
Work Zone Traffic Safety During Disaster Recovery Efforts

Inform recovery crews about the special hazards they will face and how to protect themselves when they work in areas with moving equipment and traffic.

Develop and use a traffic control plan for the work zone – provide traffic flow details and train crew members to stay clear of all motorized equipment.

Provide all crew members with high-visibility apparel and headwear that can be seen in daylight and at night, and that are suited to the conditions. Ensure that apparel is used by crew members so that they are conspicuous to motorists and equipment operators.

Signs – Protect recovery crews exposed to traffic by giving motorists plenty of advance warning of upcoming work zones. Post warning signs (e.g., REDUCED SPEED AHEAD, WORK ZONE AHEAD, ROAD CLOSED, EVACUATION ROUTE, FLAGGER AHEAD, MERGE AHEAD, etc.) along the roadway to warn drivers of the work in progress.

On urban streets, place the first warning sign ahead of the work zone at a distance (in feet) of 4 to 8 times the speed limit (in mph). The high end of the range should be used when speeds are relatively high. For example, at 35 mph the first warning sign should be 140 feet ahead of the work zone.

Traffic Control – Use positive protective barriers (e.g., concrete, sand-filled barriers), highway channeling devices, traffic cones, and flaggers to steer traffic away from work crews.

Flaggers – Ensure flaggers use high-visibility apparel and headwear that can be seen in daylight and at night, and are

- Trained/certified and use authorized signaling methods.
- Clearly visible to the first approaching vehicle at all times and are located to allow the first approaching vehicle plenty of advance notice.
- Stationed far enough ahead of the work zone that they have time to warn road crews if approaching vehicles appear dangerous or out of control (use audible warnings devices such as horns or whistles).
- Standing on the shoulder adjacent to the traffic being controlled or in the closed lane, not in an active lane.
- Standing alone. Never permit other crew members to gather around the flagger station.

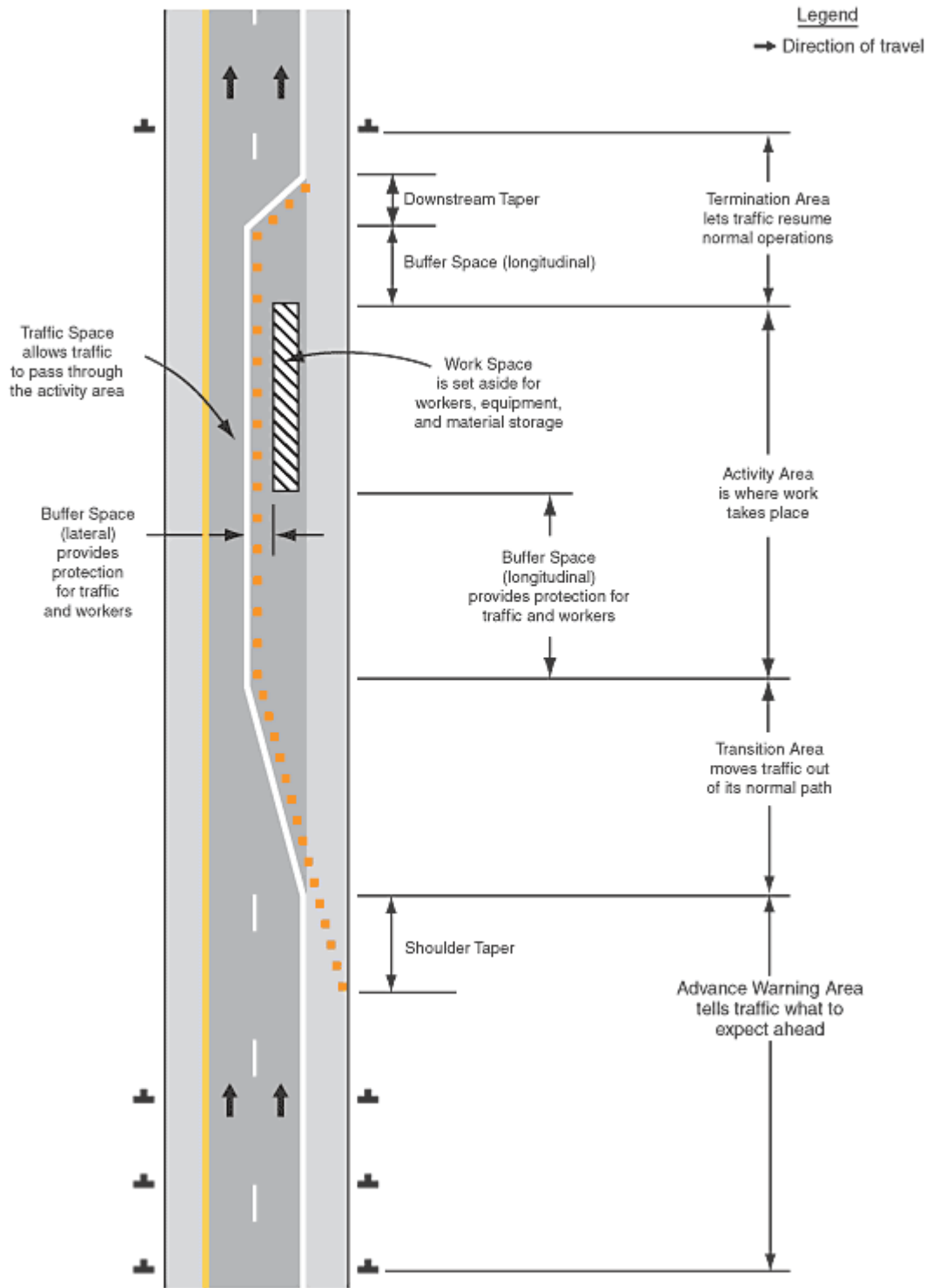
Lighting – Ensure that the work zone, including the flagger, is well lit, but control glare so that work crews and passing motorists are not blinded.

