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Transportation Management Plan (TMP) 101
April 22, 2020

TMP History

- The Work Zone Safety and Mobility Rule
- Establishes requirements and provides guidance for:
  - Addressing work zone safety and mobility impacts
  - Developing strategies to manage those impacts
- Better understand, anticipate, and plan for work zone impacts:
  - Assess/understand local as well as corridor and network impacts
  - Examine solutions that minimize these impacts
  - Involve stakeholders in the process
  - Facilitate customer-focused project development
- Consider solutions that go beyond the immediate location of the work zone:
  - Expand work zone management beyond traffic safety and control
  - Managing a transportation system
  - Address safety and mobility

Source: https://ops.fhwa.dot.gov/wz/resources/final_rule.htm

What is a TMP?

- A TMP lays out a set of coordinated strategies and describes how these strategies will be used to manage the work zone impacts of a project. The scope, content, and level of detail of a TMP may vary based on the agency's work zone policy and the anticipated work zone impacts of the project.
- A TMP Contains three items:
  - Temporary Traffic Control Plan
  - Transportation Operations Plan
  - Public Information Plan
- Two of the keys to a successful TMP are:
  - Developing it as early as possible.
  - Using a multidisciplinary approach.

Source: https://ops.fhwa.dot.gov/wz/rule_guide/sec6.htm#sec61

TMP Development

- Step 1 – Compile Project Material
- Step 2 – Determine TMP Needs
- Step 3 – Identify Stakeholders
- Step 4 – Develop TMP
- Step 5 – Update/Revise TMP
- Step 6 – Finalize Construction Phasing/Staging and TMP
- Step 7 – Re-Evaluate/Revise TMP
- Step 8 – Implement TMP
- Step 9 – TMP Monitoring
- Step 10 – Update/Revise TMP Based on Monitoring
- Step 11 – Post-Project TMP Evaluation

Source:
https://ops.fhwa.dot.gov/wz/rule_guide/sec6.htm#sec61

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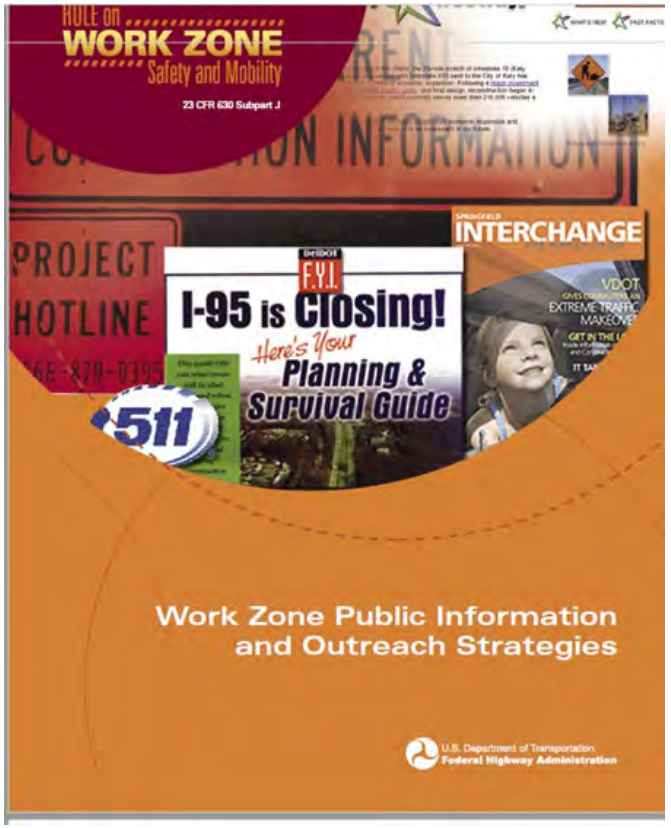
Public Information

Public Information

1. Develop Foundation/Framework for Campaign	✓
1.1 Define goals and objectives for outreach campaign	
1.2 Determine approach, resources, and scope of outreach	
1.3 Define the outreach coordination team and necessary partners and define roles	
1.4 Identify target audience	
1.5 Develop messages	
1.6 Develop brand themes and logo for project	
1.7 Determine general opportunities to distribute the messages (public meetings, peak commute times, direct mail, etc.)	
1.8 Develop draft plan to implement outreach strategies (specific actions/timelines/points of contact)	
1.9 Determine success criteria	
1.10 Validate communications plan/secure buy-in from key leaders and partners	
2. Develop Outreach Strategies	✓
2.1 Confirm outreach product types and format requirements (negotiate pricing where possible/ appropriate and determine final product types based on budget	
2.2 Determine communication strategies to convey the messages (news, brochures, web site, radio ads, dynamic message signs, etc.)	
2.3 Identify audience for each product	
2.4 Confirm specific message for each product	
2.5 Determine design of product	
2.6 Develop specific content of product	
2.7 Produce outreach products	
3. Implement Outreach Strategies	✓
3.1 Confirm outreach opportunities/distribution channels and identify deadlines or special requirements. Document in plan.	
3.2 Match outreach products to specific distribution channels identified in item 1.7.	
3.3 Continue to identify outreach partners and possible outreach opportunities	
3.4 Develop/maintain contact lists	
3.5 Distribute products through channels	
4. Evaluate/Improve Outreach Strategies	✓
4.1 Regularly review and update each outreach strategy.	
4.2 Conduct regular process reviews as appropriate (will depend on length of project)	
4.3 At completion of outreach, evaluate effectiveness of outreach results based on success criteria, document lessons learned, and implement improvements in the future.	



Source: https://ops.fhwa.dot.gov/wz/info_and_outreach/public_outreach_guide.pdf

Public Information

- https://ops.fhwa.dot.gov/wz/info_and_outreach/public_outreach_guide.pdf
- https://ops.fhwa.dot.gov/wz/publicinfostrategies.htm

Ways to Communicate Work Zone Information	
Project web site	Video
Email alerts	CB radio network (for truckers)
Web-connected traffic cameras	Billboards
Direct mail (community contact letter, other materials)	Advertising on buses
Brochures/flyers/factsheets	Information center or kiosk
Newsletter	Project hotline
Legislative briefings	511
Public meetings/workshops/events	Dynamic message signs (DMS)
Project model display with related traffic information	Highway advisory radio (HAR)
Newspapers advertising and articles	Personal contacts
TV advertising, articles, traffic spots	Press kit
Radio advertising, articles, and traffic spots	Business survival kit
Maps	Rest-stop restaurant tray liners
Empoyee newsletters	Give-aways (key-chains, pens, etc.)

Source: https://ops.fhwa.dot.gov/wz/info_and_outreach/public_outreach_guide.pdf

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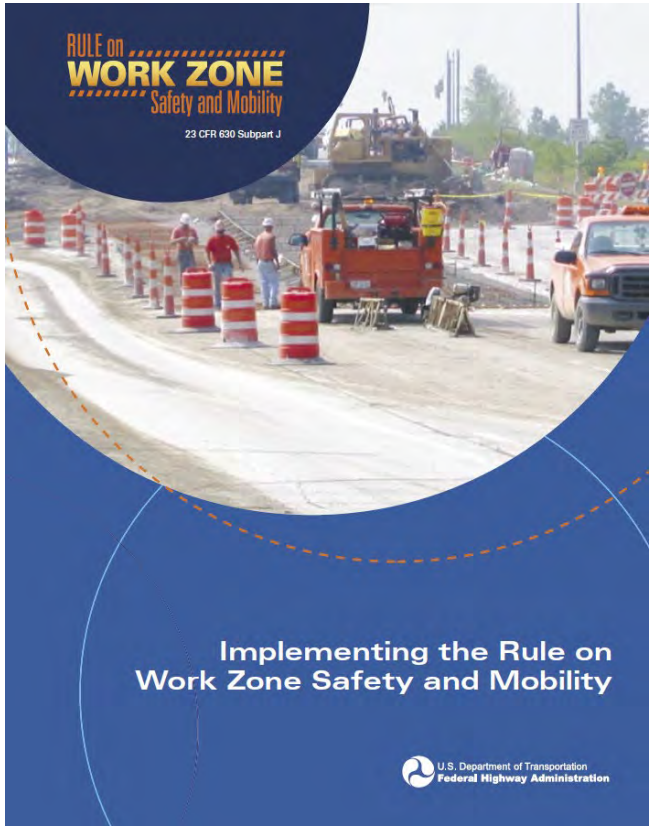
Transportation Operations

Transportation Operations

Transportation Operations (TO)			
Demand Management Strategies	**Corridor/Network Management Strategies**	**Work Zone Safety Management Strategies**	**Traffic/Incident Management and Enforcement Strategies**
▪ Transit service improvements ▪ Transit incentives ▪ Shuttle services ▪ Ridesharing/carpooling incentives ▪ Park-and-ride promotion ▪ High-occupancy vehicle (HOV) lanes ▪ Toll/congestion pricing ▪ Ramp metering ▪ Parking supply management ▪ Variable work hours ▪ Telecommuting	▪ Signal timing/coordination improvements ▪ Temporary traffic signals ▪ Street/intersection improvements ▪ Bus turnouts ▪ Turn restrictions ▪ Parking restrictions ▪ Truck/heavy vehicle restrictions ▪ Separate truck lanes ▪ Reversible lanes ▪ Dynamic lane closure system ▪ Ramp metering ▪ Temporary suspension of ramp metering ▪ Ramp closures ▪ Railroad crossings controls ▪ Coordination with adjacent construction site(s)	▪ Speed limit reduction/variable speed limits ▪ Temporary traffic signals ▪ Temporary traffic barrier ▪ Movable traffic barrier systems ▪ Crash-cushions ▪ Temporary rumble strips ▪ Intrusion alarms ▪ Warning lights ▪ Automated Flagger Assistance Devices (AFADs) ▪ Project task force/committee ▪ Construction safety supervisors/inspectors ▪ Road safety audits ▪ TMP monitor/ inspection team ▪ Team meetings ▪ Project on-site safety training ▪ Safety awards/incentives ▪ Windshield surveys	▪ 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 markets ▪ Tow/freeway service patrol ▪ Photogrammetry ▪ Coordination with media ▪ Local detour routes ▪ Contract support for incident management ▪ Incident/emergency management coordinator ▪ Incident/emergency response plan ▪ Dedicated (paid) police enforcement ▪ Cooperative police enforcement ▪ Automated enforcement ▪ Increased penalties for work zone violations



Source: https://ops.fhwa.dot.gov/wz/rule_guide/

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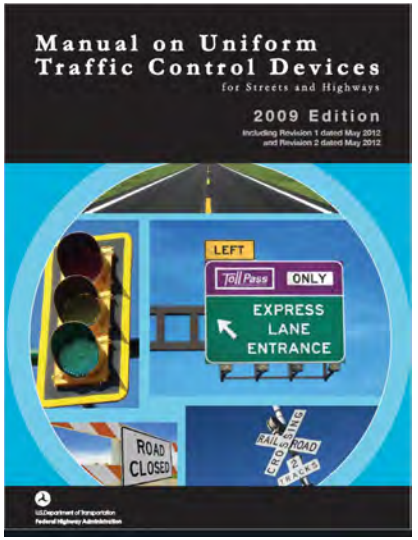
Temporary Traffic Control

Temporary Traffic Control Plans

Temporary Traffic Control (TTC)		
Control Strategies	**Traffic Control Devices[3]**	**Project Coordination, Contracting and Innovative Construction Strategies**
▪ Construction phasing/staging ▪ Full roadway closures ▪ Lane shifts or closures - 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 to maintain number of lanes ▪ One-lane, two-way operation ▪ Two-way traffic on one side of divided facility (crossover) ▪ Reversible lanes ▪ Ramp closures/relocation ▪ Freeway-to-freeway interchange closures ▪ Night work ▪ Weekend work ▪ Work hour restrictions for peak travel ▪ Pedestrian/bicycle access improvements ▪ Business access improvements ▪ Off-site detours/use of alternate routes	▪ Temporary signs - Warning - Regulatory - Guide/information ▪ Changeable Message Signs (CMS) ▪ Arrow panels ▪ Channelizing devices ▪ Temporary pavement markings ▪ Flaggers and uniformed traffic control officers ▪ Temporary traffic signals ▪ Lighting devices	▪ Project coordination - Coordination with other projects - Utilities coordination - Right-of-way coordination - Coordination with other transportation infrastructure ▪ Contracting strategies - Design-build - A+B bidding - Incentive/ disincentive clauses - Lane rental ▪ Innovative construction techniques (precast members, rapid cure materials)

Source: https://ops.fhwa.dot.gov/wz/rule_guide/

Temporary traffic control plans and devices SHALL be the responsibility of the authority of a public body or official having jurisdiction for guiding road users



Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Temporary Traffic Control Plans

- A TTC plan describes TTC measures to be used for facilitating road users through a work zone or an incident area.
- TTC plans range in scope from being very detailed to simply referencing typical drawings contained in the MUTCD, 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.
- 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.
- 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.

Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Traffic Control

- Primary Function of Traffic Control
  - "Provide for the reasonably safe and efficient movement of road users through or around temporary traffic control in work zones while reasonably protecting workers, responders to traffic incidents, and equipment"

- What is Temporary Traffic Control (TTC)?
  - *System* to communicate with road users to safely guide them through a roadway affected by:
    - Construction and reconstruction
    - Maintenance activities
    - Utility operations
    - Disasters, special events and incidents

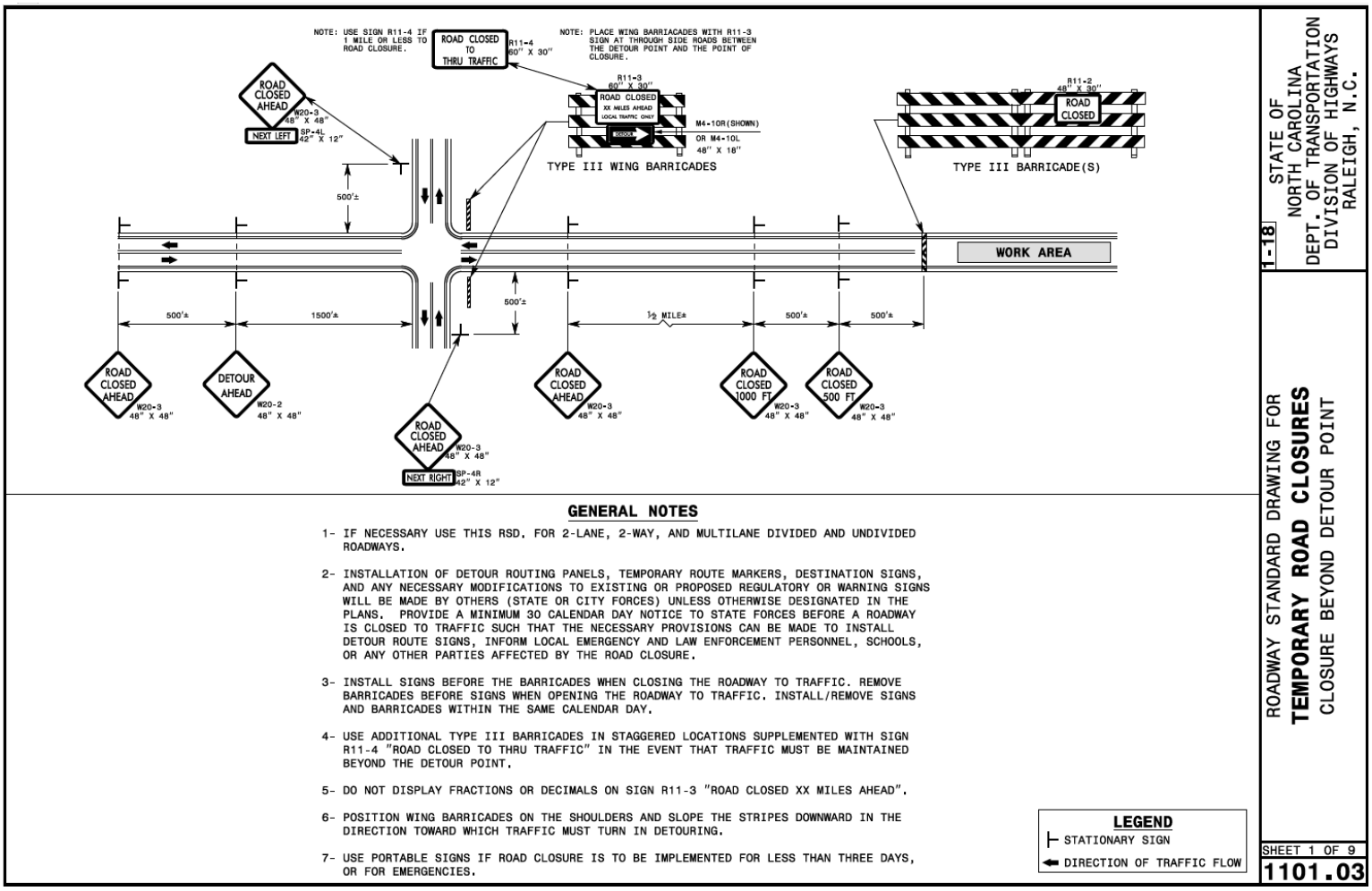
Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Temporary Traffic Control Basics

- Primary Function of Traffic Control
  - For Road Users
    - Provide Reasonably Safe Movement
    - Provide Efficient Movement
  - In Work Areas
    - Provide Reasonable Protection for Workers and/or Responders Equipment

Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Road Closure Example



Source: https://connect.ncdot.gov/resources/Specifications/2018StandardRdwyDrawings/

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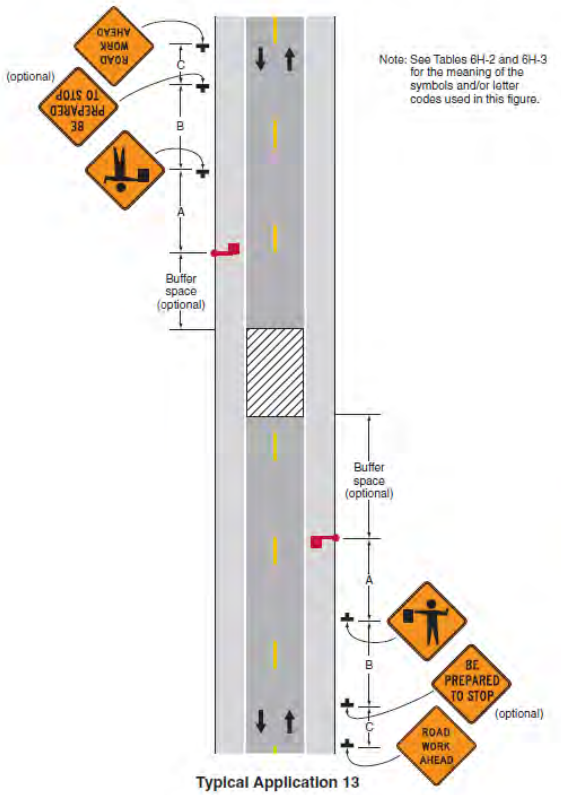
Temporary Road Closure

Table 6H-2. Meaning of Symbols on Typical Application Diagrams

Arrow board	Shadow vehicle
Arrow board support or trailer (shown facing down)	Sign (shown facing left)
Changeable message sign or support trailer	Surveyor
Channelizing device	Temporary barrier
Crash cushion	Temporary barrier with warning light
Direction of temporary traffic detour	Traffic or pedestrian signal
Direction of traffic	Truck-mounted attenuator
Flagger	Type 3 barricade
High-level warning device (Flag tree)	Warning light
Longitudinal channelizing device	Work space
Luminaire	Work vehicle
Pavement markings that should be removed for a long-term project	

Figure 6H-13. Temporary Road Closure (TA-13)



Typical Application 13

Table 6C-1. Recommended Advance Warning Sign Minimum Spacing

Road Type	Distance Between Signs**		
	A	B	C
Urban (low speed)*	100 feet	100 feet	100 feet
Urban (high speed)*	350 feet	350 feet	350 feet
Rural	500 feet	500 feet	500 feet
Expressway / Freeway	1,000 feet	1,500 feet	2,640 feet

* Speed category to be determined by the highway agency
** The column headings A, B, and C are the dimensions shown in Figures 6H-1 through 6H-46. 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.)

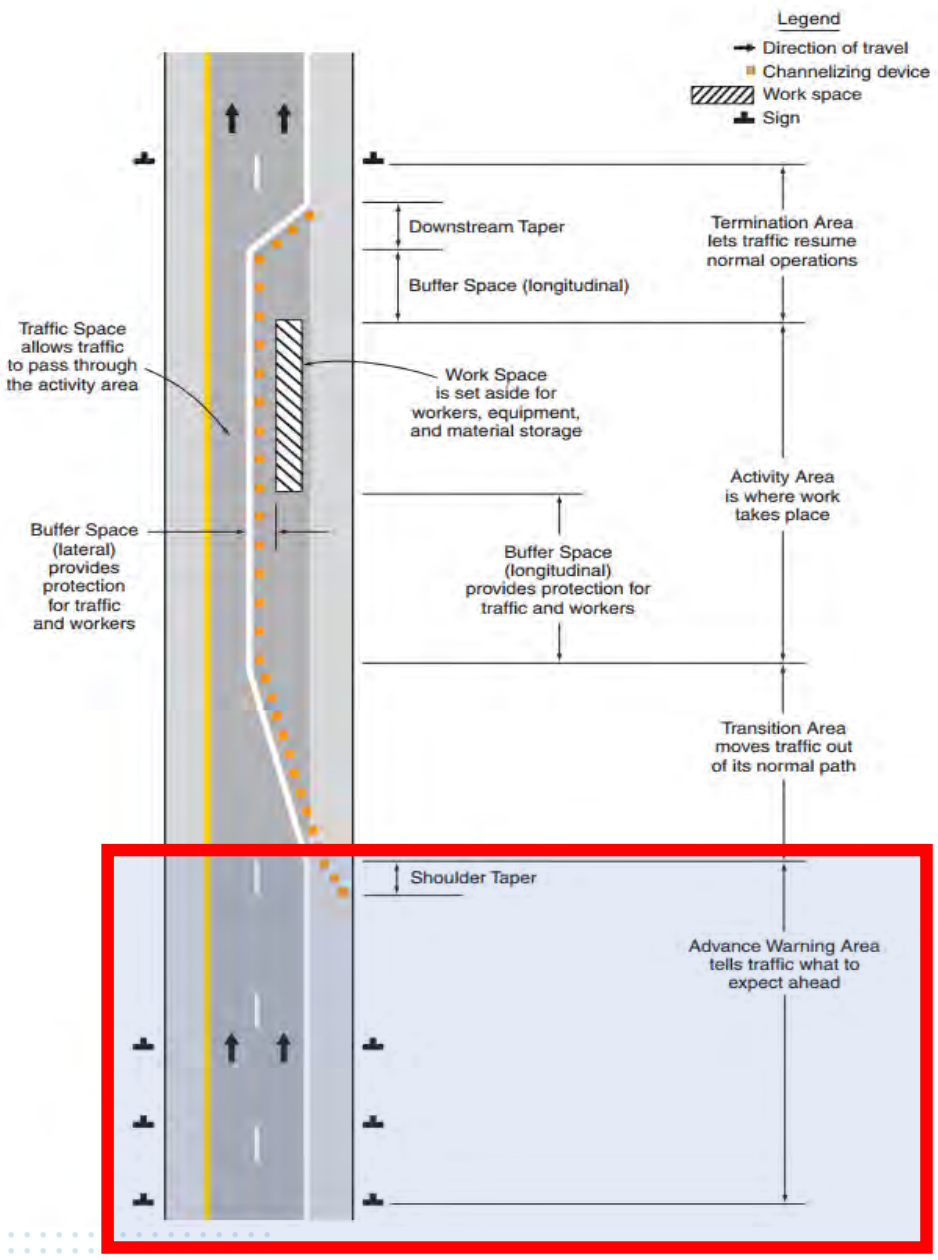
Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Basic Elements of the Work Zone

- Temporary Traffic Control Plans
- Advance Warning Area
- Transition Area
- Activity Area (buffer space and work space)
- Termination Area
- Tapers

Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Advance Warning Area



Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Advance Warning Signs

- First Sign- Advises of work ahead
- Second Sign- What to expect
- Third Sign- Action to take
- The overall effect of signs:
  - to make the driver aware of what they are approaching and what action is required.

