Guidelines for Traffic Control in Work Zones

for the District of Columbia

District Department of Transportation

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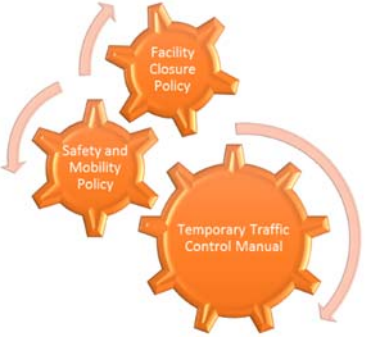
1. Introduction

The purpose of this guide is to serve as a readily-accessible source of information covering basic conditions workers may encounter while performing maintenance, utility work, and construction activities in the District of Columbia. This handbook summarizes the basic requirements of Part 6 of the Manual on Uniform Traffic Control Devices (MUTCD) and the District of Columbia Temporary Traffic Control Manual (DC TTCM); with emphasis on short-term work areas.

This handbook presents information and provides examples of typical control applications for two-lane and multilane work areas. This information is intended to illustrate the principles of proper work zone traffic control, but is not a standard. These guidelines are to be used only within the District of Columbia. The DC TTCM contains the standards for work area traffic control within the District of Columbia, upon which this "pocket guide" is based.

The DC TTCM is part of the District of Columbia Work Zone Management Manual (WZMM), which also includes the Transportation Facility Closure Policy and the Work Zone Safety and Mobility Policy.



Work Zone Management Manual Relationships

Resources referenced in this handbook are listed below:

Primary Resources

- Temporary Traffic Control Manual (TTCM), Latest Edition, District Department of Transportation (DDOT)
- Work Zone Management Manual (WZMM), Latest Edition, DDOT
- Manual of Uniform Traffic Control Devices (MUTCD), Latest Edition, Federal Highway Administration (FHWA)

Other Useful Resources

- Standard Highway Signs, Latest Edition, FHWA
- Standard Specifications for Highways and Structures, Latest Edition, DDOT
- Transportation Facility Closure Policy, Latest Edition, DDOT
- Work Zone Safety and Mobility Policy, Latest Edition, DDOT
- Pedestrian Safety and Work Zone Standards – Covered and Open Walkways, Latest Edition, DDOT
- Design and Engineering Manual, Latest Edition, DDOT
- National Cooperative Highway Research Program (NCHRP) Report 350, Transportation Research Board (TRB)

2. Definitions

The following are definitions for select terms used throughout these guidelines. Additional words and phrases are defined in the DDOT WZMM and shall be applicable when such definitions are not found within this pocket guide. When used in the guidelines that follow, the terms below shall have the following meanings:

Shall – a mandatory condition (that is, standard)

Should – an advisory condition (that is, guidance)

May – a permissive condition (that is, option)

Freeway – A divided and access-controlled road with operating speed of at least 35 mph.

Low Speed – a condition associated with a roadway on which the posted speed is < 40 miles per hour.

Low Volume/Local – a condition of a roadway on which the average daily traffic (ADT) volume is < 500 vehicles per day.

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 1000± linear foot distance.

Off-peak Traffic Hours – all hours of the day and days of the week not defined as "peak traffic hours."

Peak Traffic Hours – 7:00 a.m. to 9:30 a.m. and 3:30 p.m. to 6:30 p.m., Monday through Friday, except holidays.

Posted Speed Limit – a speed limit determined by law of regulation and displayed on Speed Limit signs.

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

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.

3. Major Traffic Control Considerations

Since every work zone situation is different, several items must be considered in determining the appropriate traffic control needed. The following list of questions can assist in identifying the major traffic control considerations.

1. What will be the time duration of the work?
    - **Long-term stationary** – work that occupies a location for a period > three days.
    - **Intermediate-term stationary** – work that occupies a location from overnight to three days.
    - **Short-term stationary** – daytime work that occupies a location between one and twelve hours.
    - **Short duration** – work that occupies location between 6 and 15 minutes.
    - **Moderate duration** – work that occupies a location between 16 and 60 minutes.
2. Where is the work zone located (on the roadway, on the shoulder/parking lane, or beyond the shoulder/parking lane)?
3. What type of road is involved?
4. What is the speed of the traffic?
5. What is the traffic volume on the roadway? Should the work be rescheduled to avoid heavy volume conditions?
6. Will the nature of traffic change while work is underway?
7. Will the work impact pedestrians and/or bicycle facilities?
8. Do the local law enforcement agencies need to be notified?
9. What kind of signing is required?
10. Are cones, drums, barricades, or an arrow board needed for traffic channelization?
11. Will a flagger be required?

4. Fundamental Principles

The control of road users (motorist, streetcar, bicyclists, and pedestrians) through a temporary traffic control (TTC) zone shall be an essential part of highway construction, utility work, special events, maintenance operations, and management of traffic incidents.

The following principles provide guidance to assist road users and help protect workers in the vicinity of a TTC zone.

1. Safety of the road users and workers in a TTC zone should be an integral and high-priority element of every project from planning through design and construction.
2. Traveler movement should be inhibited as little as possible.
3. Travelers should receive clear and positive guidance through the entire work zone by giving adequate advance warning and using appropriate traffic control devices.
4. Attention should be given to the maintenance of roadside safety during the life of the TTC zone.
5. Routine day and night inspections of temporary traffic control elements should be performed. Work zones should be monitored and modified as work progresses.
6. Adequate provisions shall be made for transit and taxi access when appropriate.
7. Frequent and abrupt changes in geometrics such as lane narrowing, dropped lanes, or main roadway transitions that require rapid maneuvers, should be avoided.
8. Bicyclists and pedestrians, including those with disabilities, shall be provided with access and reasonably safe passage through the TTC zone.
9. Roadside recovery areas / clear zones, free of vehicles and equipment, shall be provided where possible.
10. 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.

5. Pedestrians & Bicyclists

A wide range of pedestrians might be affected by TTC zones, including people with disabilities and impairments. These pedestrians need a clearly delineated and usable travel path.

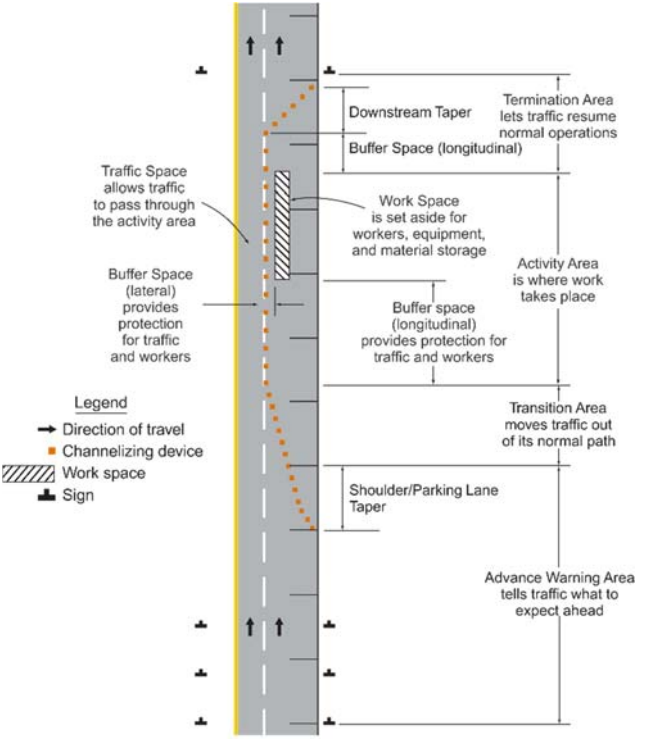
According to DC Section 3315 (Safe Accommodation for Pedestrian and Bicyclists) of Title 24, Chapter 33 (Public Space and Safety – Public Right-of-Way Occupancy Permits), a public right-of-way occupancy permit that authorizes blockage of a sidewalk, bicycle lane, or other public bicycle path shall require the permittee to provide a safe accommodation for pedestrians and bicyclists.

The safe accommodation for pedestrians shall meet or exceed the current DDOT standards, "Pedestrian Safety and Work Zone Standards – Covered and Open Walkways", while also complying with the American with Disabilities Act of 1990 (ADA) Title II, Paragraph 35.130. Any requirements of the ADA shall be followed for any work zone.

The routing for a safe accommodation for bicyclists shall replicate the safety level of the existing bicycle route. Refer to DC Section 3315 (Safe Accommodation for Pedestrian and Bicyclists) of Title 24, Chapter 33 for methods for providing safe accommodation for bicyclists.

6. Component Parts of a TTC Zone

The TTC Zone is defined as the entire section of roadway between 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. A TTC Zone is subdivided into four main parts: advance warning area, transition area, activity area (work area, buffer area), and termination area, which are shown in the figure below.



Component Parts of a Temporary Traffic Control Zone

Buffer Area

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. Neither work activity nor storage of equipment, vehicles or materials should occur in this area. The length of a longitudinal buffer is determined by the posted speed limit and should be as shown in the chart below.

Length of Longitudinal Buffer Space (Urban)

Speed*	Distance
20 mph	35 ft.
25 mph	55 ft.
30 mph	85 ft.
35 mph	120 ft.
40 mph	170 ft.
45 mph	220 ft.
50 mph	280 ft.
55 mph	335 ft.
60 mph	415 ft.
65 mph	485 ft.

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

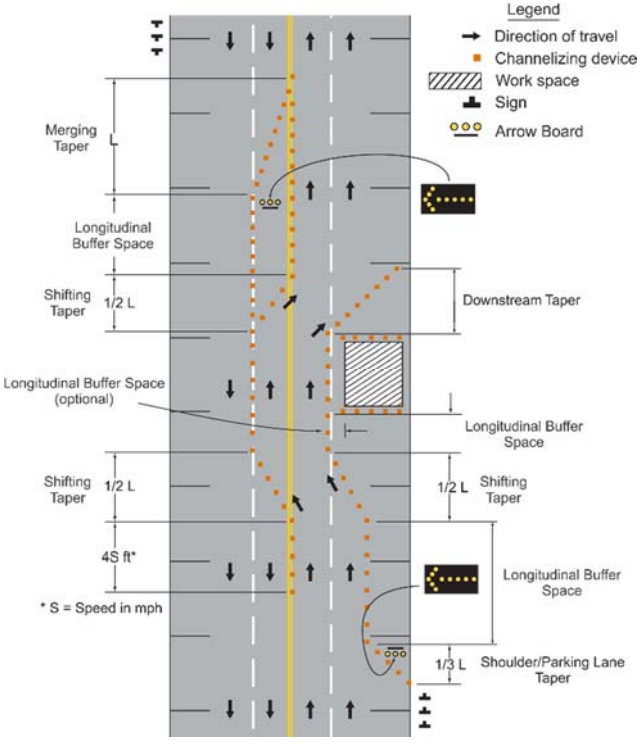
Length of Longitudinal Buffer Space (Rural & Freeway/Expressway)

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

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

7. Taper Length Criteria for Work Zones

Tapers are used to gradually move traffic into and out of the normal travelway. Tapers should be used in both the transition and termination areas. They are created by using a series of channelizing devices and/or pavement markings to move traffic safely into the temporary travel path and then back into the regular roadway. Types of tapers are shown in the figure below.



