Traffic Control Requirements for NDDOT Operations on Highways and Streets

2017 Edition

NDDOT
North Dakota
Department of Transportation

Disclaimer

This manual provides a written account of how certain activities are performed and is designed to guide and assist staff in performing their functions. When appropriate, there may be deviations from these written procedures due to changes in personnel, policies, interpretation, law, experimentation with different systems, or simply evolution of the process itself. This manual may be changed at any time. Staff are encouraged to review this manual periodically and suggest changes in the manual to keep the manual current and to minimize differences between the manual and actual practices.

Prepared by

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
BISMARCK, NORTH DAKOTA

dot.nd.gov

MTC0317

Certification

TRAFFIC CONTROL REQUIREMENTS FOR NORTH DAKOTA DEPARTMENT OF TRANSPORTATION OPERATIONS ON HIGHWAYS AND STREETS

WHEREAS, the North Dakota Department of Transportation has published a manual entitled *Traffic Control Requirements for NDDOT Operations on Highways and Streets*, and

WHEREAS, such manual conforms to the standards set forth in the current NDDOT adopted edition of the Manual on Uniform Traffic Control Devices for Streets and Highways, published by the United States Department of Transportation, Federal Highway Administration, and

WHEREAS, pursuant to Chapter 39-13, North Dakota Century Code, the Manual on Uniform Traffic Control Devices for Streets and Highways has been adopted by the NDDOT Director as the official standard for use on streets and highways in North Dakota.

NOW, THEREFORE, as Director of the North Dakota Department of Transportation, I do hereby prescribe the manual Traffic Control Requirements for NDDOT Operations on Highways and Streets, subject to amendments and addenda which may be adopted by the director, for use by the Department of Transportation personnel in performing their assigned duties on highways and streets in North Dakota.

The *Traffic Control Requirements for NDDOT Operations on Highways and Streets* 2017 version will have an effective date of May 1, 2017.

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

Grant Levi, P.E.
Director

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SHOULDER															
Fig. 1							S			S		S			
Fig. 2		S						S							
Fig. 3								S							
Fig. 4								M					M	M	
TWO-LANE ROAD															
Fig. 5	M			M		M			M		M		M	M	M
Fig. 6	M			M		M			M		M		M	M	M
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Fig. 8	S				S						S	S		S	S
MULTI-LANE ROAD															
Fig. 9	M		M			M					M		M	M	M
Fig. 10	M		M			M					M		M	M	M
Fig. 11	S	S	S		S	S			S		S	S	S	S	S
Fig. 12	S				S	S			S		S	S	S		S

M = **Mobile** or Short Duration Operations
S = **Stationary** Operations

Introduction

This manual has been prepared as a guide for North Dakota Department of Transportation (NDDOT) personnel in the placement of traffic control devices while performing their assigned duties on streets and highways in North Dakota. Traffic control guidelines for situations not covered in this manual may be found in the *Manual on Uniform Traffic Control Devices* (MUTCD) available on-line at www.mutcd.fhwa.gov.

The layouts in this manual are desirable standards for normal conditions. Additional protection must be provided when special complexities and potentially dangerous situations prevail. All notes that contain "shall" statements are shown in bold face print.

Workers face hazards in setting up and taking down the temporary traffic control zone. Vehicles with high-intensity rotating, flashing, oscillating, or strobe lights may be used in place of work zone items such as signs and channelizing devices for short-duration or mobile operations.

Figures 1 through 20 depict daylight traffic control situations in work zones; therefore, the warning signs shall be orange in color. Figures 21 through 26 are examples of maintenance situations that are not in work zones, so these warning signs shall be yellow in color. All vehicles must comply to the appropriate standards for vehicle warning lights.

All warning signs in use during hours of darkness shall be reflectorized.

Unless otherwise noted, all sign spacing is approximate.

ARROW BOARDS SHALL **NOT** BE USED IN THE **DIRECTIONAL** MODE ON TWO-LANE TWO-WAY ROADWAYS (DRIVING LANES OR SHOULDERS). The use of the CAUTION MODE is acceptable.

If work activities are being performed beyond the shoulder, the work vehicle should be parked beyond the shoulder when possible, unless it is being used as a buffer vehicle.

The NDDOT director, district engineer, or authorized representative may temporarily reduce the posted speed limit in work areas. See Figures 19 and 20.

Note: This manual does not apply to snow and ice control operations as pursuant to chapter 39-13 of the North Dakota Century Code.

Definitions

Work Duration:

Mobile - Work that moves intermittently or continuously.

Short Duration - Work that occupies a location up to one hour.

Short-Term Stationary - Daytime work that occupies a location for more than one hour within a single daylight period.

Intermediate-Term Stationary - Work that occupies a location more than one daylight period up to three days, or nighttime work lasting more than one hour.

Long-Term Stationary - Work that occupies a location more than three days.

Road Type:

Expressway - Any multi-lane, divided highway for through traffic with partial control of access and generally with grade separation at major intersections.

Freeway - Any multi-lane, divided highway with full control of access.

Rural - A highway where traffic is normally characterized by lower volume, higher speed, fewer turning conflicts and fewer conflicts with pedestrians.

Urban - A type of street normally characterized by relatively low speed, wide ranges in traffic volume, narrower roadway lanes, frequent intersections, significant pedestrian traffic and more roadside obstacles.

Truck-Mounted Attenuator (TMA):

TMA Level 2 - Impact tested at 43 mph, must be attached to vehicle weighing at least 11,025 lbs. (or the manufacturer's minimum).

TMA Level 3 - Impact tested at 62 mph, must be attached to vehicle weighing at least 16,090 lbs. (or the manufacturer's minimum).

Merging and Shifting Taper:

Merging Taper (L) - Moves traffic laterally from the normal lane to an adjacent lane.

Shifting Taper (½L) - Moves through lanes onto an alternate path but does not reduce the number of lanes.

Traffic Control Criteria

Signs: The sign spacings shown are the minimum recommended for typical situations. The spacing may be adjusted to fit the existing grade and roadside obstructions. The minimum sign size shall be 36 inches on 2-lane, 2-way roads. The minimum sign size shall be 48" on roads of 4 or more lanes. Orange flags may be affixed to signs in urban applications. The bottoms of signs mounted on temporary supports shall be no less than 1' above pavement elevation. Higher mountings are desirable. **All signs used at night shall be either retroreflective with a material that is smooth, sealed outer surface, or illuminated to show the same shape and similar color both day and night.**

Cones: The cones shall be at least 28 inches high. The cone spacing in tapers shall be a maximum of the distance in feet of the speed limit in mph. Cone spacing in channelization shall be a maximum of twice the distance in feet of the speed limit in mph.

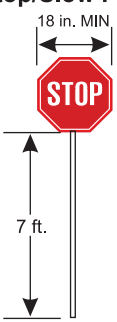
Distance: The mileage referred to is the actual work zone distance, not including the distance required for signing.

Arrow Boards: The arrow boards shall be Type B, 60" x 30" or Type C, 96" x 48." Minimum mounting height shall be 7' above the roadway to the bottom of the board, except that vehicle-mounted boards shall be as high as practicable.

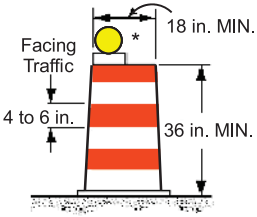
Safety Apparel: All workers must wear florescent lime-yellow colored safety apparel meeting Performance Class 2 or 3 requirements of the ANSI/ISEA 107-2015 Standard.

Flagger Equip.: All flagger equipment shall comply with the current edition of the *North Dakota Flagging Handbook*.

Stop/Slow Paddle

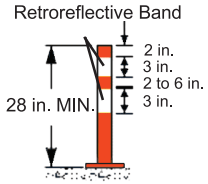


Channelizing Devices



DRUM

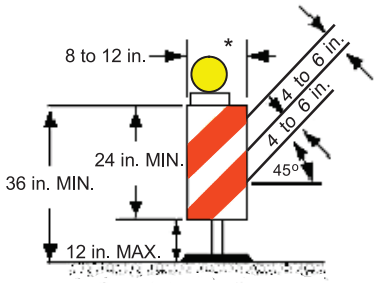
* Warning lights (optional)



Night and/or Freeway
High-Speed Roadway (≥ 45 mph)

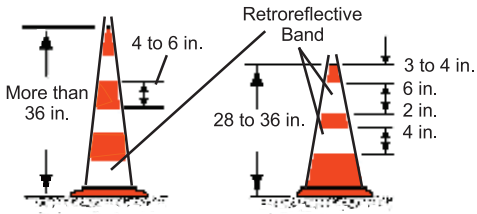
TUBULAR MARKER

* For use on all roads.



VERTICAL PANEL

* Warning lights (optional)



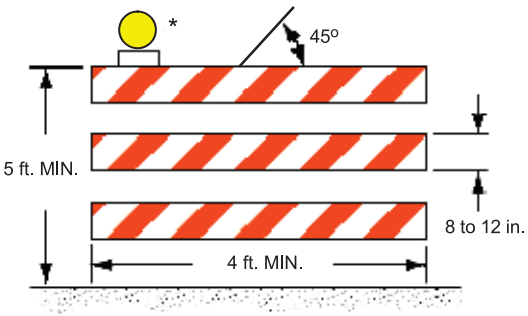
Night and/or Freeway
High-Speed Roadway (≥ 45 mph)

CONES

* For use on all roads.

Note: Where channelizing devices are used to channelize pedestrians, there shall be continuous detectable bottom and top surfaces to be detectable to users of long canes. The bottom of the bottom surface shall be no higher than 2 inches above the ground. The top of the top surface shall be no lower than 32 inches above the ground.

Channelizing Devices



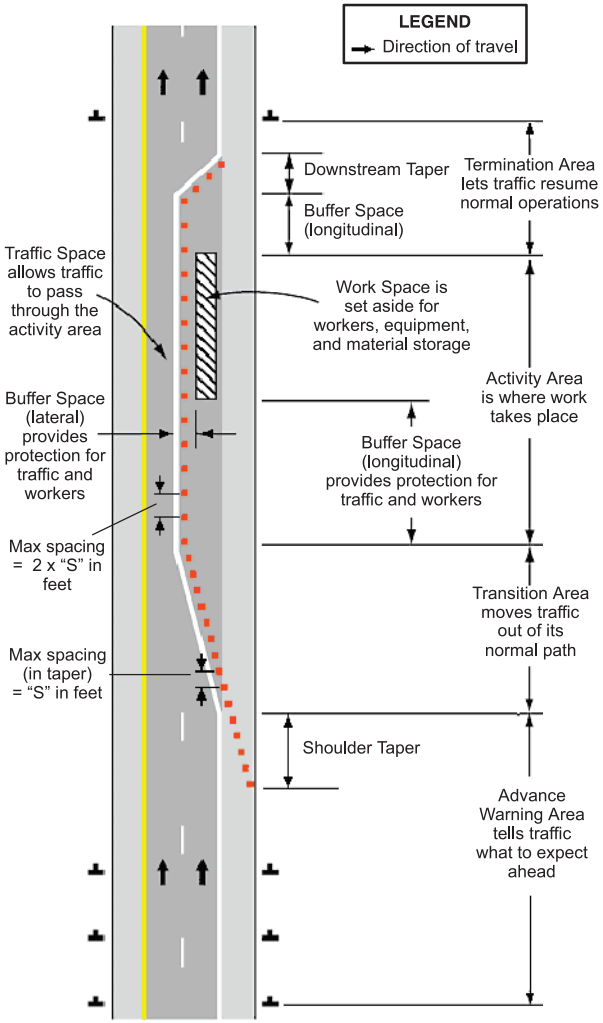
TYPE 3 BARRICADE**

* Warning lights (optional)

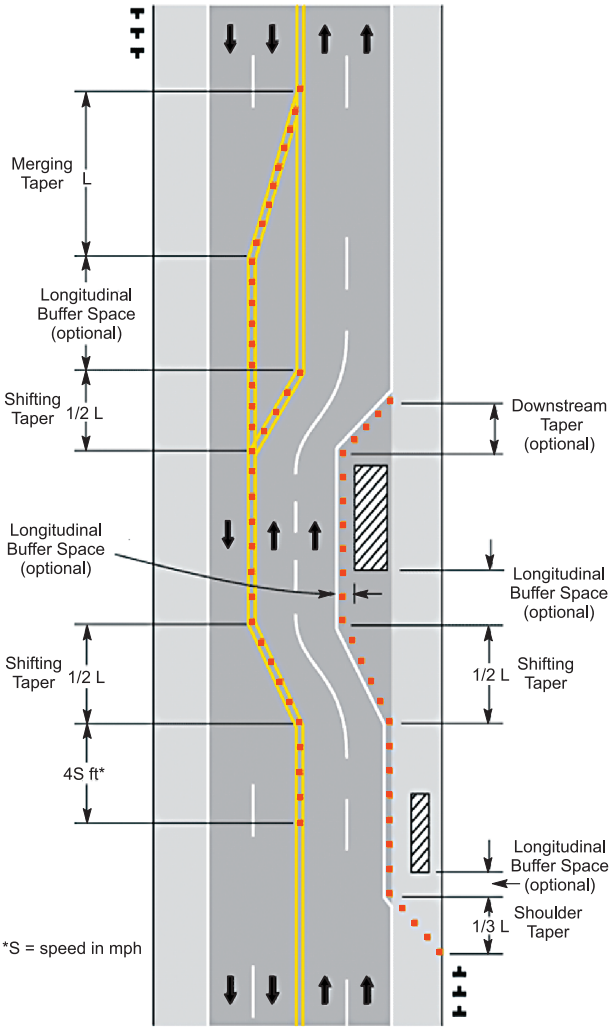
** Rail stripe widths shall be 6 inches, except that 4-inch wide stripes may be used if rail lengths are less than 36 inches. The sides of barricades facing traffic shall have retroreflective rail faces.

