



UTILITY WORK ZONE TRAFFIC CONTROL TRAINING

DISCLAIMER

- Opinions, findings, and conclusions expressed in this presentation are those of contractor(s) and not necessarily those of U.S.D.O.T. or F.H.W.A.
- Prepared in cooperation with U.S.D.O.T. and F.H.W.A.
- Utility work zone guideline is a 'Living Document' and may be modified and updated as needed



DISCUSSION ITEMS

- Underlying Principles of Utility Work Zone Traffic Control
- Utility Work Zone Traffic Control
- Suggested Traffic Control Plans & Pedestrian Issues



UNDERLYING PRINCIPLES OF UTILITY WORK ZONE TRAFFIC CONTROL

- 🚧 Utility Work Zone Guidelines
- 🚧 Significant variability in the knowledge, skills, and abilities of the utility workforce
- 🚧 Variability is associated with a level of risk for workers and motorists



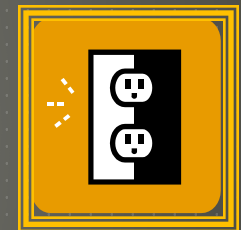
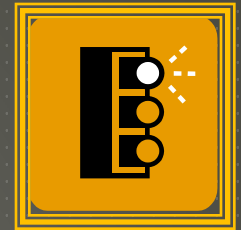
UNDERLYING PRINCIPLES OF UTILITY WORK ZONE TRAFFIC CONTROL

- 🚧 Guideline document provides uniform treatment
 - ▶ TTCPs for various utility work zone applications
- 🚧 Guidance is provided to aid the utility workforce
 - ▶ Identify level of risk
 - ▶ Mitigating risks



WHAT TYPE OF UTILITY WORK IS INCLUDED?

- ▲ Electrical, Gas, Telephone, Cable
- ▲ Traffic Signals
- ▲ Water
- ▲ Sewer Maintenance and Cleaning
- ▲ Landscaping
- ▲ Others



DIFFERENCES BETWEEN UTILITY WORK ZONES AND NORMAL WORK ZONES

- ▶ Shorter duration
- ▶ May require more time to set-up and remove traffic control than to complete work
- ▶ Often unplanned or unscheduled
- ▶ Often outside of travel way
- ▶ Smaller work area
- ▶ Smaller work crew
- ▶ Same work crew attends multiple work sites



WHAT IS NOT INCLUDED?

- 🚧 Nighttime utility work
- 🚧 Utility work conducted on freeways
- 🚧 Long term stationary
- 🚧 Utility work as a part of long term highway project



MUTCD WORK ZONE DURATION DEFINITIONS

🚧 **Long-term stationary** is work that occupies a location more than 3 days

🚧 **Intermediate-term stationary** is work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than 1 hour



MUTCD WORK ZONE DURATION DEFINITIONS

- 🚧 **Short-term stationary** is daytime work that occupies a location for more than 1 hour within a single daylight period
- 🚧 **Short-duration** is work that occupies a location up to 1 hour
- 🚧 **Mobile** is work that moves intermittently or continuously



SHORT DURATION WORK

“Simplified control procedures may be warranted for short-duration work. A reduction in the number of devices may be offset by the use of other more dominant devices such as high-intensity rotating, flashing, oscillating, or strobe lights on work vehicles.”



Source: MUTCD Section 6G.02

SHORT DURATION WORK

- “Appropriately colored or marked vehicles with high-intensity rotating, flashing, oscillating, or strobe lights may be used in place of signs and channelizing devices for short-duration or mobile operations.”



Source: MUTCD Section 6G.02

SHORT TERM AND SHORT DURATION NEED

- Standardized plans
- Workers realize need for traffic control
- Different traffic control devices than long and intermediate term work
 - Fewer devices
 - Portable devices



PASSING MOTORIST NEED

- ⚠ Early recognition
- ⚠ Clear recognition of potential hazard
- ⚠ Positive guidance
- ⚠ Driver expectancy maintained through the work zone



PURPOSE OF UTILITY WORK ZONE TRAFFIC CONTROL

- 🚧 Safe and efficient travel of all road users
- 🚧 Worker protection



UTILITY WORK ZONE CRASH RISK FACTORS

- 🚧 Traffic volume
- 🚧 Travel speed
- 🚧 Lateral distance from travel lanes
- 🚧 Work duration – time to complete the work
- 🚧 Sight distance and work area visibility
- 🚧 Others



PREVENTION OF WORK ZONE CRASHES

“Analyze the work site including traffic patterns and plan the work zone before you begin working”



“Position work vehicles to create an obstacle to prevent oncoming traffic from hitting you”

Source: NIOSH FACE Program, 2007

PREVENTION OF WORK ZONE CRASHES



“Minimize exposure to moving traffic”



“Drivers should not engage in activities that distract them from driving or hinder driving performance”

Source: NIOSH FACE Program, 2007

EARLY RECOGNITION OF UTILITY WORK ZONE BY MOTORISTS

- ▶ Evasive action taken to avoid a traffic crash if motorist recognizes work zone
- ▶ TTC provides information about potential hazard
- ▶ Information is provided through signs, cones, drums, barriers, etc.



EARLY RECOGNITION OF UTILITY WORK ZONE BY MOTORISTS

- 🚧 Uniformity of treatment
- 🚧 Making utility work zones conspicuous to the passing motorist - **orange color**
- 🚧 Treatments must consider driver expectancy



DRIVER EXPECTANCY

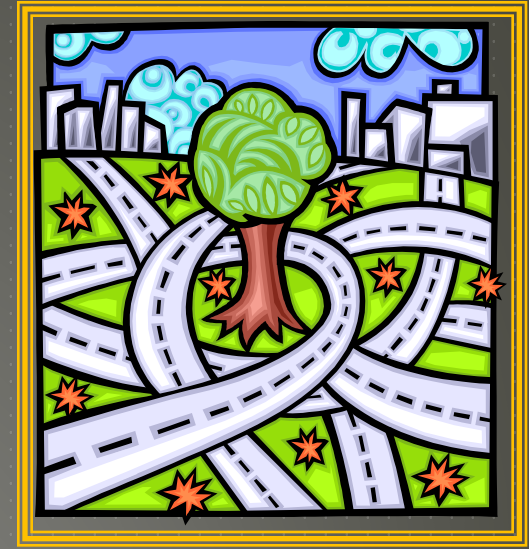
“Driver expectancy relates to the readiness of the driver to respond to events, situations, or the presentation of information.”



Source: *A Users' Guide to Positive Guidance* - FHWA

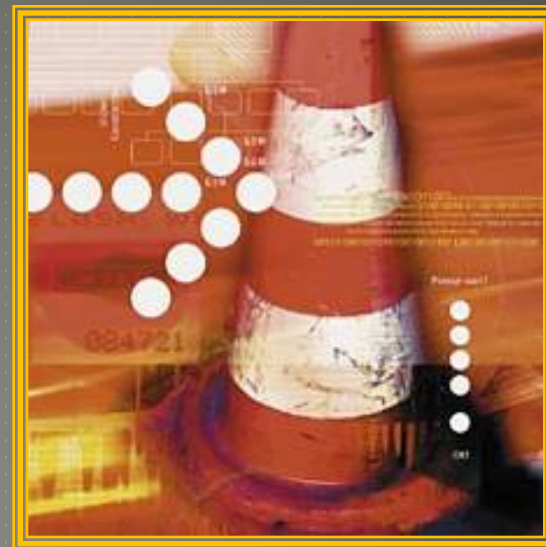
DRIVER EXPECTANCY

- ▲ Gained through experience and training
- ▲ Guided by traffic control devices
- ▲ Drivers respond quickly and correctly
- ▲ Information must be clear
- ▲ Consistency decreases reaction time
- ▲ Uniformity simplifies driving tasks



DRIVER EXPECTANCY VIOLATED

- ⚠ Occurs when uncommon/unique situations arise
- ⚠ Drivers require longer response times
- ⚠ Greater chance of error
- ⚠ Work zones naturally violate drivers' expectancy



POSITIVE GUIDANCE

▲ “Positive guidance information increases the driver’s probability of selecting the speed and path most appropriate to the operating conditions of the highway”

▲ “Positive Guidance is based on the premise that competent drivers can be given appropriate information about hazards and inefficiencies to avoid errors.”



Source: A Users' Guide to Positive Guidance - FHWA

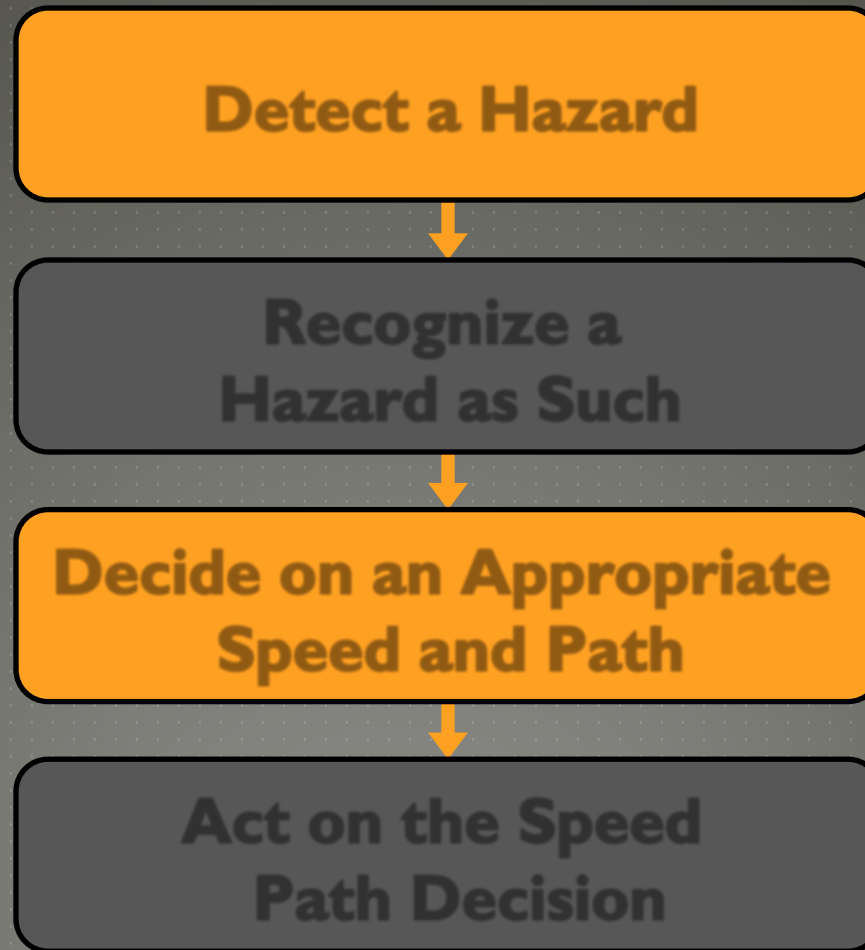
BASIC DRIVING TASK

- 🚧 **Control** – driver's interaction with vehicle
- 🚧 **Guidance** – driver's ability to maintain safe path on highway
- 🚧 **Navigation** – driver's ability to plan and execute trip from point of origin to destination



