

MPW Work Zone Training

Manual on Uniform Traffic Control
Devices (MUTCD) &

Iowa Code Sec. 321.255

Iowa DOT Flagger's Handbook

OSHA



**Muscatine
Power and Water**

Responsibility

- Providing temporary traffic control in compliance with established practices is a requirement of the public trust; it's simply the right thing to do.
- Iowa has adopted the Federal MUTCD as the state standard.

Liability

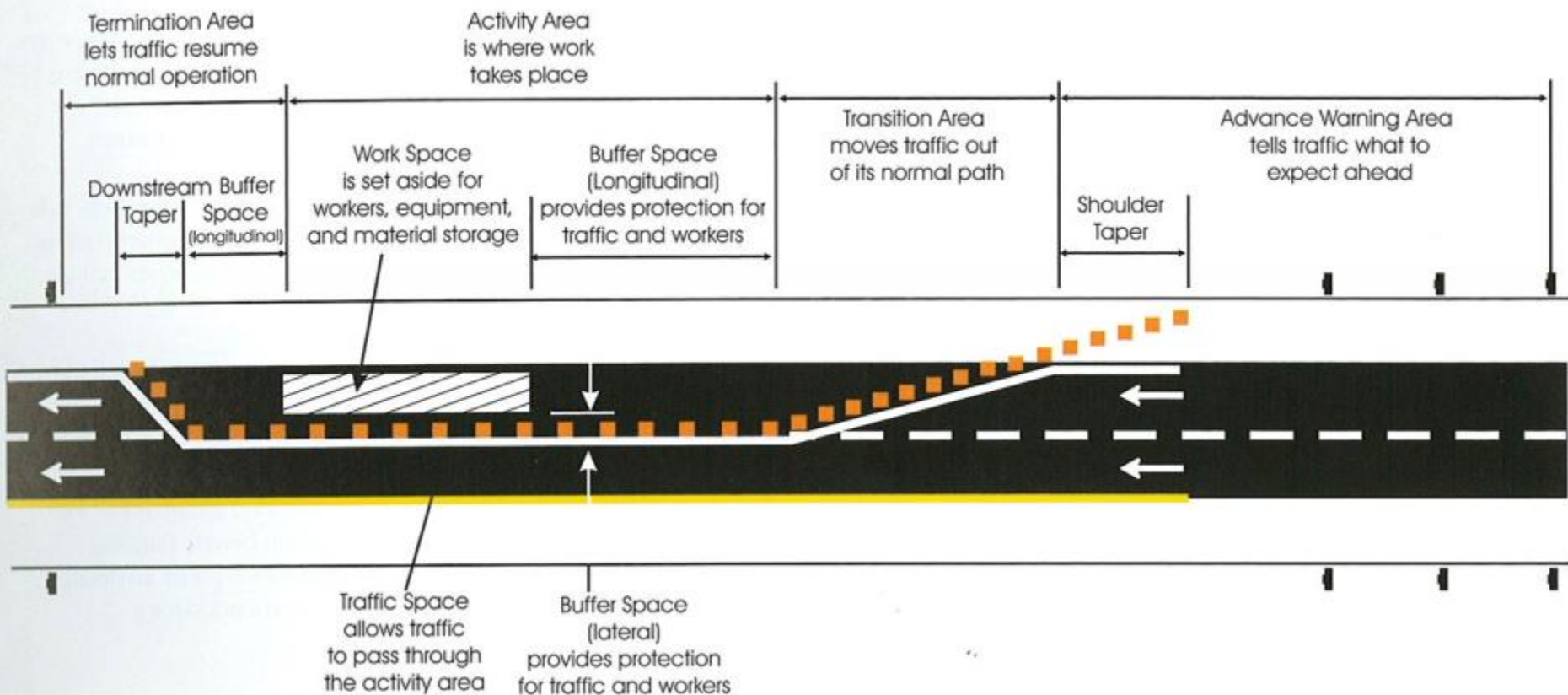
- Improper use of temporary traffic control, deficiency of devices or negligence may result in legal claims against a contractor, agency, or even individual workers.
- Complying with accepted standards and guidance could help avoid and reduce possible legal action.
- Traffic control devices are the major means of communication for road users; so it is most important that design, condition, and placement be proper at all times.

Work Zone Traffic Control Elements

- Most work zones involving major traffic obstructions can be divided into four major components:
 - 1 Advance Warning – Signs – Arrow Boards
 - 2 Transition Area – Taper (Redirects Traffic)
 - 3 Activity Area – Buffer, Work, Traffic Spaces
 - 4 Termination Area – Buffer - Taper - Sign

Work Zone Temporary Traffic Control – Major Elements

A typical work zone, designated with signs and various other traffic control devices is defined as extending from the first advance warning sign or vehicle with amber rotating/strobe light to an END ROAD WORK (G20-2) sign or other device beyond which traffic returns to normal paths.



1 Advance Warning Area

Advance Warning Area

Advance Warning is crucial to safety, and every work zone should include this important feature. Without effective warning, road users cannot be expected to react properly.

The advance warning area is that section of roadway where road users are informed about the activity ahead. Depending on the type of road, traffic volumes and speeds, and degree of obstruction, advance warning might consist of one of the following

- Vehicle with amber rotating/flashing lights
- Single sign
- Series of signs.

When a series of signs are required, information is presented in this order:

1. General information such as ROAD WORK AHEAD (W20-1)
2. Description of activity or obstruction such as RIGHT LANE CLOSED AHEAD (W20-5R) or ONE LANE ROAD AHEAD (W20-4)
3. Specific action such as BE PREPARED TO STOP (W20-7b) or FLAGGER AHEAD (W20-7a)

Advance Warning Sign

- First sign used to inform public that work zone is ahead.
- 48" DOT Standard "Utility Work Ahead".
- NOTE: smaller 36" signs still useable for lower speed roads.



Advance Warning Sign

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

A *- is from the transition to the point of the first sign.

B* – between first and second sign.

C* – distance between second and third sign.

2 Transition Area (Redirect Traffic)

Transition Area

In a transition area, traffic is directed from the normal, intended path to a new course, such as from one lane to another. To accomplish this, the MUTCD requires Channelizing. Channelization, or redirection of traffic, is usually accomplished with tapers.

- The Taper is composed of only one type of device be it cones, channelizers, or barricades.
- Taper length and number of devices is regulated by traffic speed.

Work Zone Temporary Traffic Control – Major Elements

Table 1: Taper Lengths for Lane Closure*

Speed Limit (mph)	Taper Length (ft)	Number of devices	Spacing of Devices (ft)
20	80	5	20
25	125	6	25
30	180	7	30
35	245	8	35
40	320	9	40
45	540	13	45
50	600	13	50
55	660	13	55
60	720	13	60
65	780	13	65
70	840	13	70

* This table does not apply to one lane, two-way (flagger) tapers)

TAPERS – Several types of tapers are available for work zones, depending on circumstances:

- *Merging tapers* are used for lane closures on multi-lane roadways.
- *Shifting tapers* divert traffic to alternate paths without closing lanes.
- *Shoulder tapers* can be used to delineate shoulder closures.

The recommended minimum length of all these taper types depends on the speed of approaching traffic and the width of the lane being closed. Lengths of merging tapers for various speeds are shown in Table 1

Taper Device

ALL Taper Devices used in Transition or Termination must be identical, Cones Barricades or Channelizers.



18" minimum day
time and low speed
roadways < 40



28" minimum, day/night
> 40 mph
6' white reflective band
with 4" reflective band
below



42" DOT Channelizer
Cone and Heavy
Base.
Minimum 3" reflective
white band



Solar/Battery Electric Signboard

- Used to assist in routing traffic to other lane. Pintle Hookup.
- Can be set for R or L Arrow or other patterns.
- Solar/Battery System adjusts brightness for day/night conditions.
- Two available – usually placed behind tapers.



3 Activity Area – (Work Spaces)

Activity Area – The activity area of many work zones can be divided into three main parts:

- Buffer space(s)
 - Work Space
 - Traffic Space
- While Buffers are a good idea, they may not always be possible depending on location conditions.
 - A safe Traffic Space* to allow traffic around the zone is a must.
 - *10' minimum width required for traffic.

3 Activity Area – (Work Spaces)

BUFFER SPACE – Buffers are recommended wherever workers are exposed to high-speed moving traffic. They should not contain equipment, materials, or workers. A buffer area is required in many Iowa DOT applications, so always review specific project requirements carefully.

Longitudinal buffers are a safety protection for workers and road users. They give drivers space to recover in emergency situations. Like many other work zone dimensions, longitudinal buffer space is based largely on the traffic speed. Table 2 suggests buffer lengths for various traffic speeds.