Training – Train crew members not to stand between mechanical equipment and fixed objects, or in blind spots.

All illustrations from the Manual on Uniform Traffic Control Devices (MUTCD), 2003 Edition with Revision No.1 Incorporated, dated November 2004, U.S. Department of Transportation, Federal Highway Administration. For more information visit www.mutcd.fhwa.dot.gov.

Component Parts of a Temporary

Traffic Control Zone MUTCD, Figure 6C-1



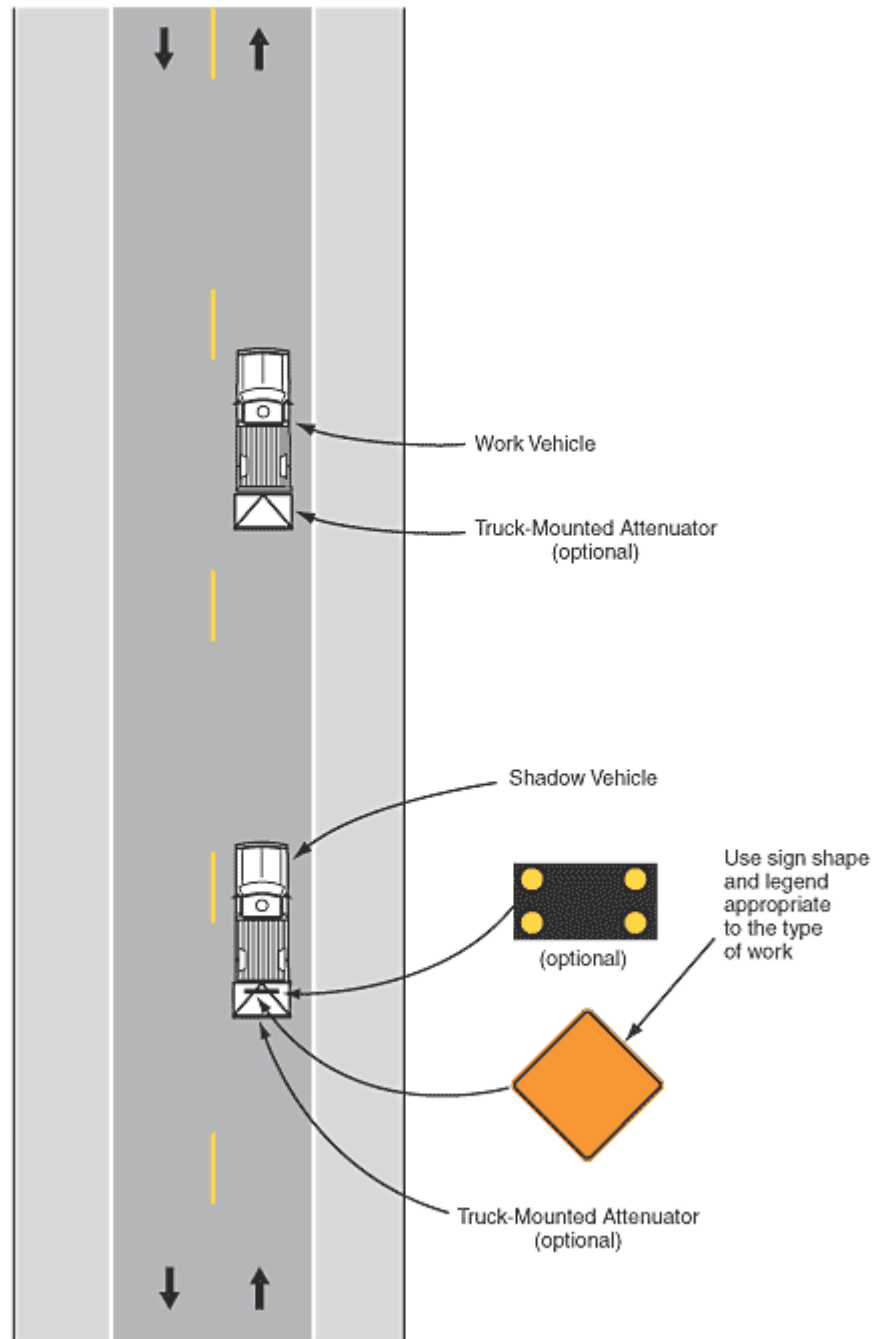
Text Version

The figure shows one direction of a divided highway with two lanes adjacent to each other traveling in an upward direction. A legend shows a black arrow indicating the direction of travel on the roadway lanes. Arrows denoting direction of travel are shown in each lane pointing upward. There are left and right shoulders shown outside of the two lanes. The left shoulder is shown with a solid yellow edge line pavement marking that runs the full length of the figure separating the left shoulder from the left lane. The right shoulder is shown with a solid white edge line pavement marking separating the right shoulder from the right lane that runs from the bottom of the figure to the end of the section of road that is labeled "Advance Warning Area." At the end of the "Advance Warning Area," the right lane and right shoulder are shown as closed and shown as reopened beyond the end of the section of road that is labeled "Downstream Taper." Four component parts of a temporary traffic control zone are illustrated on the right side of this figure, which are described as follows:

- At the bottom of the figure, the first component part of a temporary traffic control zone is labeled the "Advance Warning Area tells traffic what to expect ahead." This area is illustrated with solid white line edge pavement markings along the right edge of the roadway, which separates the right shoulder from the right edge of roadway. Along the center of the roadway, a broken white line is shown that runs the full length of the advance warning area separating the two lanes of traffic. Also within this area, a solid yellow line edge is shown along the left edge of the roadway, which separates the left shoulder from the left edge of the roadway. Three symbols in the shape of an upside-down