Source: Alexander, G.J., "Some Factors Affecting Reception and Use of Information by Drivers", Public Road, Vol. 37, No. 1

PROCESS OF INFORMATION HANDLING



Source: Federal Highway Administration, A Users' Guide to Positive Guidance

CRASH CAUSAL FACTORS

Work zone crashes have several potential causes

- ▶ Driver, Environment, Vehicle
- ▶ Organizational, Worker

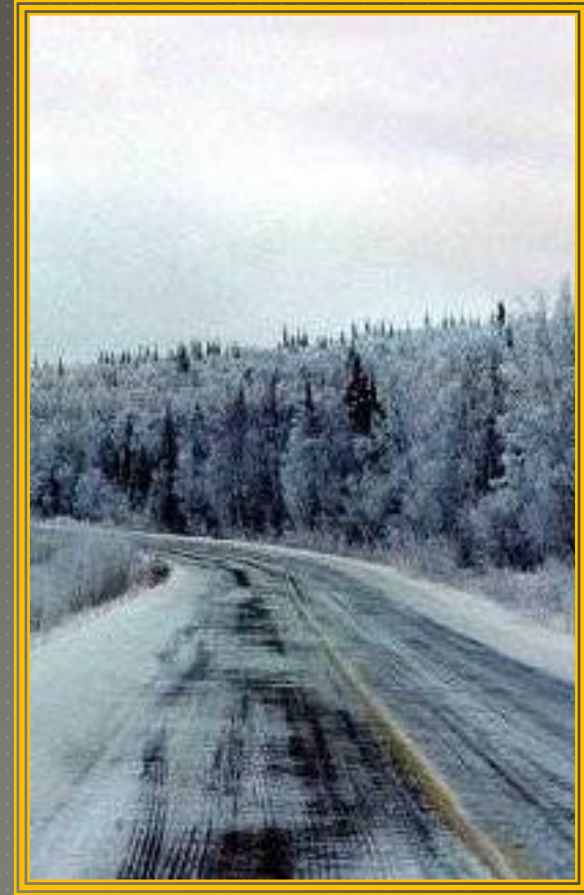
Understanding of causes that leads to prevention

Establishment of policies and procedures

Crashes are not a result of any one factor

- ▶ Failure of individuals to perform duties
- ▶ Breakdown in safety-related policies and procedures
- ▶ Managerial failure

SOME OF THE CAUSAL FACTORS ARE BEYOND OUR CONTROL



BUT SOME ARE NOT!

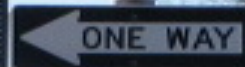


CONFLICTING WORK ZONE SIGNS

Coordination
between separate
adjacent work
zones required



“End Road Work”
sign from previous
work zone



“Lane Merge”
sign for upcoming
work zone

CONFLICTING WORK ZONE SIGNS (CONT.)



"No Left Turn"
sign on mast arm

Temporary "Left
Lane Must Turn
Left" sign

Temporary traffic control
must be consistent with
permanent traffic control

CONFLICTING WORK ZONE SIGNS (CONT.)

Coordination between separate adjacent work zones required

“End Road Work” sign from previous work zone

“Right Lane Closed Ahead” sign for upcoming work zone



CONFLICTING WORK ZONE SIGNS (CONT.)



Temporary traffic control signs must be consistent with each other

"Right Lane Ends" sign for upcoming work zone

"Left Lane Closed Ahead" sign for upcoming work zone



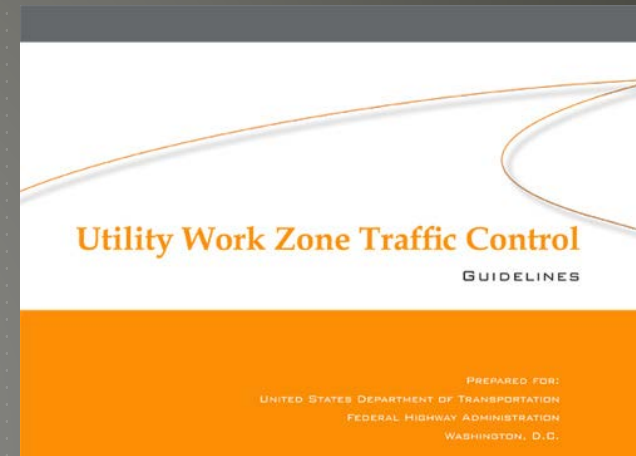
UTILITY WORK ZONE TRAFFIC CONTROL

UTILITY WORK ZONE TRAFFIC CONTROL GUIDELINES

- 🚧 Developed and revised for FHWA Work Zone Safety Grants
- 🚧 Include suggested traffic control plans
- 🚧 Temporary traffic control devices
- 🚧 Meant for electrical, gas, telephone, cable, water, sewer, street lights, traffic signals, landscaping, others
- 🚧 Not meant for nighttime or freeway work



U.S. Department of Transportation
Federal Highway Administration



NEED FOR UTILITY WORK ZONE GUIDELINES

- ⚠ Shorter in duration
- ⚠ Different traffic control needed
- ⚠ Change in travel environment for drivers
- ⚠ Improve mobility
- ⚠ Reduce utility work zone crashes



PERCEPTION REACTION TIME OF DRIVERS

- ▶ **Perception:** recognition or realization that cue or stimulus exists that requires response
- ▶ **Intellection:** Identification of cue or stimulus
- ▶ **Emotion:** determination of appropriate response to cue or stimulus
- ▶ **Volition:** physical response that results from decision



UNIFORMITY

- 🚧 Treatment of similar work site with same traffic control
- 🚧 Traffic control devices
- 🚧 Color
- 🚧 Strobe or oscillating lights
- 🚧 Arrow panels



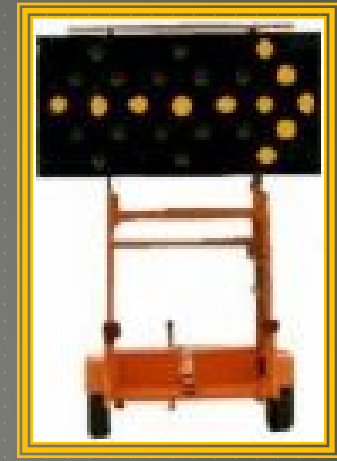
CONSPICUITY

- ⚠ Increased through proper traffic control devices
- ⚠ Using color of work zones – **ORANGE**
- ⚠ Retro-reflective TCDs
- ⚠ Work zones that stand out from other surroundings to passing motorists



BASIC REQUIREMENTS FOR TRAFFIC CONTROL DEVICES

- ▲ Fulfill a need
- ▲ Command attention
- ▲ Convey a clear, simple message
- ▲ Command respect from road users
- ▲ Give adequate time for proper response

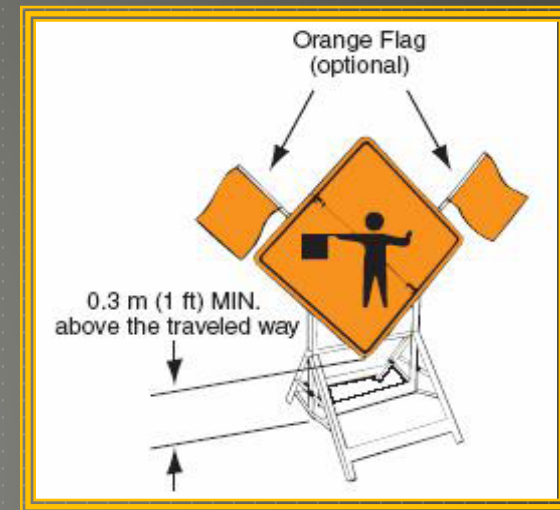


Source: MUTCD Section 1A.02

TEMPORARY TRAFFIC CONTROL SIGNS

- ▶ Message, layout, and configuration per MUTCD
- ▶ Construction fluorescent orange color with microprismatic retro-reflective characteristics
- ▶ 2 orange supplemental flags may be mounted
- ▶ Size = 36" x 36"
- ▶ Crashworthy

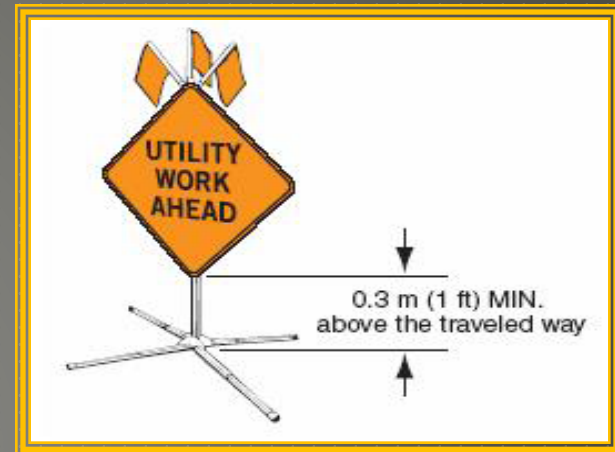
Source: MUTCD
Figure 6F-2



TEMPORARY TRAFFIC CONTROL SIGNS

- ▶ Portable temporary traffic control signs
- ▶ Shall be mounted at least 1 foot above the traveled way
- ▶ Reduces traffic control setup and removal time
- ▶ Decreases worker exposure to risk especially for utility work zones