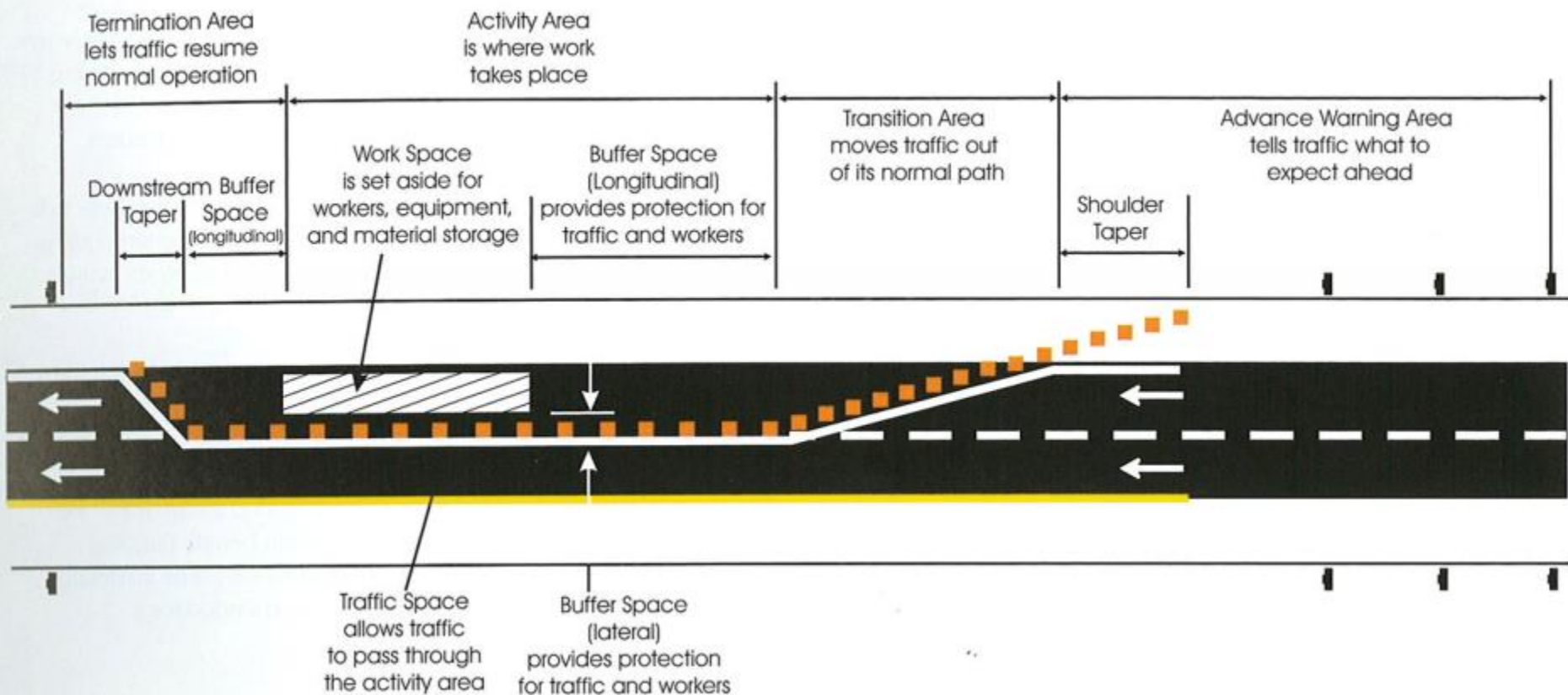
Lateral buffers are especially effective in high-speed and heavy traffic situations where maximum possible separation of workers from moving vehicles is desired. Flaggers are often beneficial on these circumstances as well.

Table 2: Longitudinal Buffer Space

Speed (MPH)	Length (Feet)
20	35
25	55
30	85
35	120
40	170
45	220
50	280
55	335
60	415
65	485
70	585

Work Zone Temporary Traffic Control – Major Elements

A typical work zone, designated with signs and various other traffic control devices is defined as extending from the first advance warning sign or vehicle with amber rotating/strobe light to an END ROAD WORK (G20-2) sign or other device beyond which traffic returns to normal paths.



Traffic Channelizer Device

- 42" DOT Channelizer Cone and Heavy Base.
- Used as Two-Way Traffic Divider on Four Lane or narrow road where wider barricades won't fit.
- Different types of devices can be alternated for this if needed.



4 Termination Area

- Taper to normal roadway path after work zone.
- Use small buffer space if possible.
- Always use identical devices for Termination Taper.
- No set spacing for termination area.
- Use common sense to assure smooth flow of traffic.
- End Work Zone sign is last Device.

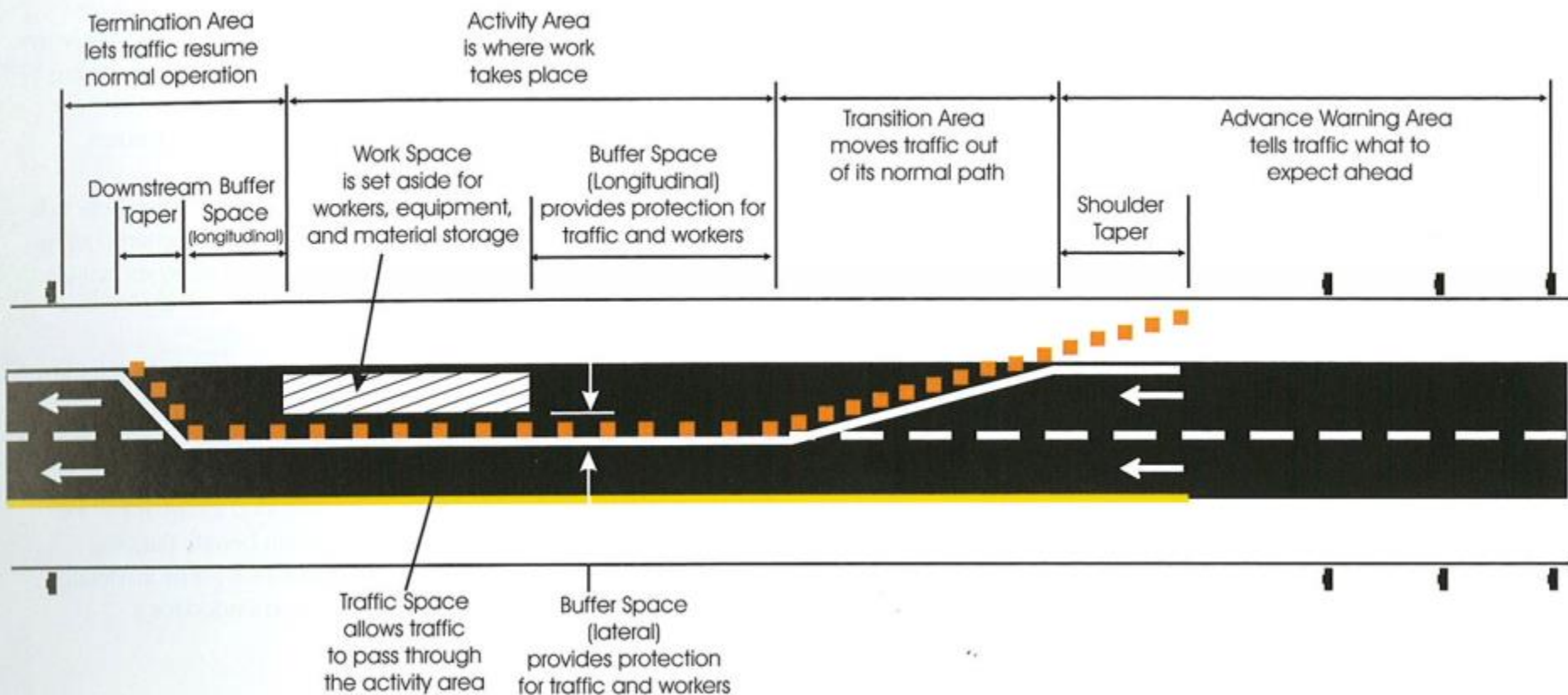
4 Termination Area

- 48" DOT End of Road Work Sign.
- Use as last sign for work zone.
- With this sign in place work zone is legal and Police can ticket drivers for double fines.



Work Zone Temporary Traffic Control – Major Elements

A typical work zone, designated with signs and various other traffic control devices is defined as extending from the first advance warning sign or vehicle with amber rotating/strobe light to an END ROAD WORK (G20-2) sign or other device beyond which traffic returns to normal paths.



Maintain Traffic Control Devices

If we don't respect these devices enough to maintain them, then we cannot expect the traveling public to respect them either.



Maintain Traffic Control Devices

If these devices are not clean enough to be visible at night, then there is no sense even putting them out there.



Special Situations

- There are special requirements for the following work zone operations:
- Closing Streets – Requires City Help
- Barricading Excavations
- Closing Sidewalks (ADA Compliance)
- Flagging Activities

Barricades for Road Closure

- DOT Compliant Class III Barricade.
- Used for Road Closure Only.
- NOTE: Road closure always requires City Notification & Permit.
- Highway DOT notification.



Button up safety closures



In the lower picture, work is currently being performed, recommend that the left side of the closure be opened. That way, a driver would have to make a “conscious” maneuver to pass around the barricade on the left side before entering the work area.

Button up safety closures

Drivers Plunge Off Missing I-235 Bridge

Cars Fall 50 Feet To Road Below

POSTED: 11:29 a.m. CST December 18, 2002

UPDATED: 12:29 p.m. CST December 18, 2002

DES MOINES, Iowa -- Concrete barriers are now blocking a road in Des Moines where a bridge over Interstate 235 once stood.



The barriers went up Tuesday night after a minivan and car plunged down an embankment after driving off the end of Euclid Avenue, where the bridge used to be.

The bridge was torn down as part of the I-235 improvement project last week.

Police said the driver of the van became confused by the space between the barricades, which were intended to block the road. The van flew off, followed by the car.



"I didn't see the van hit, I just saw her go off and up and I didn't see her anymore. I couldn't stop and I knew I was coming off somewhere, but I didn't know where. I didn't know where she went either," driver Melissa Brown said.

The van fell more than 50 feet, hit a concrete support, and crashed to the ground. Brown's car fell in place right behind the van.

"I couldn't stop. We just dropped off before I saw the drop off and I couldn't stop. I just closed my eyes, held onto the wheels and hoped that nothing was going to happen to me," Brown said.

Two years later...

Drivers sue after vehicles plunge

By **JEFF ECKHOFF**

REGISTER STAFF WRITER

Two motorists whose vehicles plunged off the road where an interstate bridge had been demolished say state traffic officials and construction crews should have erected barricades to prevent such accidents.

Polk County court papers allege that Mary Lynne Blair's minivan, with her two children aboard, turned off Interstate Highway 235 onto Euclid Avenue on Dec. 17, 2002, and was airborne for about 50

feet before it collided with a concrete bridge support.

The minivan immediately was followed into the breach by a 1993 Dodge Stealth driven by Melissa Brown.

Their lawsuit alleges that Quality Traffic Control Inc. and Jenson Construction Co. had been hired to install barriers at the site but that none were in place when the accidents occurred.

No serious injuries were reported.

Also named in the lawsuit is the

Iowa Department of Transportation. The department and the two companies failed "to exercise reasonable care" to keep vehicles away from the area, the lawsuit alleges.

A lawyer for the drivers did not return a telephone call seeking comment. A transportation department lawyer declined to comment because he had not seen the lawsuit.