letter "T" representing a sign location are shown along the right side of the road equally spaced apart in the advance warning area. The upper portion of the advance warning area is shown as an area labeled "Shoulder Taper." Within this area, a series of equally spaced orange squares are shown that run diagonally from the right edge of the shoulder to the left edge of the shoulder.
- Directly above the advance warning area traveling upward, the next component part of the temporary traffic control zone is shown, labeled the "Transition Area moves traffic out of its normal path." In this area along the roadway, a solid white edge line is drawn diagonally from the right edge of the roadway to the center of the roadway. Also, a series of equally spaced orange squares are shown, representing channelizing devices, that run parallel to and to the right of the solid white diagonal edge line noted above.
- Directly above the transition area traveling upward, the next component part of the temporary traffic control zone is shown, labeled the "Activity Area is where work takes place." The activity area is shown divided into two successive spaces, the lower of which is labeled the "Buffer Space (longitudinal) provides protection for traffic and workers." Directly above the buffer space (longitudinal) traveling upward, a space is shown labeled "Work Space is set aside for workers, equipment, and material storage." This space is illustrated as being within the closed right lane and is shown as a rectangular area with diagonal lines within the rectangle. Throughout the activity area, the open lane of traffic is labeled "Traffic Space allows traffic to pass through the activity area." Also throughout the activity area, the portion of the closed right lane that is to the right of the edge line pavement marking and to the left of the work space is labeled "Buffer Space (lateral) provides protection for traffic and workers." Throughout the activity area, to the right of and parallel to the solid white edge line pavement markings, a series of equally spaced orange squares are shown.
- Directly above the activity area traveling upward, the next component part of the temporary traffic control zone is shown labeled "Termination Area lets traffic resume normal operations." The