Types of Tapers and Buffer Spaces

The following tables are five types of tapers with varying lengths based on speed and lane width.

Types of Tapers for Temporary Traffic Control Zones

Type of Taper		Taper Length
Merging Taper	Number of Lanes is reduced	L min.
Shifting Taper	Lateral shift, no lane reduction	$1/2\ L$ min.
Shoulder Taper	Shoulder closed	$1/3\ L$ min.
Two-way Traffic Taper	Opposing directions	50 ft. min 100 ft. max
Downstream Taper	End of work area	100 ft./lane max

Taper Length Criteria for Temporary Traffic Control Zones

Taper Lengths (*L*)					
Speed Limit (S)	Width of offset (W)				Remarks (Formula)
	9 ft.	10 ft.	11 ft.	12 ft.	
25 mph	95 ft.	105 ft.	115 ft.	125 ft.	$L = WS^2/60$
30 mph	135 ft.	150 ft.	165 ft.	180 ft.	$L = WS^2/60$
35 mph	185 ft.	205 ft.	225 ft.	245 ft.	$L = WS^2/60$
40 mph	240 ft.	270 ft.	295 ft.	320 ft.	$L = WS^2/60$
45 mph	405 ft.	450 ft.	495 ft.	540 ft.	$L = WS$
50 mph	450 ft.	500 ft.	550 ft.	600 ft.	$L = WS$
55 mph	495 ft.	550 ft.	605 ft.	660 ft.	$L = WS$

Notes: *L = Length of Taper (ft.),*
W = Width of Lane or Taper (ft.), and
S = Posted Speed (mph)

8. Traffic Control Devices

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, pedestrian facility, or bikeway by authority of DDOT. All TTC devices shall be retroreflective. The following are several basic types of traffic control devices typically used in work area traffic control:

- Signs
- Channelizing Devices
- Lighting Devices
- Arrow Panels
- Pavement Markings
- Impact Attenuators

Signs

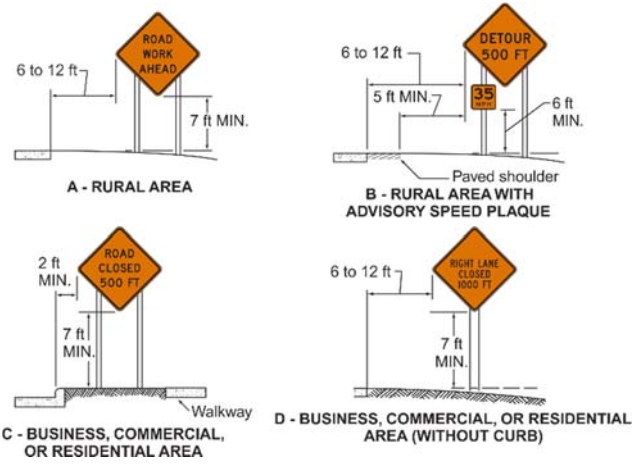
The three categories of signs include: **regulatory, warning, and guide**. Standard orange 24" X 24" flags or flashing warning lights can be used in conjunction with signs, but shall not obstruct the sign face. Specific warning and guide signs are also used for traffic incident management situations. Signs shall be routinely inspected for cleanliness, visibility and appropriate positioning.

Placement – Signs should be located in the right-hand side of the roadway, unless otherwise provided in the TTCM.

Mounting – Standards for heights and lateral clearance of temporary ground-mounted signs, and signs mounted on barricades or other portable supports are provided in the TTCM. The minimum standards are:

- ≥ 7 ft. high for post-mounted signs installed at the side of the road from the bottom of the sign to the near edge of the pavement.
- ≥ 1 foot from the top of the pavement for signs mounted on barricades or other portable supports.

All sign mountings and supports (including barricades) shall meet the AASHTO Manual for Assessing Safety Hardware (MASH) standards. Guidelines for height and lateral clearance of temporary ground-mounted signs are shown in the figure below.



Height and Lateral Location of Mounted Signs

Illumination & Reflectorization – All signs used at night shall be either retroreflective or illuminated to show the same shape and similar color both day and night.

Removal – All TTC signs shall be removed as soon as practical when no longer needed. Signs, bases, and portable stands shall be removed when not in use. TTC signs on a post or stand shall never be rotated to prevent their display. Also, when work operations conditions have changed so that the existing TTC signs

are no longer needed, the signs, bases, and portable stands associated with the work area operation shall be promptly removed from the roadway.

Regulatory Signs

Regulatory signs shall be used to inform road users of applicable traffic laws /regulations and to impose legal obligations on all road users. They shall not be used unless authorized by DDOT Chief Engineer. Regulatory signs are generally:

- Rectangular
- Black legend and border
- White background
- **Exceptions**: STOP, YIELD, DO NOT ENTER, WRONG WAY, and ONE WAY signs

Warning Signs

Warning signs notify road users of specific situations or conditions on or adjacent to a roadway that might not otherwise be apparent. They are used to provide information to road users during construction and maintenance activities in or adjacent to the road way. Warning signs are generally:

- Diamond-shaped
- Black legend and border
- Orange background

Size – The minimum standard sign size in the District are:

- 30" x 30" for local – residential streets, with prevailing speeds ≤ 25 mph.
- 36" x 36" for collector and arterial roads, with prevailing speeds > 25 mph and < 45mph.
- 48" x 48" for higher-speed locations, with prevailing speeds ≥ 45 mph.

Guide Signs

Guide signs provide road users with information to help them navigate through the TTC zone. Guide signs that should be used in TTC zones (as needed) include standard route marking (where temporary route changes are necessary), directional signs, street name signs, and special guide signs. If additional temporary guide signs are used in TTC zones, they shall have:

- Black legend and border
- Orange background

Spacing – Recommended warning sign spacing should be:

Recommended Advance Warning Sign Minimum Spacing

Road Type (Posted or 85th%)	Distance Between Signs*		
	A	B	C
Urban (25 mph)	150 ft.	150 ft.	150 ft.
Urban (30 mph)	200 ft.	200 ft.	200 ft.
Urban (35 mph)	250 ft.	250 ft.	250 ft.
Urban (40 mph)	350 ft.	350 ft.	350 ft.
Urban (45 mph)	550 ft.	550 ft.	550 ft.
Urban (50 mph)	600 ft.	600 ft.	600 ft.
Urban (55 mph)	700 ft.	700 ft.	700 ft.
Expressway / Freeway	1,000 ft.	1,500 ft.	2,640 ft.

Note: The column headings A, B, and C are the dimensions shown in the Typicals.*

- *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.*

Traffic Incident Management Area Signs

A traffic incident management area is an area of road where TTC are installed as authorized by a public authority or DDOT, in response to a road user incident, natural disaster, hazardous 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. Warning and guide signs shall be used for traffic incident management situations, and they shall have:

- Black legend and border
- Fluorescent pink background

Portable Changeable Message Signs

The primary purpose of portable changeable message signs (PCMS) in TTC zones is to advise road users of unexpected situations. PCMS are particularly useful, as they are capable of:

1. Conveying complex messages
2. Displaying real time information about conditions ahead
3. Providing information to assist road users in making decisions prior to the point where actions must be taken

Some typical applications include the following:

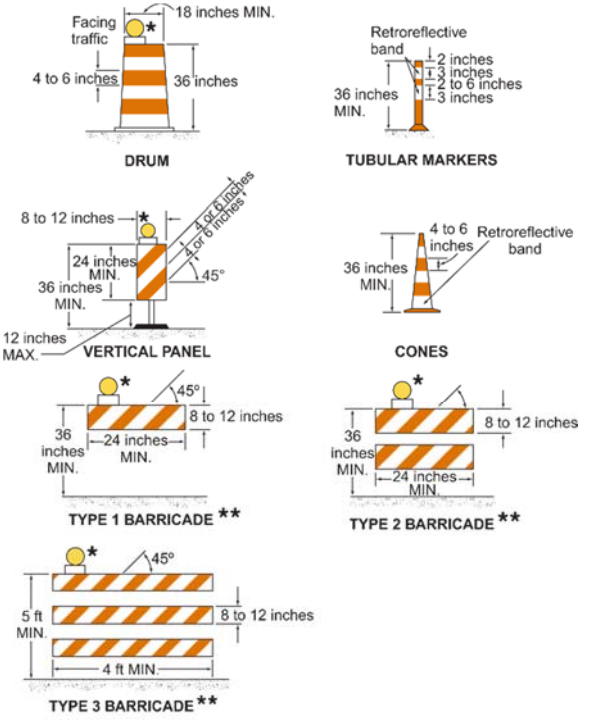
- Where the speed of vehicular traffic is expected to drop substantially;
- Where significant queuing and delays are expected;
- Where adverse environmental conditions are present;
- Where there are changes in alignment or surface conditions;
- Where advance notice of ramp, lane, or roadway closures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

PCMS should be used as a supplement to conventional signs and pavement markings, not as a substitute. The guidelines for the PCMS messages include the following:

- Messages shall consist of a maximum two phases; and a phase should consist of a maximum of 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 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;
- The entire message should be readable twice at the usual roadway speed limit.

Channelizing Devices

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. All channelizing devices shall be crash-worthy and shall have retroreflective sheeting. Standard designs of channelizing devices are shown in the figure below.



* 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 faceing traffic shall have retro reflective rail faces.

Channelizing Devices

Appropriate Usage of Channelizing Devices

Barricades are portable or fixed devices having from 1 to 3 rails with appropriate markings and are used to control road users by closing, restricting, or delineating all or a portion of the right-of-way. Barricades are classified as:

- **Type 1 or Type 2:** used in situations where road user flow is maintained through the TTC zone
- **Type 3:** used to close a roadway for an extended period of time.

Drums are used to channelize or delineate road user flow. They may also be used alone or in groups, and also at night.

Vertical Panels are also used for channelization and serve as an alternative to cones, especially during night work. Where space is limited, vertical panels may be used to:

- Channelize vehicular traffic;
- Divide opposing lanes; or
- Replace barricades.

Cones are most commonly used to:

- Channelize road users,
- Divide opposing vehicular traffic lanes,
- Divide lanes when ≥ 2 lanes remain open in the same direction, and
- Delineate short duration maintenance and utility work.
- (Note: Cones shall not be used during night work.)