Note: Where channelizing devices are used to channelize pedestrians, there shall be continuous detectable bottom and top surfaces to be detectable to users of long canes. The bottom of the bottom surface shall be no higher than 2 inches above the ground. The top of the top surface shall be no lower than 32 inches above the ground.

Component Parts of a Temporary Traffic Control Zone



Types of Tapers and Buffer Spaces



TAPER LENGTH CRITERIA FOR TEMPORARY TRAFFIC CONTROL ZONES

Type of Taper	Taper Length (L)
Merging Taper	at least L
Shifting Taper	at least 0.5L
Shoulder Taper	at least 0.33L
One-Lane, Two-Way Traffic Taper	100 ft. maximum
Downstream Taper	100 ft. per lane

(100 ft. taper = 5 cones spaced 20 ft. apart.)

FORMULAS FOR DETERMINING TAPER LENGTHS

Speed Limit (S)	Taper Length (L)
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.

Speed (S) in mph	Minimum Merging Taper Length (L) in Feet Width of offset (w) in Feet		Minimum Shifting Taper Length (0.5L) in Feet Width of offset (w) in Feet		10' Shoulder Taper (0.33L) in Feet	Maximum Device Spacing in Feet		Buffer Space in Feet
	11'	12'	11'	12'		Along Taper (S)	Along Tangent (2S)	
25 or below	115	125	60	65	35	25	50	155
30	165	180	85	90	50	30	60	200
35	225	245	115	125	70	35	70	250
40	295	320	150	160	90	40	80	305
45	495	540	250	270	150	45	90	360
50	550	600	275	300	165	50	100	425
55	605	660	305	330	185	55	110	495
60	660	720	330	360	200	60	120	570
65	715	780	360	390	215	65	130	645
70	770	840	385	420	235	70	140	730
75	825	900	415	450	250	75	150	820

Key of Symbols Used


Arrow panel


Arrow panel support or trailer (shown facing down)


Channelizing device


Direction of traffic


Flagger

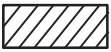

Sign (shown facing left)

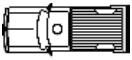

Surveyor


Truck-mounted attenuator (TMA)


Type 3 barricade


Warning lights


Work space


Work vehicle

Notes for Figure 1
Work Beyond a Shoulder

1. The sign illustrated in this figure may be omitted where the work space is behind a barrier, more than 2 feet behind the curb, or 15 feet or more from the edge of any roadway.

2. If the work space is in the median of a divided highway, an advance warning sign shall also be placed on the left side of the directional roadway; and a matching set of signs for traffic from the opposite direction.

3. For a short-term, short-duration or mobile operation such as mowing, all signs and channelizing devices may be eliminated if a vehicle with activated high-intensity rotating, flashing, oscillating, or strobe lights is used.

4. **Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights. They shall only be used as a supplement.**

Road Type	Distance (ft.)
	A
Urban – Low Speed (40 mph or less)	100
Urban – High Speed (greater than 40 mph)	350
Rural	500
Urban Expressway/Freeway (60 mph or less)	750
Rural Expressway/Freeway (greater than 60 mph)	1000

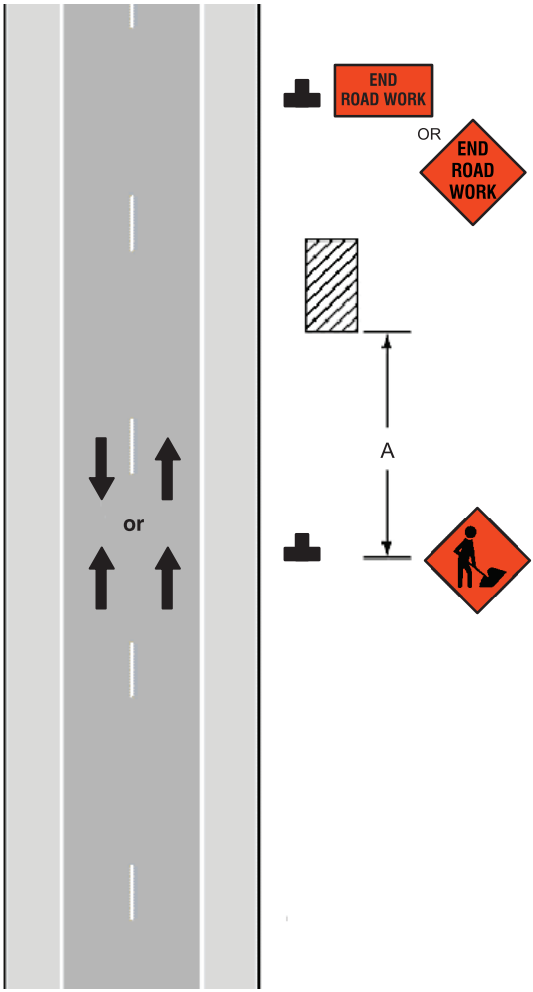


Figure 1: Work beyond a shoulder
(See Note 2 for multi-lane operations.)

Notes for Figure 2
Work on a Shoulder

1. For short-term, short-duration, or mobile operations, all signs and channelizing devices may be eliminated if a vehicle with activated high-intensity rotating, flashing, oscillating, or strobe lights is used.

2. **Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights. They shall only be used as a supplement.**

3. All signs in the sign series should be placed on the left side of the roadway for a divided or one-way street only if the left shoulder is affected.

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

5. **When paved shoulders having a width of 8 feet or more are closed, at least one advance warning sign shall be used. In addition, channelizing devices shall be used to close the shoulder in advance to delineate the beginning of the work space and direct vehicular traffic to remain within the traveled way.**

6. **If an arrow board is used, it shall be used in caution mode for a two-lane road and arrow mode for a multi-lane road.**

Road Type	Distance (ft.)	
	A	B
Urban – Low Speed (40 mph or less)	100	100
Urban – High Speed (greater than 40 mph)	350	350
Rural	500	500
Urban Expressway/Freeway (60 mph or less)	750	1000
Rural Expressway/Freeway (greater than 60 mph)	1000	1500

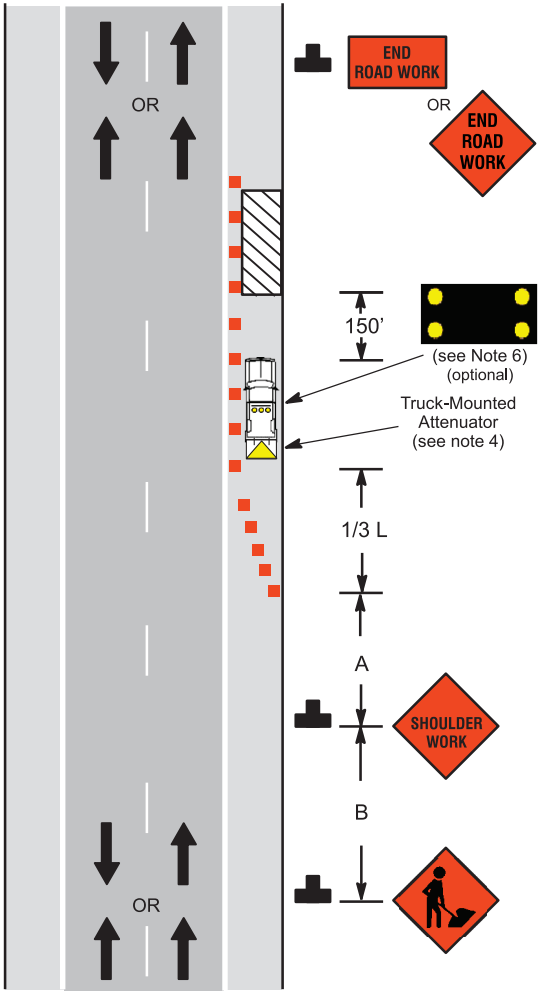


Figure 2: Work on a shoulder
(See Note 3 for multi-lane operations.)

Notes for Figure 3
Shoulder Work With Minor Encroachment on a Two-Lane Road

1. All lanes should be a minimum of 10 feet in width as measured to the near face of the channelizing devices.
2. The treatment shown may be used on a minor road having low speeds. For higher speed traffic conditions and divided highways, a lane closure should be used.
3. For short-term use on low-volume, low-speed roadways with vehicular traffic that does not include longer and wider heavy commercial vehicles, a minimum lane width of 9 feet may be used.
4. Where the opposite shoulder is suitable for carrying traffic and of adequate width, traffic lanes may be shifted by use of closely spaced channelizing devices, provided that the minimum lane width of 10 feet is maintained.
5. Additional advance warning may be appropriate, such as a ROAD NARROWS sign.
6. Temporary traffic barriers may be used along the work space.
7. The shadow vehicle may be omitted if a taper and channelizing devices are used.
8. A truck-mounted attenuator may be used on the shadow vehicle.
9. **If an arrow board is used for an operation on the shoulder, the caution mode shall be used.**
10. For short-duration work, the taper and channelizing devices may be omitted if a shadow vehicle with activated high-intensity rotating, flashing, oscillating, or strobe lights is used.
11. **Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights. They shall only be used as a supplement.**

Road Type	Distance (ft.)
	A
Urban – Low Speed (40 mph or less)	100
Urban – High Speed (greater than 40 mph)	350
Rural	500

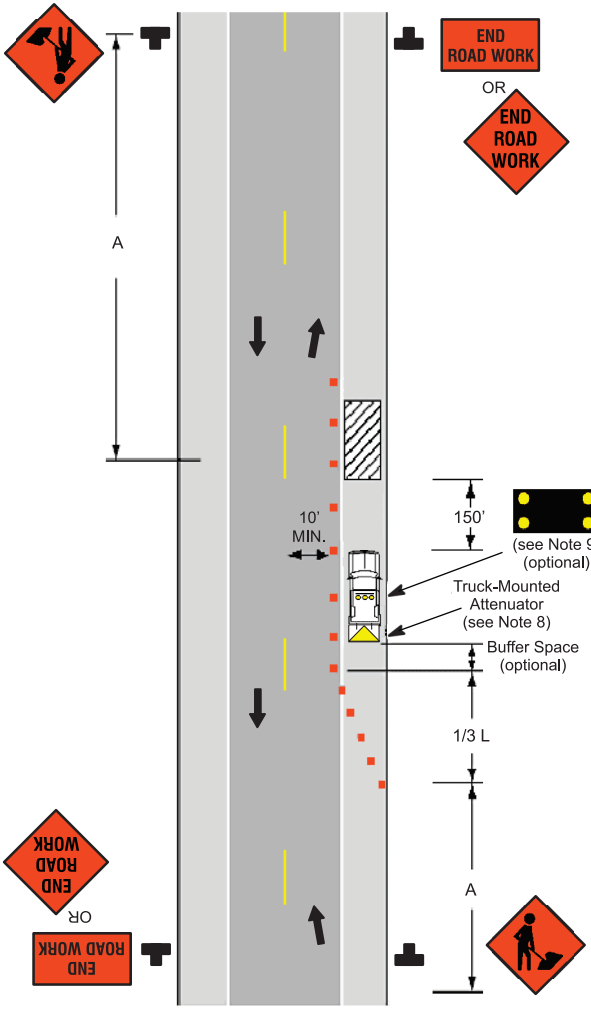


Figure 3: Shoulder work with minor encroachment on a two-lane road

Notes for Figure 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 5 miles.
2. **In those situations where the distance between the advance signs and the work is 2 to 5 miles, a Supplemental Distance plaque shall 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 of more than 2 miles.
4. Warning signs may be omitted when the work and shadow vehicles display high-intensity rotating, flashing, oscillating, or strobe lights.
5. **Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights. They shall only be used as a supplement.**
6. Shadow vehicles are used to warn motor vehicle traffic of the operation ahead. A truck-mounted attenuator may be used on the shadow vehicle.
7. **If an arrow board is used for an operation on the shoulder, the caution mode shall be used.**

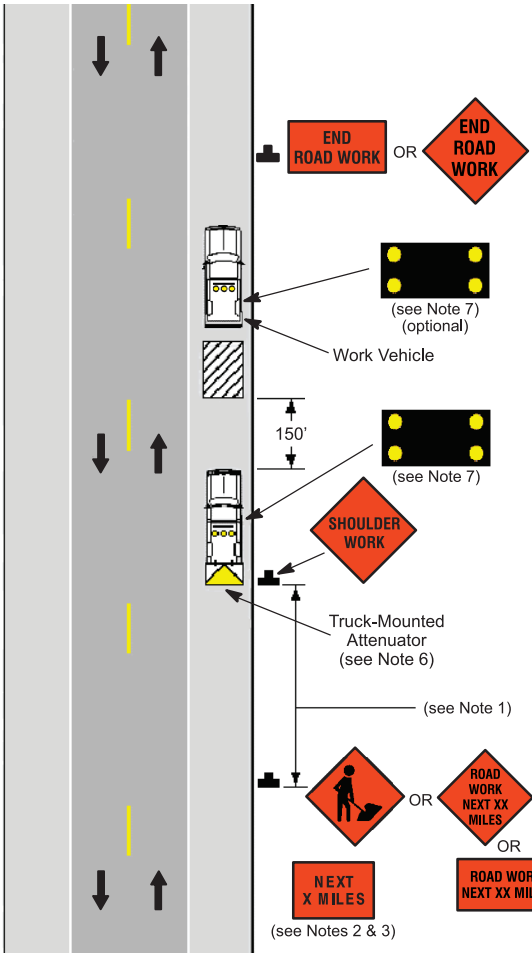


Figure 4: Short duration or mobile operation on a shoulder

Notes for Figure 5
Mobile Operation on a Two-Lane Road

1. **All vehicles shall display high-intensity rotating, flashing, oscillating, or strobe lights. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights. They shall only be used as a supplement.**

2. Where practical and needed, the work and shadow vehicle should pull over periodically to allow vehicular traffic to pass.