Source: MUTCD Figure 6F-2



POORLY MOUNTED SIGNS



SIGN REFLECTIVITY

No Reflectivity



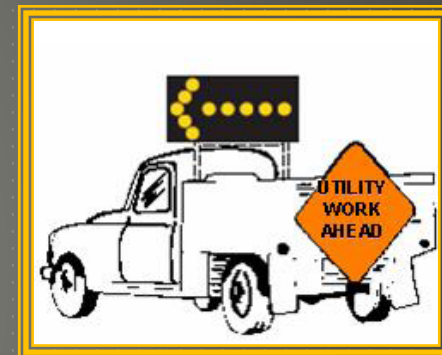
Daylight



Nighttime

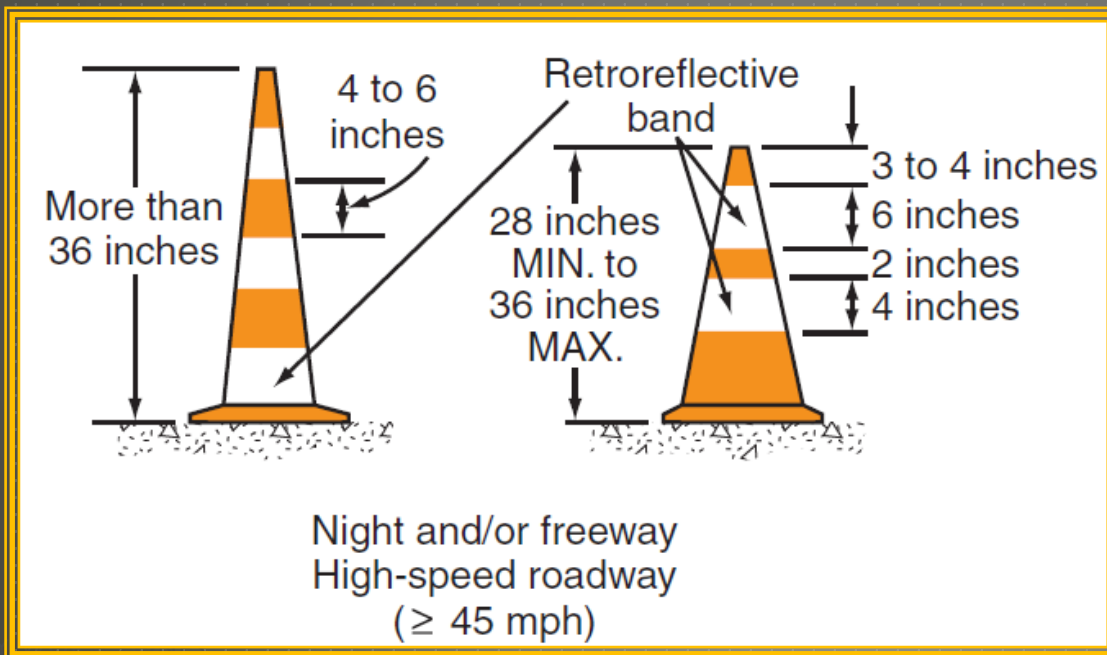
ARROW PANELS

- Support panel 48" H x 96" W
- Minimum of 15 lamps
- Front panel with flat, non-reflective black background
- Mounted at minimum of 7' from roadway to bottom of panel
- Flash Rate: 25-40 flashes per minute



CHANNELIZING DEVICES

- ▲ Provides guidance/delineation to motorists
- ▲ Need to be easily installed and removed
- ▲ Must be orange and contain retro-reflective bands
- ▲ Made of a material that will not damage a vehicle if impacted
- ▲ 36" or taller cones or tubular markers are more desirable



Source: MUTCD Figure 6F-7

CHANNELIZING DEVICE REFLECTIVITY

Damaged Cone



Daylight

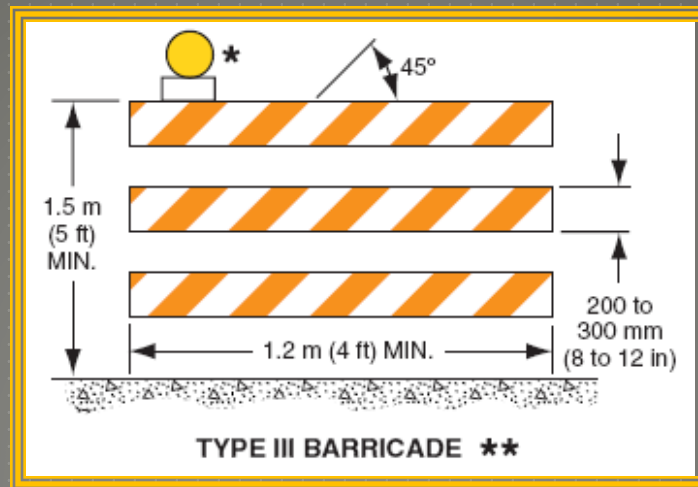
No Reflectivity



Nighttime

CONES & BARRICADES

- Use orange taller cones with retro-reflective bands
- Provides increased visibility
- Transported easily
- Quick installation and removal on-site
- Barricades



WARNING LIGHTS ON WORK VEHICLES

- ⚠️ Attract the attention of road users
- ⚠️ Potentially hazardous situation
- ⚠️ Sufficient time for taking appropriate action
- ⚠️ Warning light standardization desirable
- ⚠️ Promote driver understanding
- ⚠️ Recognition of lights on work vehicles



WARNING LIGHTS ON WORK VEHICLES

- Warning lights should be visible to drivers from all angles (360 degrees)
- Larger vehicles should be equipped with a minimum of three warning lights
- Warning lights should be amber in color



WARNING LIGHTS ON WORK VEHICLES

Warning lights should be **TURNTD ON!**



RETRO-REFLECTIVE MARKINGS ON WORK VEHICLES

- ▶ Visibility increased by the use of retro-reflective markings and appropriate vehicle colors
- ▶ Should supplement warning light systems
- ▶ Affixed to the back of utility work vehicles



WORK VEHICLE COLOR ORANGE

- ▶ Visibility of work vehicle very important
- ▶ Orange vehicle is visual cue of approaching work zone
- ▶ Consistency in colors improves early recognition
- ▶ Increases driver awareness and recognition of work zone



WORK VEHICLE COLOR ORANGE

Desirable Vehicle Color



Undesirable Vehicle Colors



WORK VEHICLE PLACEMENT

- Place upstream to warn vehicles of an upcoming work zone and shield workers from traffic
- Place equipment trailers downstream of work area to avoid being hit by traffic



IMPROPER PLACEMENT OF WORK VEHICLES OR DEVICES



AERIAL LIFT SAFETY

- 🚧 Vehicle-mounted, boom-supported aerial platforms
 - ▶ Cherry pickers, bucket trucks, etc.
- 🚧 26 worker fatalities per year due to the user of aerial lifts*
 - ▶ More than half due to bucket trucks
- 🚧 Positioning of any vehicle on the highway pavement or shoulder requires proper traffic control compliant to the MUTCD



*Center to Protect Workers Rights - 2004

AERIAL LIFT SAFETY

- ▲ States may have their own policy or guidelines
- ▲ Temporary traffic control will be dependent on the work duration
- ▲ Chapter 6 of MUTCD
- ▲ No one standard traffic control plan
 - ▶ Should be prepared by trained professional



HOW WOULD YOU LIKE TO DRIVE
UNDERNEATH THIS?



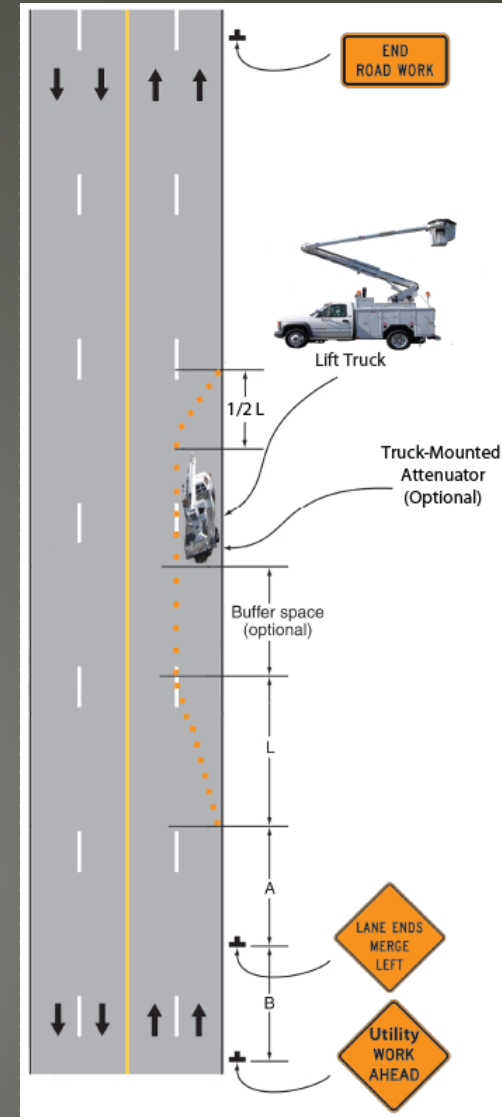
WHAT RISKS ARISE WHEN OPERATING ABOVE TRAFFIC?