Tubular markers are used effectively to:

- Divide opposing lanes of road users,

- Divide vehicular traffic lanes when 2 or more lanes of moving vehicular traffic remain open in the same direction, and
- Delineate the edge of a pavement drop off where space limitations do not allow the use of larger devices.

Channelizing Devices Spacing

The spacing between channelizing devices should be as shown in the table below and should not exceed a distance in feet equal to 1.0 times the speed limit in mph. The spacing for taper channelization and tangent channelization should not exceed 60 ft.

Spacing of Channelizing Devices

Channelizing Device Spacing		
Work Zone Location	Posted Speed Limit	Spacing
Low-Speed Road	≤ 20 mph	10 ft.
In Transitions and Curves	≤ 35 mph	20 ft.
Parallel to the Travelway	≤ 35 mph	40 ft.
Spot Construction Access*	≤ 35 mph	80 ft.
In Transitions and Curves	> 35 mph	40 ft.
Parallel to the Travelway	> 35 mph	80 ft.
Spot Construction Access*	> 35 mph	120 ft.

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.

Lighting Devices

Lighting devices should be provided in TTC zones based on engineering judgment. Lighting devices may be used to supplement retroreflectorized signs, barriers, and channelizing devices. Four types of lighting devices commonly used in TTC zones are floodlights, flashing warning beacons, warning lights, and steady-burn electric lamps**.**

Warning lights may supplement retroreflectorization on channelizing devices. The four types of warning lights are:

- **Type A Low-Intensity Flashing** warning lights are used during nighttime hours.
- **Type B High-Intensity Flashing** warning lights are used during both daylight and nighttime hours.
- **Type C Steady-Burn** warning lights are used during nighttime hours to delineate the edge of the traveled way.
- **Type D 360-degree** warning lights are similar to Type C, but provide 360-degree visibility.

Arrow Boards

An arrow board in the arrow or chevron mode shall be used to advise approaching traffic of a lane closure along major multilane roadways in situations involving:

- Heavy traffic volumes
- High speeds
- Limited sight distances
- Locations where road users are less likely to expect lane closures

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

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 Alternating Diamond Caution

Advance Warning Arrow Board Display Specifications

Arrow Board Display Standards

Arrow Board Type	Minimum Size	Minimum Legibility Distance	Minimum Number of Elements
A	48" x 24"	1/2 mile	12
B	60" x 30"	3/4 mile	13
C	96" x 48"	1 mile	15
D	None*	1/2 mile	12

Note: Length of arrow equals 48", width of arrowhead equals 24".*

Pavement Markings

For long-term stationary projects, the TTCM guidelines should be followed in placing and removing pavement markings. The colors of temporary pavement markings and delineators follow the same standard as permanent markings:

White – used to enhance the visibility of the roadway edge, and is specified along both sides of two-way roadways and the right side of one-way roadways. White lines are also used when separating lanes going the same direction.

Yellow – used for centerlines and lane lines a when separating opposing directions of traffic

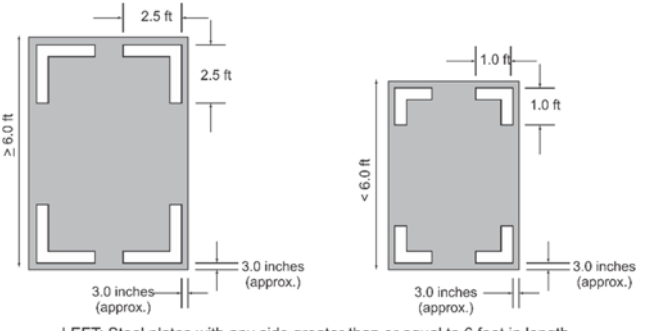
The work should be planned and staged to provide for the placement and removal of the pavement markings in a way that minimizes the disruption to traffic flow approaching and through the TTC zone during the placement and removal process.

Where existing pavement markings conflict with the temporary travel path, additional signing and channelizing devices are appropriate.

Steel Plate Conspicuity and Warning

Steel plates are used to provide temporary protection to motorists and pedestrians, and continued movement of traffic, in areas where excavation has taken place. A Steel Plate Ahead (W8-24) sign shall be placed in advance of the steel plate to warn approaching motorists of the changed roadway conditions.

Steel plates shall be marked with durable, highly reflective white Type B, Class VI pavement marking tape, no less than 4 inches in width, and comply with DDOT Standard Specifications for adequate tensile strength to withstand starting, stopping, and shearing action caused by turning maneuvers. Placement of the marking is shown below:



LEFT: Steel plates with any side greater than or equal to 6 feet in length
RIGHT: Steel plates with all sides less then 6 feet in length

Steel Plate Conspicuity Markings

Impact Attenuator

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 used in TTC zones are:

- **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.
- **Truck-mounted attenuators (TMA)** are used under the following circumstances:
  - When closing a lane on a four or more lane roadway with a posted speed of 40 mph or greater
  - On ramps and loops of interstate and limited access highways
  - 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
  - Other locations where DDOT feels such protection is warranted.

TMAs shall be positioned a sufficient distance (50 to 100 ft.) in advance of the workers or equipment being protected.

Each TMA vehicle shall have at least one rotating amber light or high intensity amber strobe light functioning while in operation.

Attenuators shall be crashworthy conforming to the requirements National Cooperative Highway Research Program (NCHRP) Report 350.

9. Installing and Removing Lane Closures

Care must be exercised when installing and removing lane closures. All stationary lane closures begin and end as mobile operations. The traffic control needed to perform the operation safely is dictated by where the mobile operation will occur (i.e., shoulder, partially in a travel lane, or fully in a travel lane).

Installing Lane Closures

Stationary lane closures should be installed with the traffic flow in the following sequence:

1. Install all advance warning signs.
2. Place arrow panel in the shoulder at the beginning of the merging taper.
3. Place channelizing devices to form a merging taper.
4. Install the buffer space.
5. Continue placing channelizing devices through the work area at the correct spacing.
6. Install an "END ROAD WORK" sign between ≥ 150 ft. and ≤ 500 ft. beyond the last device.
7. Place a TMA vehicle, if required, 50-100 ft. from the first work crew or hazard approached by road users.

A "ride through" check should be performed along the entire length of the lane closure (with adjustments made to any traffic control devices, as needed) to ensure that the lane closure is properly installed and functionally acceptably.

Removing Lane Closures

Stationary lane closures should be removed against the traffic flow in the following sequence:

1. Remove channelizing devices from the end of the closure back to the widest part of the merging taper.
2. Place the removal vehicle on shoulder and remove devices from taper by hand onto the backing vehicle.
3. Remove the arrow panel after ensuring that the roadway is clear.
4. Moving with the traffic flow, remove all the advance warning signs, beginning with the "ROAD WORK AHEAD" sign and ending with the "END ROAD WORK" sign.

10. Mobile Operations

Mobile operations are work activities that move along the road either intermittently or continuously. Safety for mobile operations should not be compromised by using fewer devices than would typically be used for a similar stationary operation.

The advance warning area must move with the work area or be repositioned periodically to provide advanced warning for the road users. Portable devices should be used.

Intermittent Mobile Operation

Intermittent mobile operations often involve frequent short stops, each as much as 15 minutes long for activities (e.g., pothole patching, utility operations) and are similar to stationary operations. Warning signs, flashing vehicle lights, and/or channelizing devices should be used.

With operations that move slowly (< 3 MPH) it may be feasible to use stationary signing that is periodically retrieved and repositioned in the advance warning area. In addition, vehicles may be equipped with flashing vehicle lights, truck mounted attenuators, and appropriate signs.

Caution must be exercised so flaggers are not exposed to unnecessary hazards, if used.

Continuously Moving Mobile Operation

Continuously moving mobile operations include activities in which workers and equipment move along the road without stopping (e.g. pavement striping), usually at slow speeds.

For some continuously moving operations where volumes are light and visibility is good, a well-marked and well-signed vehicle may suffice.

If volumes and/or speeds are higher, a shadow or protection vehicle, equipped as a sign truck, should follow the work vehicle. The advance warning area moves with the work area.

11. Pedestrian, Bicyclist, and Worker Safety

A wide range of pedestrians may be affected by TTC zones, including people with disabilities. When pedestrian pathways are closed or disrupted due to construction, maintenance, or utility work, pedestrian traffic controls are required. These controls include signs, channelizing devices, flags, etc. to direct pedestrians through and around the work site.

Pedestrian Consideration

The following items shall be considered when planning for pedestrians in TTC zones:

- Pedestrians shall not be led into conflicts with vehicles, equipment, and operations
- Pedestrians shall not be led into conflicts with vehicles moving through or around the worksite
- Pedestrians 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
- Covered walkways should be provided when pedestrians are exposed to potential injury from falling objects
- Advanced notification of sidewalk closures shall be provided
- Adequate provisions shall be made for persons with disabilities
- Proper access to businesses, residences, and crosswalks must be a maintained

Pedestrian Accommodation Checklist

The following items shall be considered when creating a Traffic Control Plan (TCP):

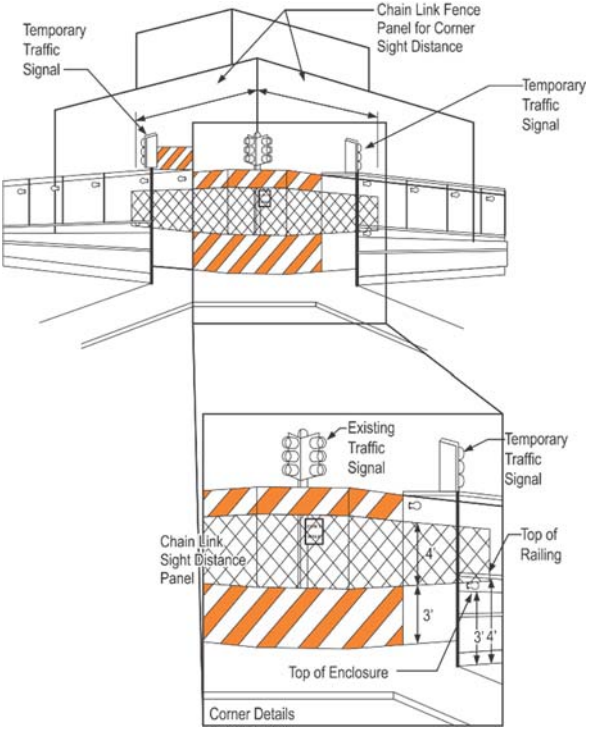
- ☐ Impact on pedestrian generators (schools, senior centers, transit stops, etc.)
- ☐ Impact on existing pedestrian flow
- ☐ Pedestrian information needs
- ☐ Pedestrian facilities
- ☐ Intersection operations
- ☐ Adequate pedestrian protection
- ☐ Construction staging to maintain pedestrian access throughout all construction phases
- ☐ Temporary nighttime lighting
- ☐ Compliance with the current Americans with Disabilities Act (ADA)
- ☐ Location/access to businesses, residences, etc.
- ☐ 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