3. Shadow vehicles are used to warn motor vehicle traffic of the operation ahead. Whenever adequate stopping sight distance exists to the rear, the shadow vehicle should maintain the minimum distance from the work vehicle and proceed at the same speed. The shadow vehicle should slow down in advance of vertical or horizontal curves that restrict sight distance.

4. The distance between the work and shadow vehicles may vary according to terrain, paint drying time, and other factors.

5. Additional shadow vehicles to warn and reduce the speed of oncoming or opposing vehicular traffic may be used. Law enforcement vehicles may be used for this purpose.

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

7. **If an arrow board is used, it shall be used in the caution mode.**

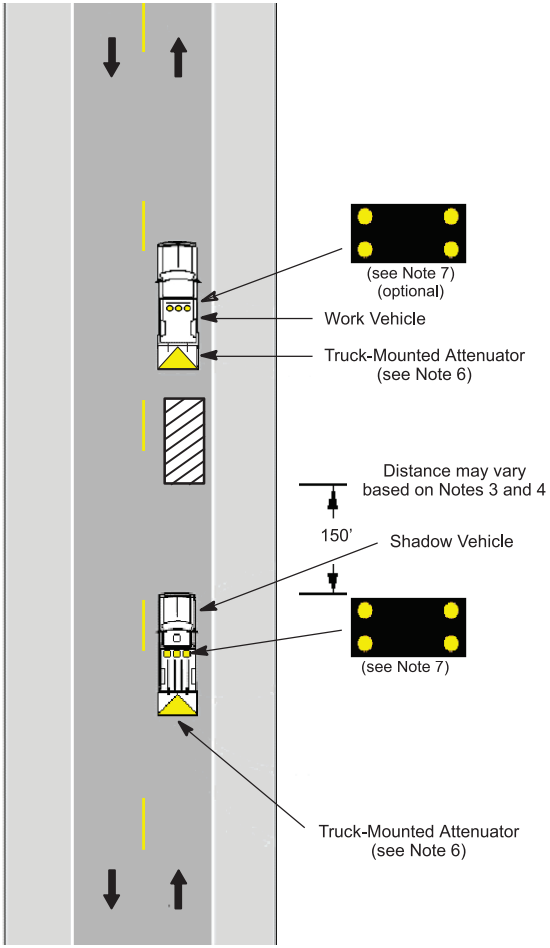


Figure 5: Mobile operation on a two-lane road

Notes for Figure 6
Mobile Operation With Frequent Short Stops on a Two-Lane Road

1. Mobile and short-duration operations often involve frequent short stops for activities including, but not limited to, roadway joint maintenance, minor scotch patching, blade patching, etc.
2. **Flaggers may be used. If a flagger is used, the Flagger symbol sign shall be used in conjunction with the flagger, positioned a minimum distance of "A" and a maximum distance of 1 mile in advance of the flagger, and shall be moved ahead as work progresses.** A single flagger may be used for low volume situations (less than 750 vehicles per day) with short work zones, on straight roadways, where the flagger is visible to road users approaching from both directions. Otherwise, two flaggers should be used.
3. Warning signs should be moved periodically to keep them near the mobile work area. In those situations where the distance between the advance signs and the work is 2 to 5 miles, a Supplemental Distance plaque shall be used with the ROAD WORK AHEAD sign. The distance between the advanced warning signs and the mobile work area should not exceed 5 miles.
4. A truck-mounted attenuator may be used on the shadow vehicle or on the work vehicle.
5. Additional shadow vehicles to warn and reduce the speed of oncoming or opposing vehicular traffic may be used.
6. Whenever adequate stopping sight distance exists to the rear, the shadow vehicle should maintain the minimum distance from the work vehicle and proceed at the same speed. The shadow vehicle should slow down in advance of vertical or horizontal curves that restrict sight distance. The distance between the work and shadow vehicles may vary according to terrain, paint drying time, and other factors.
7. **If the YIELD AHEAD symbol sign is used, the YIELD TO ONCOMING TRAFFIC sign shall also be used.** If the FLAGGER symbol sign is used, the YIELD AHEAD or BE PREPARED TO STOP sign may be removed.
8. If an arrow board is used, it shall be used in the caution mode.
9. The ROAD WORK NEXT XX MILES sign may be used instead of the ROAD WORK AHEAD sign if the work locations occur over a distance of more than 2 miles.

Road Type	Distance (ft.)		
	A (min.)	B (min.)	C (min.)
Urban – Low Speed (40 mph or less)	100	100	100
Urban – High Speed (greater than 40 mph)	350	350	350
Rural	500	500	500

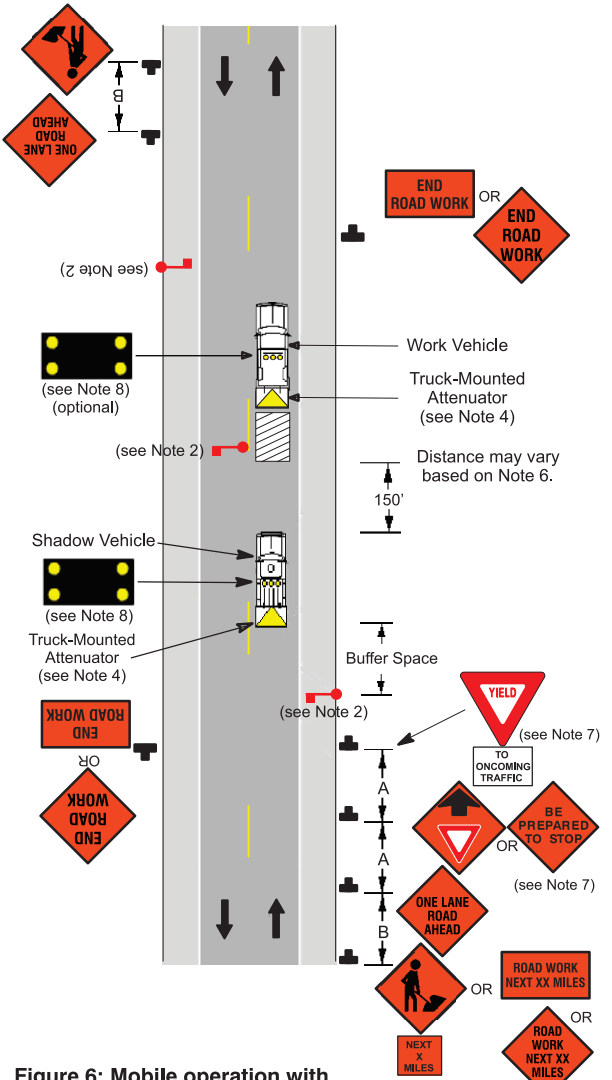


Figure 6: Mobile operation with frequent short stops on a two-lane road
(see Notes 3 & 9)

Notes for Figure 7
Lane Closure on a Two-Land Road
Using Flaggers

1. For high-volume roads, and low-volume roads with long work zones or reduced stopping sight distance, two flaggers should be used. A single flagger may be used for low-volume situations (less than 750 vehicles per day) with short work zones, on straight roadways, where the flagger is visible to road users approaching from both directions. **The flagger symbol sign shall be used in conjuction with the flagger, positioned a minimum distance of "A" and a maximum distance of 1,000 feet in advance of the flagger.**
2. The ROAD WORK AHEAD and the END ROAD WORK signs may be omitted for short-duration operations.
3. A BE PREPARED TO STOP sign may be added to the sign series. When used, the BE PREPARED TO STOP sign should be located between the FLAGGER symbol sign and the ONE LANE ROAD AHEAD sign.
4. The buffer space should be extended so that the two-way traffic taper is placed before a horizontal (or crest vertical) curve to provide adequate sight distance for the flagger and a queue of stopped vehicles.
5. **At night, flagger stations shall be illuminated, except in emergencies.**

Road Type	Distance (ft.)		
	A (min.)	B (min.)	C (min.)
Urban – Low Speed (40 mph or less)	100	100	100
Urban – High Speed (greater than 40 mph)	350	350	350
Rural	500	500	500

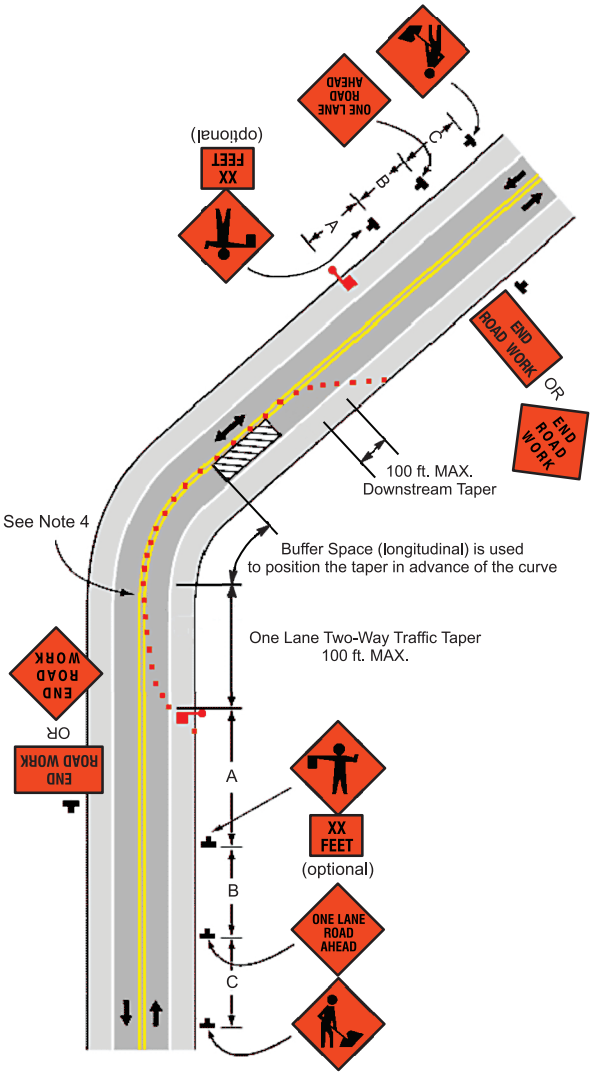


Figure 7: Lane closure on a two-lane road using flaggers

Notes for Figure 8
Lane Closure on a Two-Lane Road
With Low Traffic Volumes

1. This work zone application may be used as an alternate to the work zone application shown in Figure 7 (using flaggers) when the following conditions exist:

   a. Vehicular traffic volume is such that sufficient gaps exist for vehicular traffic that must yield.

   b. Road users from both directions are able to see approaching vehicular traffic through and beyond the work site and have sufficient visibility of approaching vehicles.

