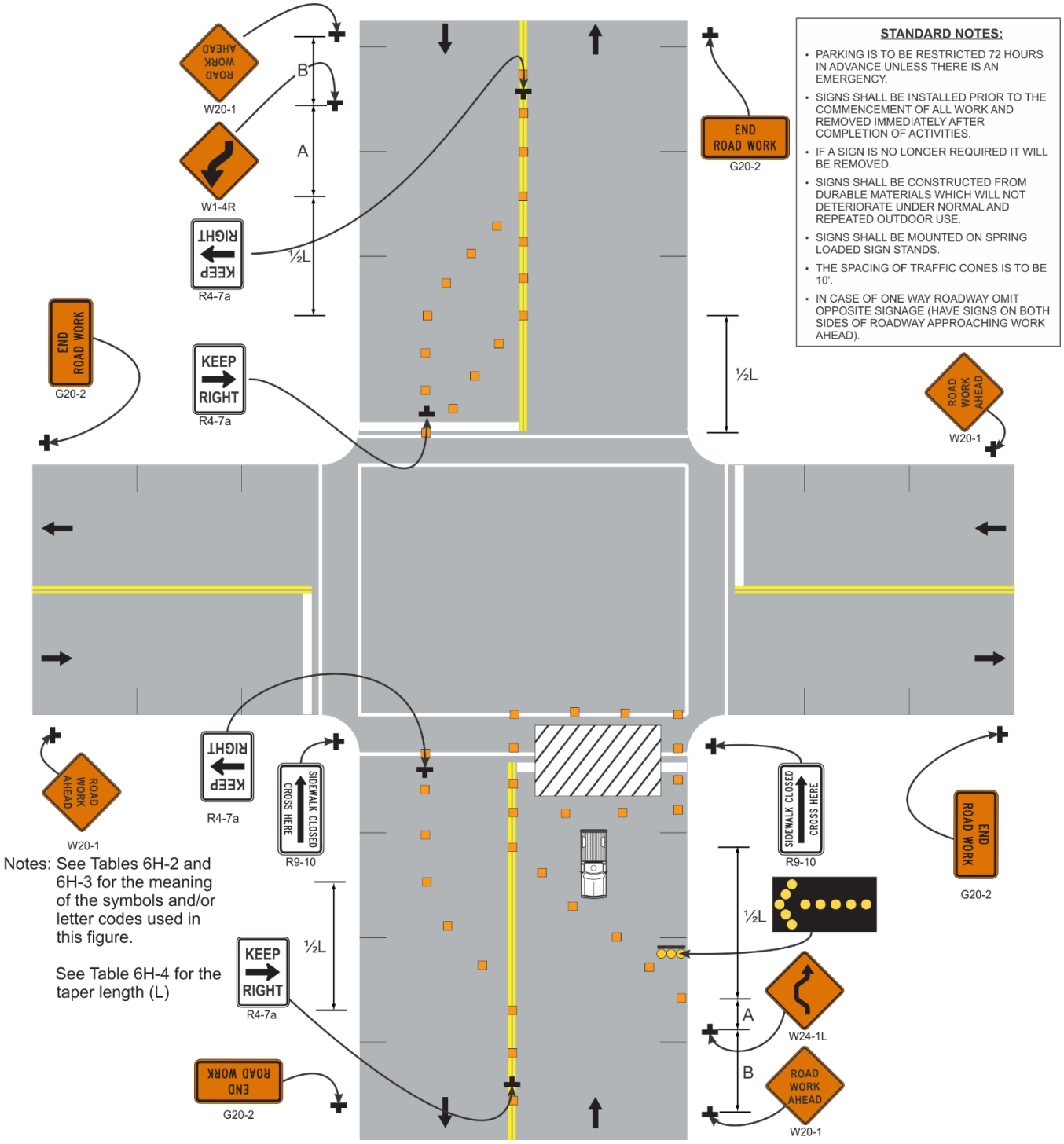
- PARKING IS TO BE RESTRICTED 72 HOURS IN ADVANCE UNLESS THERE IS AN EMERGENCY.
- SIGNS SHALL BE INSTALLED PRIOR TO THE COMMENCEMENT OF ALL WORK AND REMOVED IMMEDIATELY AFTER COMPLETION OF ACTIVITIES.
- IF A SIGN IS NO LONGER REQUIRED IT WILL BE REMOVED.
- SIGNS SHALL BE CONSTRUCTED FROM DURABLE MATERIALS WHICH WILL NOT DETERIORATE UNDER NORMAL AND REPEATED OUTDOOR USE.
- SIGNS SHALL BE MOUNTED ON SPRING LOADED SIGN STANDS.
- THE SPACING OF TRAFFIC CONES IS TO BE 10'.
- IN CASE OF ONE WAY ROADWAY OMIT OPPOSITE SIGNAGE (HAVE SIGNS ON BOTH SIDES OF ROADWAY APPROACHING WORK AHEAD).