Covered Walkways

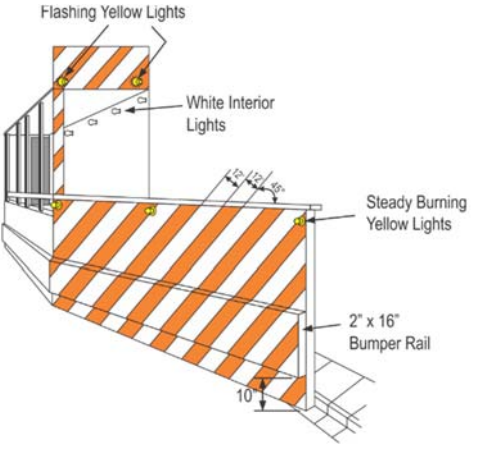
A temporary covered walkway shall be used to protect pedestrians from falling debris and to provide a covered passage for pedestrians. Temporary covered walkways are subject to the following criteria:

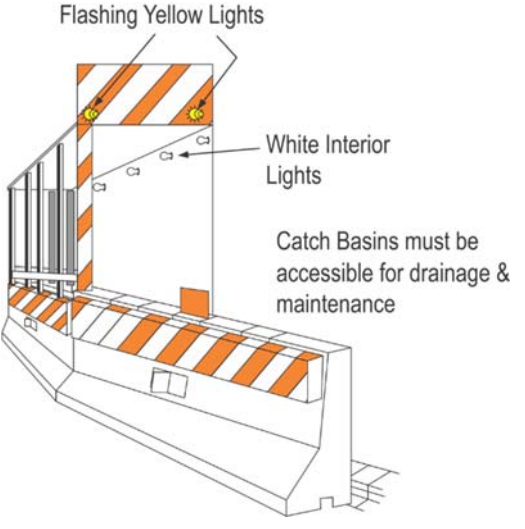
- The structural design and construction of covered pedestrian pathways shall be approved by DDOT
- Covered walkways shall be sturdily constructed and adequately lit for nighttime use with vandal-resistant fixtures mounted on 30-foot centers near the roof line
- Under no circumstances shall work equipment 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
- When allowed, 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.
- An overhead clearance of ≥ eight ft. and a minimum navigable width of ≥ six ft. shall be provided
- Continuous handrails shall be installed along the walls of the covered walkway to aid pedestrians that have ambulatory difficulties
- Adequate provisions, including wheelchair ramps shall be made for persons with disabilities
- Covered pedestrian pathway shall be provided with corner treatments which allow a minimum 45-foot sight distance triangle

The figures below are the covered walkway standard drawings for the District of Columbia.



Covered Walkway Standard Drawing





Covered Walkway Sidewalk End View

Bicyclist Considerations

Planning for bicyclists in TTC zones on highways and streets requires careful consideration of many factors:

- Cyclists shall not be led into conflicts with vehicles, equipment, and operations
- Cyclists shall not be led into conflicts with vehicles moving through or around the worksite
- 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
- 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
- Unless a separate bike path through or around the TTC zone is provided, 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
- The routing for a safe accommodation for bicyclists shall replicate the safety level of the existing bicycle route

Worker Safety Considerations

The safety of workers is equally as important as the safety of travelers through the work zone. The following are the key elements of worker safety and TTC management that should be considered to improve worker safety:

- **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.

- **Worker Clothing** – All workers should be adequately clothed for the type of work they will be performing.

- **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.

- **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.

- **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.

- **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.

12. Flagger Control

All flaggers and spotters working on DDOT-maintained roadways, except for emergency personnel and law enforcement officers, shall be certified by a DDOT-recognized flagger certification program and shall be required to carry a valid flagger certification card and photo identification on their person at all times. ***Section 14*** provides a guidance of maintenance of traffic checklist for flaggers.

Qualifications for Flaggers

Flaggers should be able to satisfactorily demonstrate the following characteristics and capabilities:

- Ability to receive and communicate specific instructions clearly, firmly, and courteously;
- Ability to move and maneuver quickly in order to avoid danger from errant vehicles;
- Good physical condition, including sight, mobility, and hearing;
- 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;
- Ability to communicate in English while on duty;
- Ability to understand and apply safe traffic control practices, sometimes in stressful or emergency situations;
- Ability to recognize dangerous traffic situations and warn workers in sufficient time to avoid injury; and
- Be at least 18 years old.

Flagger Devices and Safety Apparels

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

Sign paddles shall conform to the following requirements:

- Octagonal shape on a rigid handle, with ≥ 24" wide with letters ≥ 8" high
- Mounted ≥ 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.
- Legible and clean

Flag

Flags shall conform to the following requirements:

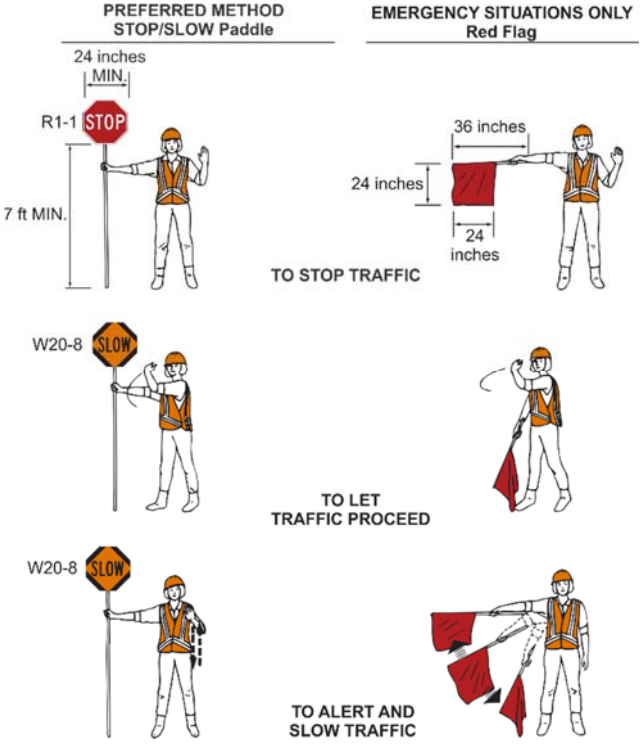
- Red or fluorescent orange/red in color
- ≥ 24" X 24"
- Securely fastened to a staff that is approximately 36" long

For daytime and nighttime activity, flaggers shall be dressed in the correct safety apparel:

- The flagger shall wear high-visibility safety apparel that meets or exceeds the Performance Class 3 requirements of the ANSI/ISEA 107–2010;
- 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;

- Retro-reflective material shall be orange, yellow, white, silver, yellow-green, or a fluorescent version of these colors, and shall be visible at ≥ 1,000 ft.;
- Shirts with sleeves and long pants (removal of shirt is prohibited); and,
- The flagger shall wear steel-toed safety shoes.

Flagging Procedures



Use of Hand-Signaling Devices by Flaggers

Flagger Stations

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. The table below provides information regarding the recommended stopping sight distance as a function of speed.

Distance of Flagger Station in Advance of the Work Space

Speed*	Minimum Distance	Recommended Distance
20 mph	35 ft.	115 ft.
25 mph	55 ft.	155 ft.
30 mph	85 ft.	200 ft.
35 mph	120 ft.	250 ft.
40 mph	170 ft.	305 ft.
45 mph	220 ft.	360 ft.
50 mph	280 ft.	425 ft.
55 mph	335 ft.	495 ft.
60 mph	415 ft.	570 ft.
65 mph	485 ft.	645 ft.

* Posted speed of the TTC zone.

13. Liability

Steps to Minimize Liability

- Have a current & approved traffic control plan;
- View the work zone from the road user's perspective (cars, trucks, motorcycles, bicyclists, and pedestrians);
- Apply the concepts of the latest version of the MUTCD;
- Minimize traffic disruptions;
- Promptly install and remove temporary traffic controls (i.e., signs, sign bases, portable stands, markings, signals, etc.) as necessary;
- Train all personnel in proper work zone safety techniques;
- Inspect work zone sites daily for conformance or changing conditions; and
- Keep comprehensive documentation (i.e., written checklist form, daily diary, photographs, video recordings).

Elements of a Good Inspection Program

- Routinely schedule inspections at different times of the day/evening
- Promptly repair or replace damaged devices
- Identify hazards and take corrective action
- Record observations and actions taken
- Verify corrective actions
- Update documentation

Maintain Documentation

- What date(s) did the work take place?
- What was the starting and ending time of work?
- Where was the work taking place?
- Who was on the site and when?
- When were traffic control devices inspected and by whom?
- What type of equipment was used?

Also be sure to keep good records of any irregularities, action taken as a result, and follow up inspection. Additional information should also be gathered in the event of a crash or incident within the work zone.

14. Checklists

The following checklists are intended to provide flaggers, supervisors, traffic safety engineers, and project managers with guidance for maintenance of traffic activities before, during, and after work zone activities.

Flagger's Checklist

- ☐ Before heading to the work zone, make sure you have all necessary equipment in working order including: warning signs, flagging paddles, retroreflective clothing, and communication equipment.
- ☐ Place advance warning sign at the appropriate locations
  - ➢ Signs should always be placed in the following order from farthest from the work zone to closest: ROAD WORK AHEAD, ONE LANE ROAD AHEAD, and the flagger symbol sign.
  - ➢ Do not begin the flagging operation until all signs are in place.
- ☐ Always stand alone in a highly visible location when flagging, allowing for space to stop motorists and also warn workers in case of a runaway vehicle.
- ☐ Never stand in the path of traffic.
- ☐ Flagger may step out near the centerline after road users have stopped in order to be visible to other approaching vehicles.
- ☐ Do not leave warning signs after the flagging operation has been terminated.

Supervisor's Checklist

- ☐ Follow the DC TTCM.
- ☐ Have a plan before going to the work site.
- ☐ Ask yourself, "What is the driver's view of the work site - at night, during peak hours, etc.?"
- ☐ Ask yourself, "Would I feel safe driving through this work zone?"
- ☐ Investigate crashes/incidents to identify if changes are needed in the traffic control plan.
  - ➢ Take photographs of all traffic control devices.
  - ➢ Sketch and dimension all devices, indicating the size of signs, placement from the edge of the travel way, and the height to the bottom of the sign.
- ☐ Remove all traffic control devices (i.e., signs, sign bases, portable stands, markings, signals, etc.) in a timely manner.