2. **If the YIELD AHEAD symbol is used, the YIELD TO ONCOMING TRAFFIC sign shall also be used.**

Road Type	Distance (ft.)		
	A (min.)	B (min.)	C (min.)
Urban – Low Speed (40 mph or less)	100	100	100
Urban – High Speed (greater than 40 mph)	350	350	350
Rural	500	500	500

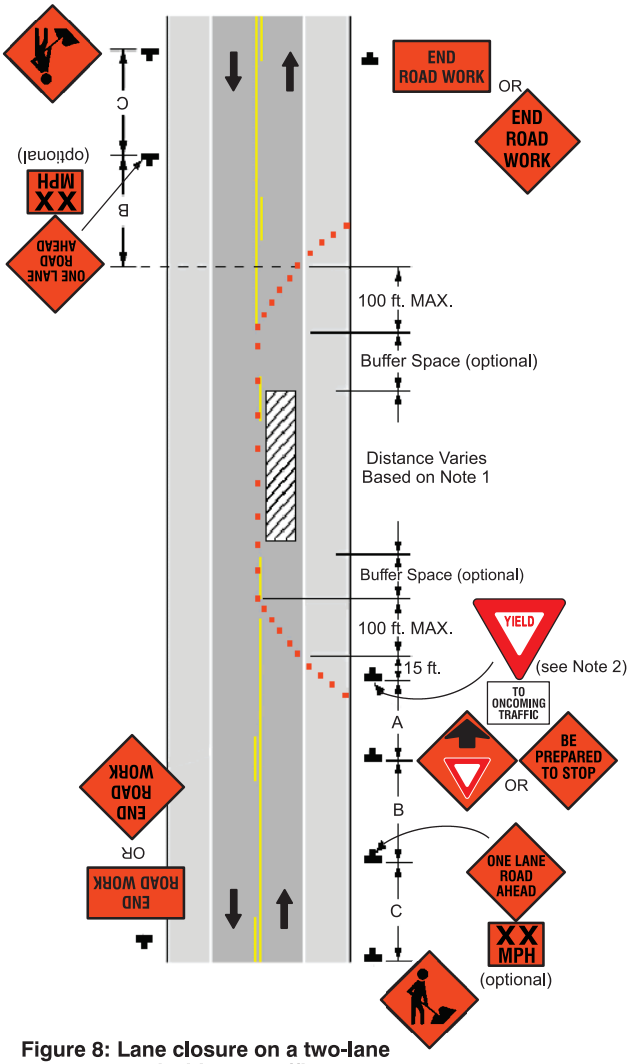


Figure 8: Lane closure on a two-lane road with low traffic volumes

Notes for Figure 9
Mobile Operation on a Multi-Lane Road

1. **Arrow boards shall, as a minimum, be Type B, with a size of 60" x 30." Recommended Type C, 96" x 48."**
2. **Shadow Vehicle 1 shall be equipped with a truck-mounted attenuator and shall be equipped with an arrow board.**
3. Shadow Vehicle 2, if used, should be equipped with an arrow board, and should travel at a varying distance from the work operation so as to provide adequate sight distance for vehicular traffic approaching from the rear.
4. **All vehicles shall display high-intensity rotating, flashing, oscillating, or strobe lights. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights. They shall only be used as a supplement.**
5. The spacing between the work vehicles and the shadow vehicles, and between each shadow vehicle should be minimized to deter road users from driving in between.
6. Work should normally be accomplished during off-peak hours.
7. When the work vehicle occupies an interior lane (a lane other than the far right or far left) of a directional roadway having a right shoulder 10 feet or more in width, Shadow Vehicle 2 should drive the right shoulder with a sign indicating that work is taking place in the interior lane.
8. A truck-mounted attenuator may be used on Shadow Vehicle 2 and on the work vehicle.
9. On high-speed roadways, a third shadow vehicle (not shown) may be used with Shadow Vehicle 1 in the closed lane, Shadow Vehicle 2 straddling the edge line, and Shadow Vehicle 3 on the shoulder. Where adequate shoulder width is not available, Shadow Vehicle 3 may drive partially in the lane. A truck-mounted attenuator may be used.
10. **An arrow board shall be used when a freeway lane is closed. When more than one freeway lane is closed, a separate arrow board shall be used for each closed lane.**

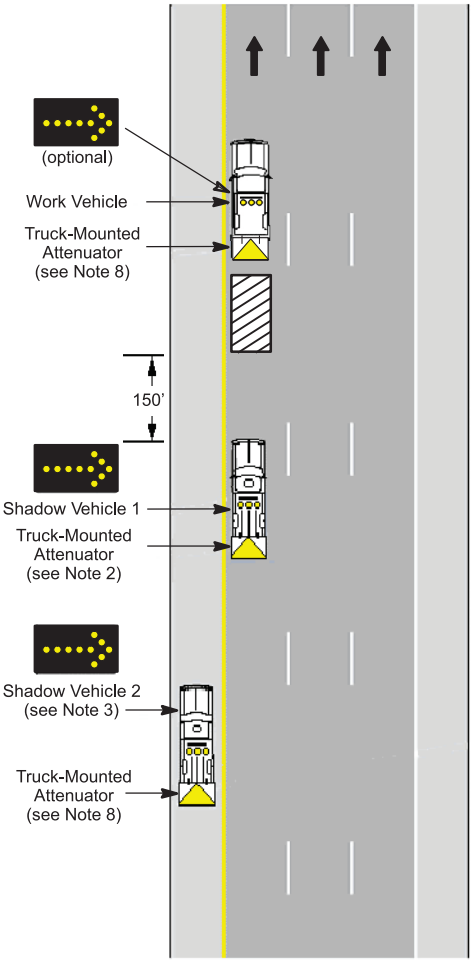


Figure 9: Mobile operation on a multi-lane road

Notes for Figure 10
Mobile Operation With Frequent Short Stops on a Multi-Lane Road

1. Mobile and short-duration operations often involve frequent short stops for activities including, but not limited to, roadway joint maintenance, minor scotch patching, blade patching, etc.
2. **Shadow Vehicle 1 shall be equipped with a truck-mounted attenuator and shall be equipped with an arrow board. Arrow boards shall, as a minimum, be Type B, with a size of 60" x 30." Recommended Type C, 96" x 48."**
3. Additional shadow vehicles to warn and reduce the speed of opposing vehicular traffic may be used. Truck-mounted attenuators and arrow boards are recommended. A TMA may also be used on the work vehicle.
4. Whenever adequate stopping sight distance exists to the rear, the shadow vehicle should maintain the minimum distance from the work vehicle and proceed at the same speed. The shadow vehicle should slow down in advance of vertical or horizontal curves that restrict sight distance.
5. The spacing between the work vehicles and the shadow vehicles and between each shadow vehicle should be minimized to deter road users from driving in between.
6. Work should normally be accomplished during off-peak hours.
7. A full lane closure is recommended for work on the interior lane(s) of three or more lane roadway. (See figure 12.)
8. **Flaggers may be used. If a flagger is used, the Flagger symbol sign shall be used in conjunction with the flagger, positioned a minimum distance "A." and a maximum distance of 1 mile in advance of the flagger, and shall be moved ahead as work progresses.**
9. Warning signs should be moved periodically to keep them near the mobile work area. In those situations where the distance between the advance signs and the work is 2 to 5 miles, a Supplemental Distance plaque shall be used with the ROAD WORK AHEAD sign. The distance between the advanced warning signs and the mobile work area should not exceed 5 miles.
10. The ROAD WORK NEXT XX MILES sign may be used instead of the ROAD WORK AHEAD sign if the work locations occur over a distance of more than 2 miles.

Road Type	Distance (ft.)	
	A (min.)	B (min.)
Urban – Low Speed (40 mph or less)	100	100
Urban – High Speed (greater than 40 mph)	350	350
Urban Expressway/Freeway (60 mph or less)	750	1,000
Rural Expressway/Freeway (greater than 60 mph)	1,000	1,500

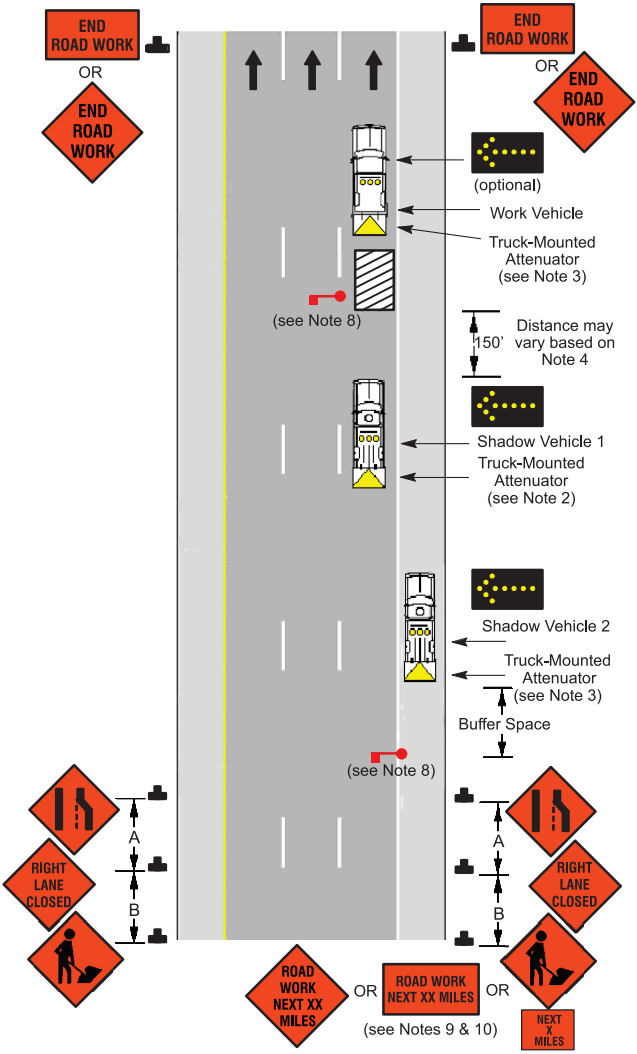


Figure 10: Mobile operation with frequent short stops on a multi-lane road

Notes for Figure 11
Lane Closure on a Multi-Lane Road

1. **This information also shall be used when work is being performed in the lane adjacent to the median on a divided highway. In this case, the LEFT LANE CLOSED signs and the corresponding LANE ENDS signs shall be substituted.**
2. When a side road intersects the highway within the TTC zone, additional TTC devices shall be placed as needed.
3. When paved shoulders having a width of 8 feet or more are closed, channelizing devices should be used to close the shoulder in advance of the merging taper to direct vehicular traffic to remain within the traveled way.
4. **A truck-mounted attenuator shall be used on the shadow vehicle and may be used on a work vehicle.**
5. **A flagger may be used at the work zone to warn traffic. If a flagger is used, the FLAGGER symbol sign shall be used.**
6. **The arrow board shall be Type B or Type C. Type C is recommended for high-volume roads.**
7. If the roadway is undivided, the left-hand signs are omitted.
8. **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. A truck-mounted arrow board can be substituted for a trailer-mounted arrow board.**
9. Warning signs should be moved periodically to keep them near the mobile work area. In those situations where the distance between the advance signs and the work is 2 to 5 miles, a Supplemental Distance plaque shall be used with the ROAD WORK AHEAD sign. The distance between the advanced warning signs and the mobile work area should not exceed 5 miles.
10. The ROAD WORK NEXT XX MILES sign may be used instead of the ROAD WORK AHEAD sign if the work locations occur over a distance of more than 2 miles.

Road Type	Distance (ft.)		
	A (min.)	B (min.)	C (min.)
Urban – Low Speed (40 mph or less)	100	100	100
Urban – High Speed (greater than 40 mph)	350	350	350
Urban Expressway/Freeway (60 mph or less)	750	1,000	1,500
Rural Expressway/Freeway (greater than 60 mph)	1,000	1,500	2,640

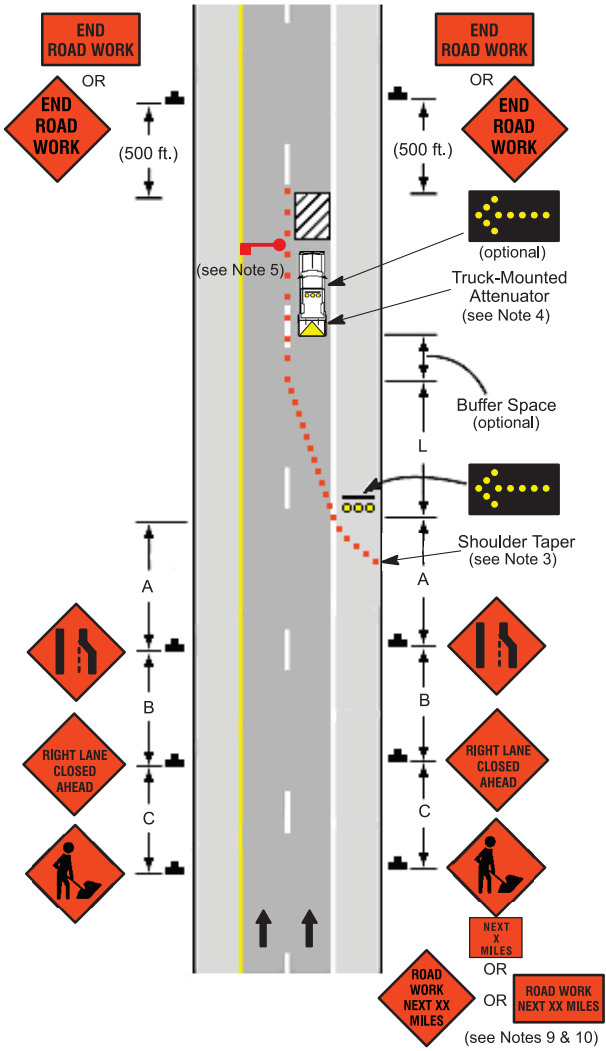


Figure 11: Lane closure on a multi-lane road

Notes for Figure 12
Double Lane Closure on a Multi-Lane Road

1. Ordinarily, the preferred position for the second arrow panel is in the closed exterior lane at the beginning of the second merging taper. However, the second arrow panel should be placed in the closed interior lane at the end of the second merging taper in the following situations:
   a. When a shadow vehicle is used in the interior closed lane and the second arrow panel is mounted on the shadow vehicle;
   b. If alignment or other conditions create any confusion as to which lane is closed by the second arrow panel; and
   c. When the first arrow panel is placed in the closed exterior lane at the end of the first merging taper (the alternative position when the shoulder is narrow).
2. **A truck-mounted attenuator shall be used on the shadow vehicle and may be used on a work vehicle.**
3. If a paved shoulder having a minimum width of 10 feet and sufficient strength is available, the left and adjacent interior lanes may be closed and vehicular traffic carried around the work space on the right lane and a right shoulder.
4. When a shoulder lane is used that cannot adequately accommodate trucks, trucks may be directed to use the normal travel lanes.
5. **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. A truck-mounted arrow board can be substituted for a trailer-mounted arrow board.**