Reporter Jeff Eckhoff can be reached at
(515) 284-8271 or
jeckhoff@dmreg.com

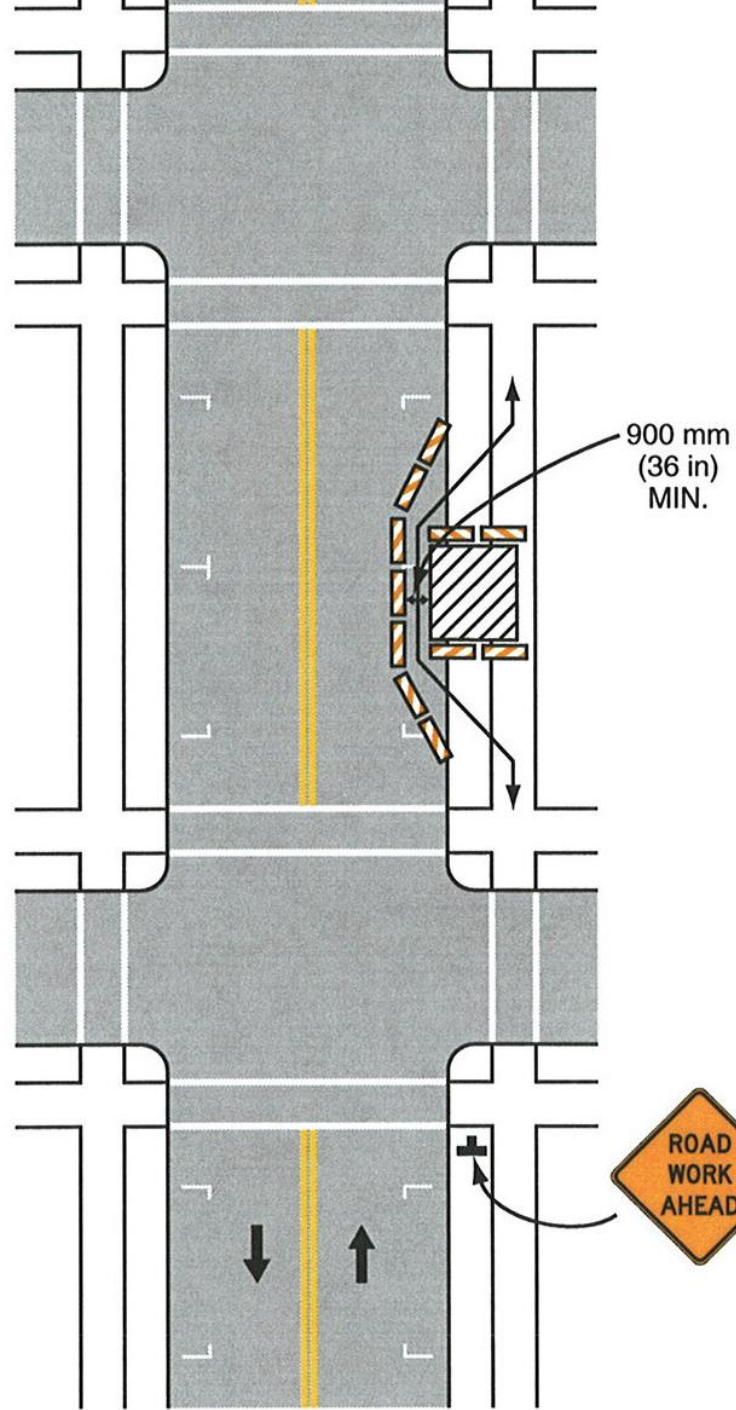
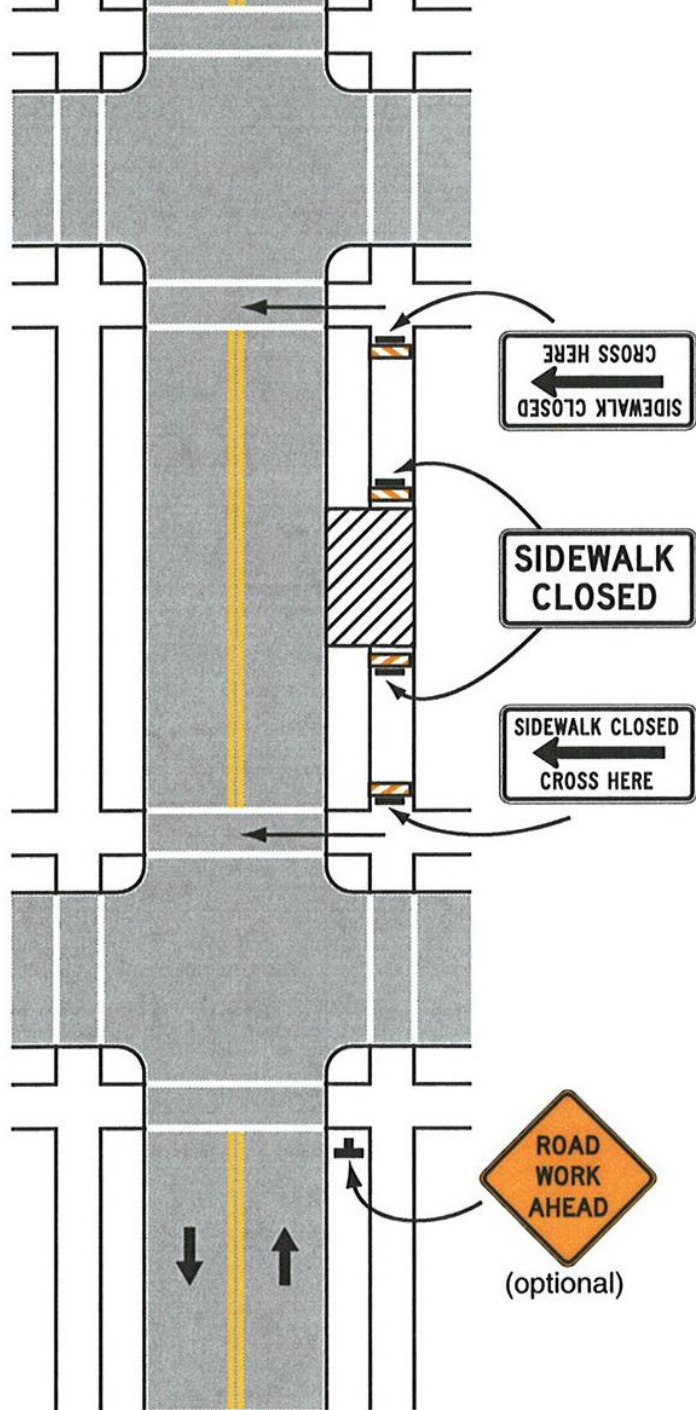
Barricade for Excavations

- DOT Class II.
- Place around excavations left overnight.
- Optional Orange blinker light can be attached for greater effectiveness but must be working.
- Traffic goes to the Left on this barricade.
- Reverse Barricade orientation to have traffic go to the Right.
- Fence all open Excavations for public safety.



Sidewalk Closure (ADA)

- Now required for any work zone that disrupts normal sidewalk use.
- Pedestrians must be redirected safely around any work area.
- If there are no sidewalks, there are no requirement for ADA compliance.
- There are two approved methods.



Flagging

- When flagging is needed due to traffic issues this sign is required in advance for planned flagging activities.
- Emergency flagging does not normally require this sign, however it should be used for an extended time.
- Use shorter taper for planned or emergency flagger.



Work Zone Temporary Traffic Control – Major Elements

Two other taper types do not depend on traffic speed or lane width:

- One lane, two-way taper (used mainly for flagging)
- Downstream (termination) taper

One hundred feet is the maximum recommended length for a one-lane, two-way taper, but a length of 50 feet can benefit flagging operations. Refer to the Iowa Flagger's Handbook for more details. At least 100 feet for each closed lane is recommended for a termination taper length.

CHANNELIZING DEVICES – Several channelization devices are available for use in tapers, including cones, vertical panels, drums, and barricades. Temporary pavement markings should also be used to improve visibility and guidance with long-term lane closures.

Planned Flagging Requirements

- Hi-Vis Flagger Hat or White Hard Hat
- Class II Vest
- Six Ft. Stop/Slow Sign
- Safety Glasses (MPW)
- Safety Shoes (MPW)
- Work Gloves (MPW)
- Radio for coordination
- Lights Required for Night Flagger Stations (Planned)



Emergency Flagging Requirements

- White Hard Hat
- Class II Vest
- Red Flag – Day
- Flashlight – Night
- Safety Glasses (MPW)
- Safety Shoes (MPW)
- Work Gloves (MPW)
- Radio for coordination



Flagging Technique

- To STOP Traffic, stand at side of road.
- Turn STOP toward traffic and extend hand out palm up.
- Look driver in eye.
- When traffic stops move to middle of lane.



Flagging Technique

- To release traffic step to side of road.
- Turn sign to slow.
- Wave traffic on.
- Coordinate flagging activities with other flagger by using radio if needed.
- Sign post can be mounted on heavy base cone for long job.



Emergency Flagging

- Stand at side of road.
- Hold flag out horizontal, with arm up palm out to traffic.
- When traffic stops move into middle of lane.
- Hold traffic until release.
- Use flashlight at night.



Emergency Flagging

- Release traffic by moving to side of road.
- Move flag out of drivers view.
- Wave traffic through.
- Use flashlight at night



One Flagger - One Lane Flagging

- For one lane flagging stop only traffic in blocked lane.
- Allow traffic in open lane to continue.
- Control flagged lane traffic to allow oncoming traffic to clear before opening blocked lane.
- Flagger **MUST** have full visibility of both lanes.

Flaggers need to be alert & visible



Flaggers need to be alert & visible



Flagging Reminders

- Flagging is important work and requires mind/eyes on task at all times.
- Always be professional.
- Never argue with a driver.
- Use clear signals at all times.
- Be prepared and plan for emergencies during flagging activities so you know what to do if something happens.

High-Visibility Apparel Required

Minimum Visible Material-ANSI

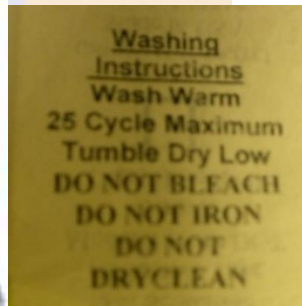
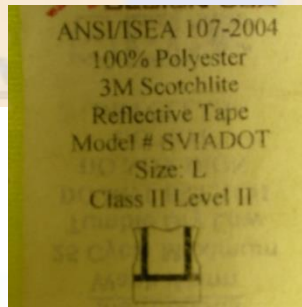
Class 1: 217 sq. in. background,
155 sq. in. retro-reflective

Class 2: 775 sq. in. background
201 sq. in. retro-reflective

Class 3: 1240 sq. in. background.
310 sq. in. retro-reflective

Plus other requirements for performance, color fast, etc.