AERIAL LIFT SAFETY

🚧 For aerial lift truck use at mid-block locations:

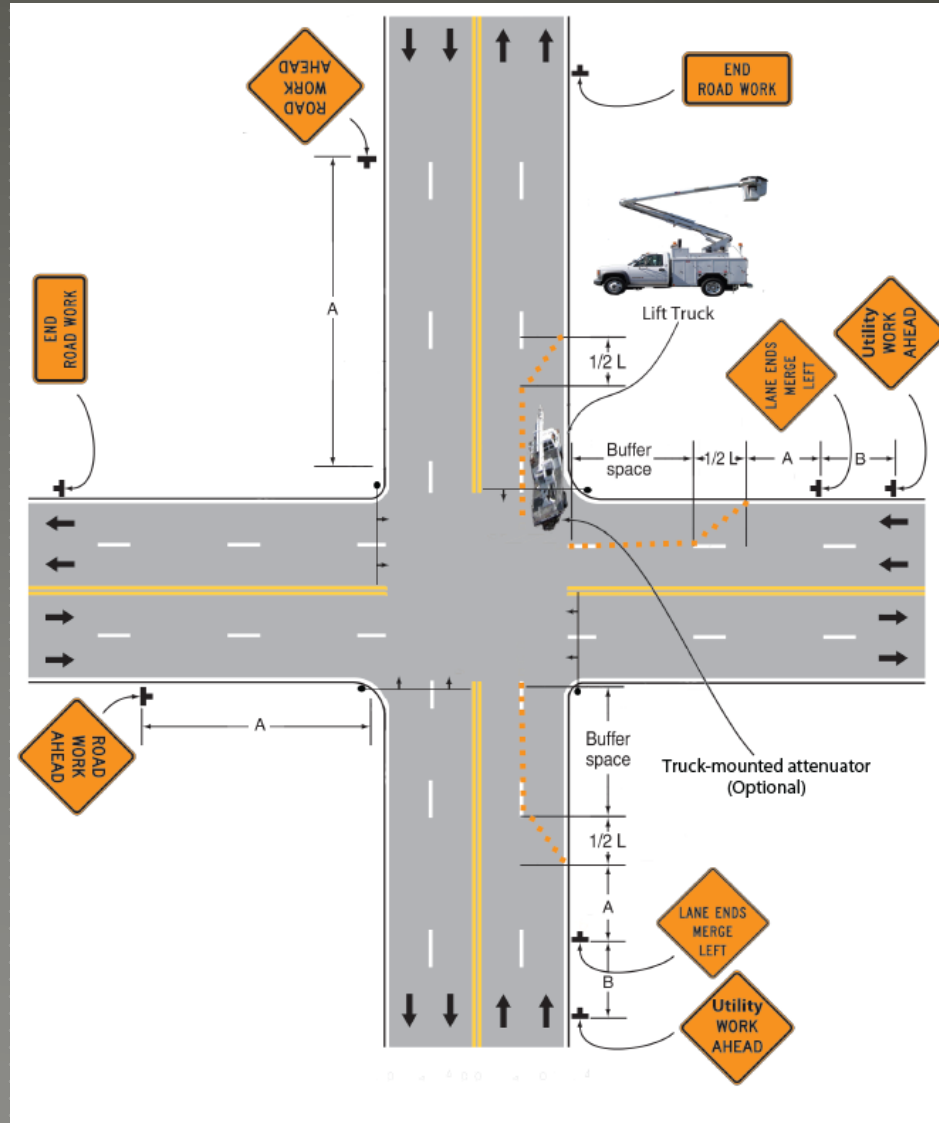
- ▶ Use of TMAs can help to decrease the impact forces of errant vehicles
- ▶ Additional consideration must be given if the bucket must be extended over the roadway
 - ▶ Buckets should not extend over active traffic
 - ▶ Consider the use of flaggers if additional closures are impractical to implement



AERIAL LIFT SAFETY

For aerial lift truck use in the vicinity of a highway intersection:

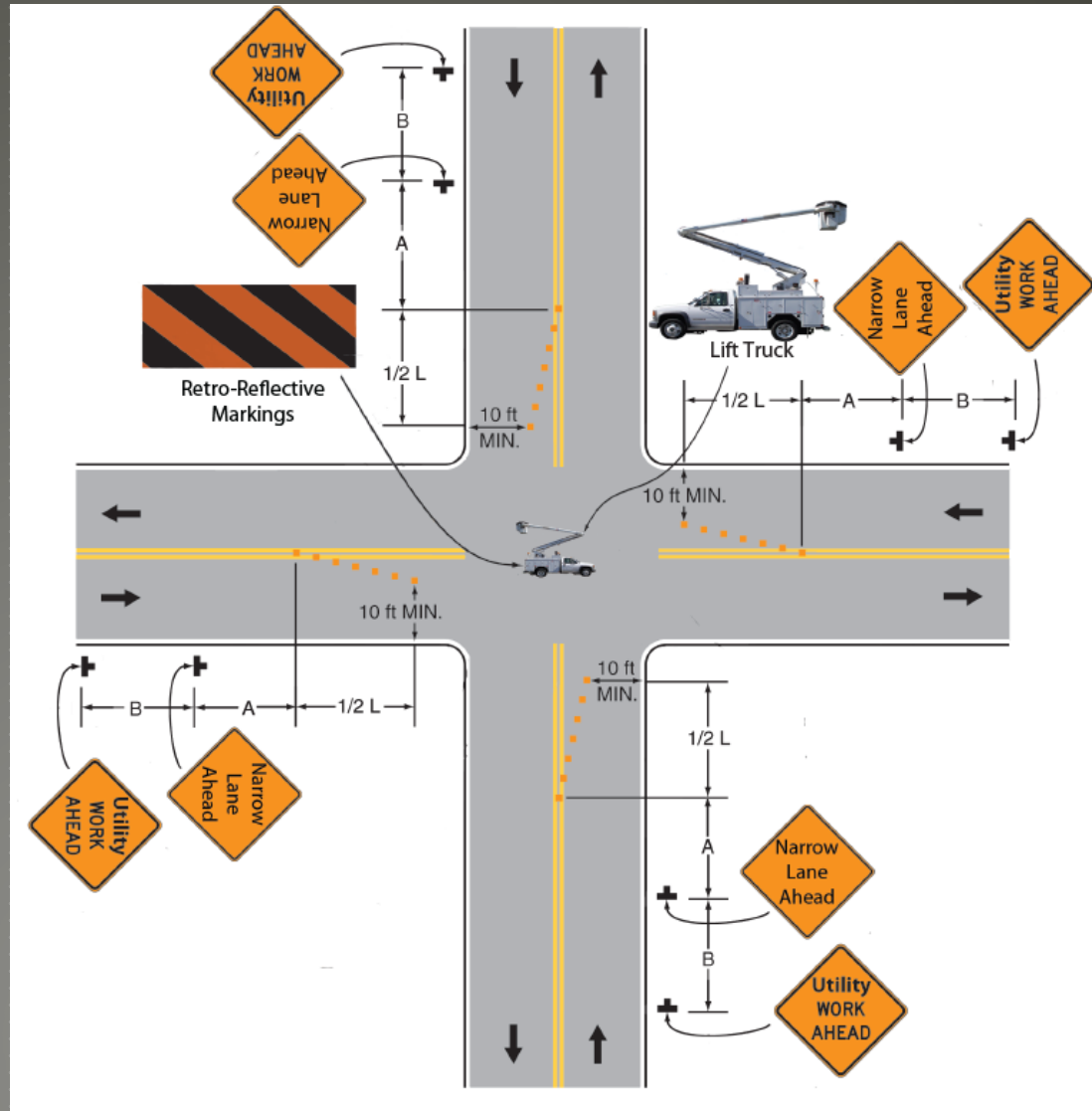
- ▶ Mount signs on portable stands
- ▶ All approaches
- ▶ Buckets should not be extended over active traffic



AERIAL LIFT SAFETY

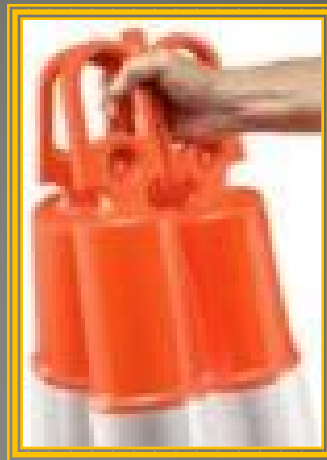
For aerial lift truck use within an intersection:

- ▶ Retro-reflective markings and high-level warning devices
- ▶ 10 foot minimum clearance required to maintain each approach
- ▶ “**Narrow Lane Ahead**” signs warn motorists of the reduced downstream lane widths



SET-UP AND REMOVAL OF DEVICES

- ▲ Spend least amount of time necessary to set-up and remove devices safely and correctly
- ▲ Perform work as expeditiously as possible to reduce exposure
- ▲ Decreasing exposure time increases safety
- ▲ Use devices that are easily transported



SET-UP OF TRAFFIC CONTROL DEVICES

- 🚧 Identify traffic control plan ahead of time
- 🚧 Plan and discuss traffic control off roadway
- 🚧 Park work vehicles and equipment to maximize safety
- 🚧 Place traffic control devices as per selected plan starting at beginning of work zone



REMOVAL OF TRAFFIC CONTROL DEVICES

- ▶ Start at end of work zone
- ▶ Remove temporary traffic control devices at the end of the workday
- ▶ Only leave in place what is needed
- ▶ Know where everything goes in work vehicle so no time is wasted



WORKER SAFETY APPAREL

- ▲ MUTCD Section 6D.03 requires “**American National Standard For High-Visibility Safety Apparel and Headwear**”
- ▲ ANSI (American National Standards Institute) / ISEA (International Safety Equipment Association) 107-2004
- ▲ Class 2 and 3 garments based on worker activities