Road Type	Distance (ft.)		
	A (min.)	B (min.)	C (min.)
Urban – Low Speed (40 mph or less)	100	100	100
Urban – High Speed (greater than 40 mph)	350	350	350
Urban Expressway/Freeway (60 mph or less)	750	1,000	1,500
Rural Expressway/Freeway (greater than 60 mph)	1,000	1,500	2,640

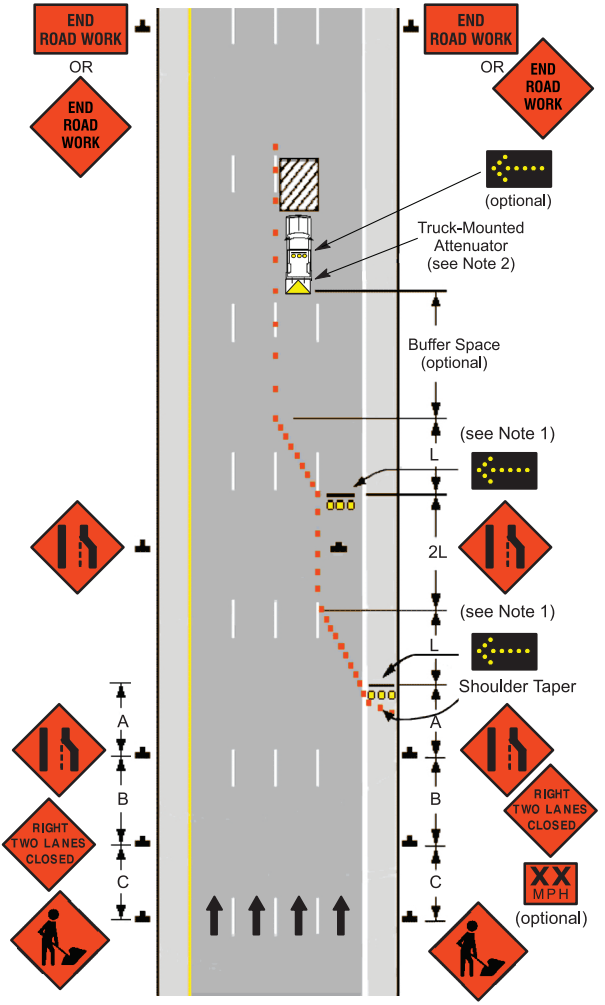


Figure 12: Double lane closure on a multi-lane road

Notes for Figure 13
Surveying Along Centerline of a Road With Low Traffic Volumes

1. On two-lane roads, the same treatment is required in both directions.
2. The survey area should be no more than two miles in length in rural areas and no more than one mile in length in urban areas.
3. Cones should be placed 6 to 12 inches on either side of the centerline.
4. The cone spacing in tapers shall be a maximum of the distance in feet of the speed limit in mph ("S"). Cone spacing in channelization shall be a maximum of twice the distance in feet of the speed limit in mph ("2S").
5. A flagger should be used to warn workers who cannot watch road users.
6. **For surveying on the centerline of a high-volume road, one or two lanes shall be closed using the information illustrated in Figure 11 or 12. Lane closures are recommended for low sight-distance roadways.**
7. If the roadway is multi-lane divided, signs are needed for both lanes and the downstream cones may be eliminated.
8. If the roadway is multi-lane undivided, the left-hand signs are omitted.
9. Cones may be omitted for a cross-section survey.
10. ROAD WORK AHEAD signs may be used in place of the SURVEY CREW AHEAD signs.
11. If the work is along the shoulder, the flagger may be omitted.
12. For a survey along the edge of the road or along the shoulder, cones may be placed along the edge line.
13. A BE PREPARED TO STOP sign may be added to the sign series. It should be located "A" distance before the FLAGGER symbol sign.

Road Type	Distance (ft.)	
	A (min.)	B (min.)
Urban – Low Speed (40 mph or less)	100	100
Urban – High Speed (greater than 40 mph)	350	350
Rural	500	500
Urban Expressway/Freeway (60 mph or less)	750	1,000
Rural Expressway/Freeway (greater than 60 mph)	1,000	1,500

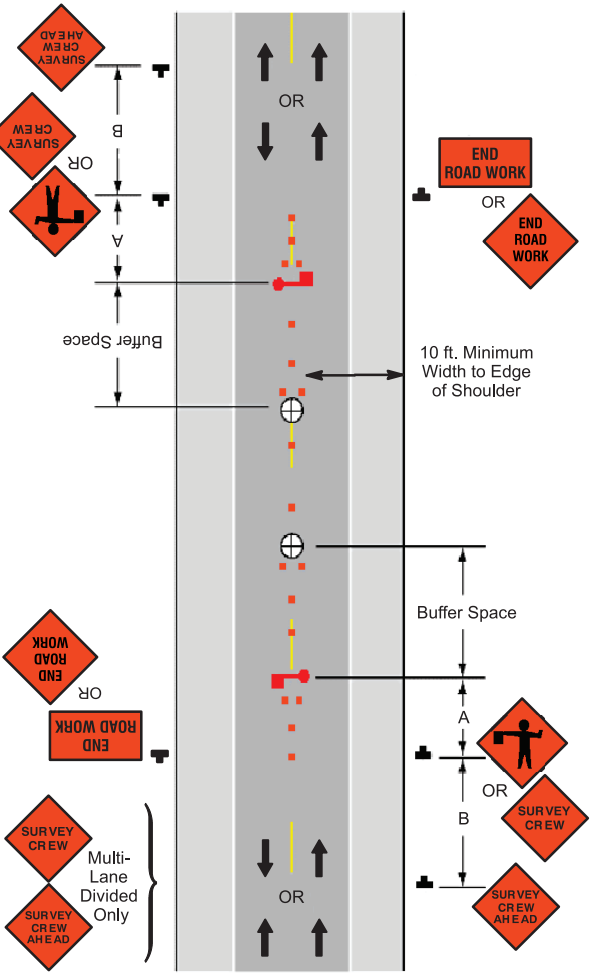


Figure 13: Surveying along centerline of a road with low traffic volumes

Notes for Figure 14
Work in the Vicinity of a Highway-Rail Grade Crossing

1. When highway-rail grade crossings exist either within or in the vicinity of roadway work activities, extra care should be taken to minimize the probability of conditions being created, either by lane restrictions, flagging, or other operations, where vehicles might be stopped within the highway-rail grade crossing, considered as being 15 feet on either side of the closest and farthest rail.

2. **If the queuing of vehicles across active rail tracks cannot be avoided, a uniformed law enforcement officer or flagger shall be provided at the highway-rail grade crossing to prevent vehicles from stopping within the highway-rail grade crossing (as described in Note 1), even if automatic warning devices are in place.**

3. Early coordination with the railroad company should occur before work starts.

4. When work is being done within 25 feet of railroad, a railroad flagger must be present. (See pages 40-41.)

5. In the example depicted, the buffer space of the activity area should be extended upstream of the highway-rail grade crossing (as shown) so that a queue created by the flagging operation will not extend across the highway-rail grade crossing.

6. The DO NOT STOP ON TRACKS sign should be used on all approaches to a highway-rail grade crossing within the limits of a work zone.

7. A BE PREPARED TO STOP sign may be added to the sign series. It should be located "A" distance before the FLAGGER symbol sign.

Road Type	Distance (ft.)		
	A (min.)	B (min.)	C (min.)
Urban – Low Speed (40 mph or less)	100	100	100
Urban – High Speed (greater than 40 mph)	350	350	350
Rural	500	500	500

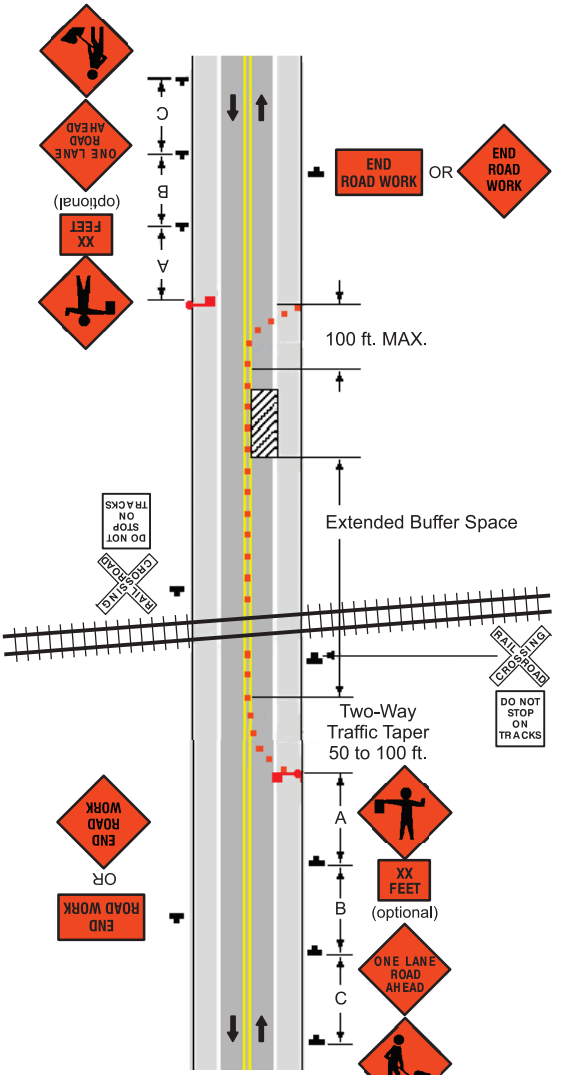


Figure 14: Work in the vicinity of a highway-rail grade crossing

Procedures for Maintenance Activities in the Vicinity of Railroad Crossings

1. When work is being done within 25 feet of a railroad crossing, a railroad flagger must be present. In such case, District Administration should contact the Road Master of the respective Railroad (2 weeks in advance) to coordinate the maintenance activities.

2. When contacting the Road Master of the respective Railroad it is important to include the crossing number. Each public highway-rail crossing has an individual crossing number. Crossings are referenced by this number or railroad milepost number. Railroads are required to have the crossing number posted at the crossing.

3. Signalized crossings have the number posted on the outside of a small structure, called a bungalow, which is normally near one of the signals. The name of the railroad and a phone number will be posted with the crossing number and milepost. Example: (DOT 093311A MP 329.5)

4. Crossings that do not have signals normally have the crossing number fastened to one of the crossbuck posts.

North Dakota Railroad Emergency Contact List

Railroad Authority

Burlington Northern Santa Fe (BNSF)

* 800-832-5452

Canadian Pacific/Soo Line (CPR)

* 800-716-9132

Dakota Missouri Valley & Western (DMVW)

Troy Fast 701-471-3435

Dakota Northern (DNRR)

Jason Bierworth 701-741-6068

Northern Plains Railroad (NPR)

Jerry Hegstrom 701-330-8022

Red River Valley & Western (RRVW)

Cal Gruebele 218-643-1532

* BNSF and CPR calls are routed for immediate response by the dispatcher. No names are available.