Daily Checklist for Temporary Traffic Control

- ☐ All devices meet specifications and quality standards.
- ☐ All signs are properly installed and legible.
- ☐ Arrow displays and Portable Changeable Message signs properly aligned and maintained.
- ☐ Proper taper and buffer lengths established.
- ☐ Channelized devices are clean, aligned, and properly spaced.
- ☐ Flaggers certified, properly equipped and using hand signals.
- ☐ Temporary barrier and attenuators properly installed and maintained in serviceable condition.
- ☐ Inapplicable traffic control devices (i.e., signs, sign bases, portable stands, markings, signals, etc.) removed when not required.
- ☐ Pavement markings in place at end of the work shift.
- ☐ Day and night drive-through inspections conducted and logged or recorded.

15. Special Events, Holidays, Inauguration

No work shall be done at any time on Sundays or legal holidays, or Saturdays before 9 a.m. or after 5:00 p.m., or on any other day before 7 a.m. or after 7 p.m., except with the written permission from DDOT. The following days are recognized as legal holidays in the District of Columbia:

- New Year's Day (January 1);
- Martin Luther King Jr's Birthday;
- Emancipation Day (District of Columbia Only);
- President's Day;
- Inauguration Day;
- Memorial Day;
- Labor Day;
- Independence Day (July 4th);
- Columbus Day;
- Veteran's Day;
- Thanksgiving Day;
- Christmas Day (December 25)

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.

16. Noise Ordinance

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:

Maximum Noise Level

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)

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.

17. Typical Application Diagrams

The diagrams on the following pages represent examples of the application of principles and procedures for safe and efficient TTC in work zones. These diagrams represent several select typicals that may be more frequently used based on the type of work commonly performed in the District of Columbia. Please refer to the DC TTCM for additional typicals.

It is not possible to include illustrations to cover every situation which will require work area protection. These Typical Applications are not intended as a substitute for engineering judgment and should be altered to fit the conditions of a particular site. All traffic control devices used must be in compliance with the TTCM.

The diagrams are not to scale, and the number of channelizing devices shown may not be the number needed at the work site. Guidelines for taper lengths are given. Refer to ***Section 7*** for more information on taper lengths, and ***Section 8*** for guidelines on advance warning sign spacing.

The notes on the typical diagrams provide important information for the user. Read all notes before using these diagrams. The values presented in these diagrams should be treated as minimum values. The typical applications in this guide are consistent with the DC TTCM, which contains the standards for work zone traffic control, including sign type numbers and dimensions of signs. Therefore, refer to the DC TTCM for further information.

Legend for Typical Application

The legend for the symbols used in the typical applications is provided on the following page.

Meaning of Symbols on Typical Application Diagrams

Notes for Typical Application 1
Work beyond the Shoulder

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. 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.

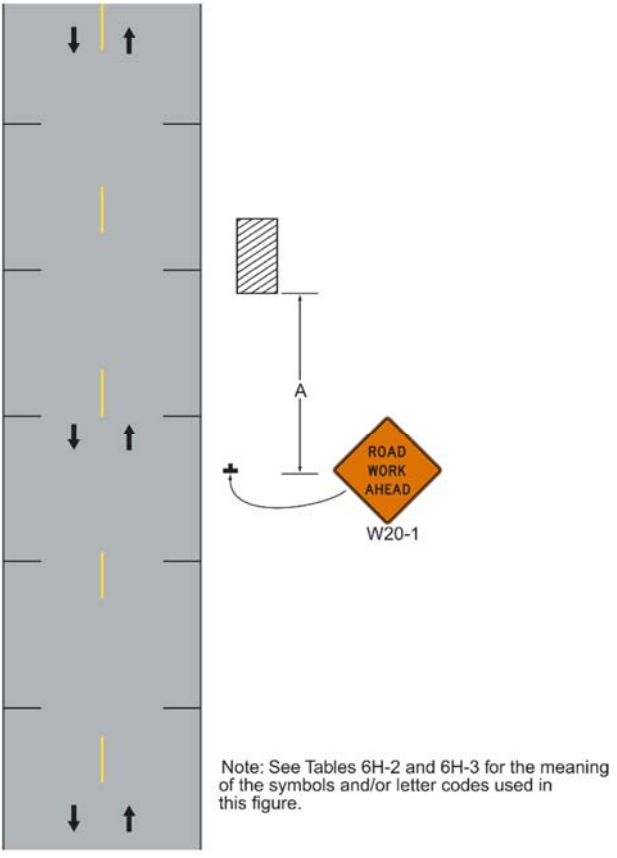
3. The ROAD WORK AHEAD sign or Workers (W21-1a) sign may be replaced with other appropriate signs such as the SHOULDER WORK sign. The SHOULDER WORK sign may be used for work adjacent to the shoulder.

4. The ROAD WORK AHEAD sign or Workers (W21-1a) sign may be omitted where the work space is behind a barrier, > 24" behind the curb, or ≥ 15 ft. 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.

Work beyond the Shoulder (TA-1)

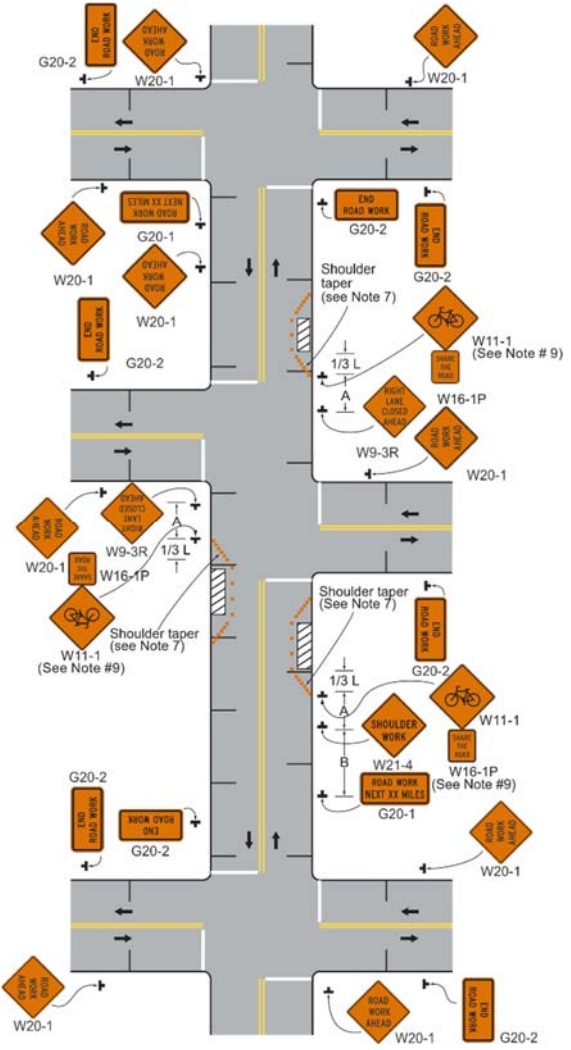


Note: See Sections 6 through 8 for layout dimensions.

Notes for Typical Application 3
Work on the Shoulders

1. 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.
2. The Workers symbol signs may be used instead of SHOULDER WORK/ ROAD WORK signs.
3. 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.
4. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.
5. 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.
6. When a side road intersects the highway within the TTC zone, additional traffic control devices shall be placed as needed.
7. When paved shoulders having a width of 8 ft. or more are closed, at least one advance warning sign shall be used.
8. All advance warning signs should be placed so that the path of travel for bicycles is not blocked, while maintaining visibility for road users.
9. When 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.

Work on the Shoulders (TA-3)



Note: See Sections 6 through 8 for layout dimensions.

Notes for Typical Application 4
Short Duration or Mobile Operation on a Shoulder

1. 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. 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 > 2 miles.

4. 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.

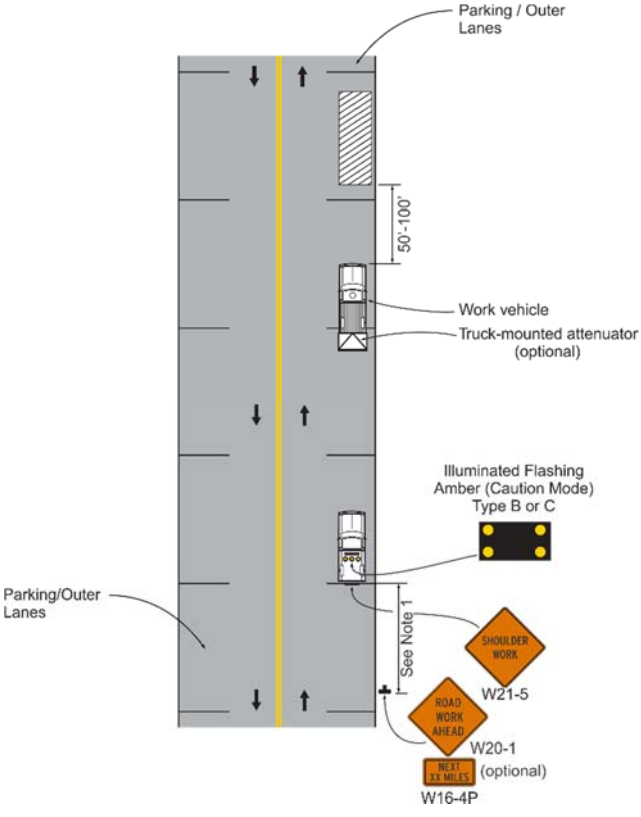
5. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.

6. Each vehicle involved in the mobile operation shall have at least one rotating amber light or high intensity amber strobe light.

7. If an arrow board is used for an operation on the shoulder, the caution mode shall be used.

8. Vehicle-mounted signs shall be mounted in a manner such that they are not obscured by equipment or supplies. Sign legends on vehicle- is not in progress.

Short Duration or Mobile Operation on a Shoulder (TA-4)



Note: See Sections 6 through 8 for layout dimensions.

Notes for Typical Application 6
Shoulder Work with Minor Encroachment

1. All lanes should be ≥ 10 ft. 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. 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. For short-term use on low-volume, low-speed roadways with vehicular traffic that does not include longer and wider heavy commercial vehicles, a lane width ≥ 9 ft. may be used.