termination area is divided into three successive spaces; the lower space is labeled "Buffer Space (longitudinal)." Within the buffer space (longitudinal), a solid white edge line is shown along the center of the roadway, and parallel to and to the right of the solid white edge line, a series of equally spaced orange squares are shown. Directly above the buffer space (longitudinal) traveling upward in the middle area of the termination area, a space is shown labeled "Downstream Taper." Within the downstream taper, a solid white edge line is shown drawn diagonally from the center of the roadway to the left edge of the shoulder. Also, equally spaced orange squares are shown directly to the right of and parallel to the diagonal solid white edge line. Directly above the downstream taper area, the solid white edge line is shown to continue upward to the end of the area labeled "Termination Area" and beyond, to the end of the figure, separating the right edge of the pavement from the left edge of the shoulder. A symbol in the shape of an upside-down letter "T," representing a sign location, is shown on the left and right sides of the road, at the upper end of the termination area. Directly above the downstream taper area in the roadway, an arrow is shown in each lane pointing upward denoting the direction of travel. Also, in the center of the roadway above the downstream taper area, a broken white line is shown separating the two lanes of traffic.

Mobile Operations
on Two-Lane Road
MUTCD, Figure 6H-17
Typical Application 17



Text Version

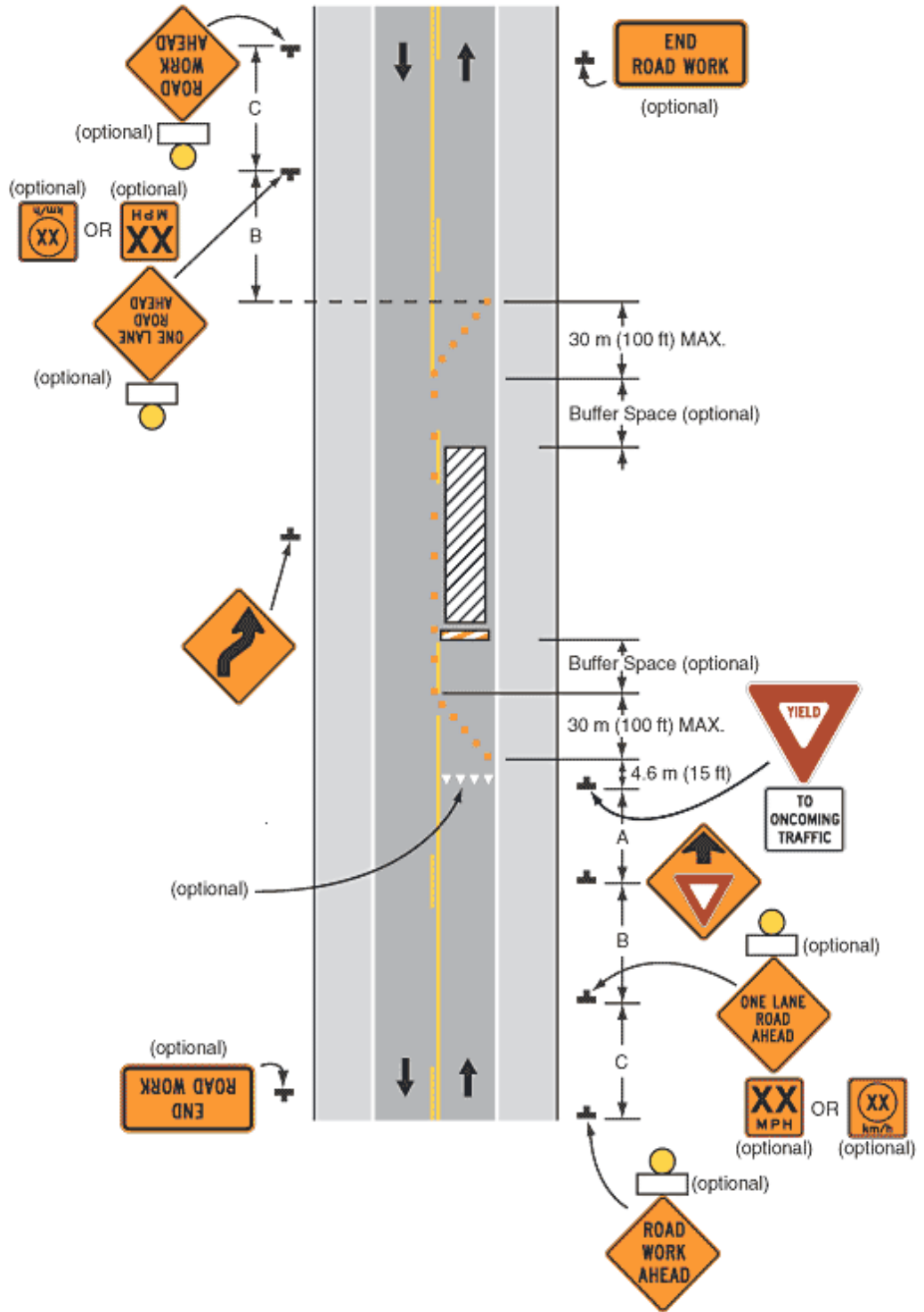
This figure shows a vertical two-lane roadway with one lane of traffic in each direction. A downward-pointing black arrow in the left lane and an upward-pointing arrow in the right lane denote the direction of travel. The opposing lanes are shown separated by a broken yellow line. A shoulder is shown to the right of each travel lane. The shoulders are shown separated from the travel lanes by a solid white line.