Notes for Figure 15
Work in the Vicinity of an Exit Ramp

1. **A temporary EXIT sign shall be located in the temporary gore.**
2. **The temporary EXIT sign placed in the temporary gore shall be black on orange.**
3. **An arrow board shall be used when a freeway lane is closed. When more than one freeway lane is closed, a separate arrow board shall be used for each closed lane.**

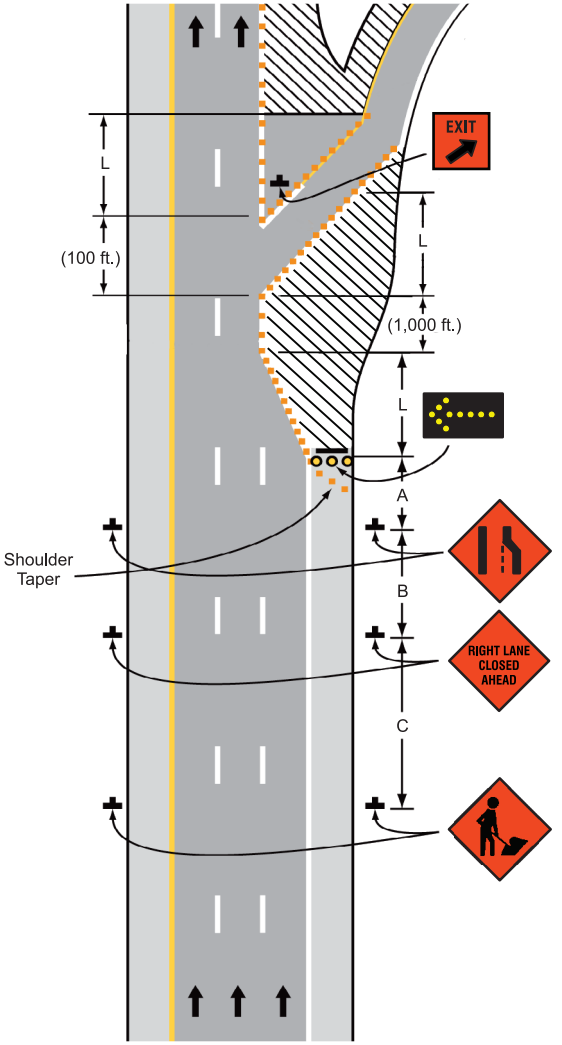


Figure 15: Work in the vicinity of an exit ramp

Notes for Figure 16
Partial Exit Ramp Closure

1. Ramp work for on-ramps requires the same traffic control devices as the situation shown.

Road Type	Distance (ft.)	
	A (min.)	B (min.)
Urban – Low Speed (40 mph or less)	100	100
Urban – High Speed (greater than 40 mph)	350	350
Urban Expressway/Freeway (60 mph or less)	750	1,000
Rural Expressway/Freeway (greater than 60 mph)	1,000	1,500

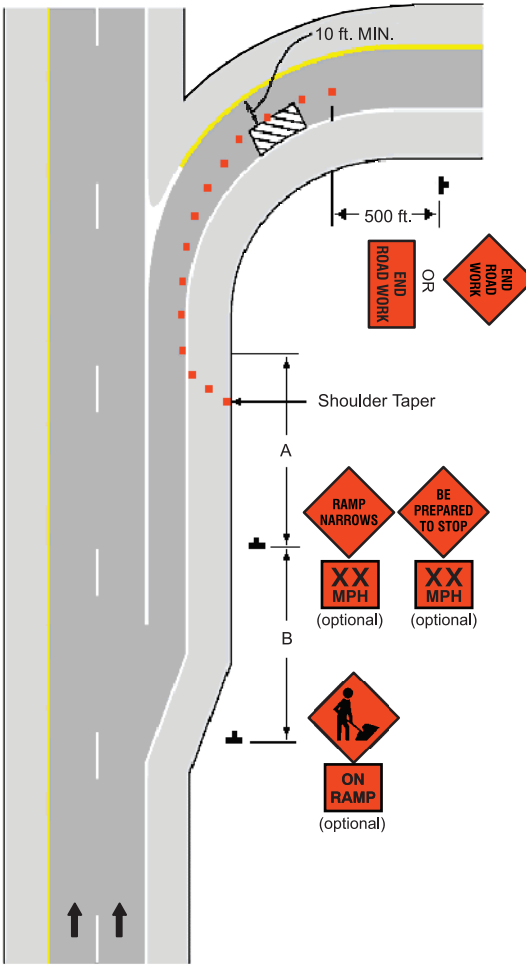


Figure 16: Partial exit ramp closure

Notes for Figure 17
Work in the Vicinity of an Entrance Ramp - Merge Required

1. The mainline merging taper with the arrow board at its starting point should be located sufficiently in advance so that the arrow board is not confusing to drivers on the entrance ramp.

2. **An arrow board shall be used when a freeway lane is closed. When more than one freeway lane is closed, a separate arrow board shall be used for each closed lane.**

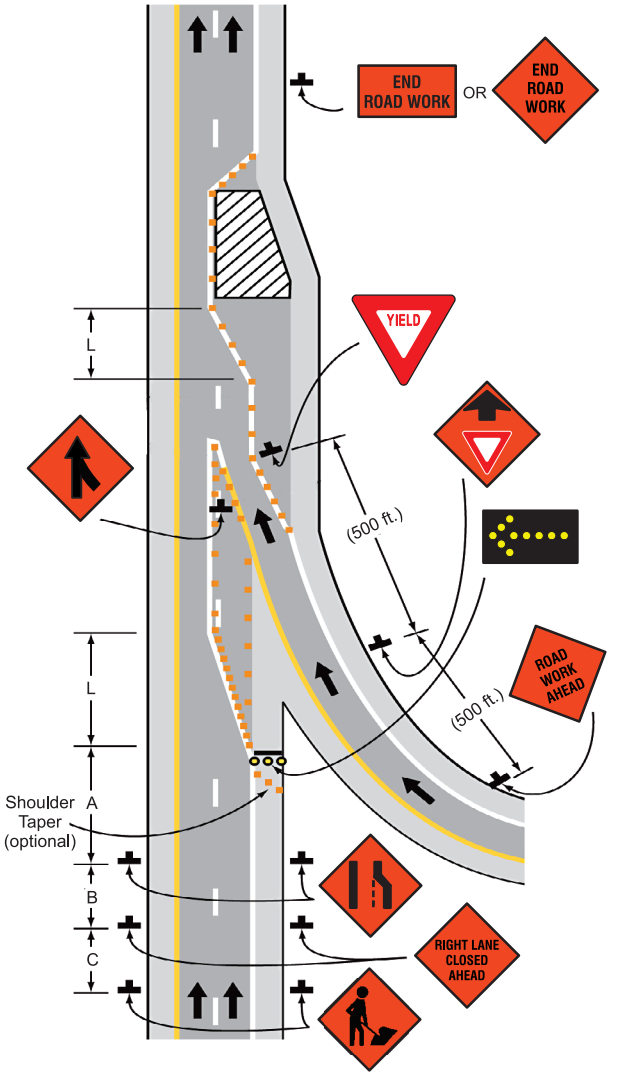


Figure 17: Work in the vicinity of an entrance ramp - merge required

Notes for Figure 18
Work in the Vicinity of an Entrance Ramp - Added Lane

1. An acceleration lane of sufficient length should be provided whenever possible as shown in the figure.
2. The mainline merging taper with the arrow board at its starting point should be located sufficiently in advance so that the arrow board is not confusing to drivers on the entrance ramp.
3. **An arrow board shall be used when a freeway lane is closed. When more than one freeway lane is closed, a separate arrow board shall be used for each closed lane.**

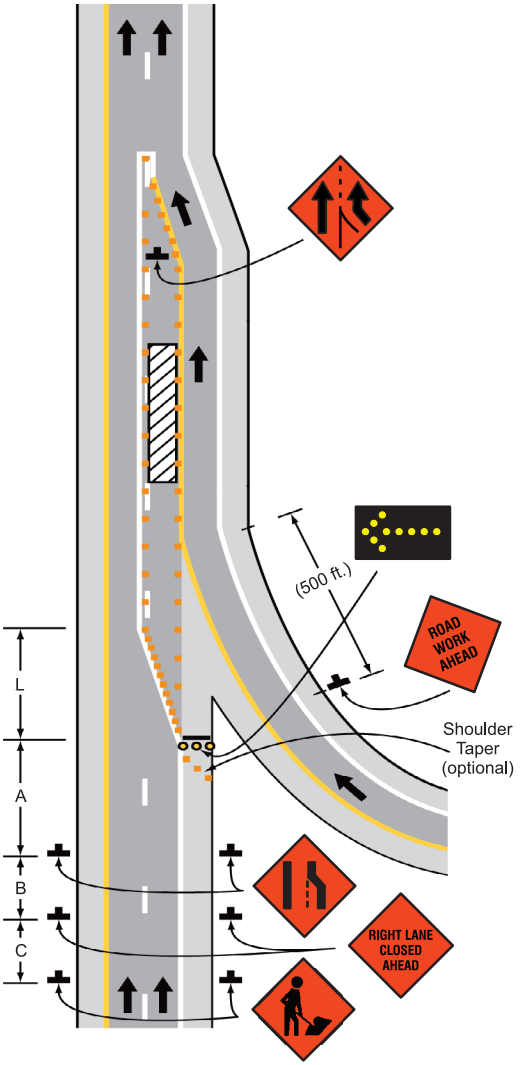


Figure 18: Work in the vicinity of an entrance ramp - added lane

Notes for Figure 19
Speed Zone on a Two-Lane Road

1. The SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT sign is not required if the work is less than 15 days.
2. **The SPEED LIMIT sign shall be placed a minimum of "A" before the beginning of the work zone, the taper, if one exists, or other signing in advance of the signs shown in Figure 16.**
3. A typical situation addressing warning sign 1 is: ONE LANE ROAD AHEAD.
4. A typical situation addressing warning sign 2 is: BE PREPARED TO STOP.
5. A typical situation addressing warning sign 3 is: the FLAGGER AHEAD symbol sign.
6. **SPEED LIMIT signs shall be 36" x 48" in size. Speed limits can be reduced in increments of no more than 30 mph. A MINIMUM FEE $80 plate shall be attached below the reduced SPEED LIMIT sign. Existing speed limit signs within a reduced speed zone shall be covered.** REDUCED SPEED AHEAD signs should be W3-5 and 48" x 48". The REDUCED SPEED AHEAD signs R2-5A are acceptable if sign is used from existing stock and has not reached end of service life. New R2-5A signs shall not be purchased. **The speed limit shall be reestablished "A" after the end of the project limits.**

Road Type	Distance (ft.)
	A (min.)
Urban – Low Speed (40 mph or less)	100
Urban – High Speed (greater than 40 mph)	350
Rural	500

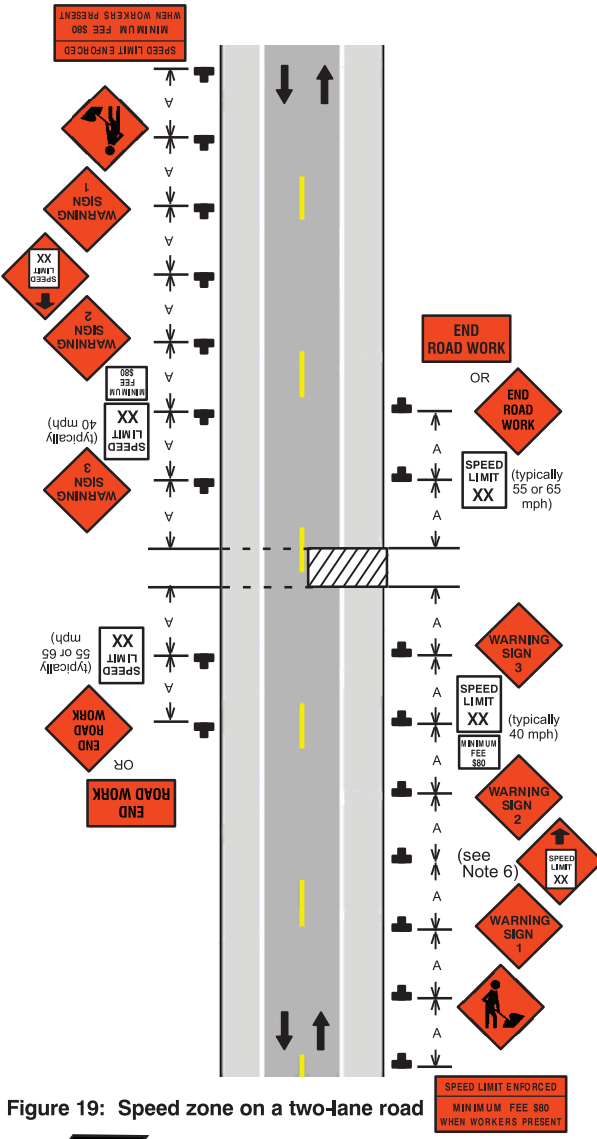


Figure 19: Speed zone on a two-lane road

Notes for Figure 20
Speed Zone on a Multi-Lane Road

1. The SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT sign is not required if the work is less than 15 days.

2. **The SPEED LIMIT sign shall be placed a minimum of 1/2 A before the beginning of the work zone, the taper, if one exists, or other signing in advance of the signs shown in Figure 20.**

3. A typical situation addressing warning sign 1 is: RIGHT LANE CLOSED AHEAD.

4. A typical situation addressing warning sign 2 is: the LANE ENDS (chimney) symbol sign.

5. **SPEED LIMIT signs shall be 36" x 48" in size. Speed limits can be reduced in increments of no more than 30 mph. A MINIMUM FEE $80 plate shall be attached below the reduced SPEED LIMIT sign. Existing speed limit signs within a reduced speed zone shall be covered.** REDUCED SPEED AHEAD signs should be W3-5 and 48" x 48". The REDUCED SPEED AHEAD signs R2-5A are acceptable if sign is used from existing stock and has not reached end of service life. New R2-5A signs shall not be purchased. **The speed limit shall be reestablished ½ A after the end of the project limits.**

6. If a lane closure with taper is used, a Type C arrow board is recommended to be used at the beginning of the taper.

Road Type	Distance (ft.)		
	A (min.)	B (min.)	C (min.)
Urban – Low Speed (40 mph or less)	100	100	100
Urban – High Speed (greater than 40 mph)	350	350	350
Urban Expressway/Freeway (60 mph or less)	750	1,000	1,500
Rural Expressway/Freeway (greater than 60 mph)	1,000	1,500	2,640