Table 6C-1. Recommended Advance Warning Sign Minimum Spacing

Road Type	Distance Between Signs**		
	A	B	C
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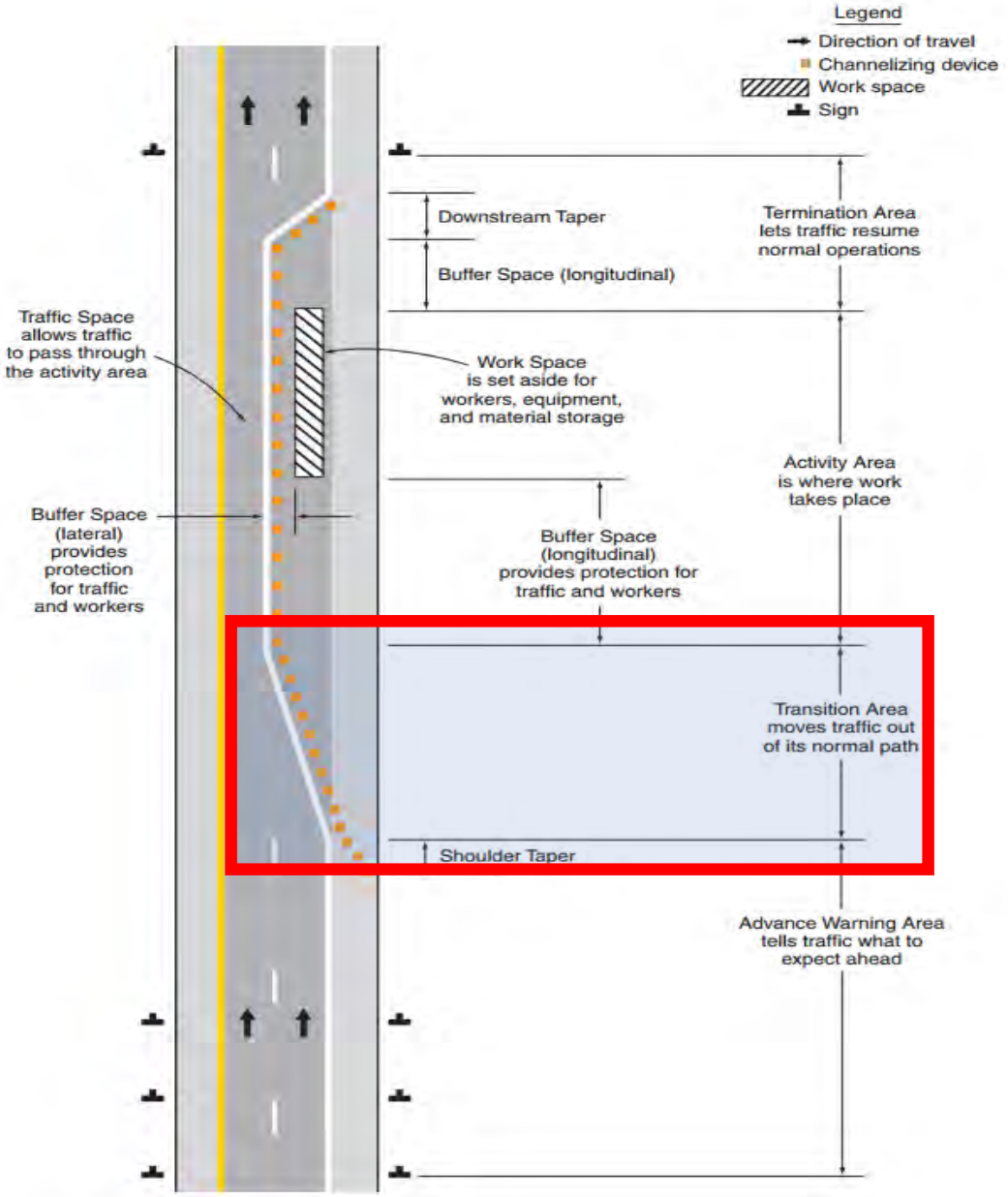
Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Transition Area



Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Activity Area

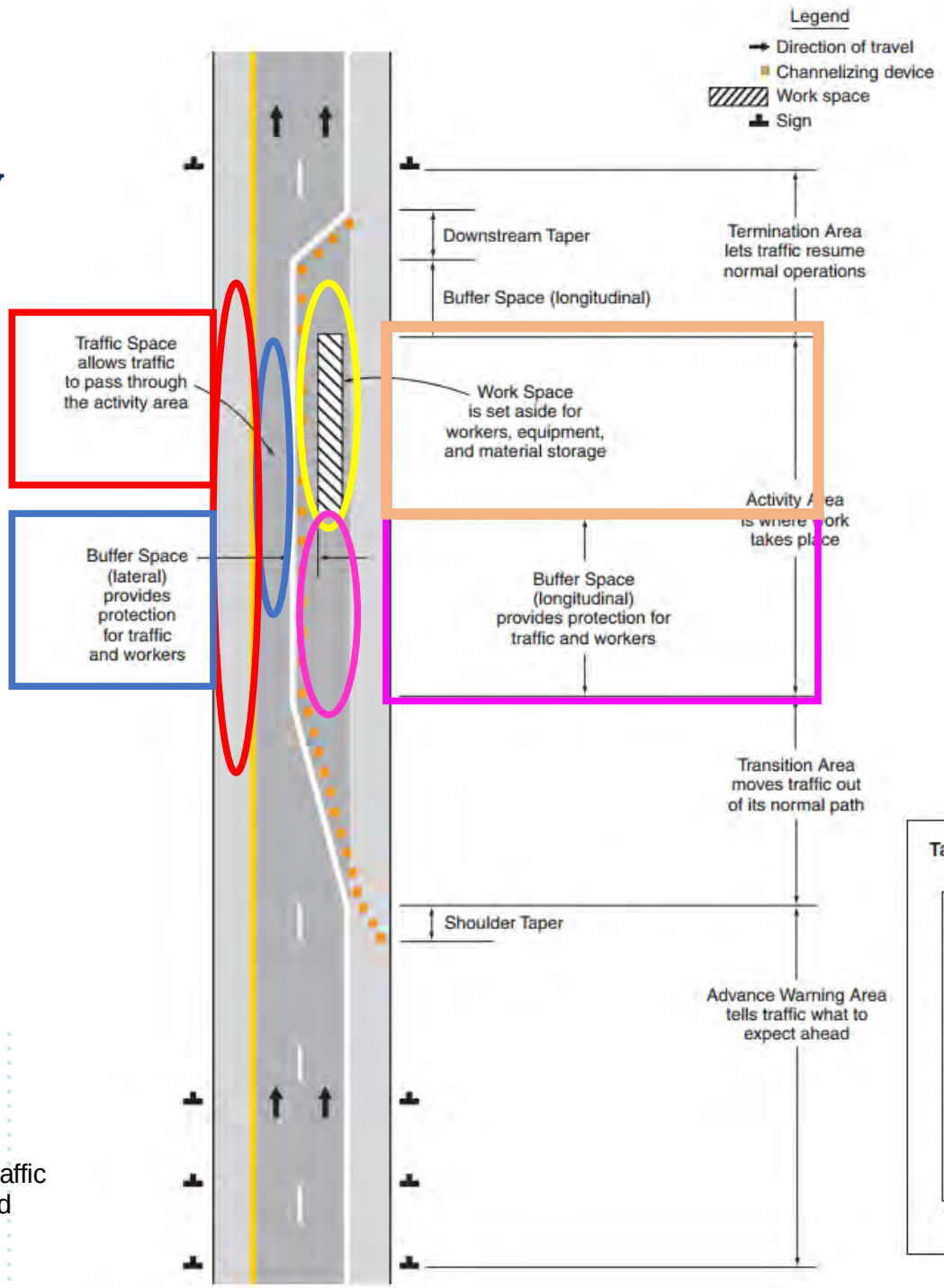


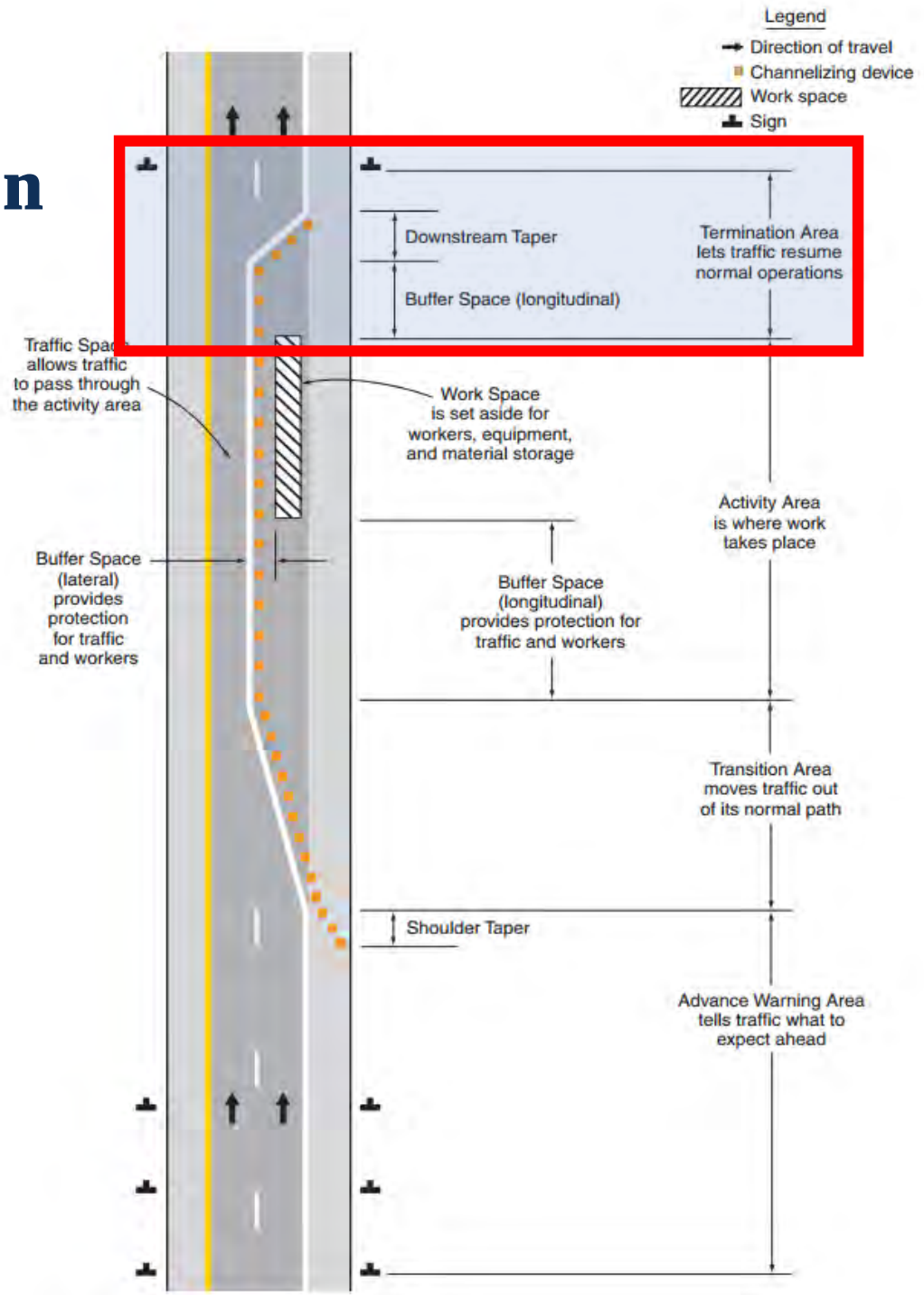
Table 6C-2. Stopping Sight Distance as a Function of Speed

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

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

Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Termination Area



Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Tapers

- Merging Tapers
  - Length = L
- Shifting Tapers
  - Length = 1/2 L
- Shoulder Tapers
  - Length = 1/3 L
- Two-way Tapers
  - 100 feet max
  - Flaggers