One-third of the way from the bottom of the figure in the center of the northbound travel lane, a shadow

vehicle is shown equipped with an arrow panel and a truck-mounted attenuator, both labeled optional. The arrow panel is shown with a yellow dot in each of the four corners on a black background. Also shown mounted on the back of the shadow vehicle is a blank diamond-shaped orange sign. On the right side of the sign, there is an arrow drawn from the blank sign to a note that reads "Use sign shape and legend appropriate to the type of work." Two-thirds of the way from the bottom on the figure, a work vehicle is shown in the center of the northbound lane equipped with a truck-mounted attenuator labeled optional.

Note for the items labeled as optional: Other warning devices may be added to supplement the devices and device spacing may be adjusted to provide additional reaction time or delineation. Fewer devices may be used based on field conditions.

Lane Closure on Two-Lane Road
with Low Traffic Volume
MUTCD, Figure 6H-11
Typical Application 11



Road Type	Distance Between Signs**		
	A	B	C
Urban (low speed)*	30 (100)	30 (100)	30 (100)

Urban (high speed)*	100 (350)	100 (350)	100 (350)
Rural	150 (500)	150 (500)	150 (500)
Expressway/Freeway	300 (1,000)	450 (1,500)	800 (2,640)

*Speed category to be determined by highway agency.

**Distances are shown in meters (feet). The column headings A, B and C are the dimensions shown in figures 6H-1 and 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.

Text Version

This figure shows a vertical two-lane roadway with one lane of traffic in each direction. Downward-pointing black arrows in the left lane and upward-pointing arrows in the right lane denote the direction of traffic. The opposing lanes are shown separated by a broken yellow line with a solid yellow line adjacent to both lanes in advance of the work space. A shoulder is shown to the right of each travel lane. The shoulders are shown separated from the travel lanes by a solid white line.