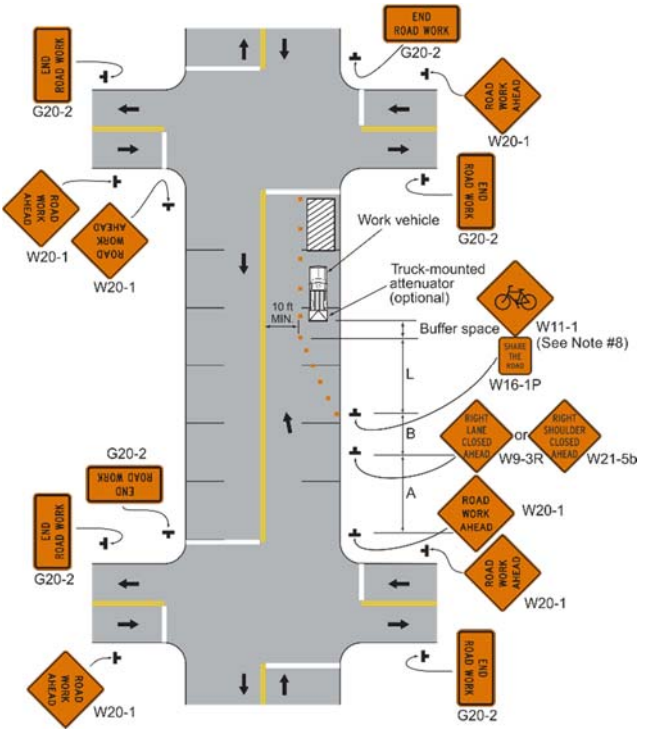
5. Where the opposite shoulder is suitable for carrying vehicular traffic and of adequate width, lanes may be shifted by use of closely-spaced channelizing devices, provided that the lane width of ≥ 10 ft. is maintained.

6. A truck-mounted attenuator may be used on the shadow vehicle.

7. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.

8. When 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.

Shoulder Work with Minor Encroachment (TA-6)



Note: See Sections 6 through 8 for layout dimensions.

Notes for Typical Application 15
Work in the Center of a Road with Low Traffic Volumes

1. The lanes on either side of the center work space should have a width of ≥ 10 ft. 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. 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.

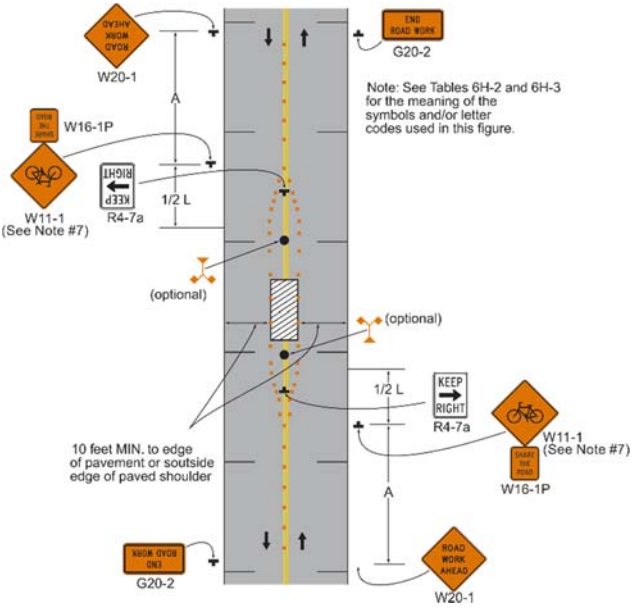
4. A lane width of 9 ft. may be used for short-term stationary work on low-volume, low-speed roadways when motor vehicle traffic does not include longer and wider heavy commercial vehicles.

5. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.

6. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.

7. When 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.

Work in the Center of a Road with Low Traffic Volumes (TA-15)



Note: See Sections 6 through 8 for layout dimensions.

Notes for Typical Application 17
Mobile Operations on a Two-Lane Road

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.

4. Where practical and when needed, the work and shadow vehicles should pull over periodically to allow vehicular traffic to pass.

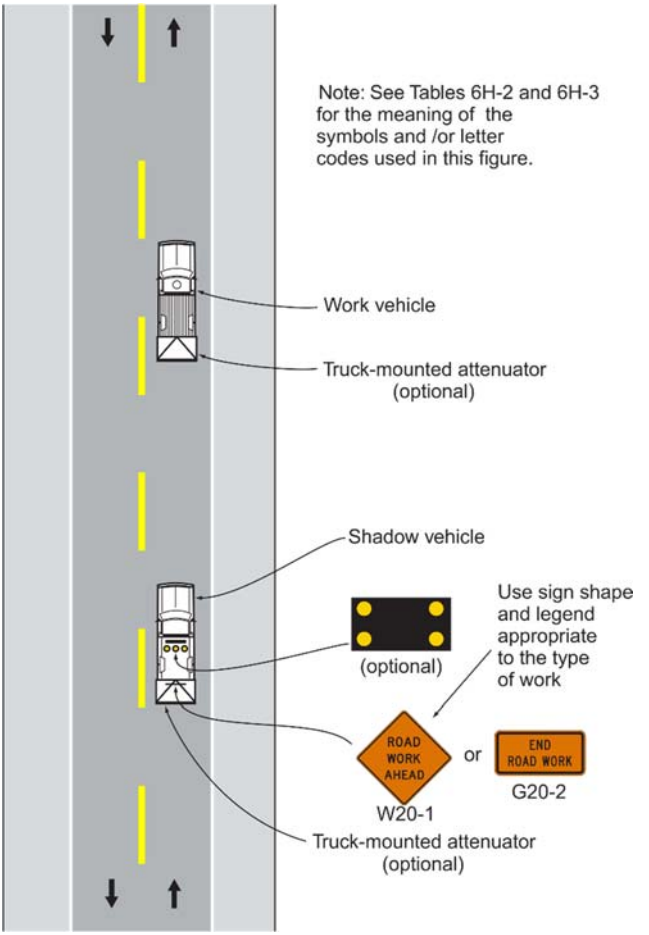
5. A truck-mounted attenuator may be used on the shadow vehicle or on the work vehicle.

6. 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.

7. Shadow vehicles are used to warn motor vehicle traffic of the operation ahead.

8. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.

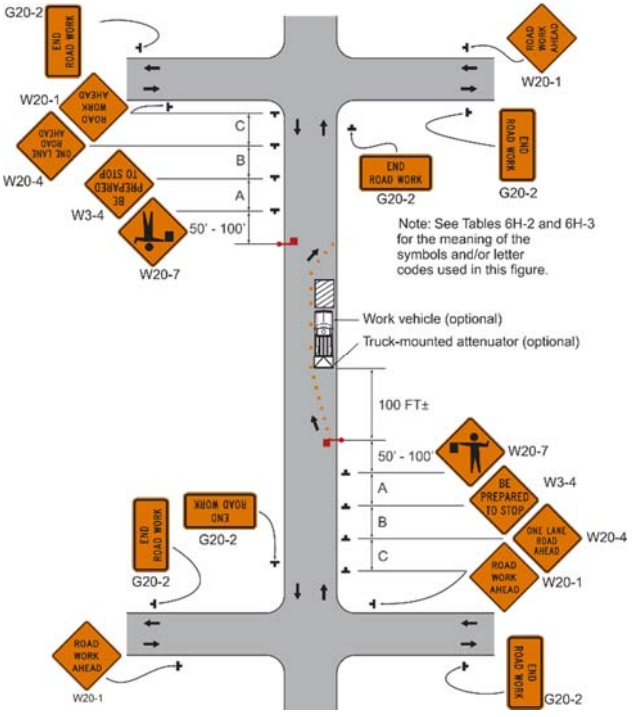
Mobile Operations on a Two-Lane Road (TA-17)



Notes for Typical Application 18
Lane Closure on a Minor Street

1. This TTC shall be used only for low-speed facilities having low traffic volumes.
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.
3. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
4. A truck-mounted attenuator may be used on the work vehicle and the shadow vehicle.

Lane Closure on a Minor Street (TA-18)



Note: See Sections 6 through 8 for layout dimensions.

Notes for Typical Application 19
Detour for One Travel Direction

1. When existing accommodations for bicycle travel are disrupted or closed, traffic control measures should be used to consider the needs and control of bicyclist through a TTC zone.

2. This plan should be used for streets without posted route numbers.

3. On multi-lane streets, Detour signs with an Advance Turn Arrow should be used in advance of a turn.

4. The STREET CLOSED legend may be used in place of ROAD CLOSED.

5. Additional DO NOT ENTER signs may be used at intersections with intervening streets.

6. Warning lights may be used on Type 3 Barricades.

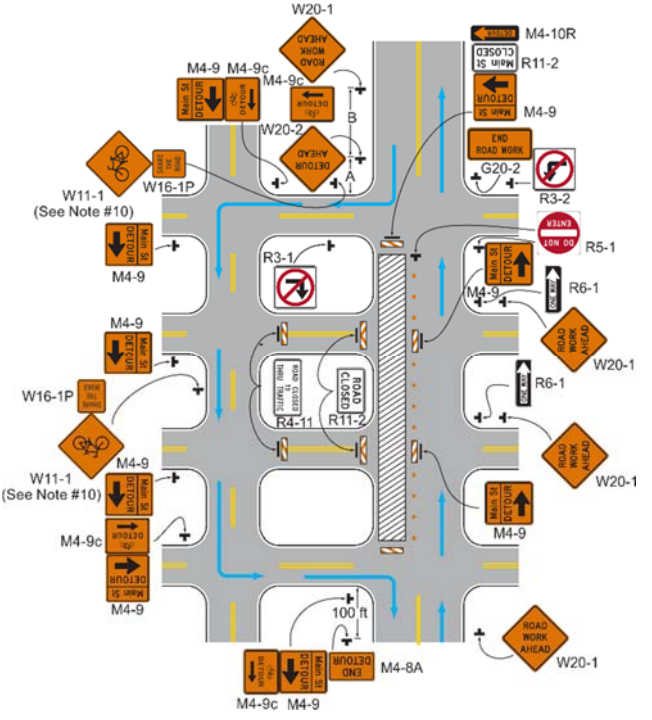
7. Detour signs may be located on the far side of intersections.

8. 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.

9. 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

10. When 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.

Detour for One Travel Direction (TA-19)

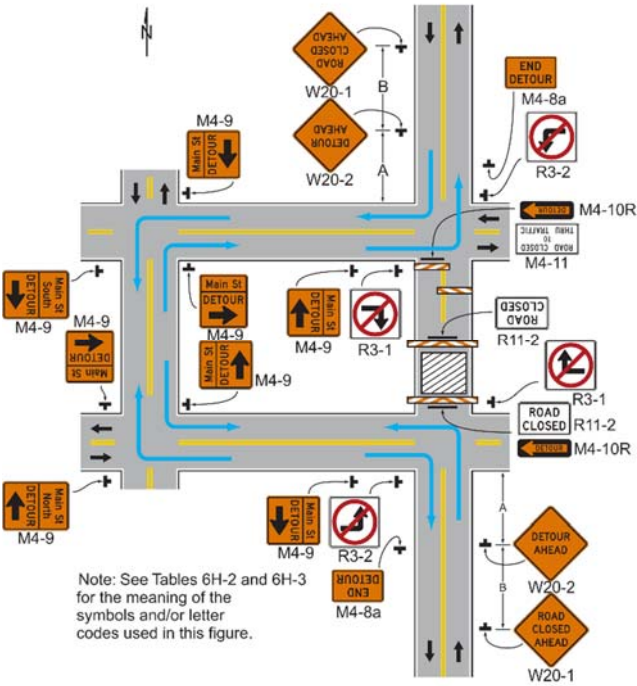


Note: See Sections 6 through 8 for layout dimensions.