- Downstream
  - Tapers (optional)
  - 100’ minimum

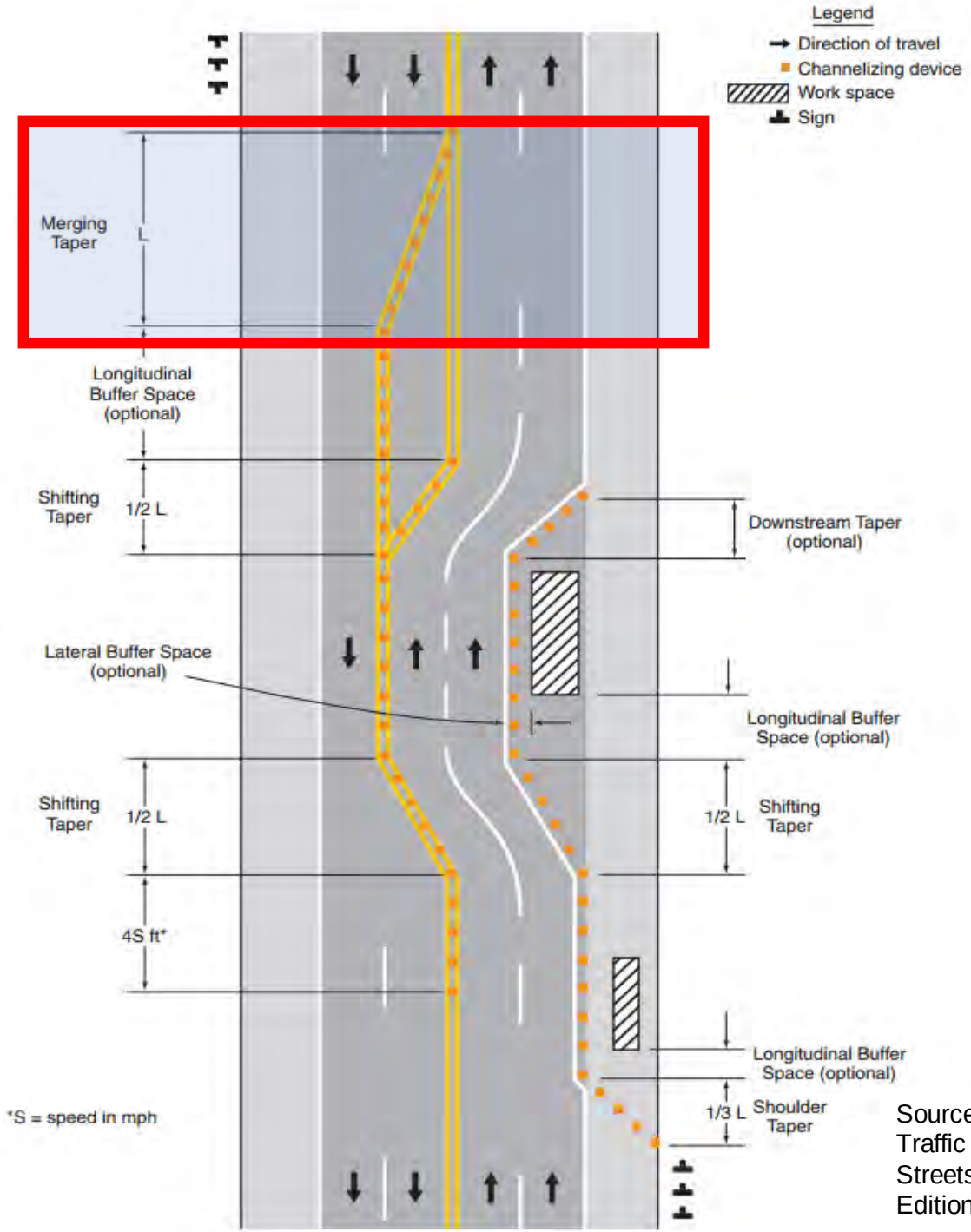
Table 6C-4. Formulas for Determining Taper Length

Speed (S)	Taper Length (L) in feet
40 mph or less	$L = \frac{WS^2}{60}$
45 mph or more	$L = WS$

Where: L = taper length in feet
W = width of offset in feet
S = posted speed limit, or off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in mph

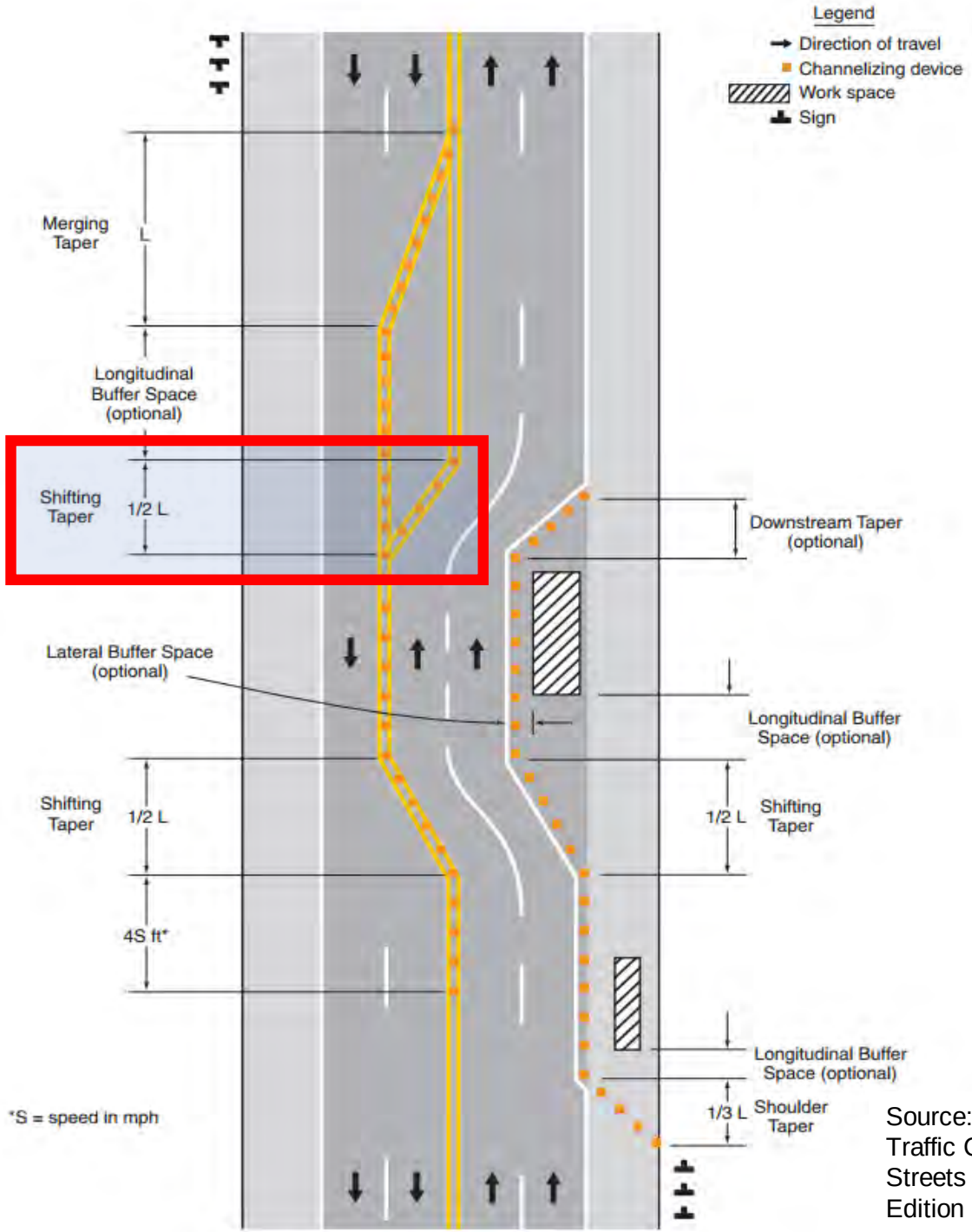
Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

MERGING TAPERS



Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

SHIFTING TAPERS



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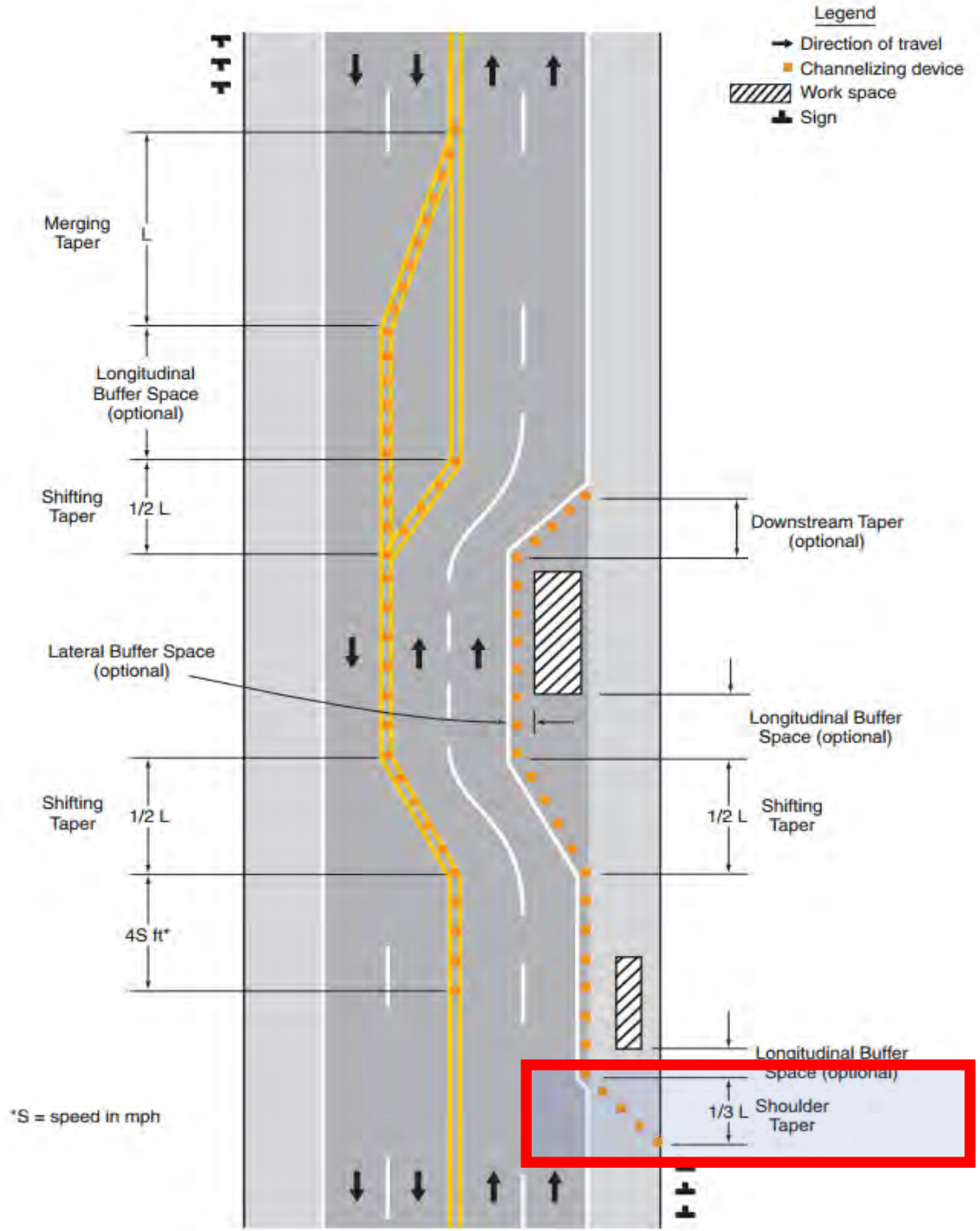
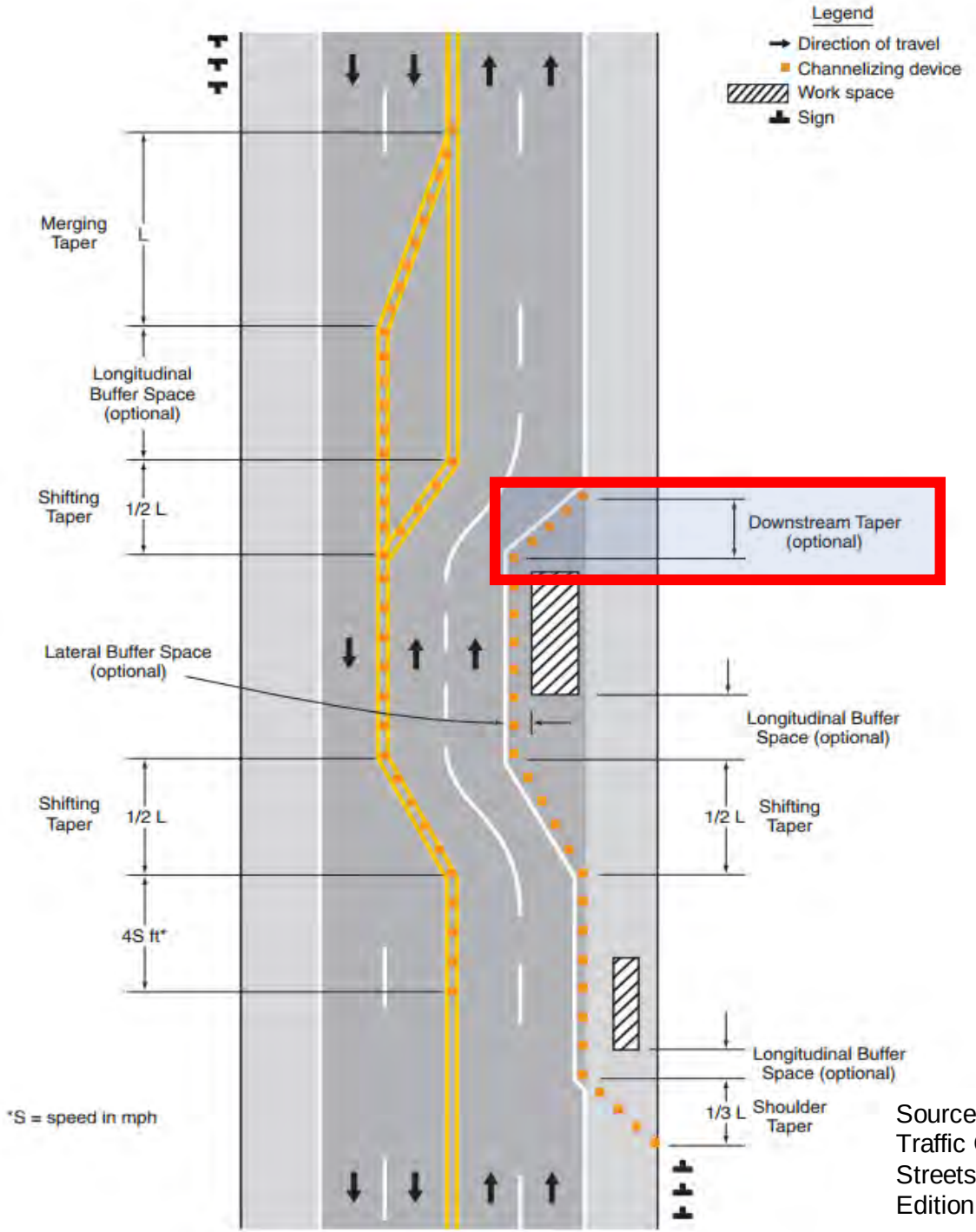
SHOULDER TAPERS



Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

DOWNSTREAM TAPERS



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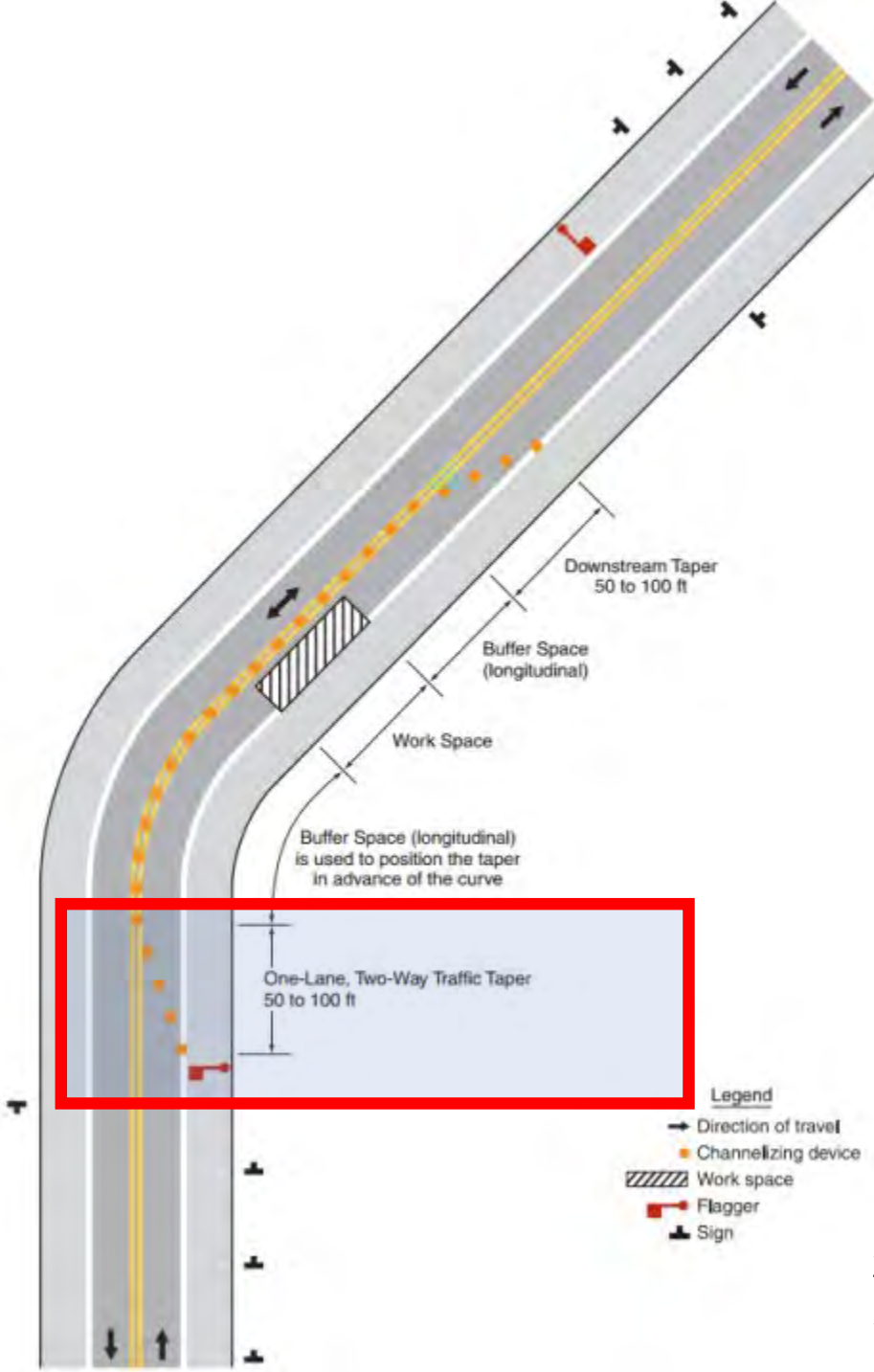
TWO WAY TAPERS



Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Work Zone Traffic Control Devices

A traffic control device is a sign, signal, marking or other device placed on or adjacent to a street or highway to regulate, warn, or guide traffic.

Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

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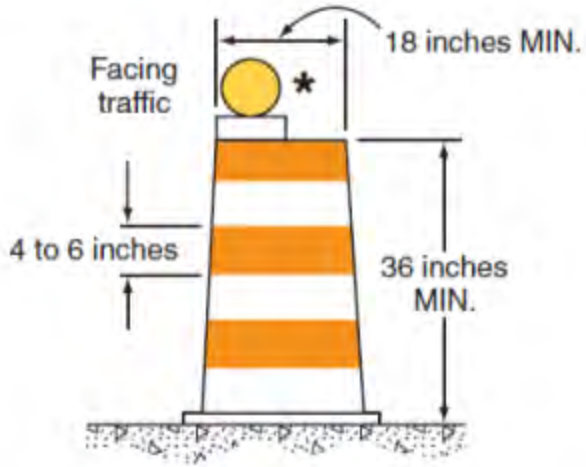
Work Duration

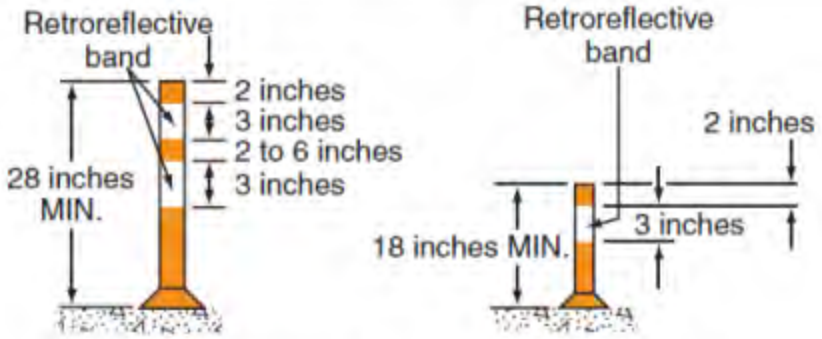
- Long-term stationary is work that occupies a location more than 3 days.
- Intermediate-term stationary is work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than 1 hour.
- Short-term stationary is daytime work that occupies a location for more than 1 hour within a single daylight period.
- Short duration is work that occupies a location up to 1 hour.
- Mobile is work that moves intermittently or continuously.

Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Channelizing Devices



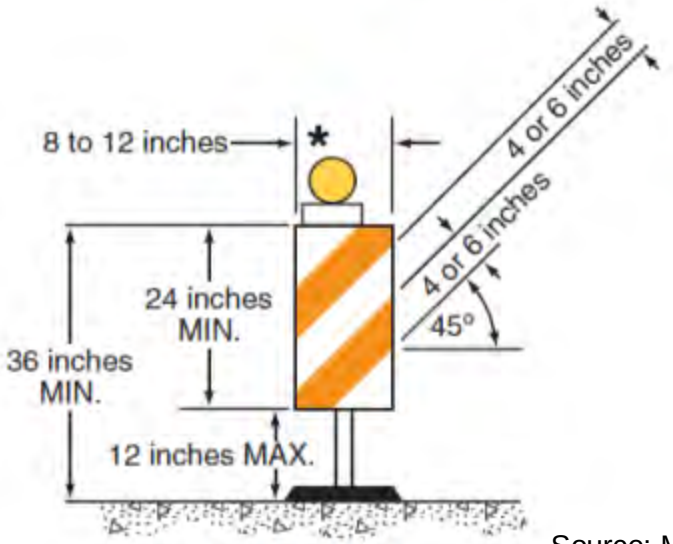
DRUM



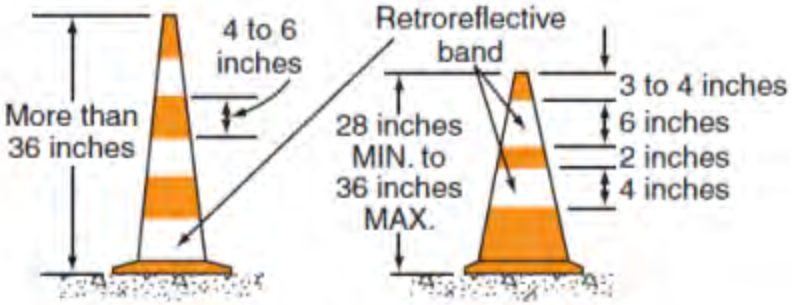
Night and/or freeway High-speed roadway (≥ 45 mph)

Day and low-speed roadway (≤ 40 mph)

TUBULAR MARKERS



VERTICAL PANEL



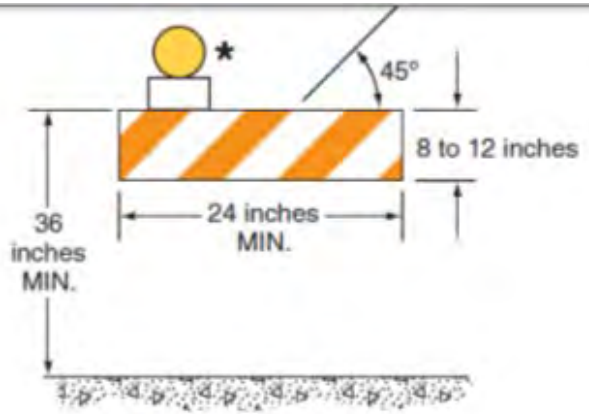
Night and/or freeway High-speed roadway (≥ 45 mph)