Class II



Class III

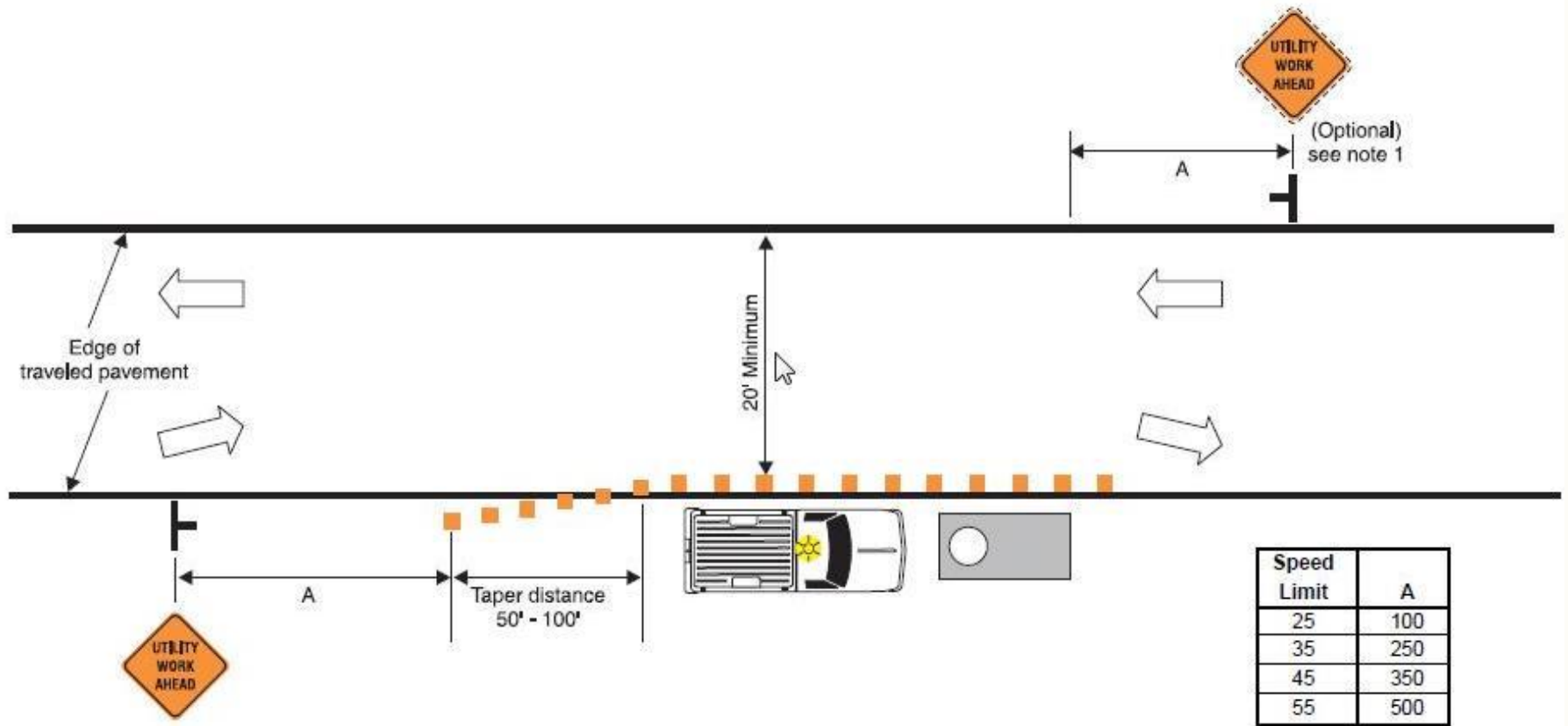


Work Zone Examples

- Use Work Zone Safety for Iowa Booklet as a guide for your set up where possible.
- Most “normal” situations are covered, however there are always variations and issues for each work zone you may encounter.
- Advance planning can make job easier.

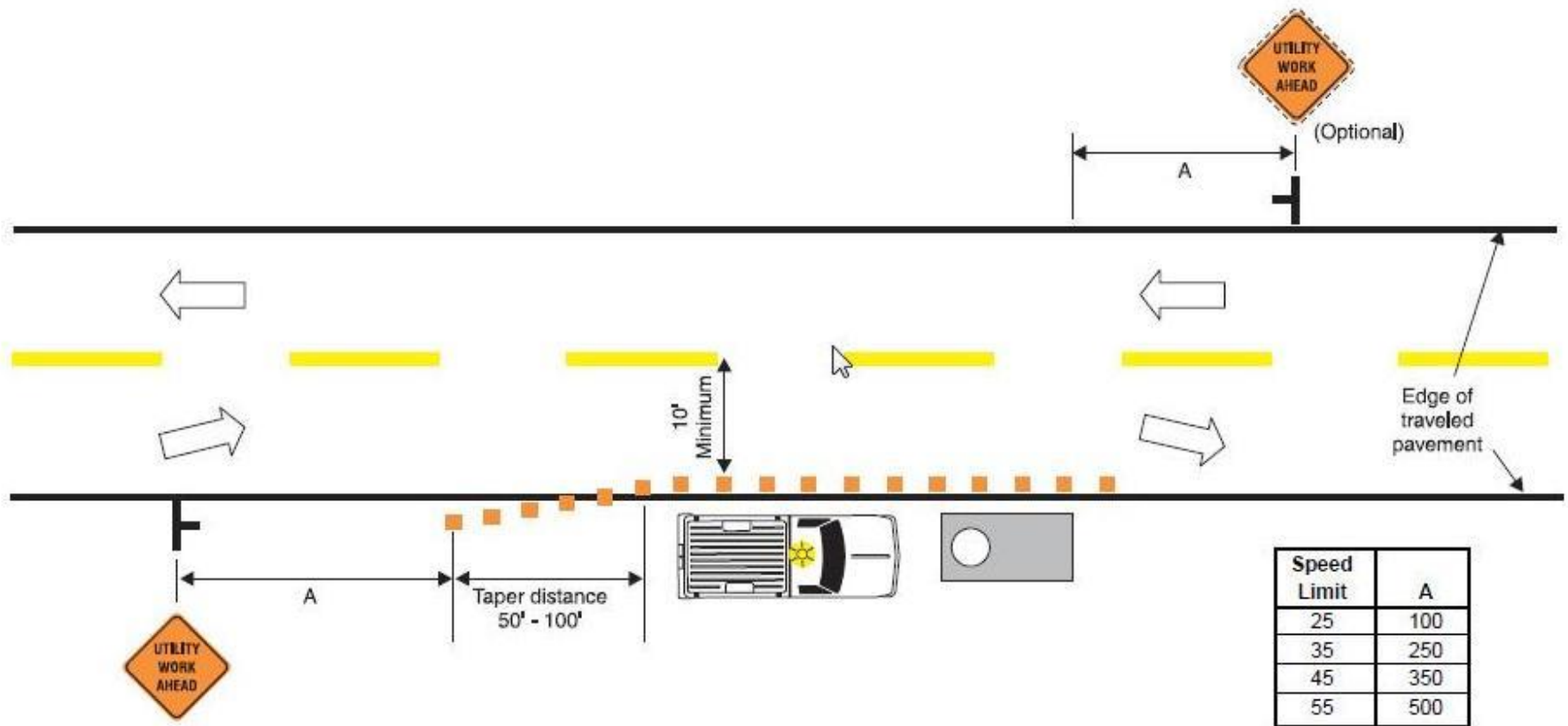
UT-1

Typical Application: Minor Encroachment With Utility Work Zone on Two-lane Road Without Centerline



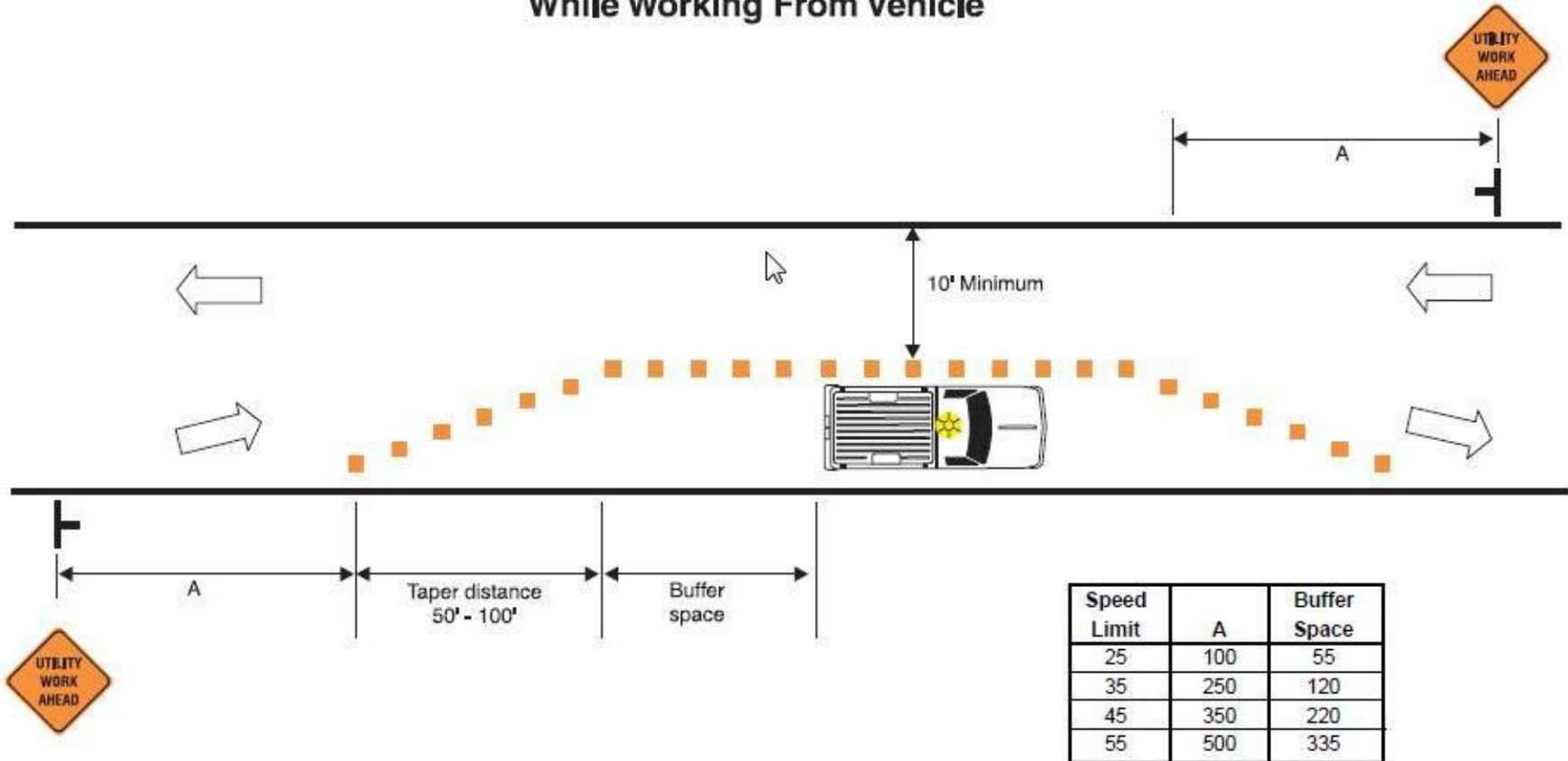
UT-2

Typical Application: Minor Encroachment With Utility Work Zone on Marked Centerline Two-lane Road