Notes for Typical Application 20
Detour for a Closed Street

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.
3. Flashing warning lights may be used on Type 3 Barricades.
4. 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.
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. When used, the Street Name sign shall be placed above the Detour sign.

Detour for a Closed Street (TA-20)



Note: See Sections 6 through 8 for layout dimensions.

Notes for Typical Application 22
Right-Hand Lane Closure on the Far Side of an Intersection

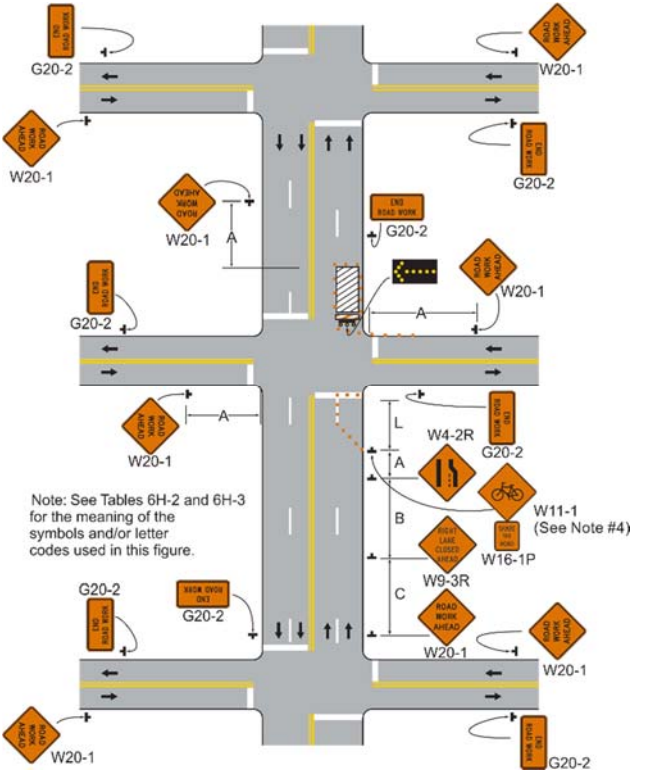
1. If the work space extends across a crosswalk, the crosswalk should be closed.

2. For intersection approaches reduced to a single lane, left-turning movements may be prohibited to maintain capacity for through vehicular traffic.

3. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.

4. When 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.

Right-Hand Lane Closure on the Far Side of an Intersection (TA-22)

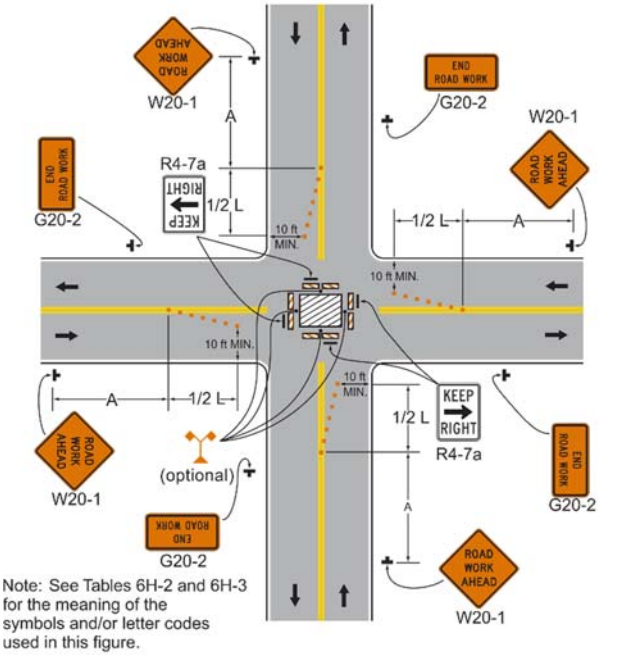


Note: See Sections 6 through 8 for layout dimensions.

Notes for Typical Application 26
Closure in the Center of an Intersection

1. All lanes should be ≥ 10 ft. in width as measured to the near face of the channelizing devices.
2. A high-level warning device may be placed in the work space, if there is sufficient room.
3. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.

Closure in the Center of an Intersection (TA-26)



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Note: See Sections 6 through 8 for layout dimensions.

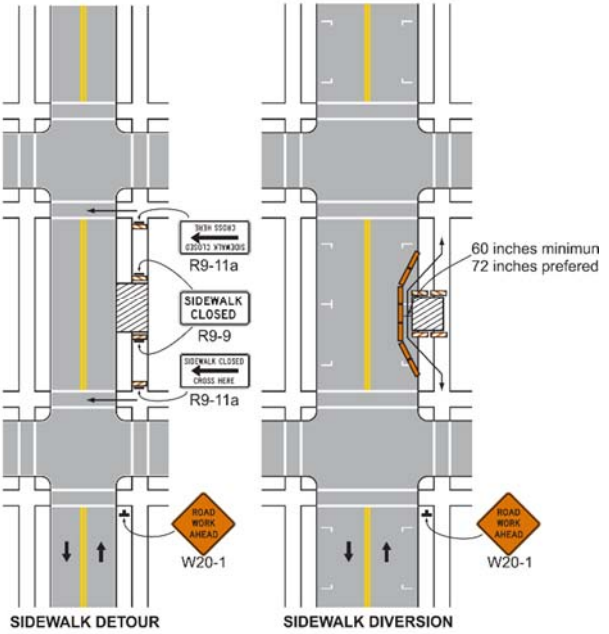
Notes for Typical Application 28
Sidewalk Detour or Diversion

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. 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. 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.

Sidewalk Detour or Diversion (TA-28)



Notes for Typical Application 30
Interior Lane Closure on a Multi-Lane Street

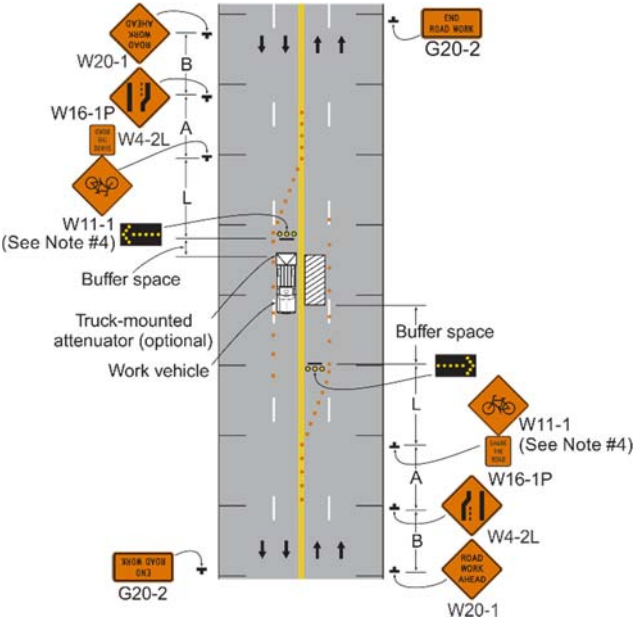
1. This information applies to low-speed, low-volume urban streets. Where speed or volume is higher, additional signing such as LEFT LANE CLOSED XX FT should be used between the signs shown.

2. 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.

3. Shadow vehicles with a truck-mounted attenuator may be used.

4. When 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.

Interior Lane Closure on a Multi-Lane Street (TA-30)

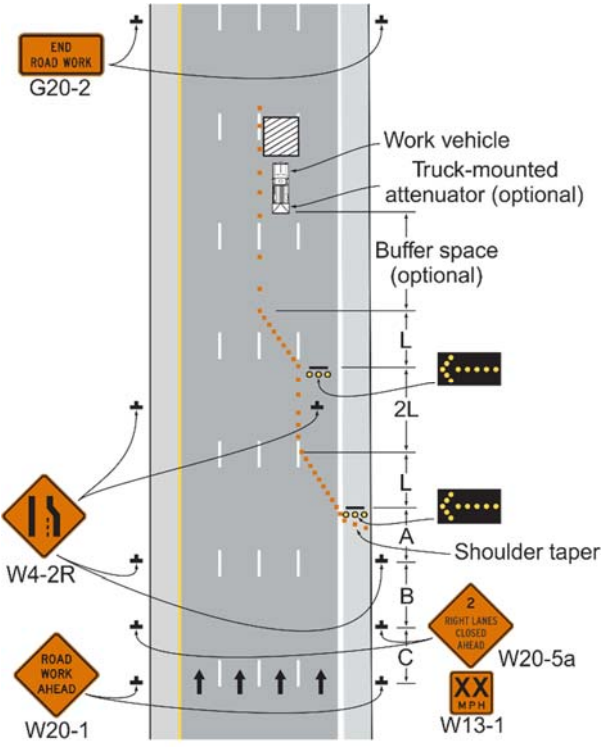


Note: See Sections 6 through 8 for layout dimensions.

Notes for Typical Application 37
Double Lane Closure on a Freeway

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. When a shadow vehicle is used in the interior closed lane, and the second arrow board is mounted on the shadow vehicle;
3. Flashing warning lights and/or flags may be used to call attention to the initial warning signs.
4. A truck-mounted attenuator may be used on the shadow vehicle.

Double Lane Closure on a Freeway (TA-37)

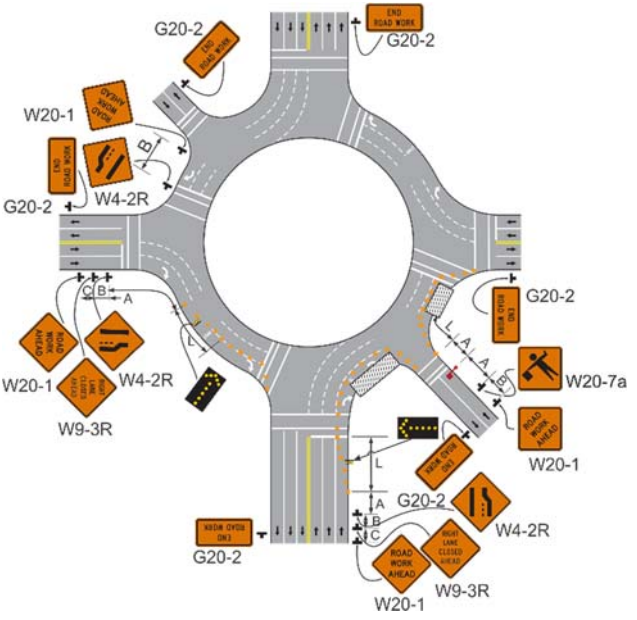


Note: See Sections 6 through 8 for layout dimensions.