Notes: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

See Table 6H-4 for the taper length (L)

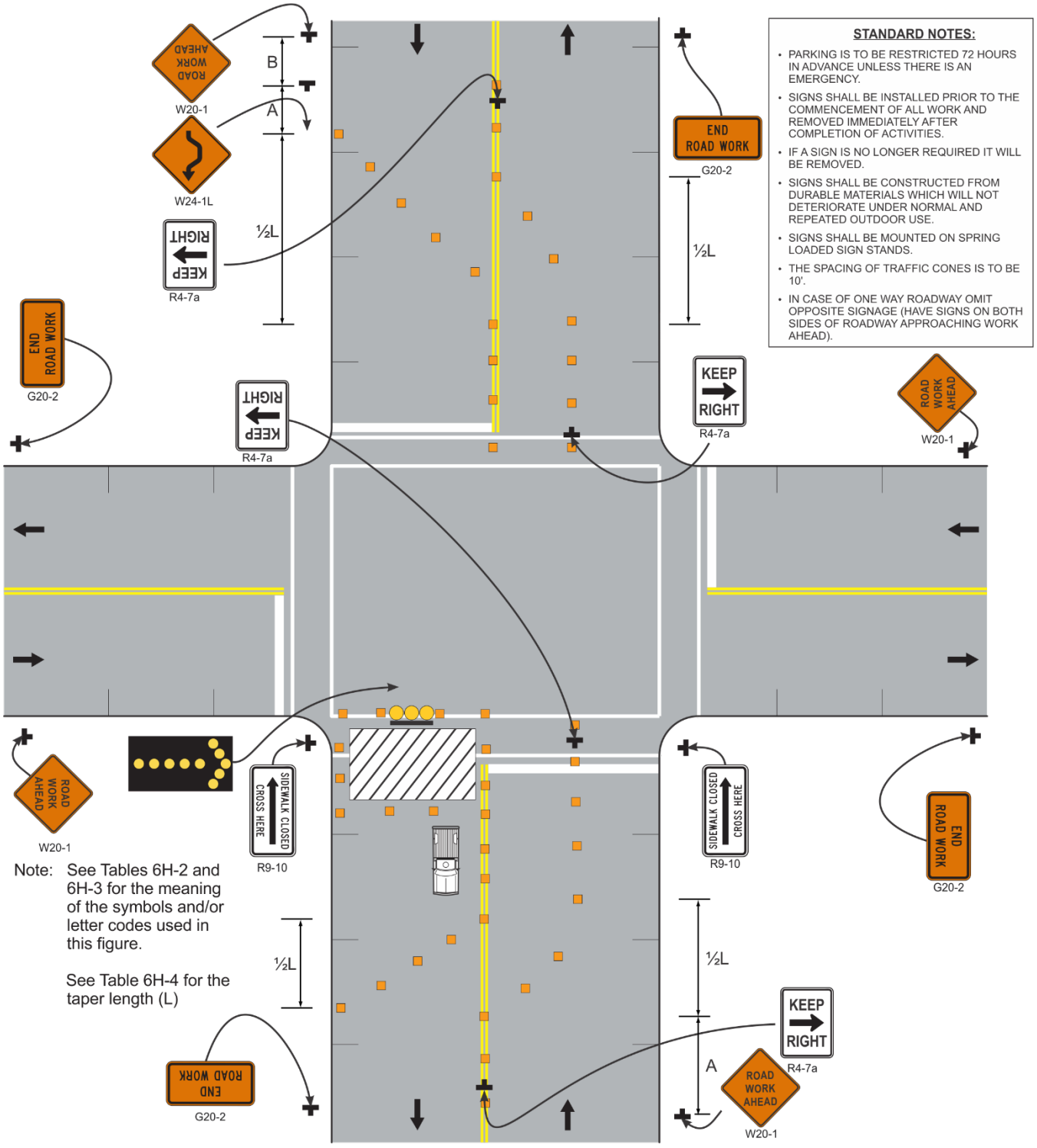
Utility Typical Application 20

Two Lane Closure on Two-Way Street to Excavate across Roadway; Phase 1 (UTA-21)



Utility Typical Application 21

Two Lane Closure on Two-Way Street to Excavate across Roadway; Phase 2 (UTA-22)



Utility Typical Application 22

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