FLAGGER (TRAFFIC REGULATOR) TRAINING

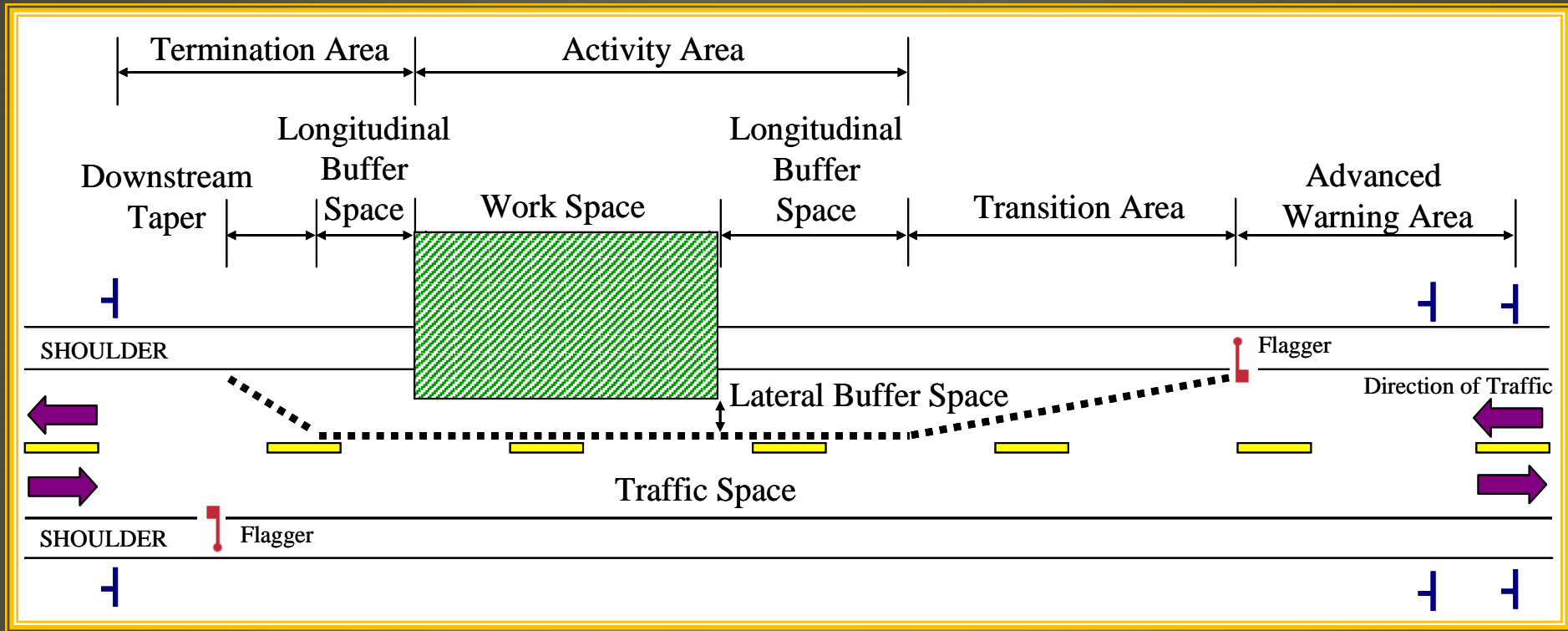
- ▲ For flagger (traffic regulator) training information refer to The National Work Zone Safety Clearinghouse at <http://www.workzonesafety.org/training>



**WORK
ZONE**

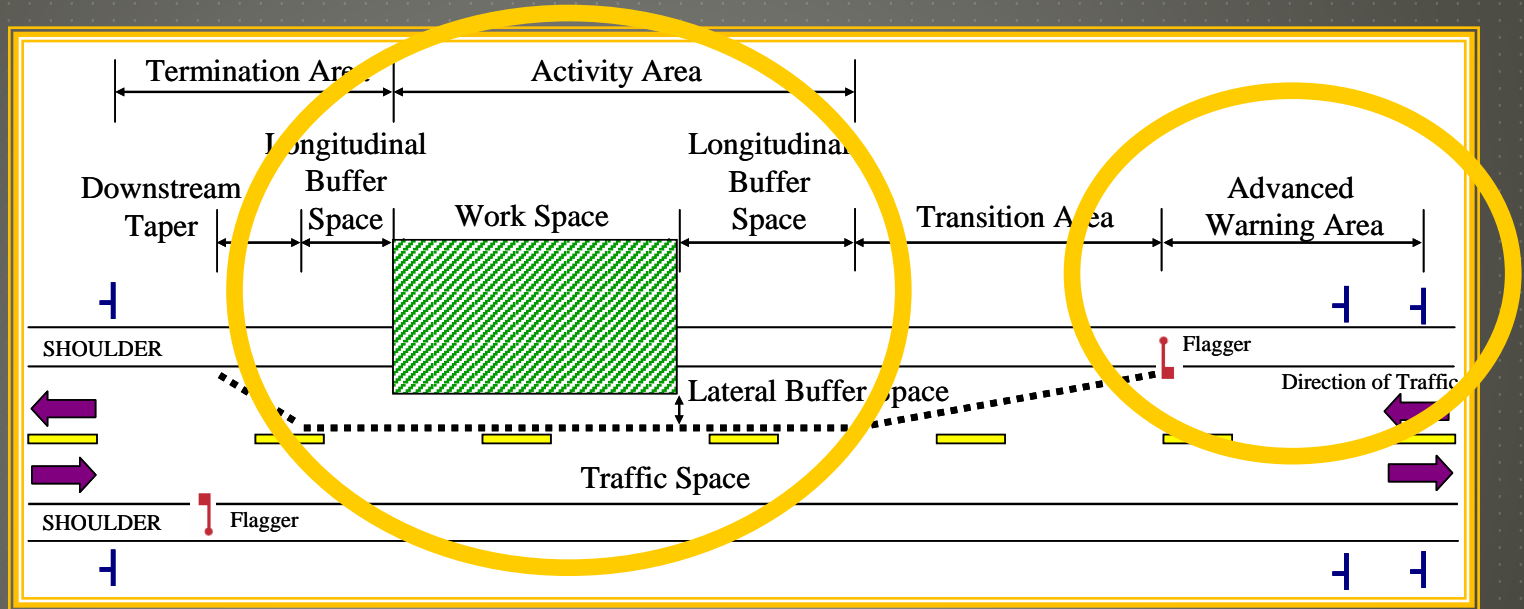
SUGGESTED TRAFFIC CONTROL PLANS & PEDESTRIAN ISSUES

UTILITY WORK ZONE TEMPORARY TRAFFIC CONTROL COMPONENTS



TEMPORARY TRAFFIC CONTROL COMPONENTS

- 🚧 **Activity Area** – work space, traffic space, and buffer space.
- 🚧 **Advanced Warning Area** – used to provide warning to motorists of an upcoming utility activity.



INSUFFICIENT ADVANCE WARNING



**No advance
warning signs**

**Missing advance
warning signs telling
which lane is closed**



LANE CLOSURE WITH NO ADVANCE WARNING



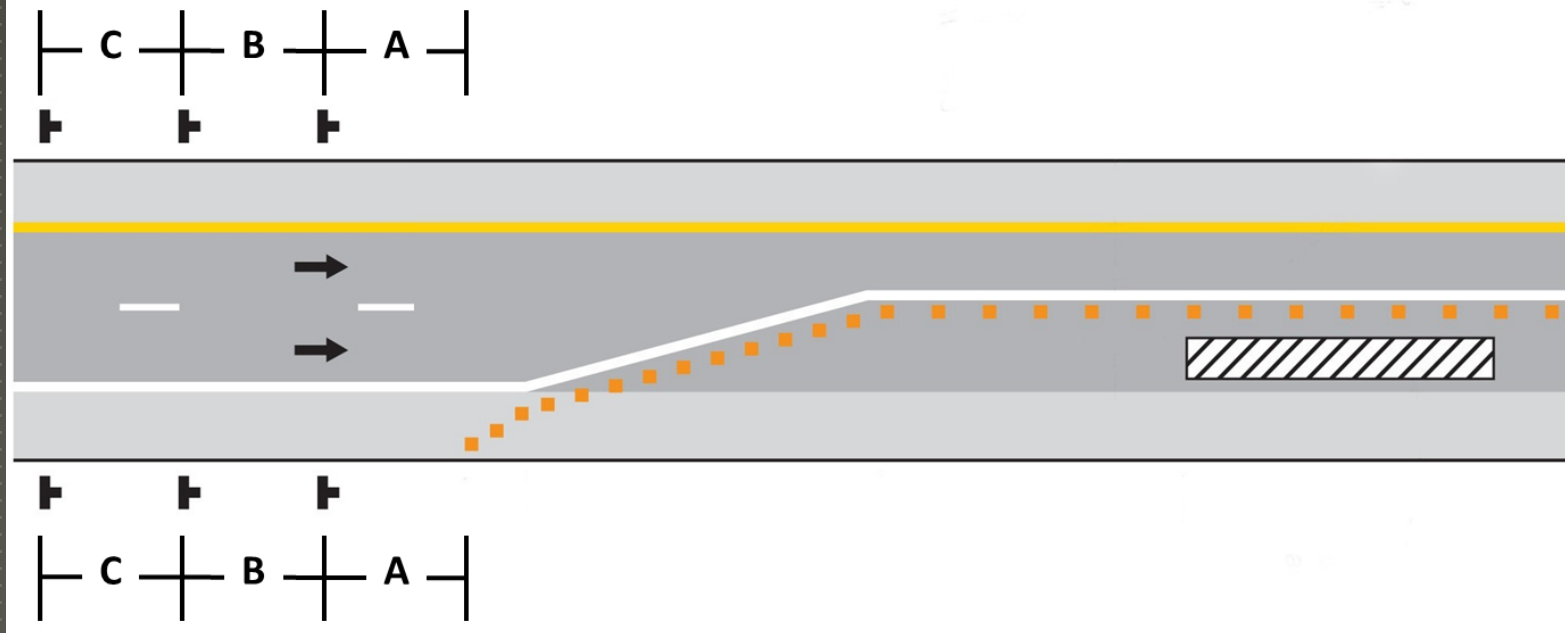
WHAT IS WRONG WITH THIS UTILITY OPERATION?