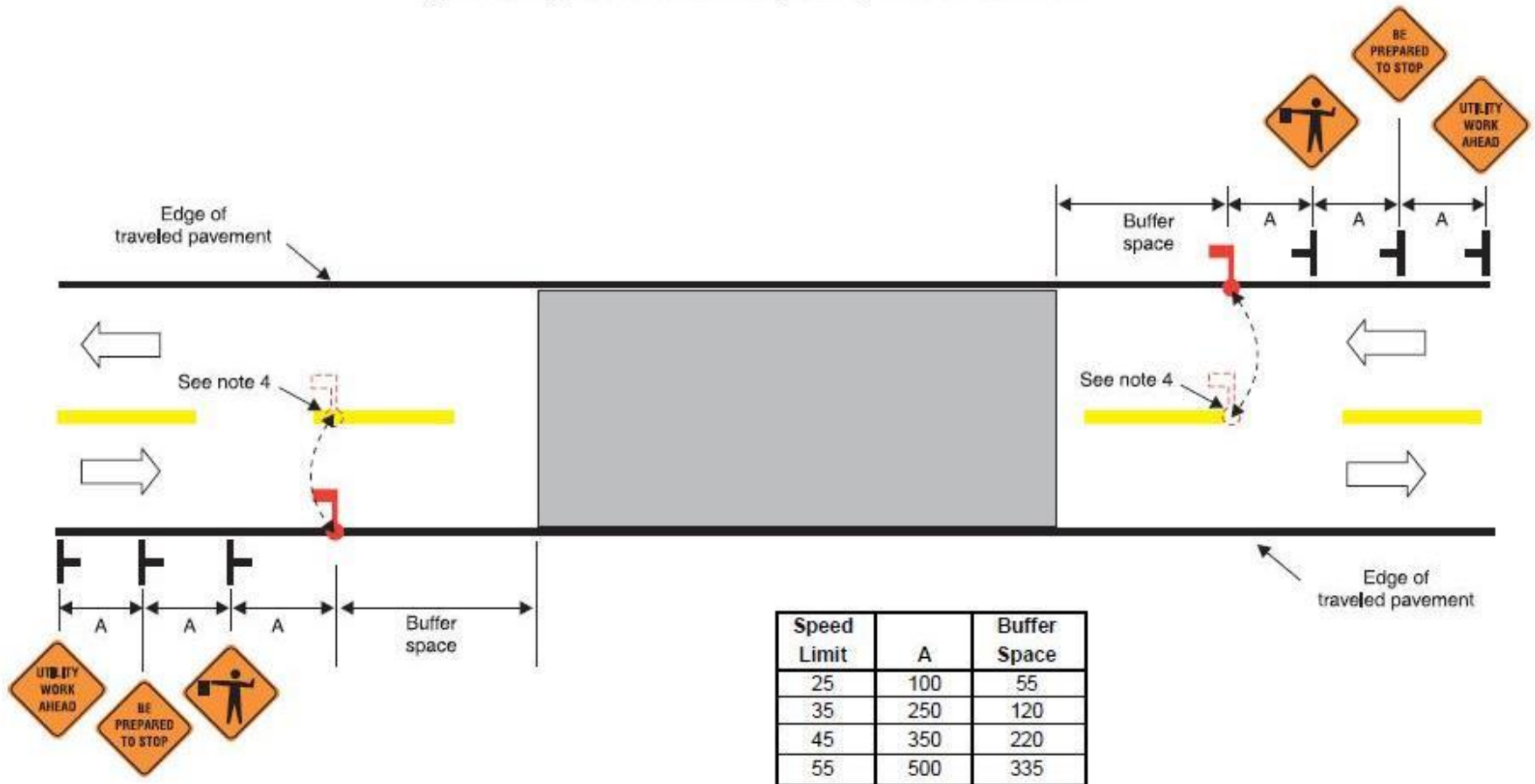
UT-4

**Typical Application: Major Encroachment on Residential Street
or on Rural Gravel Roadway
While Working From Vehicle**



UT-6

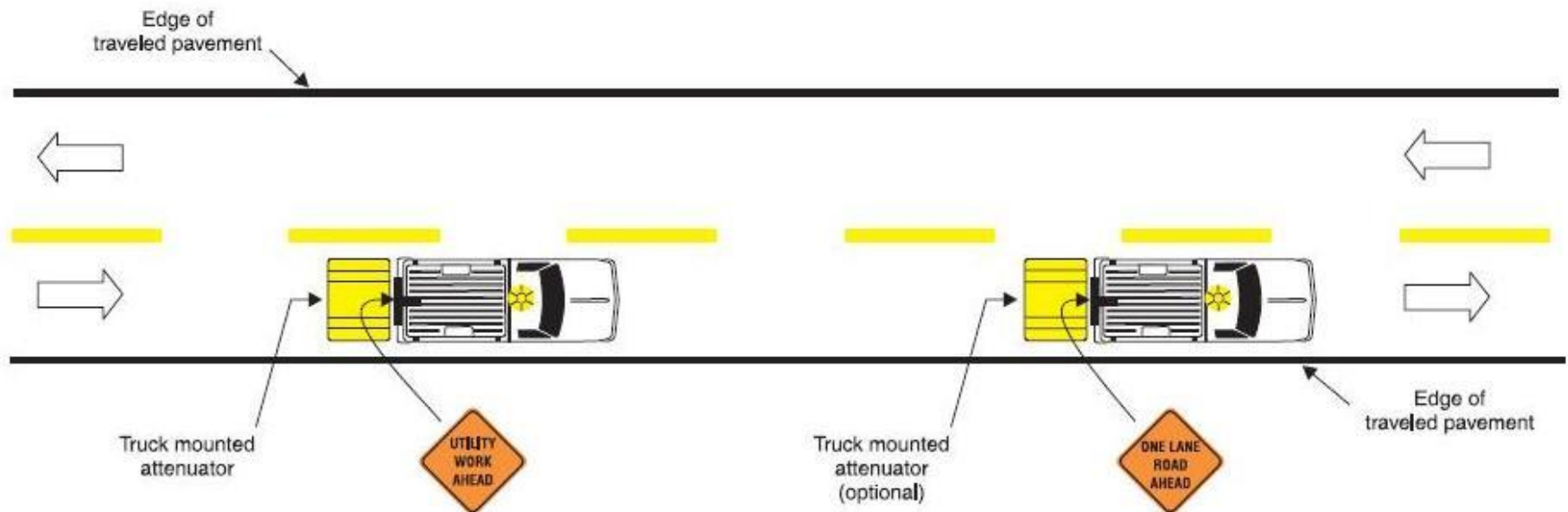
Typical Application: Temporary Road Closure



Sign spacing should be increased on higher volume roadways.