Notes for Typical Application 47
Traffic Circle with Outer-most Lane Closure

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.
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.

Traffic Circle with Outer-most Lane Closure (TA-47)

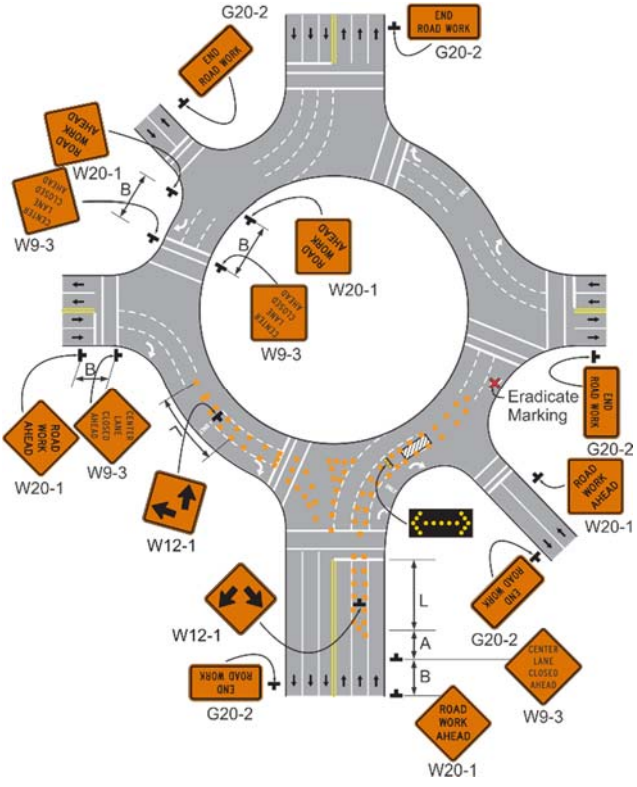


Note: See Sections 6 through 8 for layout dimensions.

Notes for Typical Application 48
Traffic Circle with Center Lane Closure

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 signs shall be used to indicate the lane closure.
4. Vehicle hazard warning signals may be used to supplement high-intensity amber, rotating, oscillating, or strobe lights.

Traffic Circle with Center Lane Closure (TA-48)

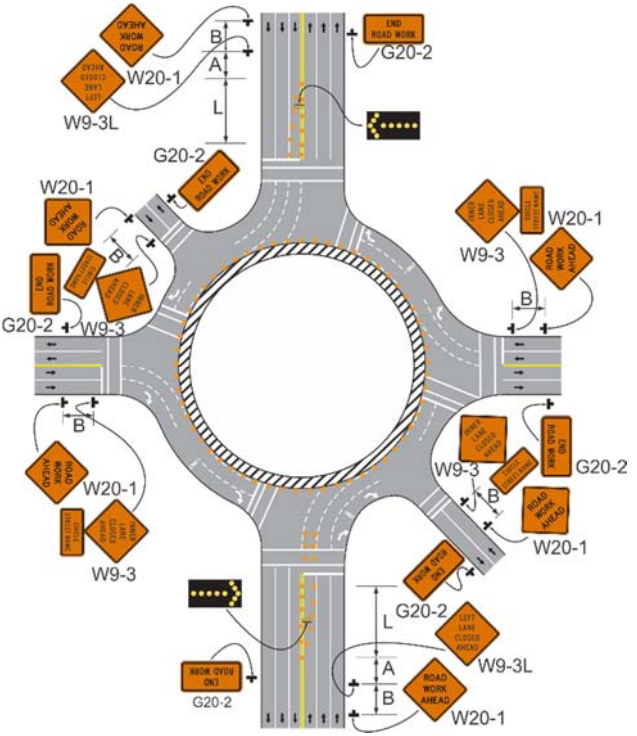


Note: See Sections 6 through 8 for layout dimensions.

Notes for Typical Application 49
Traffic Circle with Inner-Most Lane Closure

- ROAD WORK AHEAD and END ROAD WORK signs shall be placed at all legs entering/exiting the traffic circle.
- An arrow board shall be used during the lane closure.
- Warning sign shall be used to indicate the lane closure.
- Vehicle hazard warning signals may be used to supplement high-intensity amber, rotating, oscillating, or strobe lights.

Traffic Circle with Inner-Most Lane Closure (TA-49)

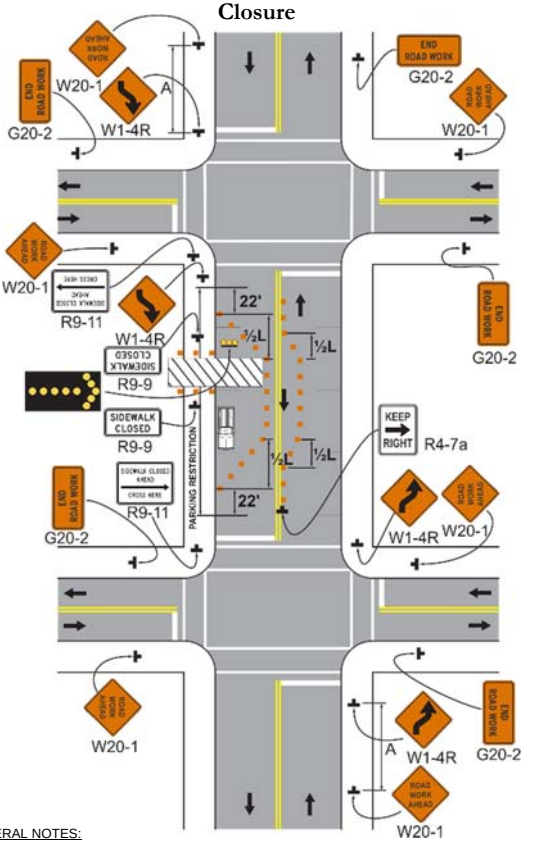


Note: See Sections 6 through 8 for layout dimensions.

Notes for Utility Typical Application 2
Travel Lane, Parking Lane, and Sidewalk Closure

1. This utility typical applications is intended for application on local roadways. Please refer the Appendix of the DC TTCM for additional utility typicals.
2. Parking is to be restricted 72 hours in advance unless there is an emergency.
3. Signs shall be installed prior to the commencement of all work and removed immediately after the completion of activities.
4. If a sign is no longer required, it will be removed.
5. Signs shall be mounted on spring loaded sign stands.
6. The spacing of traffic cones is to be 10 ft.
7. In case of a one-way roadway, omit opposite signage. Have signs on both sides of the roadway approaching the work zone ahead.
8. If the work zone is on the bus route, travel lanes must be a minimum of 11 ft. in width.

Utility Typical 02 – Travel Lane, Parking Lane, Sidewalk Closure



GENERAL NOTES:

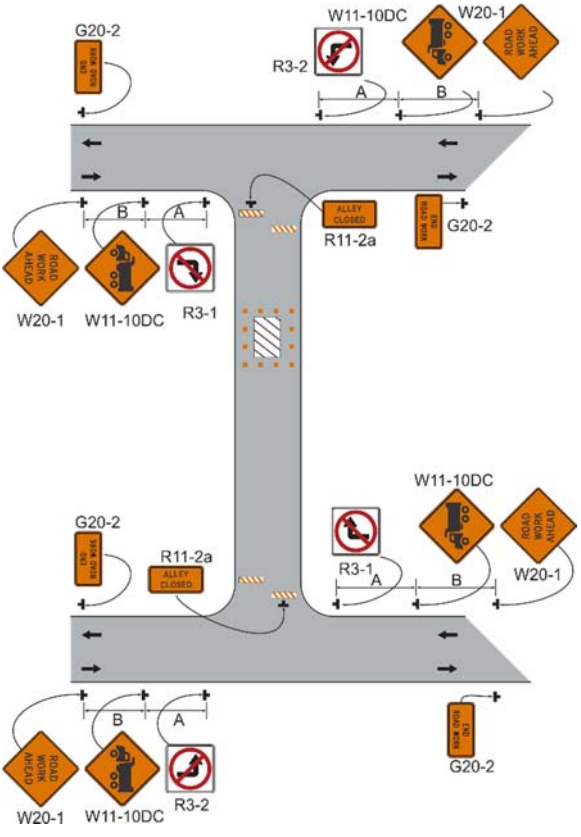
- PARKING TO BE RESTRICTED 72 HOURS IN ADVANCE (EXCEPT EMERGENCIES).
- SIGNS SHALL BE INSTALLED PRIOR TO THE COMMENCEMENT OF ALL WORK AND REMOVED IMMEDIATELY AFTER COMPLETION OF ACTIVITIES.
- IF A SIGN IS NO LONGER REQUIRED IT WILL BE REMOVED.
- SIGNS SHALL BE MOUNTED ON SPRING LOADED SIGN STANDS.
- 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 Sections 6 through 8 for layout dimensions.

Notes for Utility Typical Application 9
Alley Closure

1. This utility typical applications is intended for application on local roadways. Please refer the Appendix of the DC TTCM for additional utility typicals.
2. This utility typical applications is intended for application on local roadways. Please refer the Appendix of the DC TTCM for additional utility typicals.
3. Parking is to be restricted 72 hours in advance unless there is an emergency.
4. Signs shall be installed prior to the commencement of all work and removed immediately after the completion of activities.
5. If a sign is no longer required, it will be removed.
6. Signs shall be mounted on spring loaded sign stands.
7. The spacing of traffic cones is to be 10 ft.
8. In case of a one-way roadway, omit opposite signage. Have signs on both sides of the roadway approaching work ahead.
9. If the work zone is on the bus route, travel lanes must be a minimum of 11 ft. in width.
10. Flaggers must have electronic communication.
11. STOP/SLOW signs should be mounted on a 5-ft. pole.
12. Fire Marshall approval must be obtained prior to any road closure.

Utility Typical 9 – Alley Closure



GENERAL NOTES:

- PARKING TO BE RESTRICTED 72 HOURS IN ADVANCE (EXCEPT EMERGENCIES).
- 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 Sections 6 through 8 for layout dimensions.

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Acknowledgments

The guidelines were developed by the District of Columbia Department of Transportation (DDOT) to meet DDOT's requirements for safety in temporary traffic control zones, under the director of the Infrastructure Project Management Administration (IPMA).

Information & Training

For additional copies of this reference booklet, or for information on work zone safety and training, please contact:

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Infrastructure Project Management Administration
55 M Street SE, Suite 400
Washington, DC 20003
Phone: 202.673.6813
Fax: 202.671.0650
Email: ddot@dc.gov

District Department of Transportation