At the bottom of the figure and to the right of the northbound shoulder, a black inverted "T" is shown denoting a sign. The sign is shown as a diamond-shaped orange sign with a black border and the words "ROAD WORK AHEAD" in black. A yellow warning light labeled optional is shown mounted above the sign. Beyond the sign, at a dimensioned distance C, a sign assembly is shown to the right of the shoulder. It is shown as composed of a yellow warning light labeled optional mounted above a diamond-shaped orange sign with a black border and the words "ONE LANE ROAD AHEAD" in black, which is mounted above a square orange advisory speed plaque with a black border and the words "XX MPH." in black or its metric alternate "km/h." The XX in the km/h sign is within a black circle. This sign assembly is shown at a dimensioned distance B in advance of a diamond-shaped orange sign with a black border shown to the right of the shoulder. The sign shows a vertical upward-pointing black arrow above a red and white YIELD sign symbol. This sign is shown at a dimensioned distance A in advance of another sign assembly to the right of the shoulder. This sign assembly is shown as composed of a triangular red and white YIELD sign mounted above a horizontal rectangular white supplemental plaque with a black border and the words "TO ONCOMING TRAFFIC" in black. Adjacent to this sign assembly, a row of solid white isosceles triangles is shown across the northbound lane. These triangles, denoting a yield line, are shown pointing toward the direction of travel. Beyond the sign assembly and yield line at a dimensioned distance of 4.6 m (15 ft), a series of orange squares, denoting channelizing devices, is shown. The devices are shown beginning at the far right edge of the right lane and tapering to the left to the broken yellow line separating the opposing travel lanes for a dimensioned distance of 30 m (100 ft) MAX. A buffer space labeled optional is shown beyond this taper. Beyond the buffer space, an orange and white Type III rail barricade is shown directly in front of a vertical rectangle with diagonal black and white stripes, denoting a work space. For the length of the buffer space and to the left of the work space, a row of channelizing devices is shown along a broken yellow line. Opposite the work space to the left of the southbound shoulder, an orange triangular sign facing northbound traffic is shown with a black arrow curving to the right and then straight ahead. Another buffer space labeled optional is shown beyond the work space in advance of another series of tapering channelizing devices. The channelizing devices are shown tapering from the yellow line at the end of the buffer space back to the right edge of the right lane for a dimensioned distance of 30 m (100 ft) MAX. To the right of the shoulder and at the top of the figure, a horizontal rectangular

orange sign labeled optional is shown with a black border and the words "END ROAD WORK" in black.

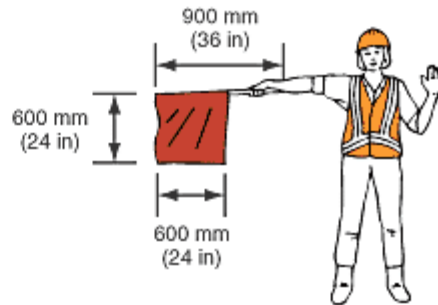
At the top of the figure and to the right of the shoulder of the southbound lane, a black inverted "T" is shown denoting a diamond-shaped orange sign with a black border and the words "ROAD WORK AHEAD" in black. A yellow warning light labeled optional is shown mounted above it. Beyond the sign, at a dimensioned distance C, a sign assembly is shown to the right of the shoulder. It is shown as composed of a yellow warning light labeled optional mounted above an orange diamond-shaped sign with a black border and the words "ONE LANE ROAD AHEAD" in black, which is mounted above a square-shaped orange advisory speed plaque with a black border and the words "XX MPH." or its metric alternate "km/h" in black. The "XX" in the km/h sign is within a black circle. This sign assembly is shown at a dimensioned distance B in advance of the last channelizing device of the ending taper in the northbound lane beyond the work space. At the bottom of the figure facing southbound traffic, a horizontal rectangular orange sign labeled optional is shown with a black border and the words "END ROAD WORK" in black.

Note for the items labeled as optional: Other warning devices may be added to supplement the devices and device spacing may be adjusted to provide additional reaction time or delineation. Fewer devices may be used based on field conditions.

Use of Hand-Signaling Devices by Flaggers

PREFERRED METHOD
STOP/SLOW Paddle

EMERGENCY SITUATIONS ONLY
Red Flag



TO STOP TRAFFIC



TO LET TRAFFIC PROCEED



TO ALERT AND SLOW TRAFFIC

Text Version

For all illustrations, the flagger is shown dressed in an orange safety helmet and orange safety vest with two vertical white stripes that join a horizontal white stripe at the bottom of the vest.