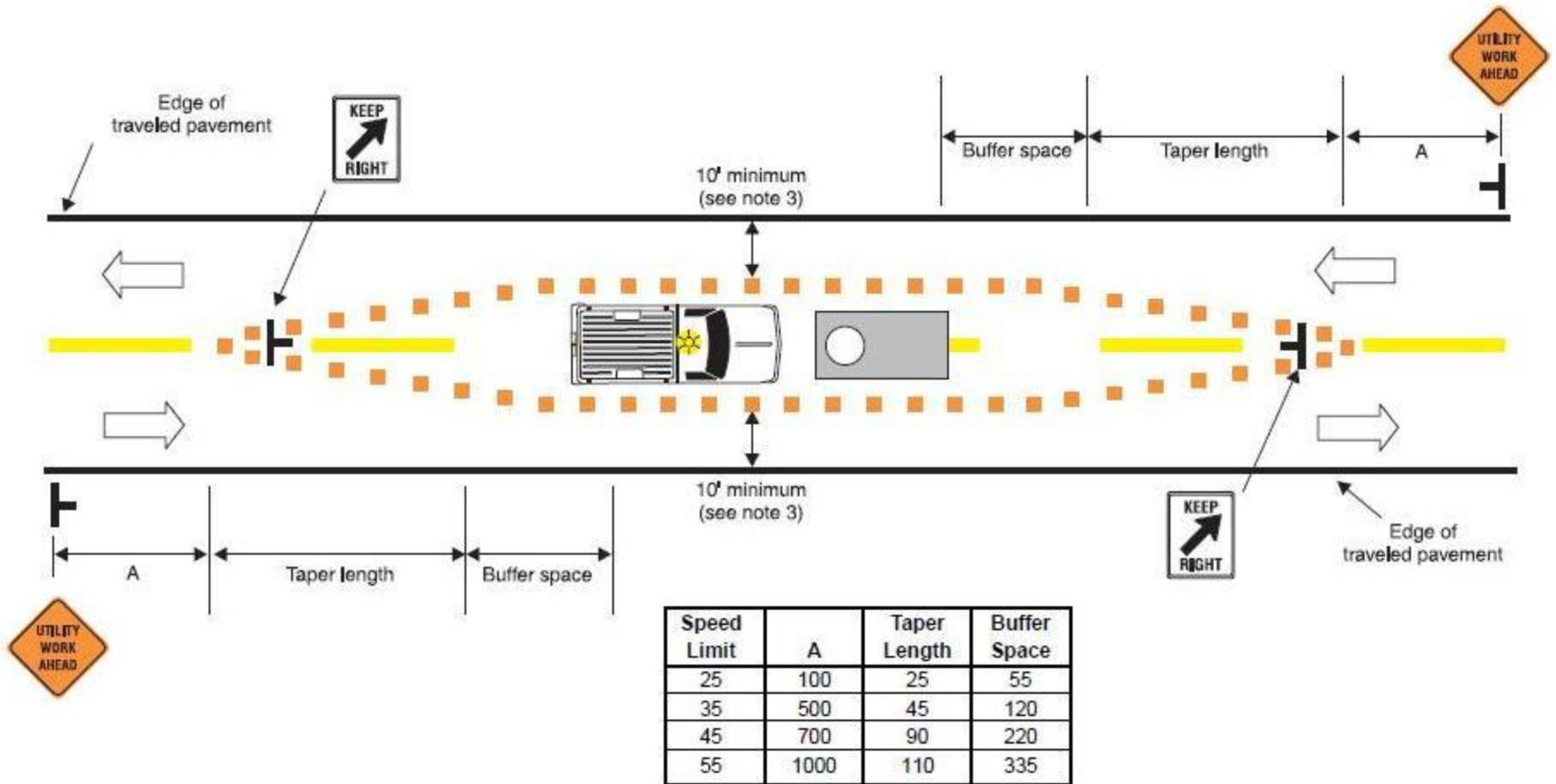
UT-7

Typical Application: Mobile Operations on Two-lane Road



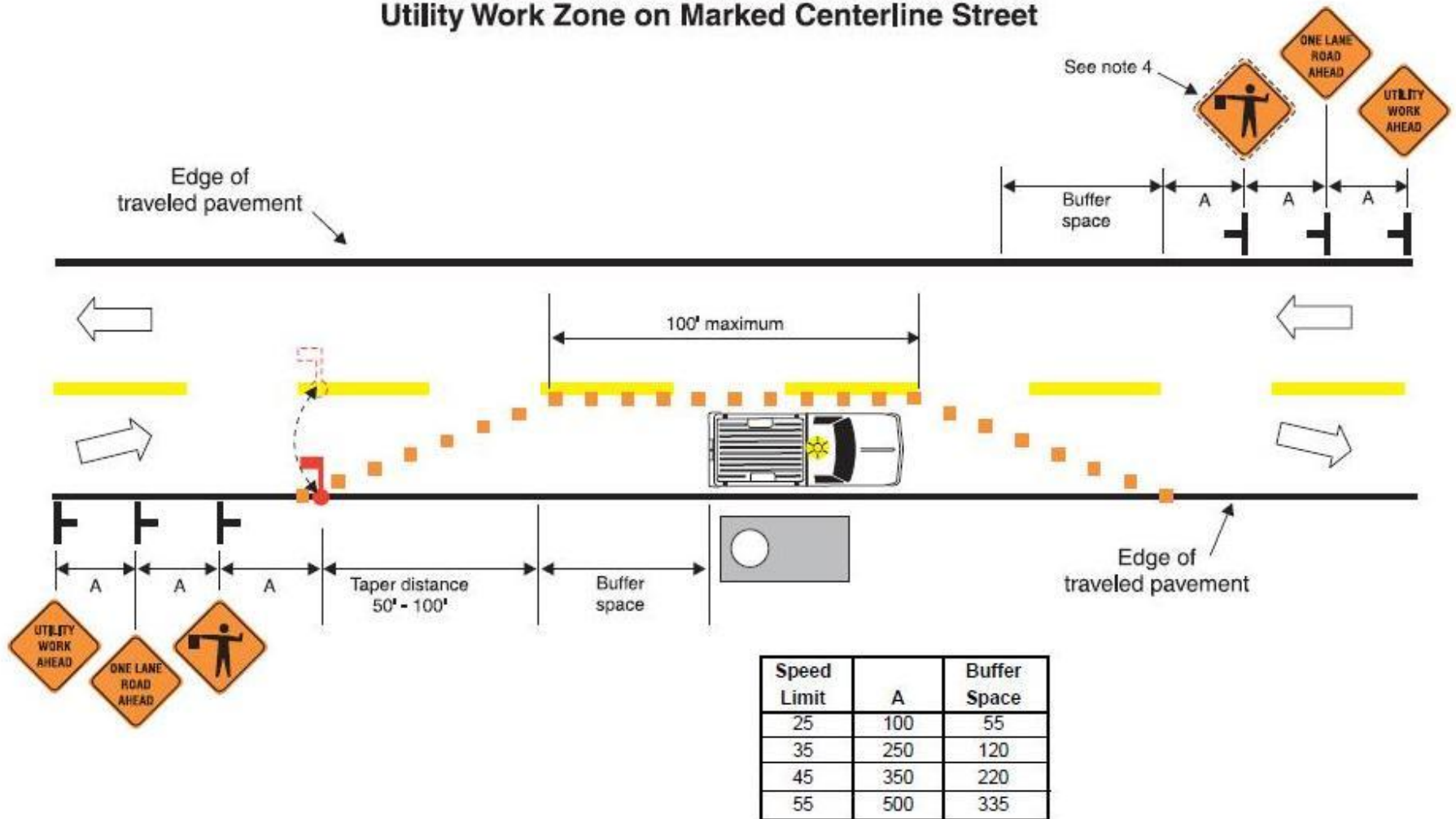
UT-8

Typical Application: Utility Work Zone in Middle of Two-lane Urban Street



UT-9

Typical Application: Major Encroachment With Utility Work Zone on Marked Centerline Street