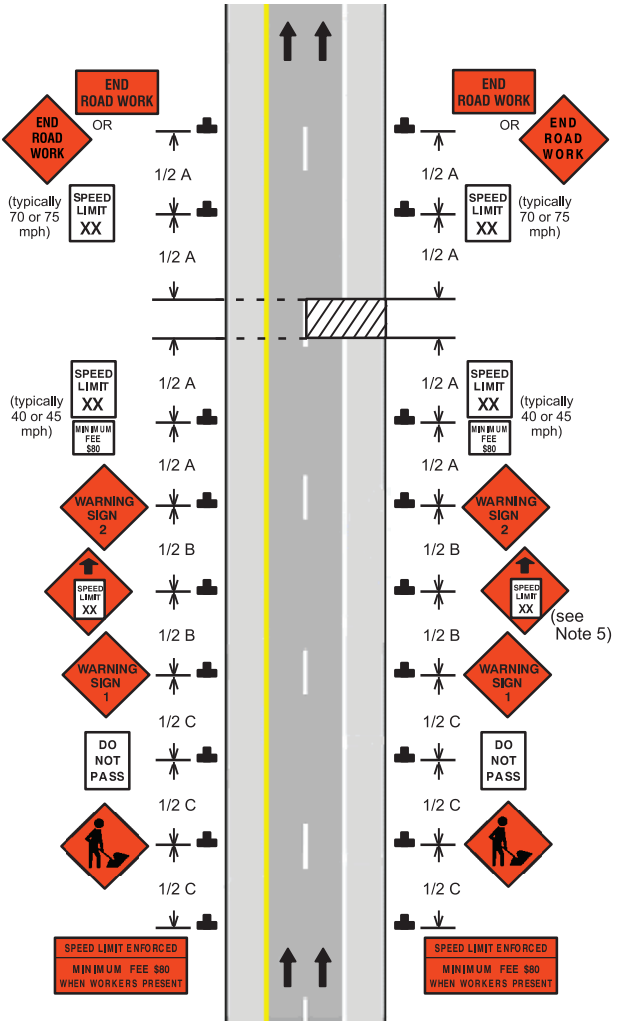


Figure 20: Speed zone on a multi-lane road

Notes for Figure 21
Speed Zone for Hazards on a Two-Lane Road

1. Layout is for one direction of travel.

2. **This layout is not in a work zone and the signs will be in place during daylight and darkness; therefore, the signs shall be reflectorized. Warning signs shall be yellow in color.**

3. **SPEED LIMIT signs shall be 36" x 48" in size. Speed limit reductions can be made in 20 mph increments. Existing speed limit signs within a reduced speed zone shall be covered.** REDUCED SPEED AHEAD signs should be W3-5 and 48" x 48". The REDUCED SPEED AHEAD signs R2-5A are acceptable if sign is used from existing stock and has not reached end of service life. New R2-5A signs shall not be purchased. **The speed limit shall be re-established 500 feet after the end of the hazard.**

* Exact spacing to be determined in field based on length of hazard. Maximum spacing is 250 feet.

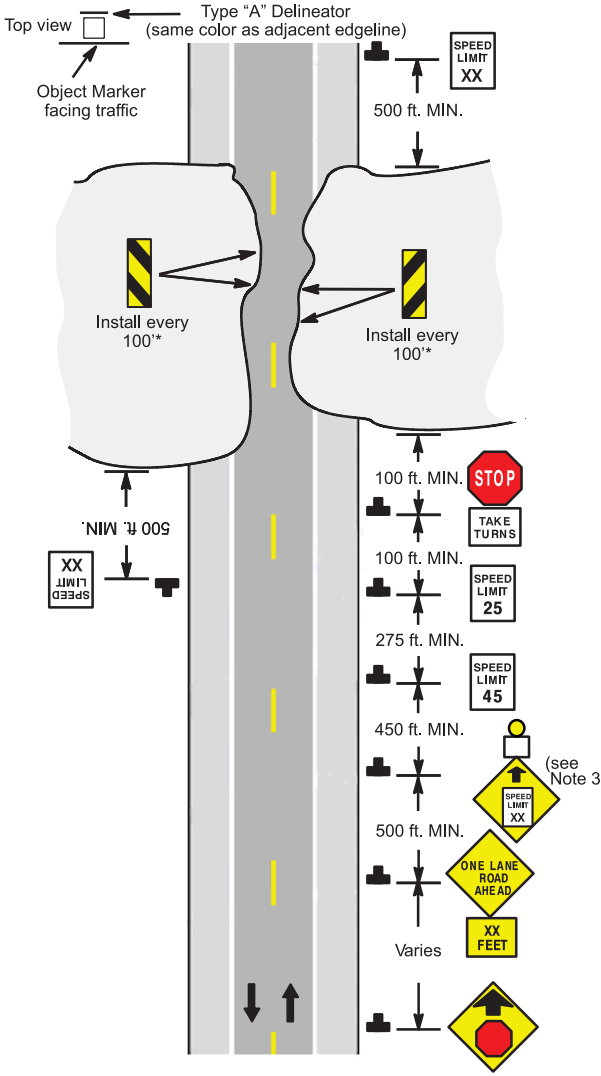


Figure 21: Speed zone for hazards on a two-lane road

Notes for Figure 22
Speed Zone for Hazards Near a Two-Lane Road

1. Layout is for one direction of travel.

2. **This layout is not in a work zone and the signs will be in place during daylight and darkness; therefore, the signs shall be reflectorized. Warning signs shall be yellow in color.**

3. One of the following signs with an advisory speed limit plaque shall be used in the obstruction area: "No Shoulder," "Soft Shoulder," "Shoulder Drop-off," "Low Shoulder," or "Material on Shoulder." If these sign messages do not describe the condition in the field, then Maintenance Division should be contacted to design a sign layout with an appropriate message. The signs shall have a black legend on yellow background.

4. The district shall determine the speed limit by using the following tables; the "Clear Zone" table and the "Guidelines for Advance Placement of Warning Signs."

* Exact spacing to be determined in field based on length of hazard. Maximum spacing is 250 feet.

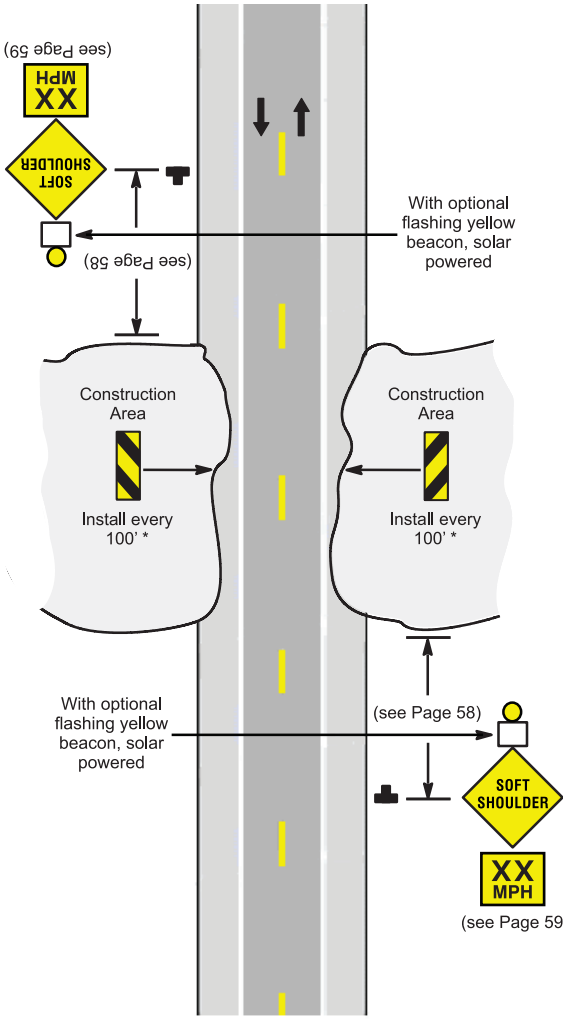


Figure 22: Speed zone for hazards near a two-lane road

Posted Speed	Deceleration to the listed advisory speed (mph) for the condition.								
	25	30	35	40	45	50	55	60	65
55 mph	225 ft.	200 ft.	175 ft.	125 ft.	100 ft.	N/A	N/A	N/A	N/A
65 mph	400 ft.	350 ft.	300 ft.	275 ft.	250 ft.	200 ft.	150 ft.	N/A	N/A
70 mph	475 ft.	450 ft.	400 ft.	375 ft.	325 ft.	275 ft.	225 ft.	150 ft.	N/A
75 mph	575 ft.	550 ft.	500 ft.	475 ft.	425 ft.	375 ft.	300 ft.	250 ft.	175 ft.

If the posted speed or advisory limit is lower than what is provided in the table, refer to Table 2C-4 of the MUTCD.

Clear Zone Table

	DESIGN ADT	FORESLOPE			BACKSLOPE		
		1V:6H	1V:5H	1V:4H	1V:4H	1V:5H	1V:6H
≤ 40 mph	Under 750	7-10	7-10	7-10	7-10	7-10	7-10
	750-1500	12	12	14	12-14	12-14	12-14
	1500-6000	14	14	16	14-16	14-16	14-16
	Over 6000	16	16	18	16-18	16-18	16-18
45-50 mph	Under 750	12	12	14	8	10	10
	750-1500	16	16	20	12	14	14
	1500-6000	18	20	26	14	16	16
	Over 6000	22	24	28	18	20	20
55 mph	Under 750	14	14	18	10-12	10-12	10-12
	750-1500	18	20	24	14	16	16
	1500-6000	22	24	30	16	18	20
	Over 6000	24	26	32	20	22	22
60 mph	Under 750	18	20	24	12	14	14
	750-1500	24	26	32	16	18	20
	1500-6000	30	32	40	18	22	24
	Over 6000	32	36	44	24	26	26
65-75 mph	Under 750	20	20	26	14-16	14-16	14-16
	750-1500	26	28	36	18	20	20
	1500-6000	32	34	42	22	24	26
	Over 6000	34	38	46	26	30	28

Notes for Figure 23
Bump on a Highway

1. **This layout is not in a work zone and the signs will be in place during daylight and darkness; therefore, the signs shall be reflectorized yellow in color.**

2. The sign at the bump location will be either a BUMP sign with a supplemental arrow, or a Type 1 OBJECT MARKER consisting of an 18" x 18" all yellow reflectorized diamond-shaped plate mounted on a delineator post (see Section 3C of the MUTCD). **The bottom of the plate shall be installed four feet above the surface elevation of the nearest driving lane.**

3. **On multi-lane divided highways, signs shall also be placed on the left shoulder.**

Two-Lane: hinged signs shall be 42" x 42" in size
Multi-Lane Divided: hinged signs shall be 54" x 54" in size

Road Type	Distance (ft.)
	A
Urban – Low Speed (40 mph or less)	100
Urban – High Speed (greater than 40 mph)	350
Rural	500
Urban Expressway/Freeway (60 mph or less)	750
Rural Expressway/Freeway (greater than 60 mph)	1,000

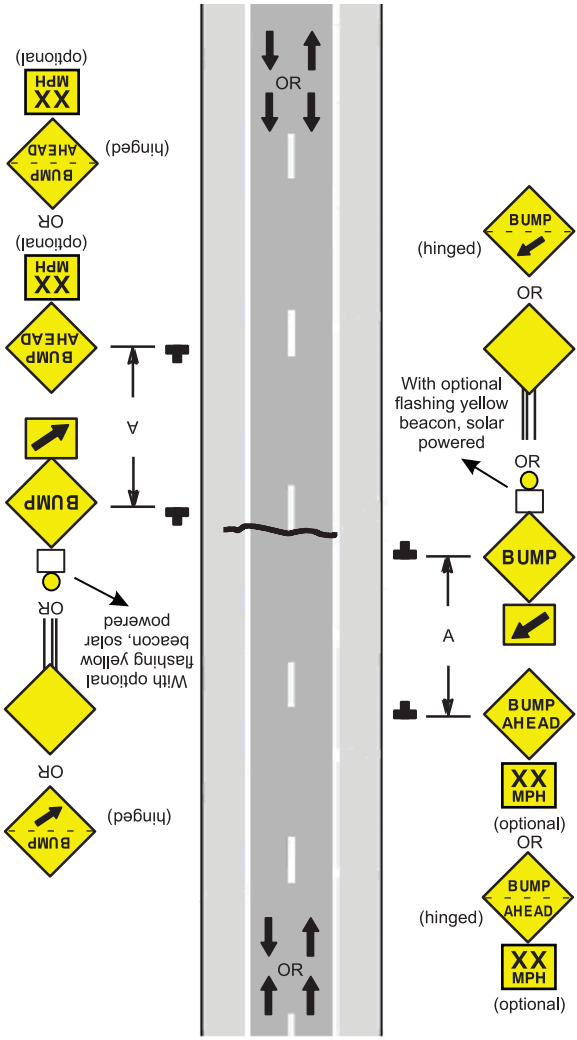


Figure 23: Bump on a highway
(See Note 3 for multi-lane highways.)