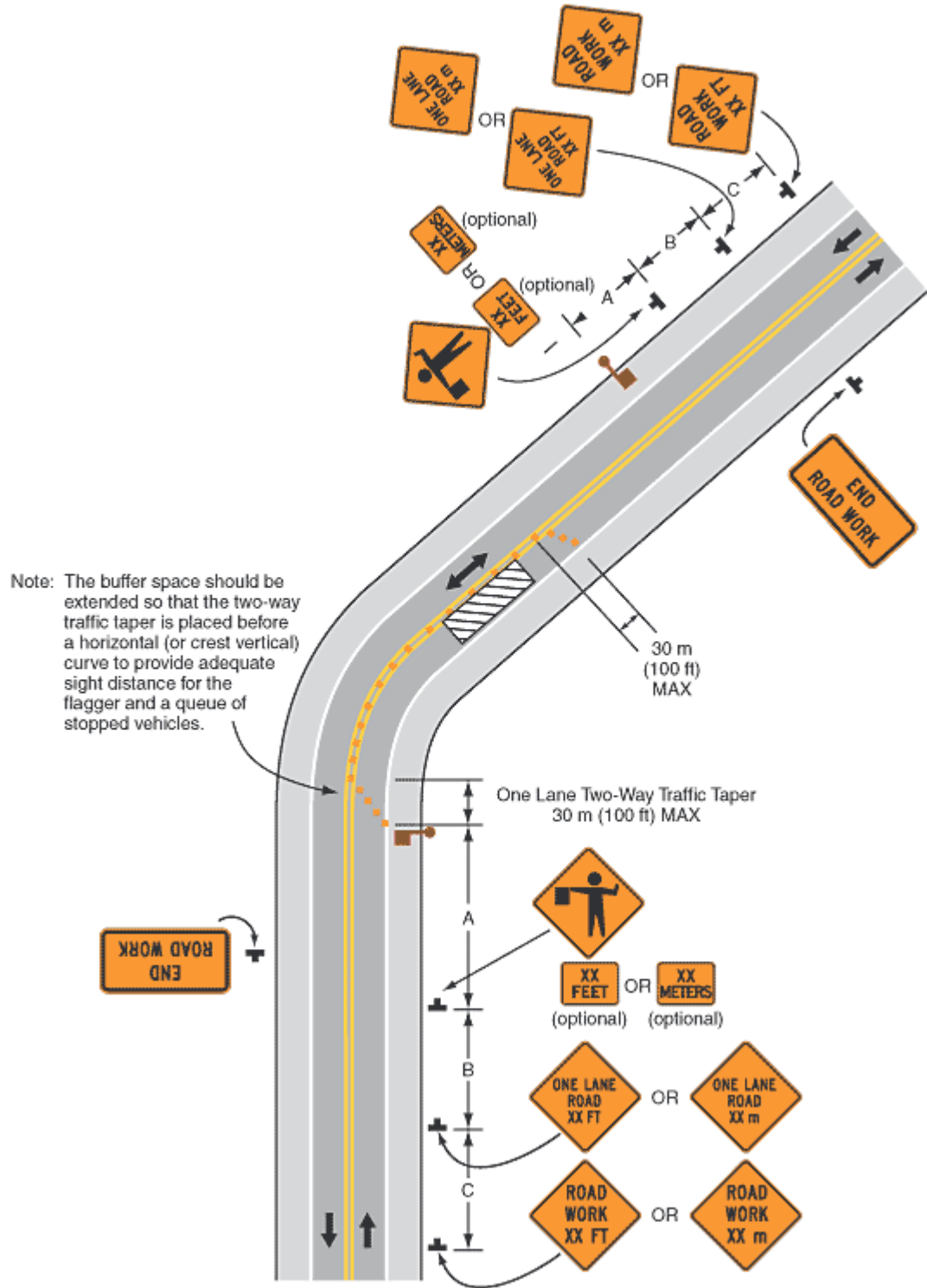
Two methods of signaling are shown: one labeled the "preferred method" and another labeled "emergency situations only." For the preferred method, the flagger is shown using an octagonal STOP/SLOW paddle. The paddle width is shown as a dimension of "450 mm (18 in) MIN." and is shown mounted on a long pole. The background of the STOP side of the paddle is shown as red with a white border, and the word "STOP" is shown in white. The background of the SLOW side of the paddle is shown as an orange diamond shape surrounded by a black area between the outside of the diamond and the octagonal edges of the sign and shows the word "SLOW" in black. For emergency situations, the flagger is shown using a square red flag with dimensions labeled as 600 x 600 mm (24 x 24 in). The flag is shown attached to a staff or handle that has an overall length, including the flag, that is shown as a dimension of 900 mm (36 in).