Typical Application 6

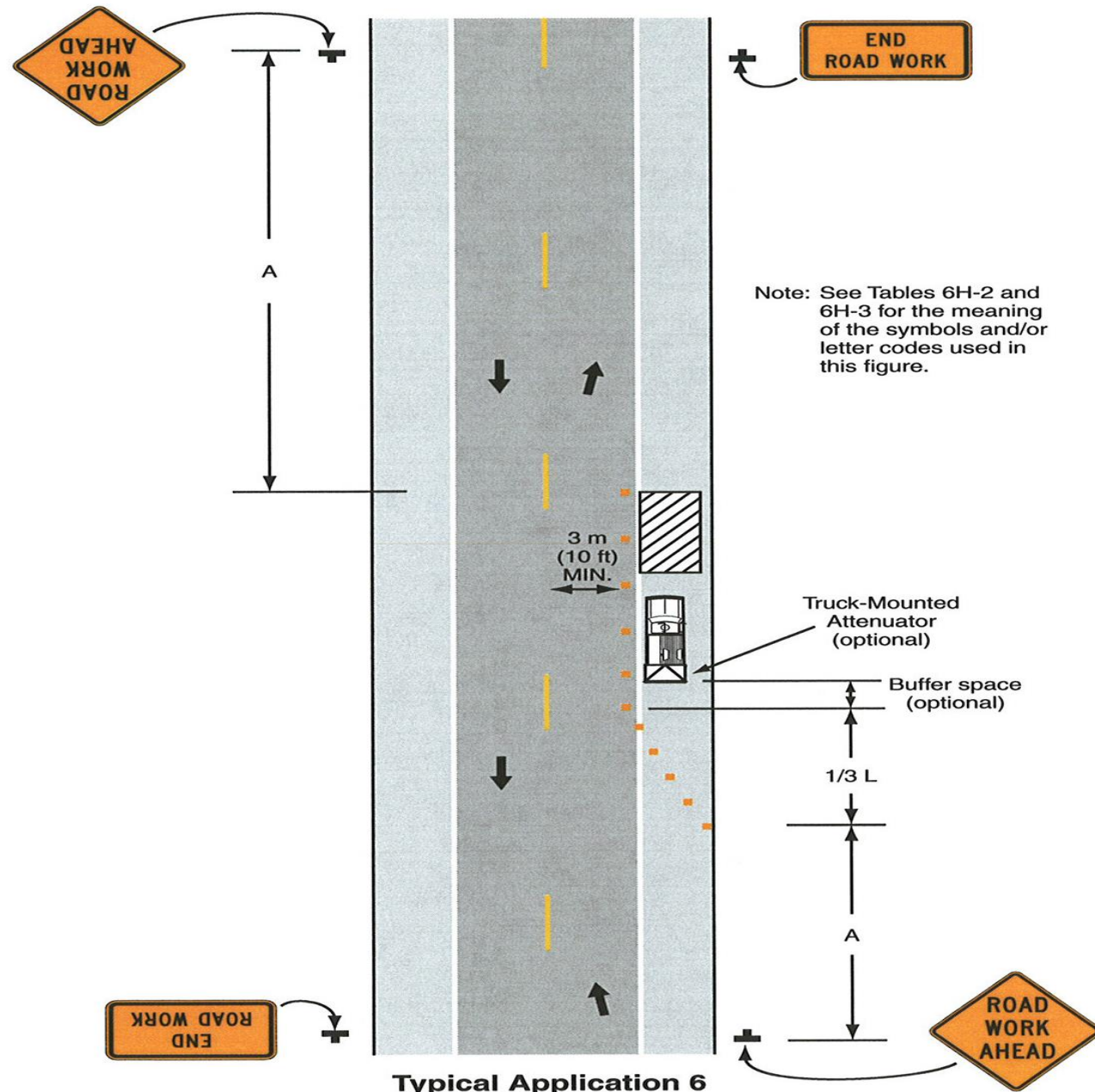
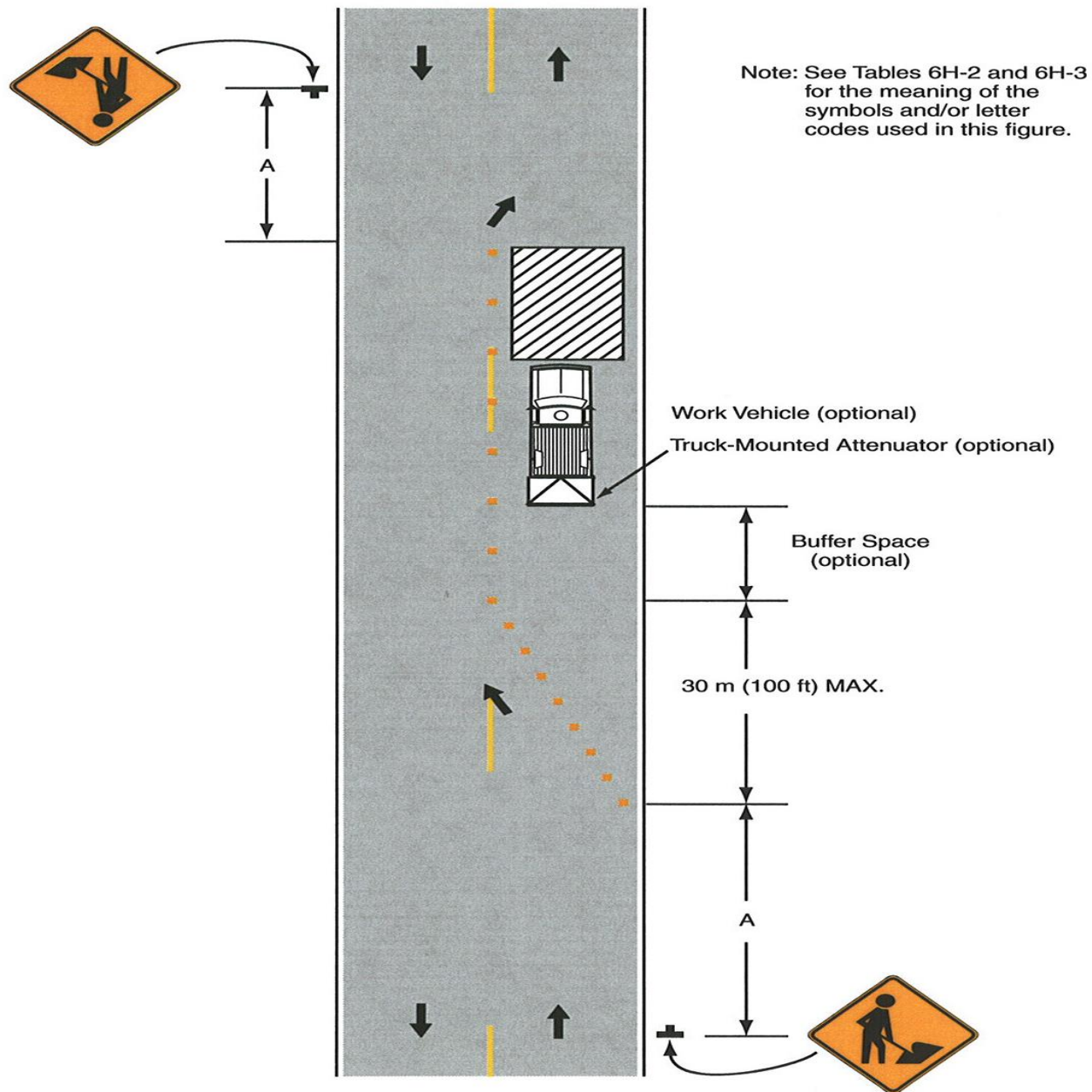
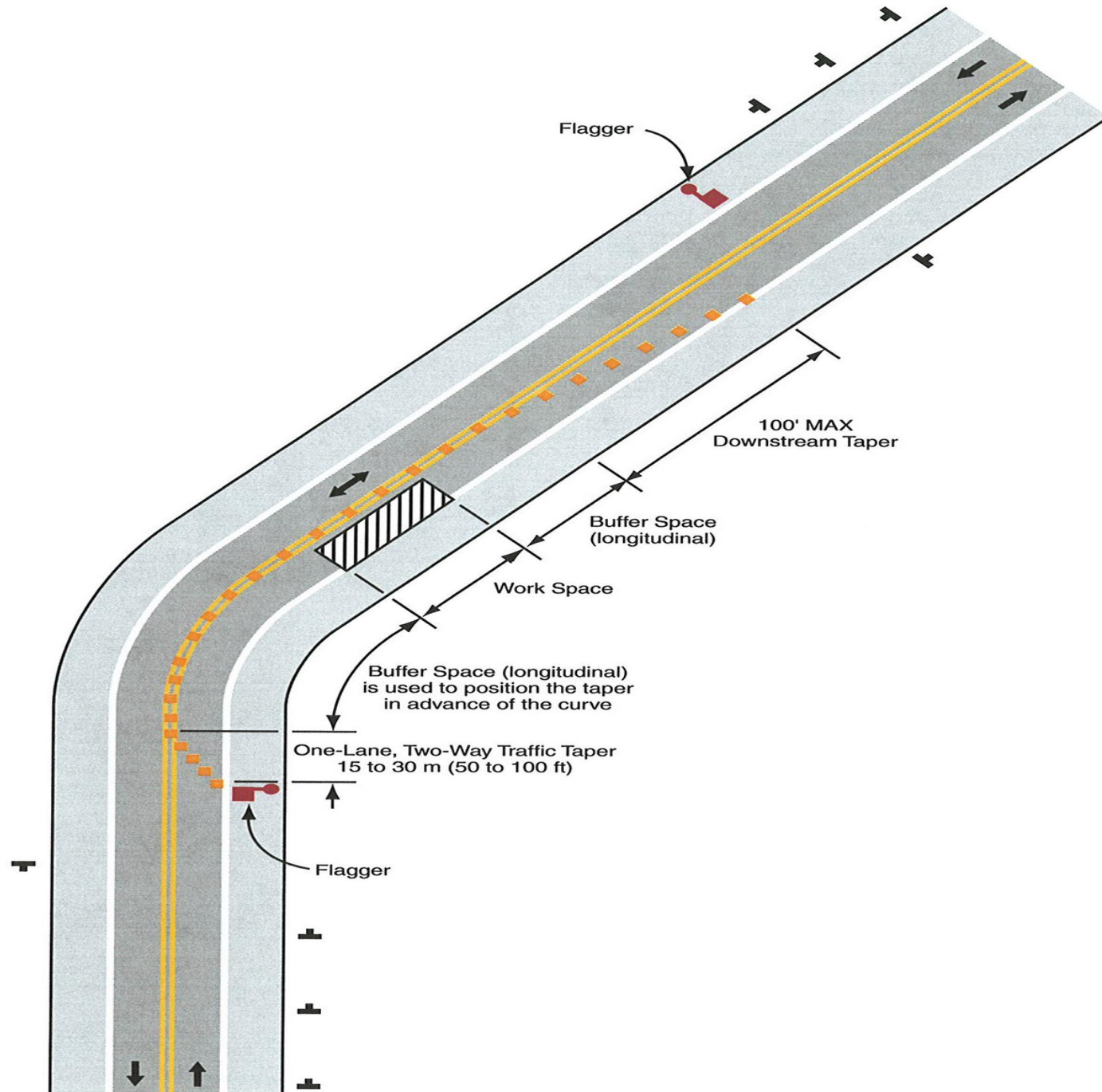


Figure 6H-18. Lane Closure on Minor Street (TA-18)



Typical Application 18

Figure 6C-3. Example of a One-Lane, Two-Way Traffic Taper



The diagram illustrates the layout of a two-lane road work zone. It is divided into three main sections: the advance warning area, the transition area, and the work area.

- Advance Warning Area:** Located on the left, it features a diamond-shaped sign reading "ROAD WORK AHEAD" and a rectangular sign showing a lane shift. The distance from the start of the transition area to the start of the work area is labeled "A". The distance from the start of the transition area to the start of the work area is also labeled "1/2 L".
- Transition Area:** This area is marked by a dashed line and a solid line. It contains a hatched rectangular area representing the work zone. The width of the work zone is indicated by a dimension line. The distance from the start of the transition area to the start of the work area is labeled "1/2 L".
- Work Area:** The central area where the work is taking place, marked by a dashed line. It contains a hatched rectangular area representing the work zone. The width of the work zone is indicated by a dimension line. The distance from the start of the transition area to the start of the work area is labeled "1/2 L".
- End of Work Area:** Located on the right, it features a rectangular sign reading "END ROAD WORK" and a diamond-shaped sign reading "ROAD WORK AHEAD". The distance from the end of the transition area to the end of the work area is labeled "A".

Additional details include:

- A note: "Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure."
- A dimension line indicating "3 m (10 ft) minimum to edge of pavement or outside edge of paved shoulder".
- Optional signs: "ROAD WORK AHEAD" and "END ROAD WORK" signs.

Figure 6H-22. Right Lane Closure on Far Side of Intersection (TA-22)