Notes for Figure 24
Series of Bumps or Pavement Breaks

1. **This layout is not in a work zone and the signs will be in place during daylight and darkness; therefore, the signs shall be reflectorized yellow in color.**
2. The sign at each bump location or at the beginning of a stretch of broken pavement will be a Type 1 OBJECT MARKER consisting of an 18" x 18" all yellow reflectorized diamond-shaped plate mounted on a delineator post (see Section 3C of the MUTCD). **The bottom of the plate shall be installed 4 feet above the surface elevation of the nearest driving lane.**
3. This layout is to be used if there is an average of three or more bumps per mile and the bumps extend over 1 mile; or if there is an average of three or more stretches of pavement breaks per mile and the breaks extend over 1 mile.
4. **If the bumps or pavement breaks extend over 5 miles, additional BUMP or PAVEMENT BREAKS signs with mileage plates shall be placed every 5 miles (or less to equalize spacing) throughout the affected length of roadway; however, on interstate and controlled access highways, the required signing will consist of placing one sign with mileage plate on each shoulder following each interchange.**
5. **On multi-lane divided highways, signs shall also be placed on the left shoulder.**
6. Supplemental advisory speed plaques may be used.

   Two-Lane: hinged signs shall be 42" x 42" in size

   Multi-Lane Divided: hinged signs shall be 54" x 54" in size

Road Type	Distance (ft.)
	A
Urban – Low Speed (40 mph or less)	100
Urban – High Speed (greater than 40 mph)	350
Rural	500
Urban Expressway/Freeway (60 mph or less)	750
Rural Expressway/Freeway (greater than 60 mph)	1,000

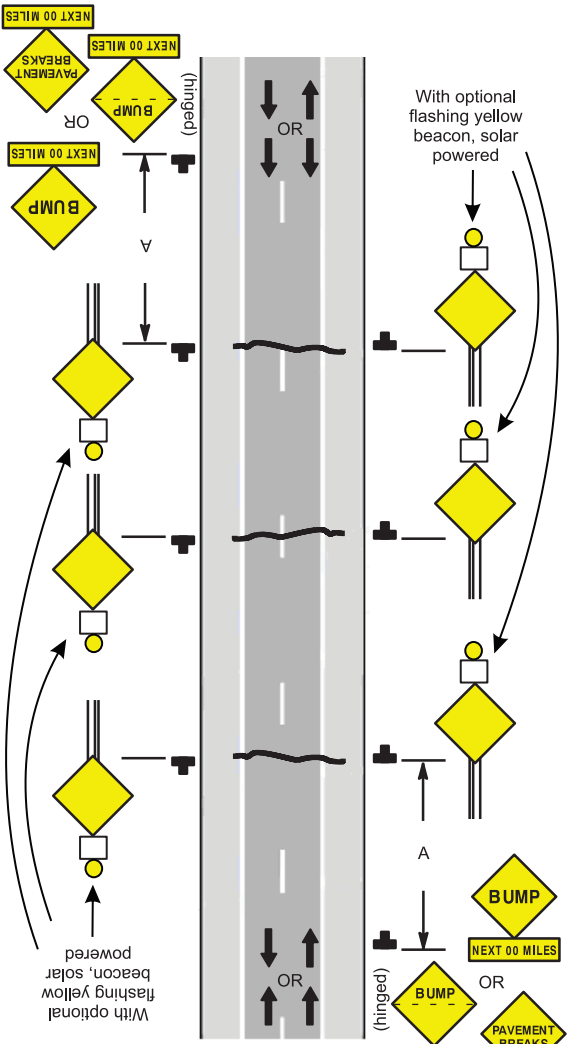


Figure 24: Series of bumps or pavement breaks
(See Notes 4 and 5 for multi-lane highways.)

Notes for Figure 25
Soft Shoulder

1. **This layout is not in a work zone and the signs will be in place during daylight and darkness; therefore, the signs shall be reflectorized yellow in color.**

2. The advisory mileage plate will be installed below the warning sign when there are continuous or intermittent soft shoulders for a length of 1 mile or more.

3. If the soft shoulders extend over 5 miles, additional SOFT SHOULDER signs with mileage plates will be installed every 5 miles (or less to equalize spacing) throughout the affected length of roadway; however, on interstate and controlled access highways, the required signing will consist of placing one sign with mileage plate on each shoulder following each interchange.

4. On multi-lane divided highways, signs will be placed on the soft shoulder side only.

Road Type	Distance (ft.)
	A
Urban – Low Speed (40 mph or less)	100
Urban – High Speed (greater than 40 mph)	350
Rural	500
Urban Expressway/Freeway (60 mph or less)	750
Rural Expressway/Freeway (greater than 60 mph)	1,000

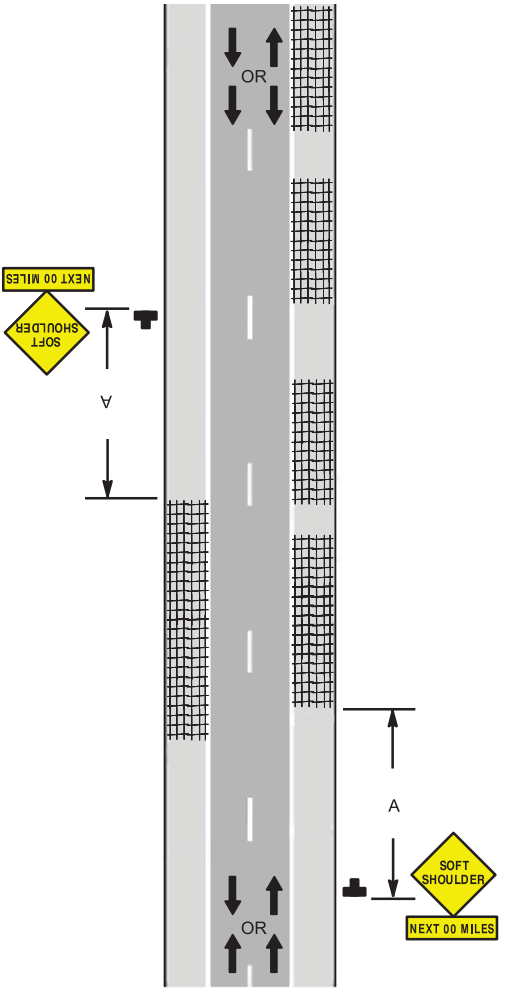


Figure 25: Soft shoulder
(See Note 4 for multi-lane highways.)

Notes for Figure 26
Pavement Ends

This layout is not in a work zone and the signs will be in place during daylight and darkness; therefore, the signs shall be reflectorized yellow in color.

USE “BUMP” APPLICATION FOR TRAFFIC IN THIS DIRECTION IF TRANSITION FROM GRAVEL TO PAVEMENT IS ROUGH.

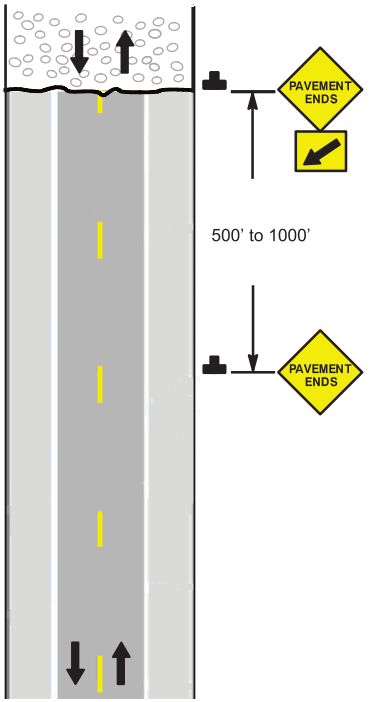


Figure 26: Pavement ends

Notes for Figure 27
Road Closure With Detour

1. 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 III Barricades may be located at the edge of the traveled way.
2. 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.
3. Flashing warning lights and/or flags may be used to call attendion to the advance warning signs.
4. Cardinal direction plaques may be used with route signs.
5. A flagger may be used to warn and guide road users, positioned in advance of the closure at the intersection of the detour.
6. For multi-lane roads, a matching set of advance warning signs should also be placed on the left-hand side of the directional roadway, or you may refer to the MUTCD or NDDOT Standard Drawings for additional guidance.

Road Type	Distance (ft.)		
	A (min.)	B (min.)	C (min.)
Urban – Low Speed (40 mph or less)	100	100	100
Urban – High Speed (greater than 40 mph)	350	350	350
Rural	500	500	500
Urban Expressway/ Freeway (60 mph or less)	750	1,000	1,500
Rural Expressway/Freeway (greater than 60 mph)	1,000	1,500	2,640

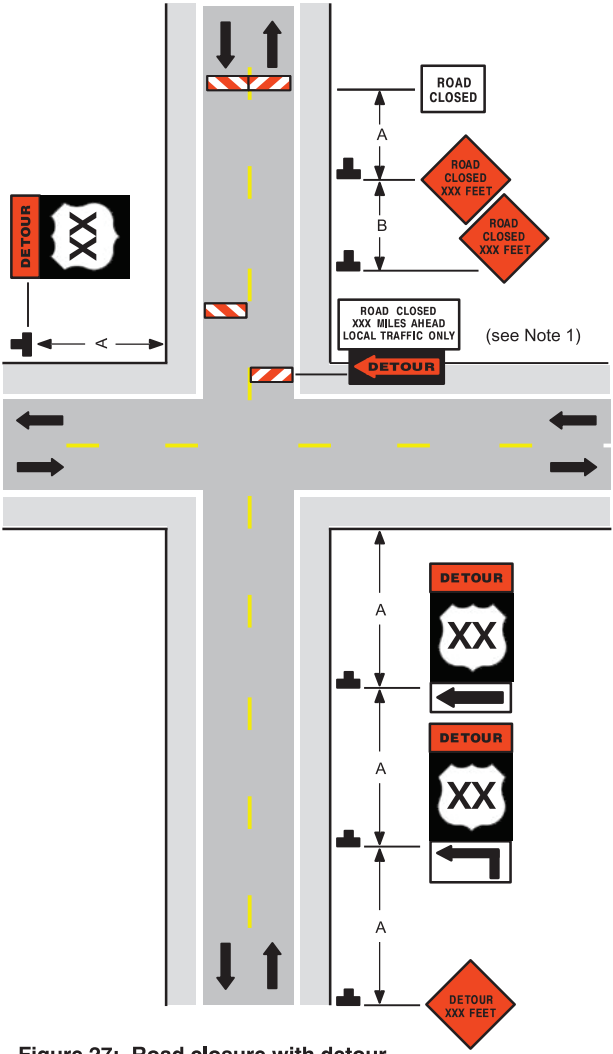


Figure 27: Road closure with detour
(See Note 6 for multi-lane highways.)

Seal Coats

Two-Lane Roads:

1. Refer to the NDDOT *Design Manual*, *Standard Specifications*, and all applicable Standard Drawings (including D-704-15 and D-704-20) for signing and striping requirements.

2. **The NO CENTERSTRIPE, DO NOT PASS, FRESH OIL LOOSE ROCK, and SPEED LIMIT signs shall be placed just after all important intersections and every 5 miles in both directions of travel, shall remain covered until the seal coat operation is within 3 miles of that portion of the project, and shall remain until the project is complete. If the newly sealed areas continue to present a flying chip hazard after seal operations have been halted for the day or week, these signs shall be placed and covered, as above, and uncovered in the evenings and on weekends.**

3. **The ROAD WORK AHEAD, BE PREPARED TO STOP, and FLAGGER AHEAD signs shall be set up in both directions of travel and taken down daily. These signs shall be moved ahead each day to maintain the required spacing from the work area as the seal work progresses.**

4. Speed limit reductions can be made in 30 mph increments.

5. **The short-term centerline striping shall be applied to the entire length of the sealed area before sunset each day. The broken line shall be 4 inches wide and either 4 feet long with 36-foot unpainted gaps or 10 feet long with 30-foot unpainted gaps. The 4-foot stripe is generally used on the first pass of the seal coat where the stripe will be covered up again. The 10-foot stripe will generally be used after the second pass as the final stripe. The barrier stripe shall be a double 4-inch wide stripe and cover the full length of the no-passing zone.**

Seal Coats (cont.)

Multi-Lane Roads:

1. Refer to the NDDOT *Design Manual*, *Standard Specifications*, and all applicable Standard Drawings (including D-704-34) for signing and striping requirements.

2. **The speed limit through the work zone shall be 10 mph less than the posted speed in areas where no work is present. Speed limit reductions can be made in 30 mph increments.**

3. **The short-term pavement striping shall be applied before the traffic control work zone is taken down or moved ahead and the roadway opened to traffic. The broken line between lanes shall be 4 inches wide, 10 feet long with 30-foot unpainted gaps.**

Standard Signs

W21-1A

W21-5

W21-6

W4-1

W4-2

W4-3

W3-4

W20-7a

W8-1

W8-3

W8-4

W8-1 hinged

RW 079*

W20-1

W8-1 hinged

* State numbers

RW 079* hinged

W16-7pL

W22-8

W20-5

RW 241*

W20-4

Object Marker
OMI-3 18 x 18

W21-6

W3-5

Object Marker
OM-3L

Object Marker
OM-3R

R2-1

G20-4

TW 047*

R4-1

* State numbers

W8-12

W3-1

W3-5

G20-55-96

G20-2

G20-2

R1-1

RR 127*

W7-3a

W16-2P

W13-1P

RW-145*

RW-082*

TW-104*

RR-161*

RR-162*

R1-2aP

* State numbers

R1-2

W3-2

W13-4P

E5-1-48

W20-2

W20-3

R11-2

R11-3a

M4-10

M4-8

M6-1

M5-1

M1-1

M1-4

M1-5

G20-1

G20-1