Day and low-speed roadway (≤ 40 mph)

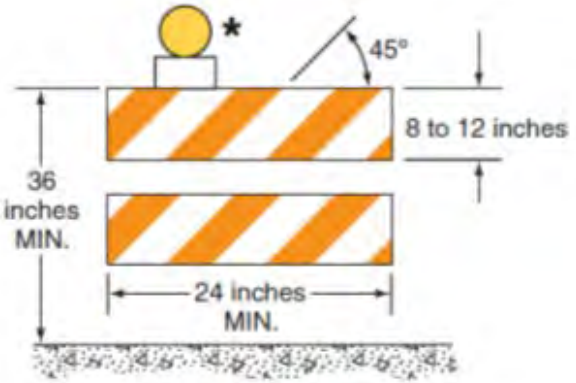
CONES

Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

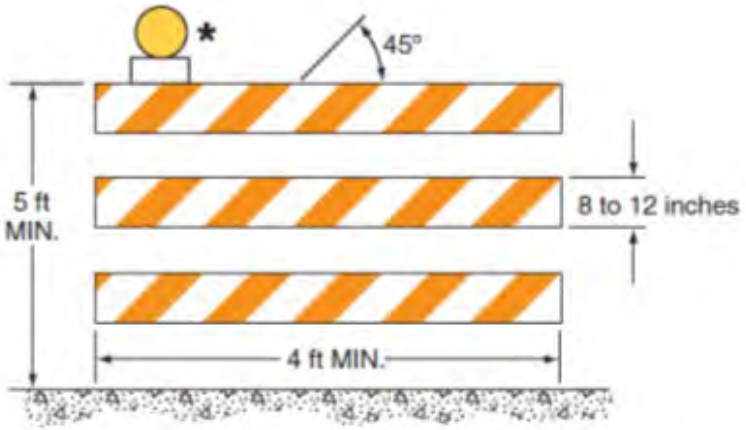
Channelizing Devices



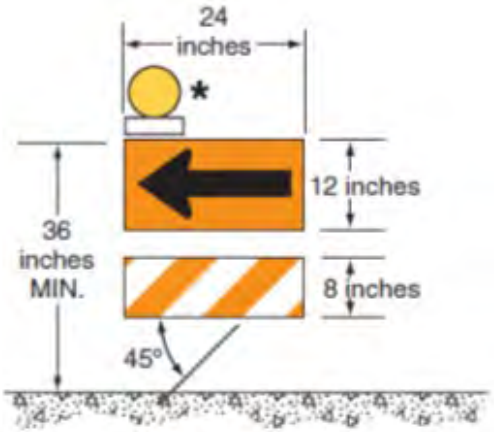
TYPE 1 BARRICADE **



TYPE 2 BARRICADE **



TYPE 3 BARRICADE **



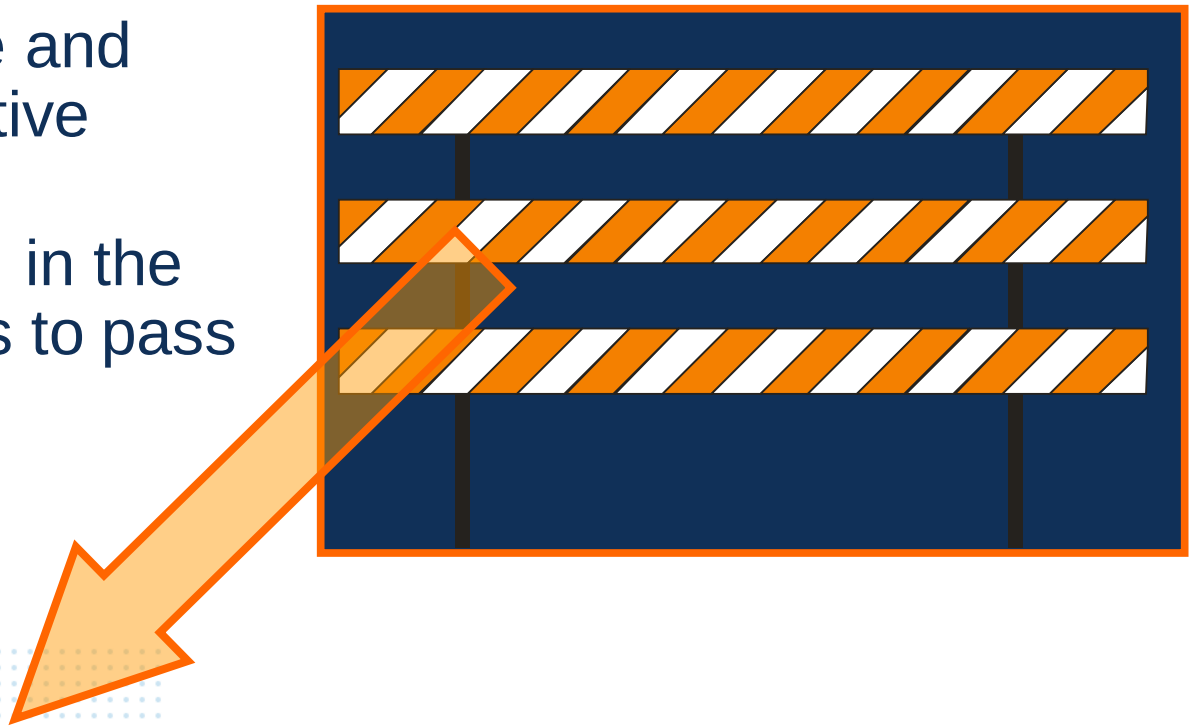
DIRECTION INDICATOR BARRICADE **

* Warning lights (optional)
** Rail stripe widths shall be 6 inches, except that 4-inch wide stripes may be used if rail lengths are less than 36 inches. The sides of barricades facing traffic shall have retroreflective rail faces.

Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Channelizing Devices

- Stripes Slope Downward In the Direction Traffic Is To Pass
  - Alternate orange and white retroreflective stripes
  - Slope downward in the direction traffic is to pass



Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Spacing of Devices

- Tangent section- twice the speed limit
  - Spacing of devices = (2 x mph)
- Taper Section- one times the speed limit
  - Spacing of devices =(1 x mph)

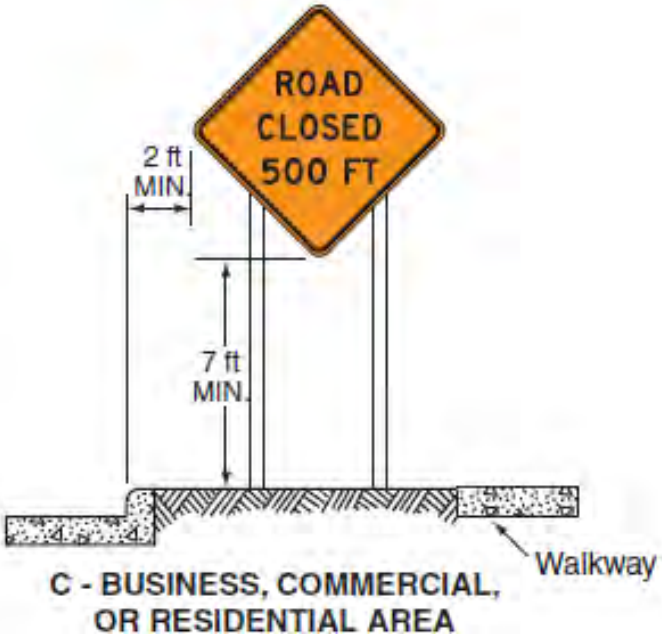
Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Warning Lights

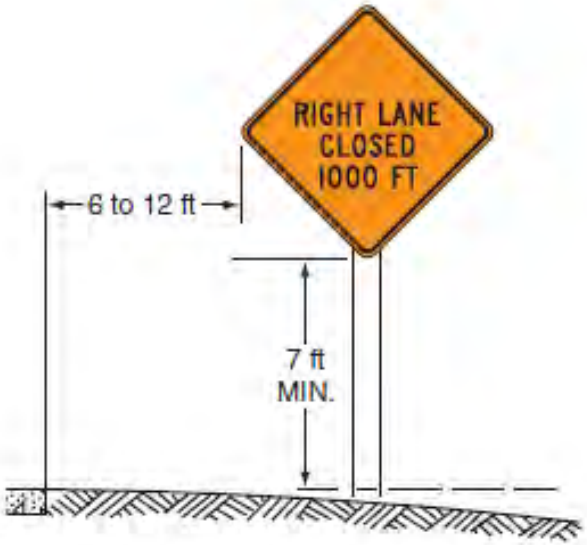
- Warning lights placed on channelizing devices used alone or in a cluster to warn of a condition must be in flash mode. [Standard Section 6F.63, Paragraph 11].
- Warning lights placed on these channelizing devices used in a series to channelize road users shall be steady-burn. [Standard Section 6F.63, Paragraph 11].

Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Warning Signs



C - BUSINESS, COMMERCIAL, OR RESIDENTIAL AREA



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

- Diamond shaped panels
- 48” X 48” Minimum for Freeway or Expressway
- 36” X 36” Minimum for Conventional Road
- Minimum 7’ above pavement – Urban

Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

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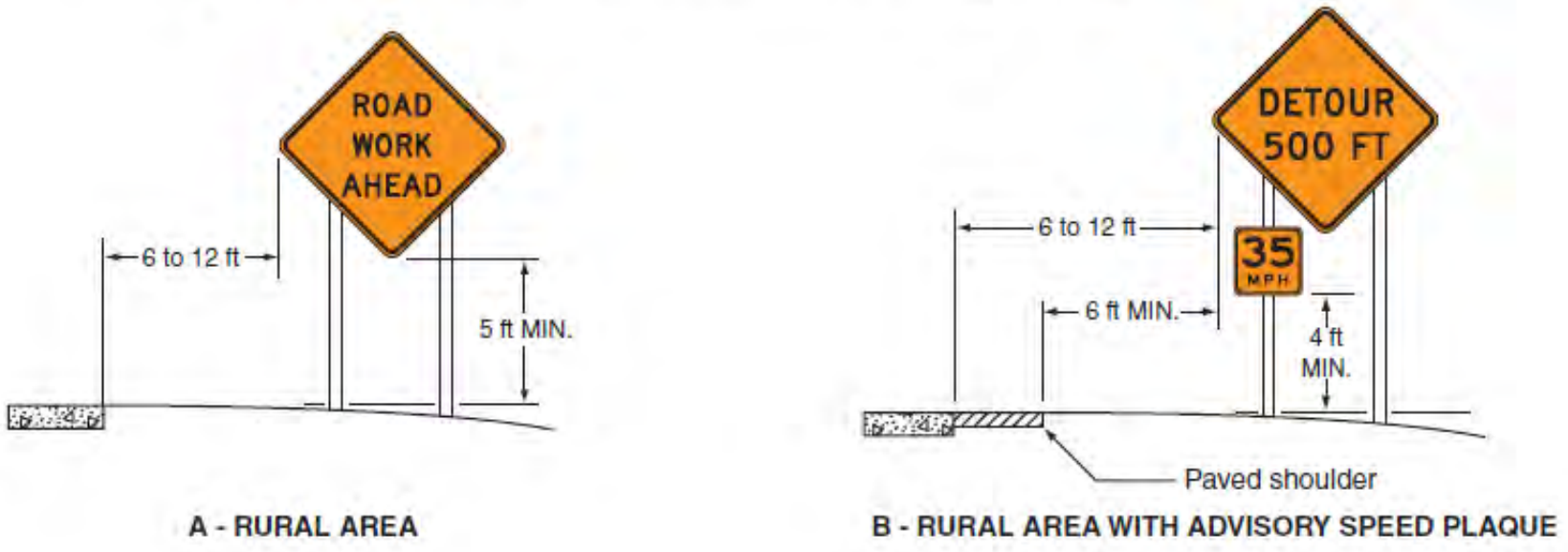
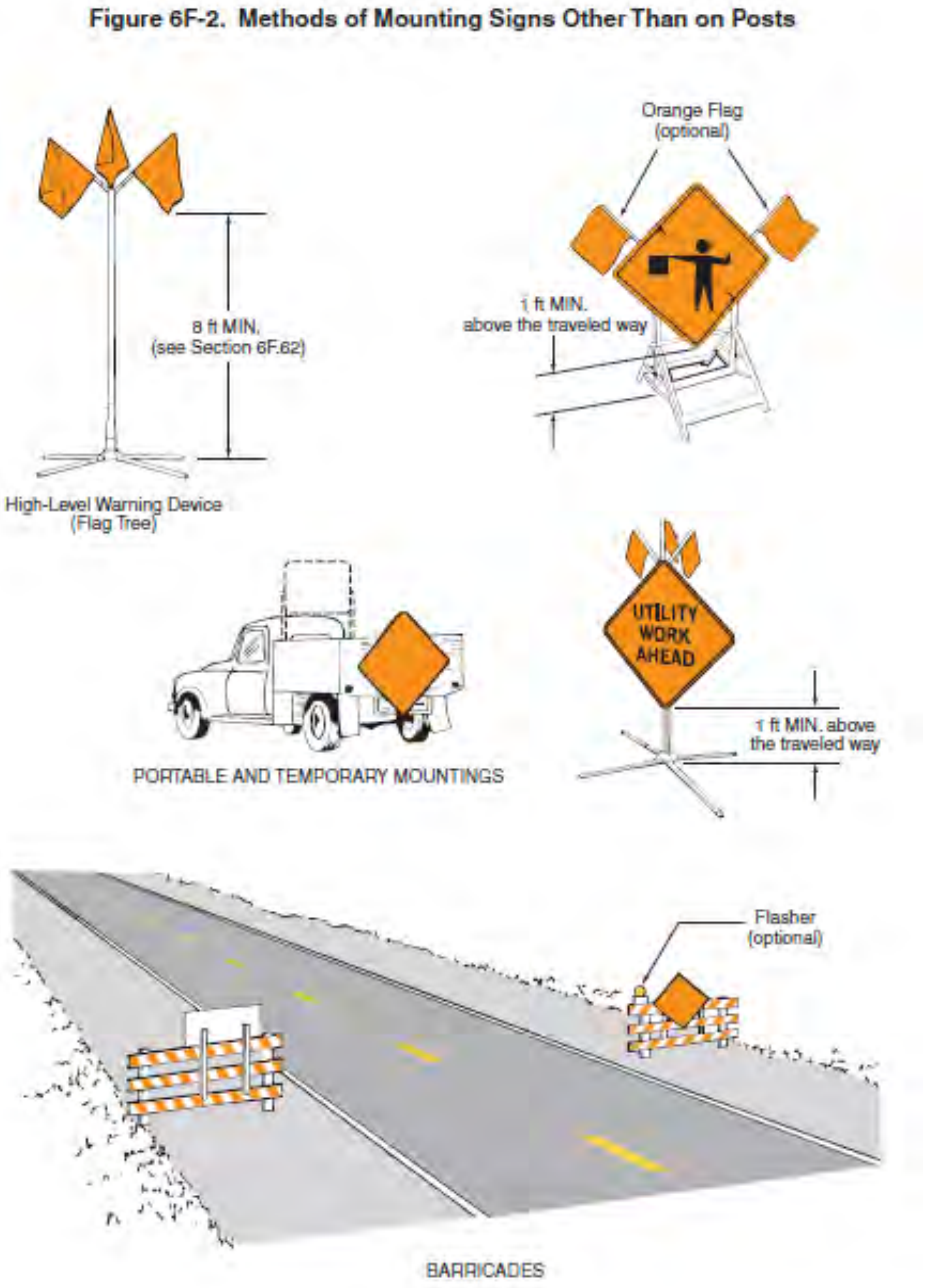
Warning Signs - Rural

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



- Minimum 5’ above pavement – Rural
- Repeat last sign in series 500’ past major intersections or interchanges outside urban areas

Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition



Warning Signs

- Minimum 12” above pavement (temporary)
- Sand bags should be used to stabilize stand
- Flashers should be on the side traffic is to pass

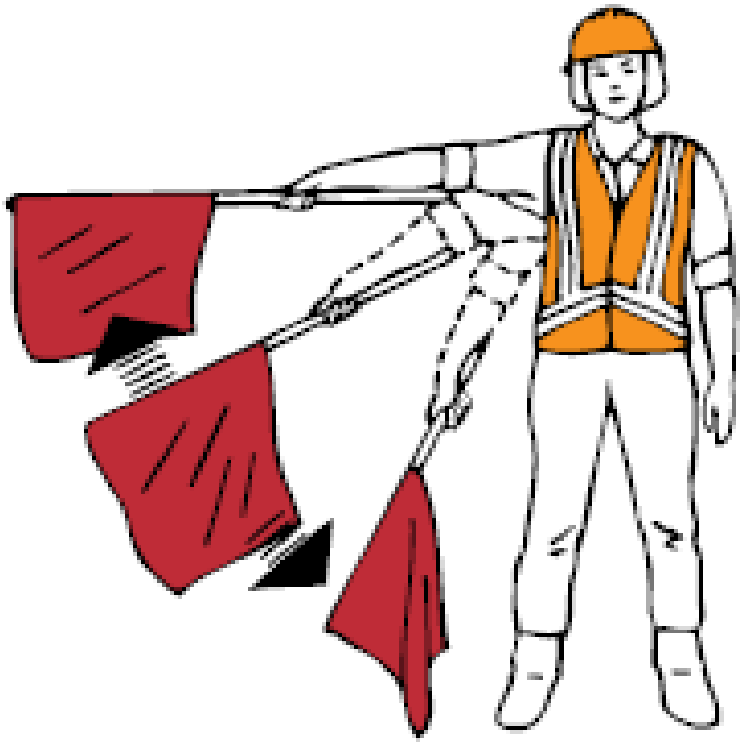
Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Flagger Control

- Shall wear ANSI Class 2 garments at all time during daylight hours
- Should wear ANSI Class 3 garments at night
- The flagger should stand alone, away from other workers, work vehicles, or equipment.

Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Flagger Control



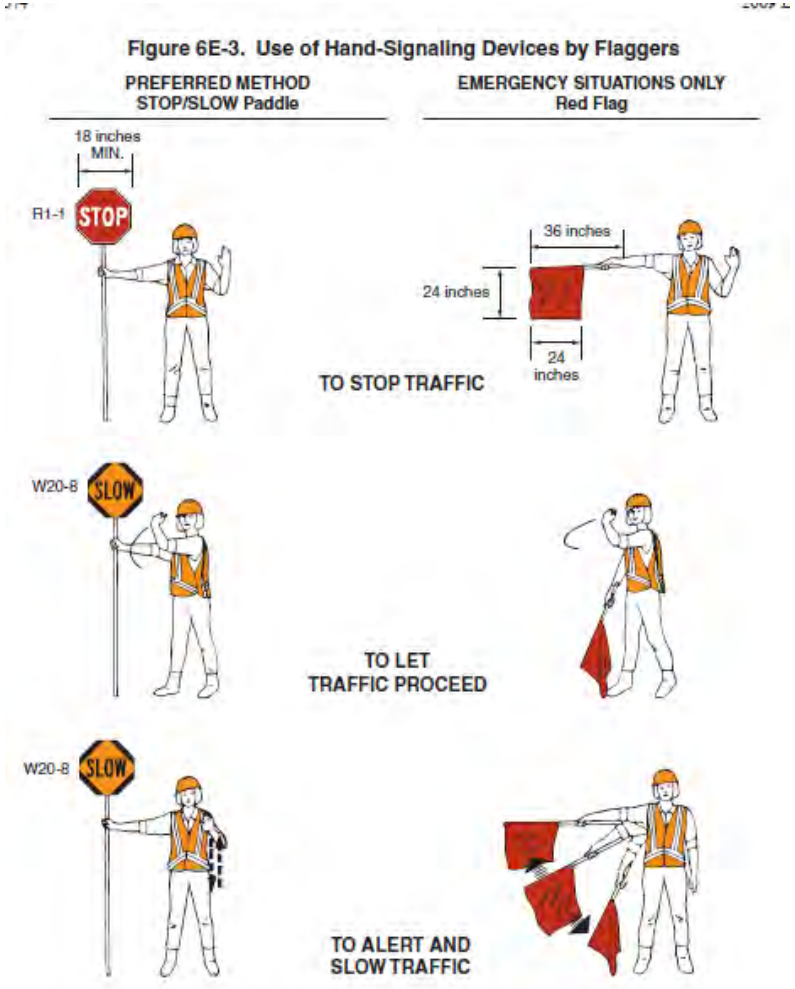
- Figure 6E-1
  - Red Flag should be limited to emergency use only
  - Use the standard STOP/SLOW Paddle as shown in Figure 6E-1 and Flagger procedure in Section 6E.04

Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Flagger Control

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

When used at night, the STOP/SLOW paddle shall be retroreflectorized.



Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

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Flagger Control

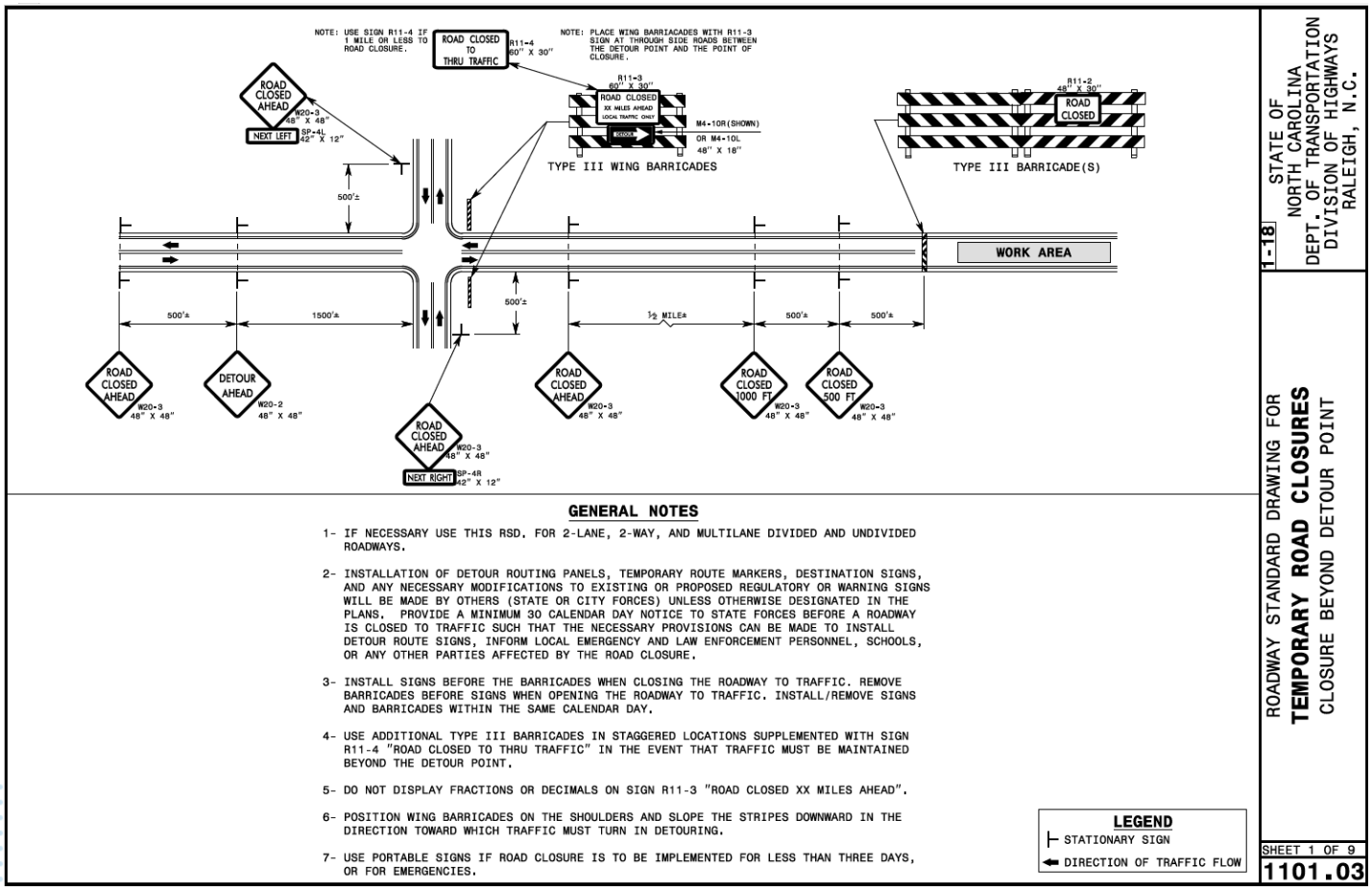
- *The flagger should stand either on the shoulder adjacent to the road user being controlled or in the closed lane prior to stopping road users. A flagger should only stand in the lane being used by moving road users after road users have stopped.*

- *The flagger should be clearly visible to the first approaching road user at all times.*

- *The flagger also should be visible to other road users. The flagger should be stationed sufficiently in advance of the workers to warn them (for example, with audible warning devices such as horns or whistles) of approaching danger by out-of-control vehicles.*

Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Road Closure Example



Source: https://connect.ncdot.gov/resources/Specifications/2018StandardRdwyDrawings/

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MUTCD Road Closure

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.