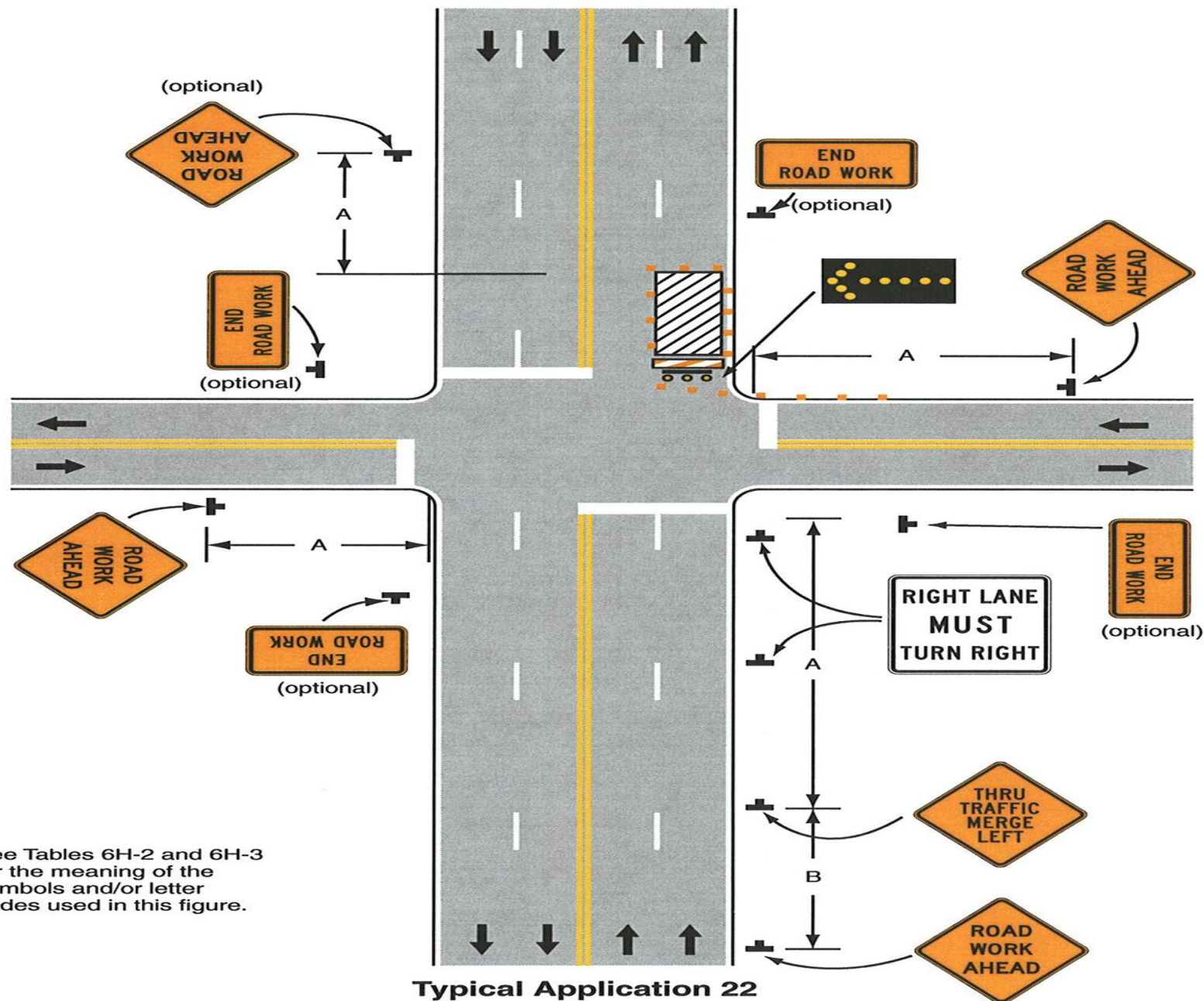
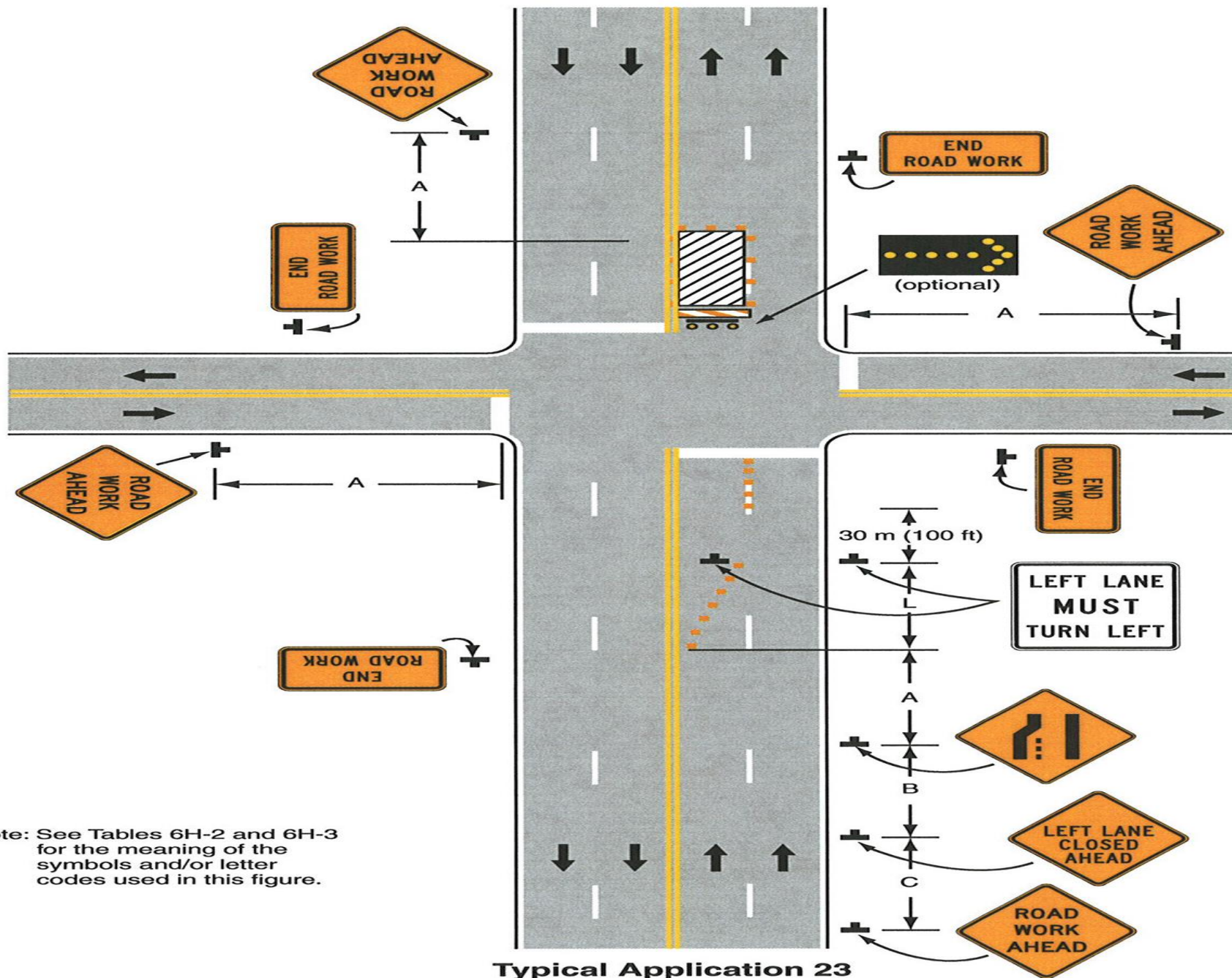
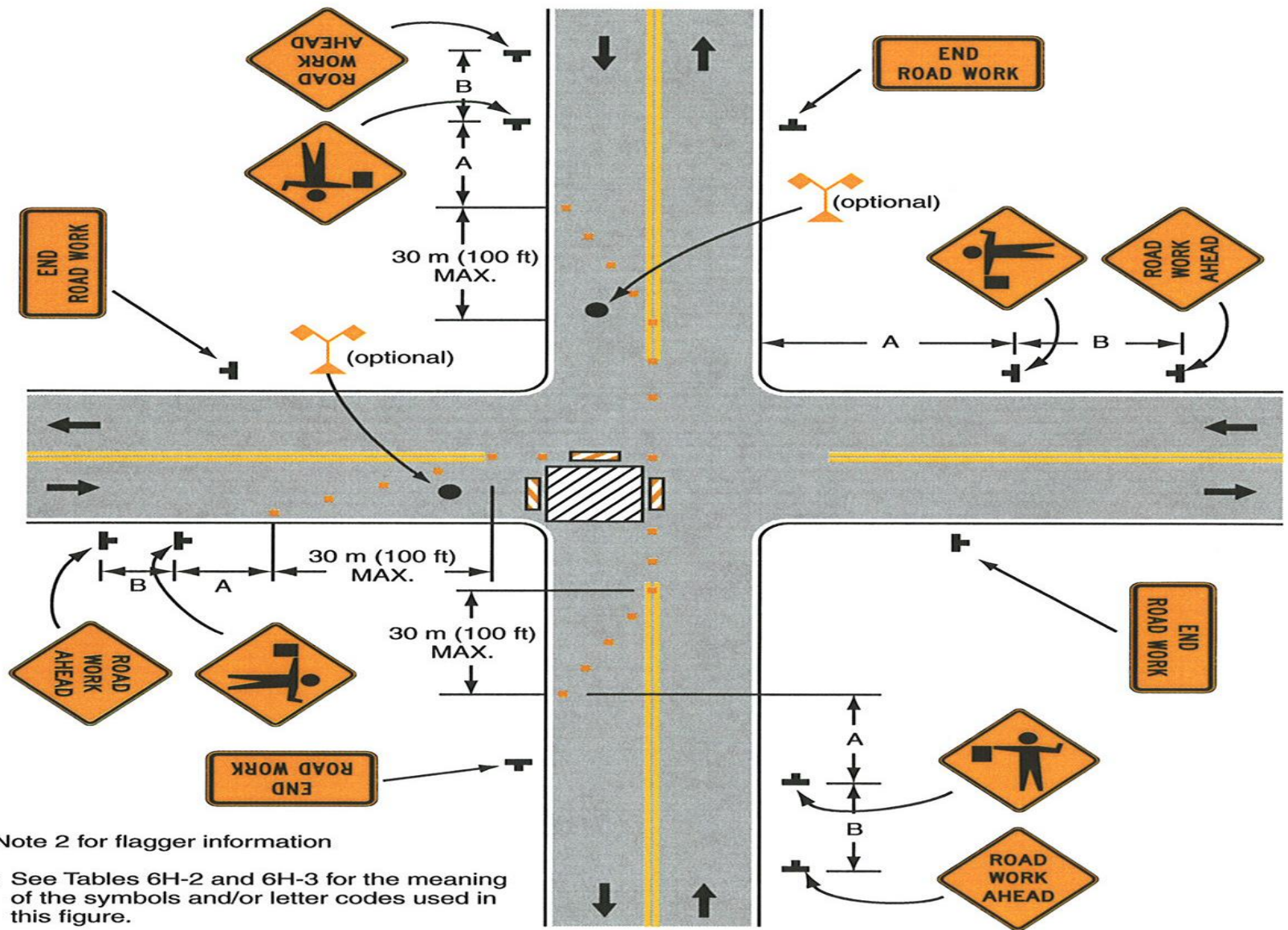


Figure 6H-23. Left Lane Closure on Far Side of Intersection (TA-23)



Typical Application 23

Figure 6H-27. Closure at Side of Intersection (TA-27)



See Note 2 for flagger information

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

Typical Application 27

- Have a plan before going to the work site.
- Devices are installed in the direction that traffic moves—that is “downstream.” The first device placed is the first advance warning sign.
- Remove the devices in a timely manner.
- When possible, traffic control zones should be removed by picking up the devices in a reverse sequence to that used for installation. This requires moving backwards or “upstream” through the zone.
- Ask yourself, “What is the driver’s view?”

QUESTIONS????