UTILITY WORK ZONE ISSUES



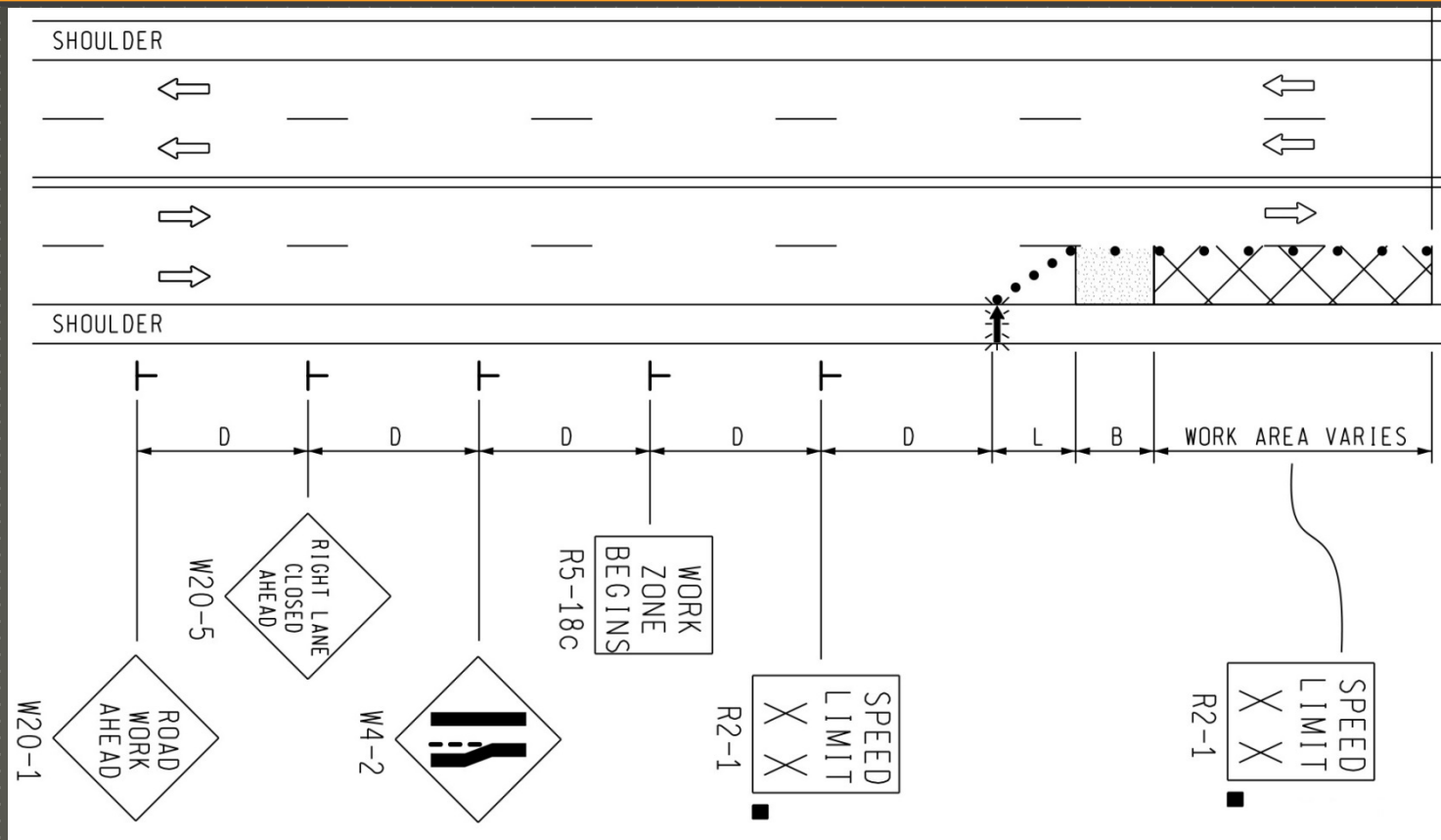
DISTANCE BETWEEN TRAFFIC SIGNS (NATIONAL STANDARD)



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

Source: MUTCD 2009 Table 6C-1

DISTANCE BETWEEN TRAFFIC SIGNS (MICHIGAN STANDARD)

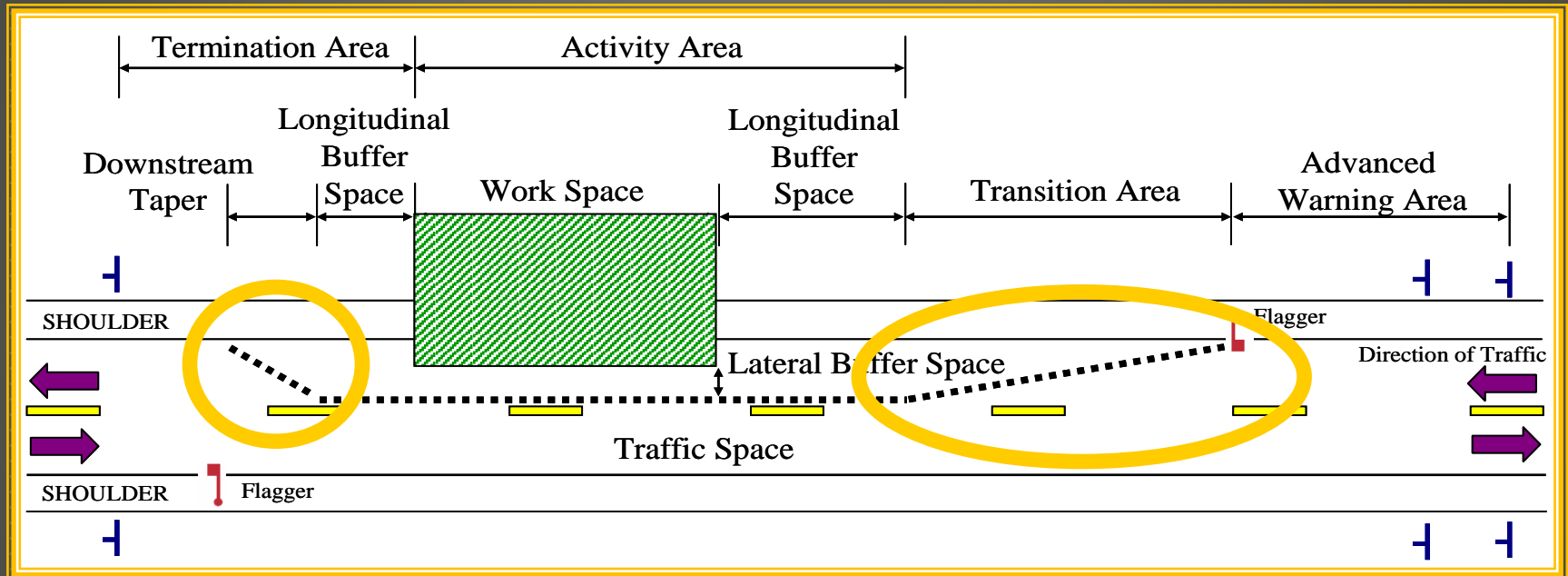


"D" DISTANCES	POSTED SPEED LIMIT, MPH (PRIOR TO WORK AREA)									
	25	30	35	40	45	50	55	60	65	70
D (FEET)	250	300	350	400	450	500	550	600	650	700

Source: MDOT Maintaining Traffic Typical M0020a

TEMPORARY TRAFFIC CONTROL COMPONENTS

🚧 **Tapers** – gradual transition to direct traffic from normal paths to designated path, must be free of workers, vehicles, equipment, etc.

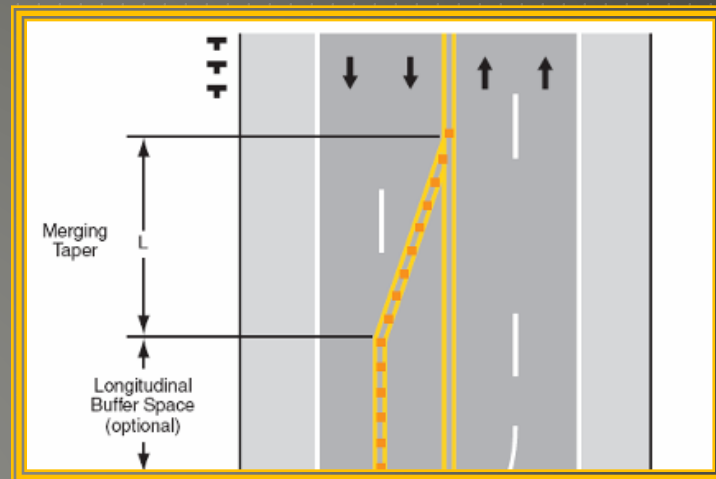
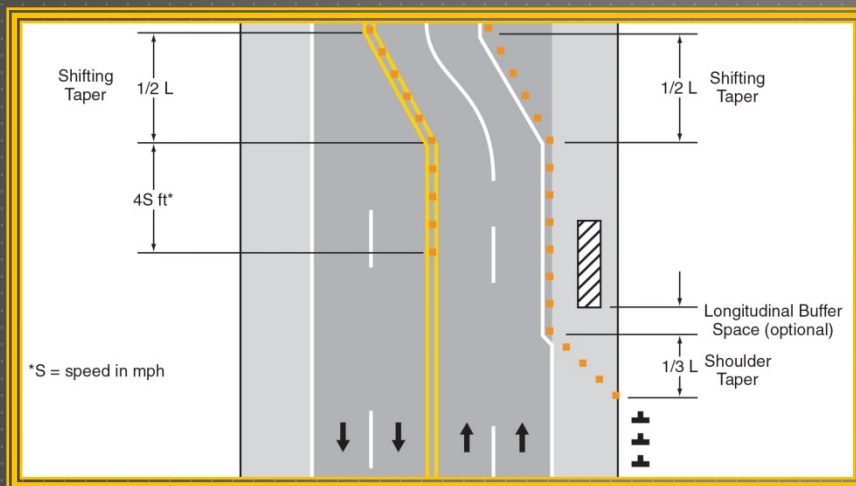


DIFFERENT TYPES OF TAPERS

Traffic
controlled
by flagger

Type of Taper	Taper Length
Merging Taper	at least L
Shifting Taper	at least 0.5 L
Shoulder Taper	at least 0.33 L
One-Lane, Two-Way Traffic Taper	50 feet minimum, 100 feet maximum
Downstream Taper	50 feet minimum, 100 feet maximum

Source:
*MUTCD Figure 6C-2
and Table 6C-3*



FORMULAS FOR CALCULATING TAPER LENGTHS

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

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

Source: MUTCD Table 6C-4

CALCULATING TAPER LENGTH EXAMPLE PROBLEM

🚧 Roadway characteristics

- ▶ Lane width: 12 feet
- ▶ Posted Speed Limit: 35 mph

🚧 Taper Length (L)