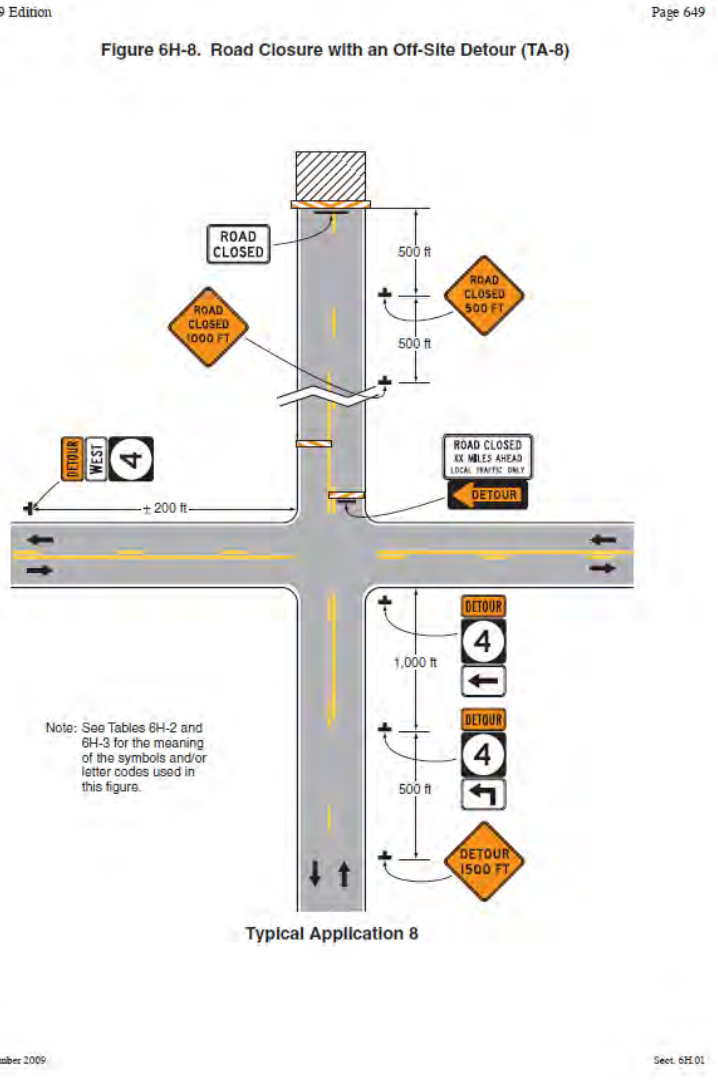
Option:

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.



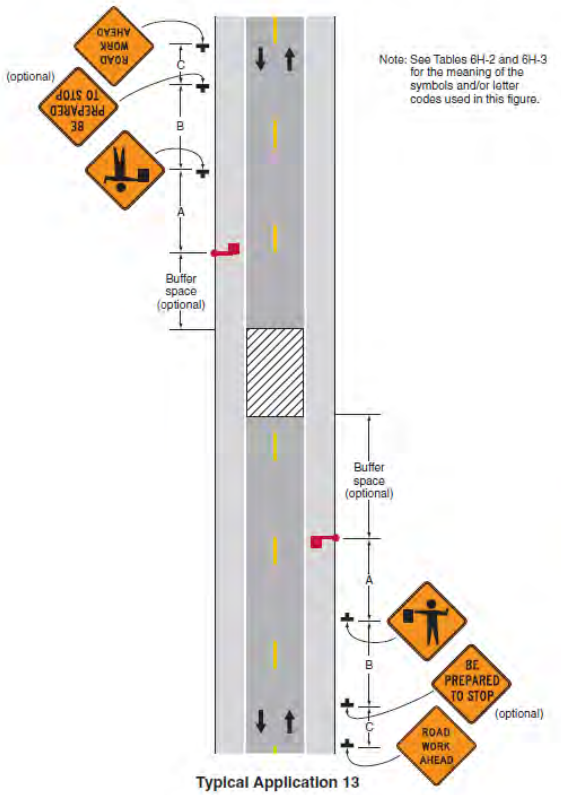
Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Temporary Road Closure

Table 6H-2. Meaning of Symbols on Typical Application Diagrams

Arrow board	Shadow vehicle
Arrow board support or trailer (shown facing down)	Sign (shown facing left)
Changeable message sign or support trailer	Surveyor
Channelizing device	Temporary barrier
Crash cushion	Temporary barrier with warning light
Direction of temporary traffic detour	Traffic or pedestrian signal
Direction of traffic	Truck-mounted attenuator
Flagger	Type 3 barricade
High-level warning device (Flag tree)	Warning light
Longitudinal channelizing device	Work space
Luminaire	Work vehicle
Pavement markings that should be removed for a long-term project	

Figure 6H-13. Temporary Road Closure (TA-13)



Typical Application 13

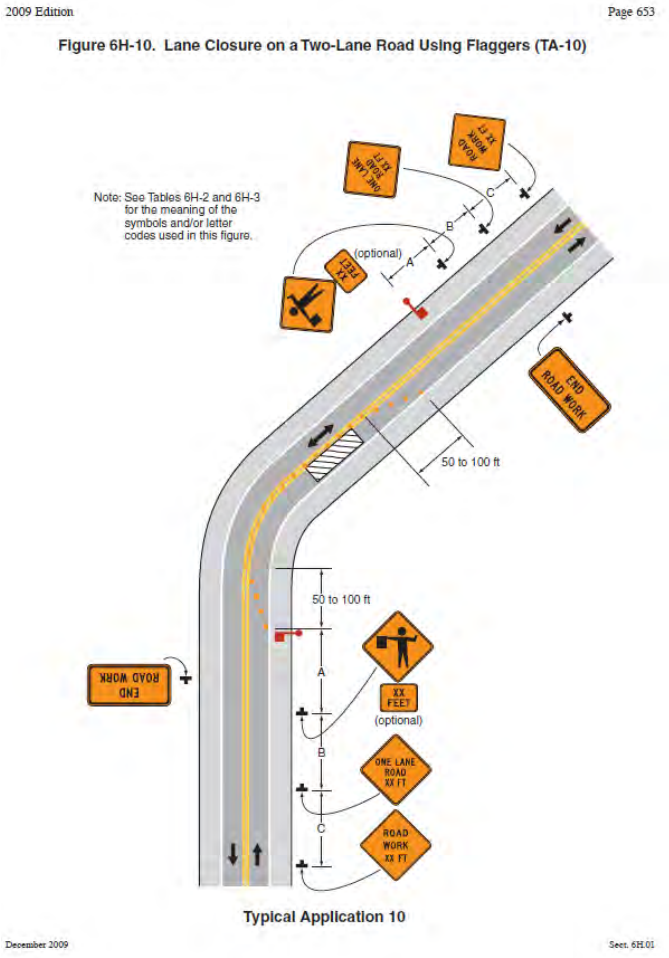
Table 6C-1. Recommended Advance Warning Sign Minimum Spacing

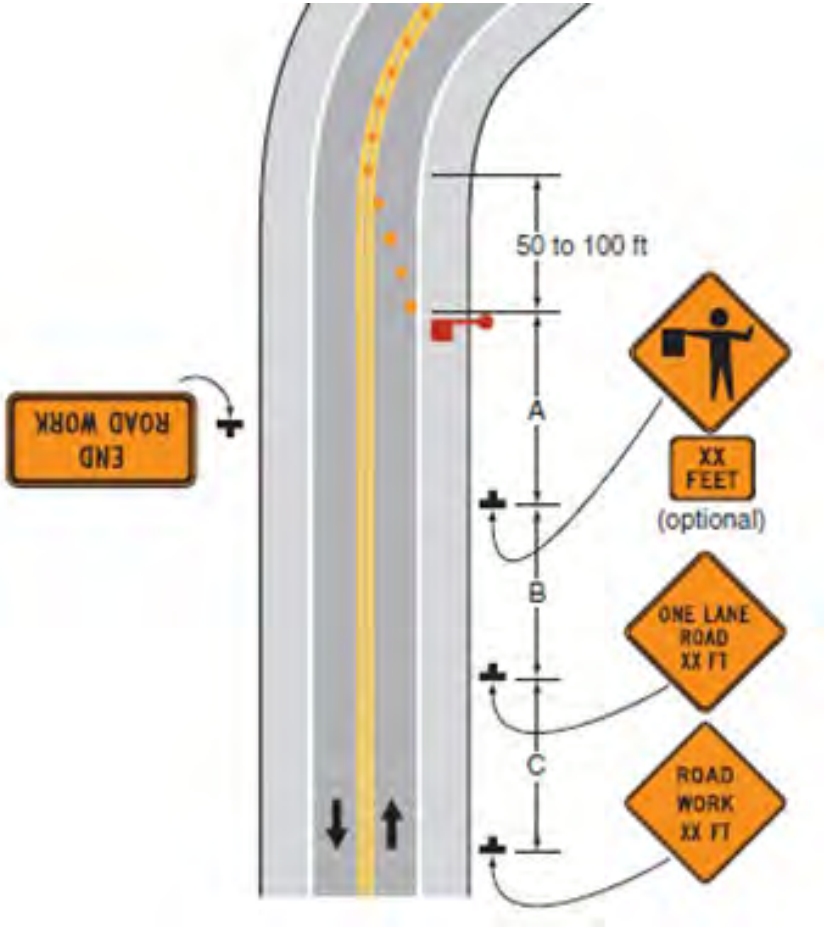
Road Type	Distance Between Signs**		
	A	B	C
Urban (low speed)*	100 feet	100 feet	100 feet
Urban (high speed)*	350 feet	350 feet	350 feet
Rural	500 feet	500 feet	500 feet
Expressway / Freeway	1,000 feet	1,500 feet	2,640 feet

* Speed category to be determined by the highway agency
** The column headings A, B, and C are the dimensions shown in Figures 6H-1 through 6H-46. 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.)

Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

Flagger Operations with Lane Closure

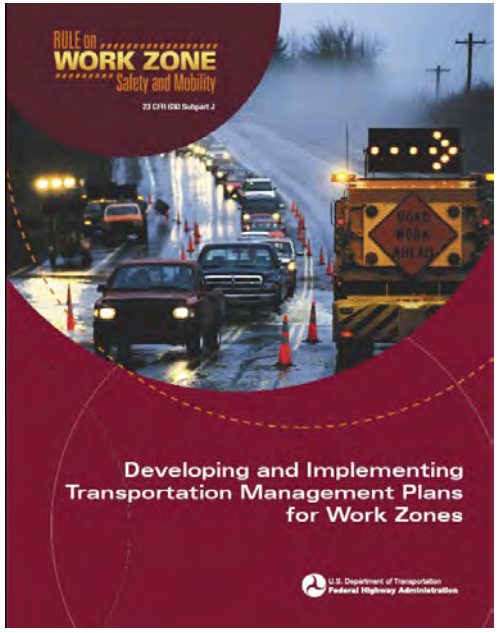




Source: Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition

TMP Resources

- WZ Safety and Mobility Rule Web Site - http://www.ops.fhwa.dot.gov/wz/resources/final_rule.htm
  - Contains sample TMPs, presentations, and TMP development resources
- Developing and Implementing TMPs for Work Zones - http://www.ops.fhwa.dot.gov/wz/resources/publications/trans_mgmt_plans/index.htm
  - Contains a TMP Checklist and matrix of TMP strategies
- Advanced Work Zone Management and Design Course (NHI) - http://ops.fhwa.dot.gov/wz/outreach/nhi_wz_courses.htm



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Questions?