Under the heading "PREFERRED METHOD," three illustrations are shown:

- An illustration labeled "TO STOP TRAFFIC" shows the flagger standing facing the viewer and with the STOP side of the paddle facing the viewer, with the flagger's arm holding the paddle extending horizontally away from the body. The flagger is shown holding the free arm with the palm above shoulder level and facing the viewer.
- An illustration labeled "TO LET TRAFFIC PROCEED" shows the flagger standing facing the viewer but with the body angled slightly to the flagger's right and with the SLOW side of the paddle facing the viewer, with the flagger's arm holding the paddle extending horizontally away from the body. The flagger is shown motioning with the free hand swinging in an upward arc from below the horizontal arm toward the flagger's head.
- An illustration labeled "TO ALERT AND SLOW TRAFFIC" shows the flagger standing facing the viewer and with the SLOW side of the paddle facing the viewer, with the arm holding the paddle extending horizontally away from the body. The flagger is shown motioning up and down with the free hand, palm down.

Under the heading of "EMERGENCY SITUATIONS ONLY," three illustrations are shown:

- An illustration labeled "TO STOP TRAFFIC" shows the flagger standing facing the viewer and extending the flag staff horizontally across the road users' lane, with the flag hanging down. The flagger is shown holding the free arm with the palm above shoulder level and facing the viewer.
- An illustration labeled "TO LET TRAFFIC PROCEED," shows the flagger standing facing the viewer but with the body angled slightly to the flagger's right with the flagger's arm holding the flag down next to the body. The flagger is shown motioning with the free hand swinging in an upward arc from below the horizontal arm toward the flagger's head.
- An illustration labeled "TO ALERT AND SLOW TRAFFIC" shows the flagger standing facing traffic and slowly waving the flag in a sweeping motion from shoulder level to straight down. The flagger is shown holding the free arm down at the side of the body.



Text Version

A vertical two-lane roadway is shown, the top half curving to the right. Downward-pointing black arrows in the left lane and upward-pointing black arrows in the right lane denote the direction of travel. The opposing lanes are shown separated by a solid double yellow line. A shoulder is shown to the right of each

direction of travel. The shoulders are shown separated from the travel lanes by a solid white line.

At the bottom of the figure and to the right of the shoulder of the right lane, a black inverted "T" is shown denoting a sign. The sign is shown as a diamond-shaped orange sign with a black border and the words "ROAD WORK XX FT" in black or its metric alternate "XX m." This sign is shown at a dimensioned distance C in advance of another diamond-shaped orange sign with a black border to the right of the right shoulder. It shows the words "ONE LANE ROAD XX FT" in black or its metric alternate "XX m." This sign is shown at a dimensioned distance B in advance of a sign assembly to the right of the right shoulder. This assembly is shown as composed of a diamond-shaped orange sign with a black border and a black symbol of a flagger above a horizontal rectangular orange supplemental plaque labeled optional with a black border and the distance "XX FEET" in black or its metric alternate "XX METERS." This sign assembly is shown at a dimensioned distance A in advance of a red symbol for a flagger, shown on the right shoulder. Beginning where the flagger is shown and at the white line separating the shoulder from the right lane, a series of orange squares, denoting channelizing devices, are shown tapering in to the solid double yellow line separating the opposing traffic lanes. This taper is denoted as a "one lane, two-way traffic taper" at a dimensioned distance of 30 m (100 ft) MAXIMUM. Beyond this area, the channelizing devices continue along the solid double yellow line as the road is shown curving to the right. A note states "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."

Beyond the curve, the work space is shown in the right lane, represented by a vertical rectangular black and white diagonally striped box. The channelizing devices are shown continuing along the solid double yellow line to a point one device beyond the work space and then tapering back to the right shoulder for a dimensioned distance of 30 m (100 ft) MAXIMUM. Near the top of the figure, a horizontal rectangular orange sign with a black border is shown to the right of the right shoulder with the words "END ROAD WORK" in black.

At the top of the figure, to the outside of the left lane, the same three diamond-shaped orange signs are shown at the same dimensioned distances in advance of another flagger symbol in advance of the work space. Beyond the work space and roadway curve in the left lane, another End Road Work sign is shown.

Note for the items labeled as optional: Other warning devices may be added to supplement the devices and device spacing may be adjusted to provide additional reaction time or delineation. Fewer devices may be used based on field conditions.

www.osha.gov

www.dol.gov

Page last updated: 04/21/2009