- ▶ $L = WS^2 / 60$
- ▶ $L = (12)(35)^2 / 60$
- ▶ $L = 245$ feet

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

Where: L = taper length in meters (feet)

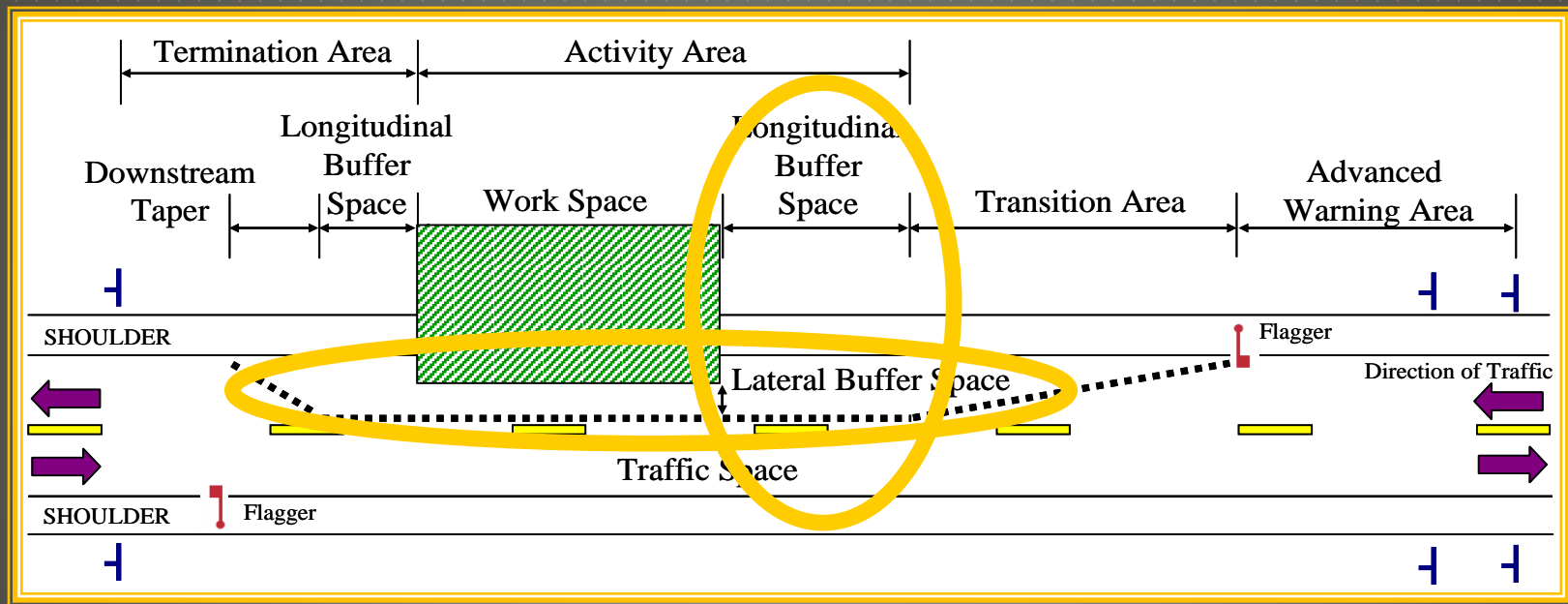
W = width of offset in meters (feet)

S = posted speed limit, or off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in km/h (mph)

Source: MUTCD Table 6C-4

TEMPORARY TRAFFIC CONTROL COMPONENTS

Buffer Space (Optional) – lateral and/or longitudinal area that separates traffic from work space, must be free of workers, vehicles, equipment, etc.



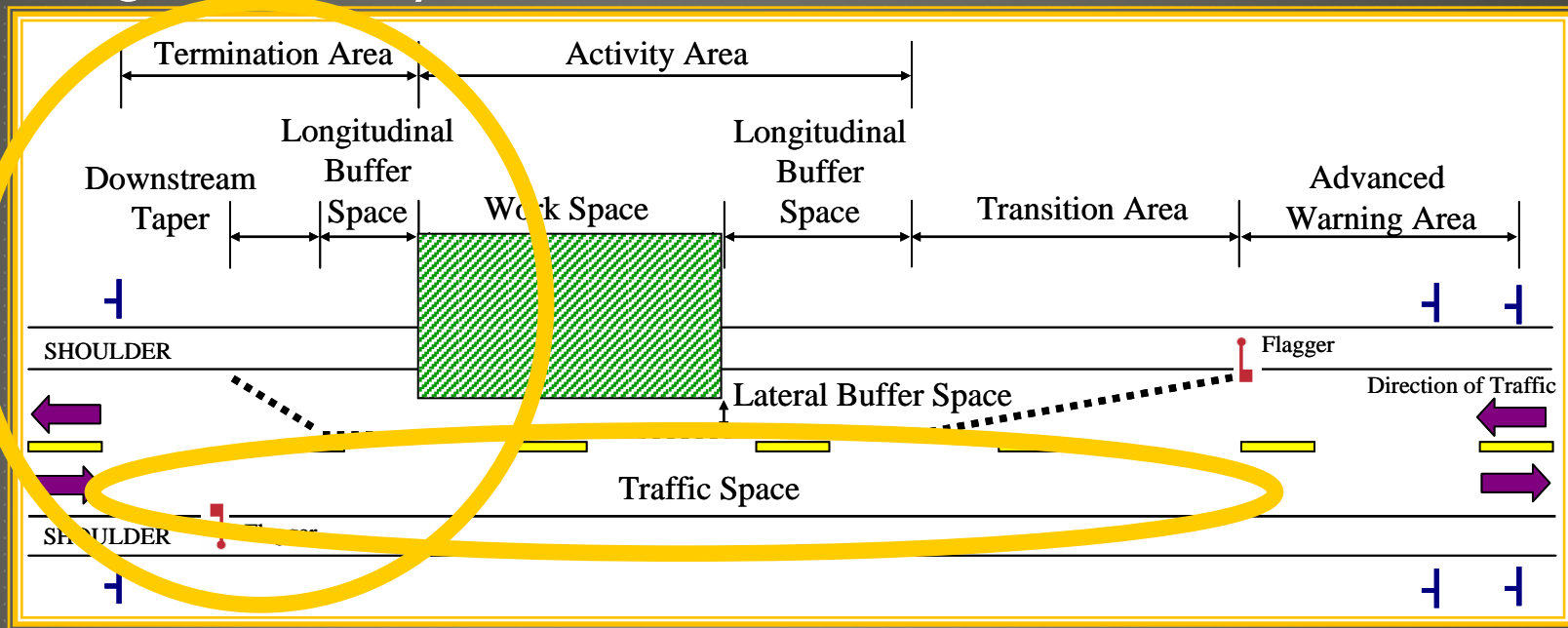
WHY USE BUFFER SPACE?

- ▶ Easy to accommodate into plan
- ▶ Inexpensive
- ▶ Improves worker safety
- ▶ Provides additional space between work zone and motorists



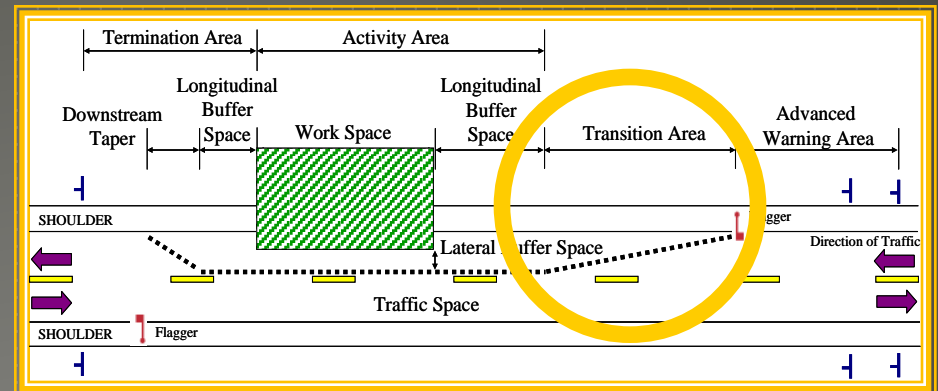
TEMPORARY TRAFFIC CONTROL COMPONENTS

- Termination Area – area used to return to normal path
- Traffic Space – portion of highway in which road users are routed through the activity area

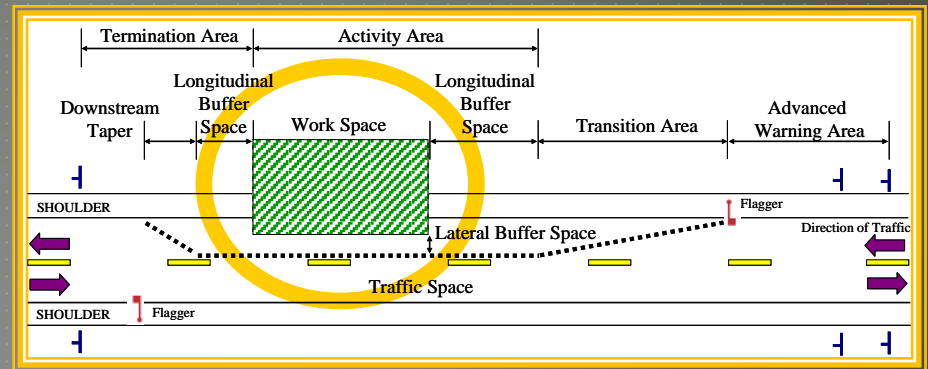


TEMPORARY TRAFFIC CONTROL COMPONENTS

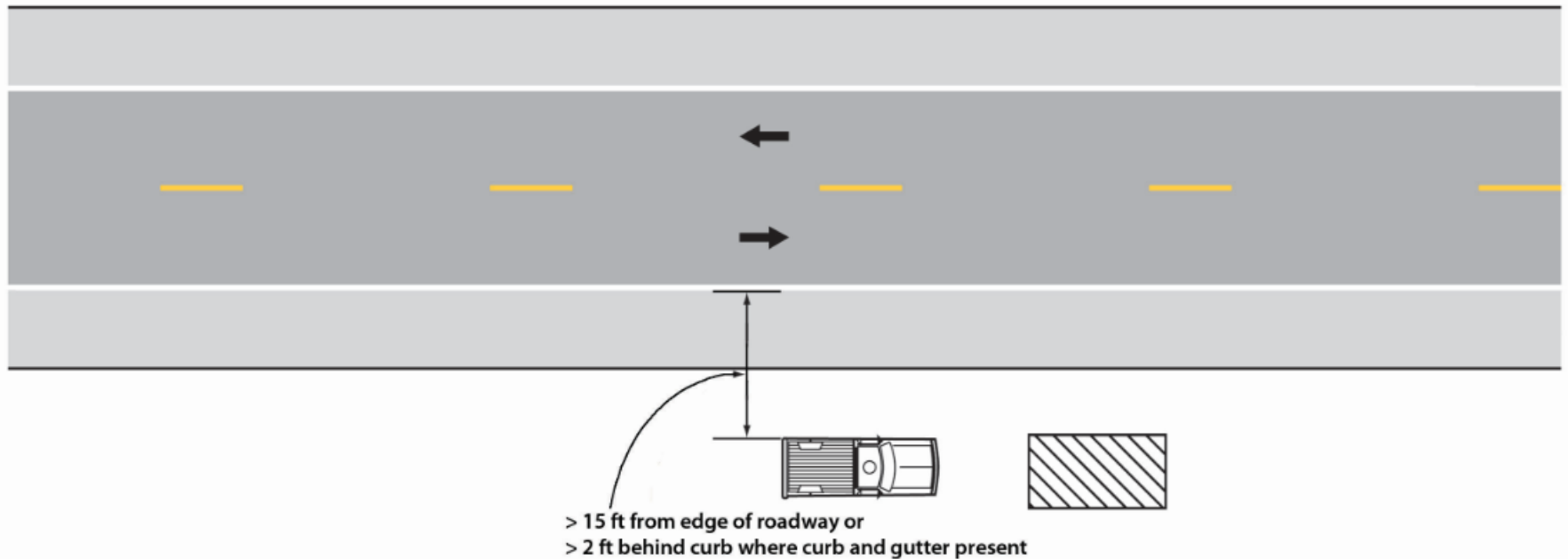
Transition Area – area utilized to move motorists from their normal path



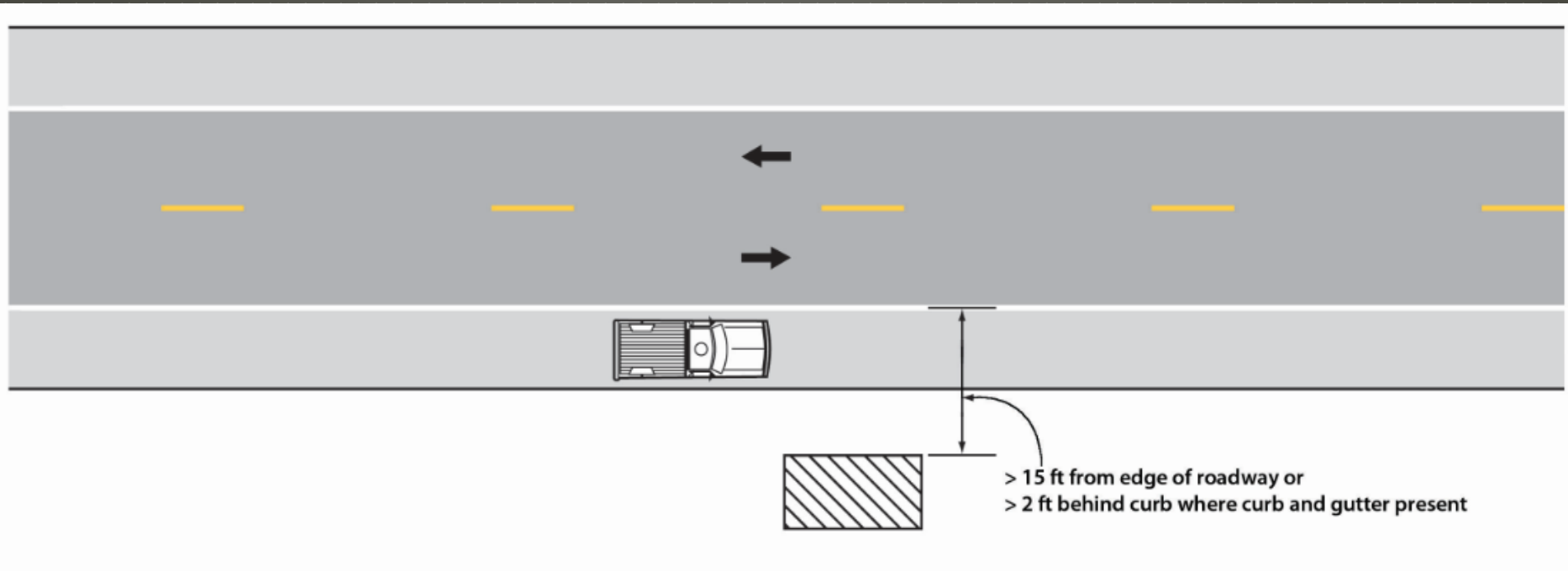
Work Space – portion closed to road users; occupied by utility workers, equipment and vehicles.



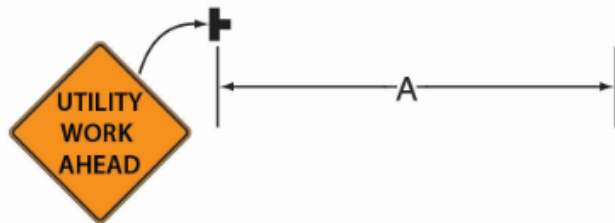
UTILITY WORK BEYOND SHOULDER



UTILITY WORK BEYOND SHOULDER WITH WORK VEHICLE(S) PARKED ON SHOULDER



UTILITY WORK ON SHOULDER (LOW TRAFFIC VOLUME AND LOW SPEEDS)

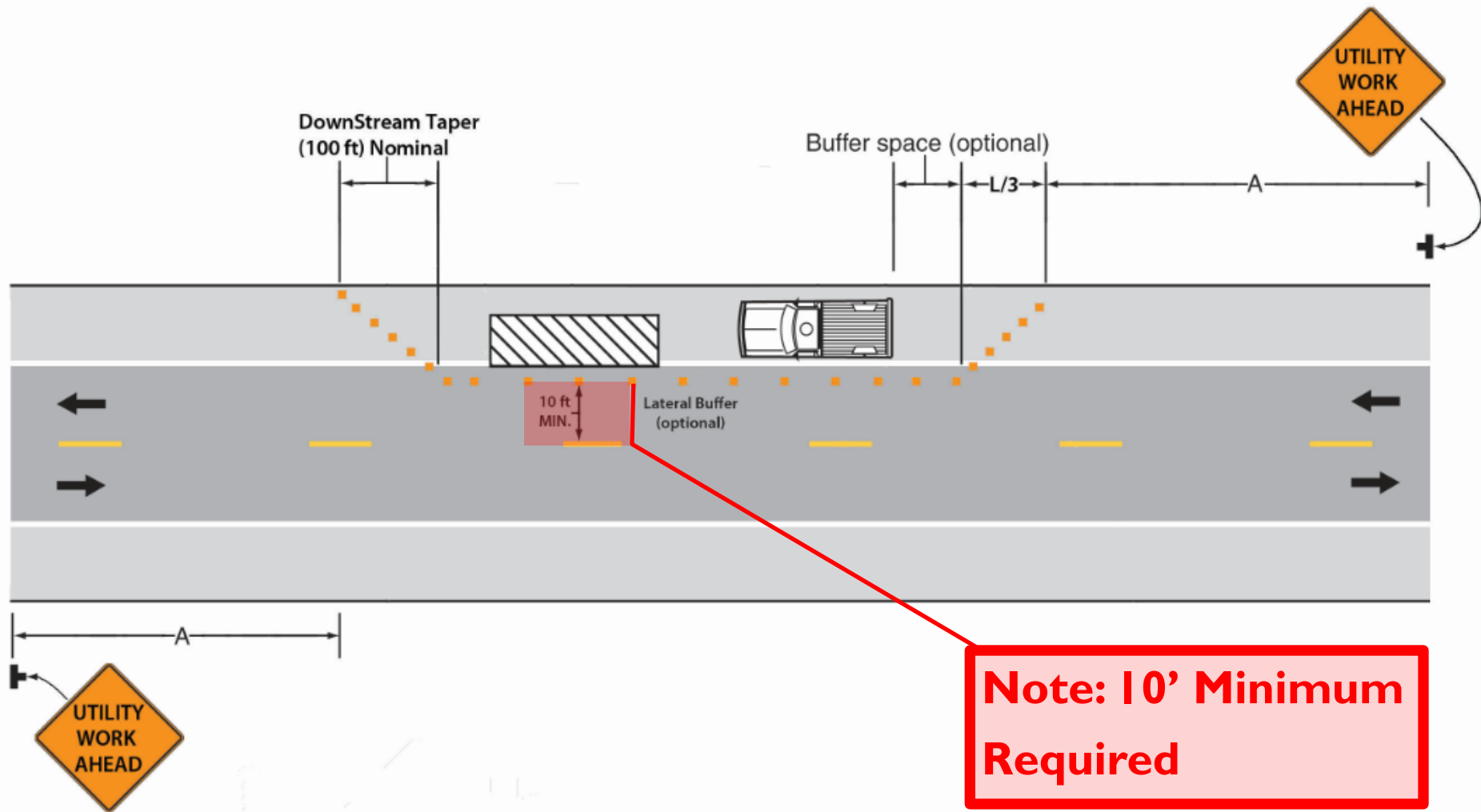


CONSIDERATIONS FOR UTILITY WORK ON SHOULDER AT VERTICAL CURVE

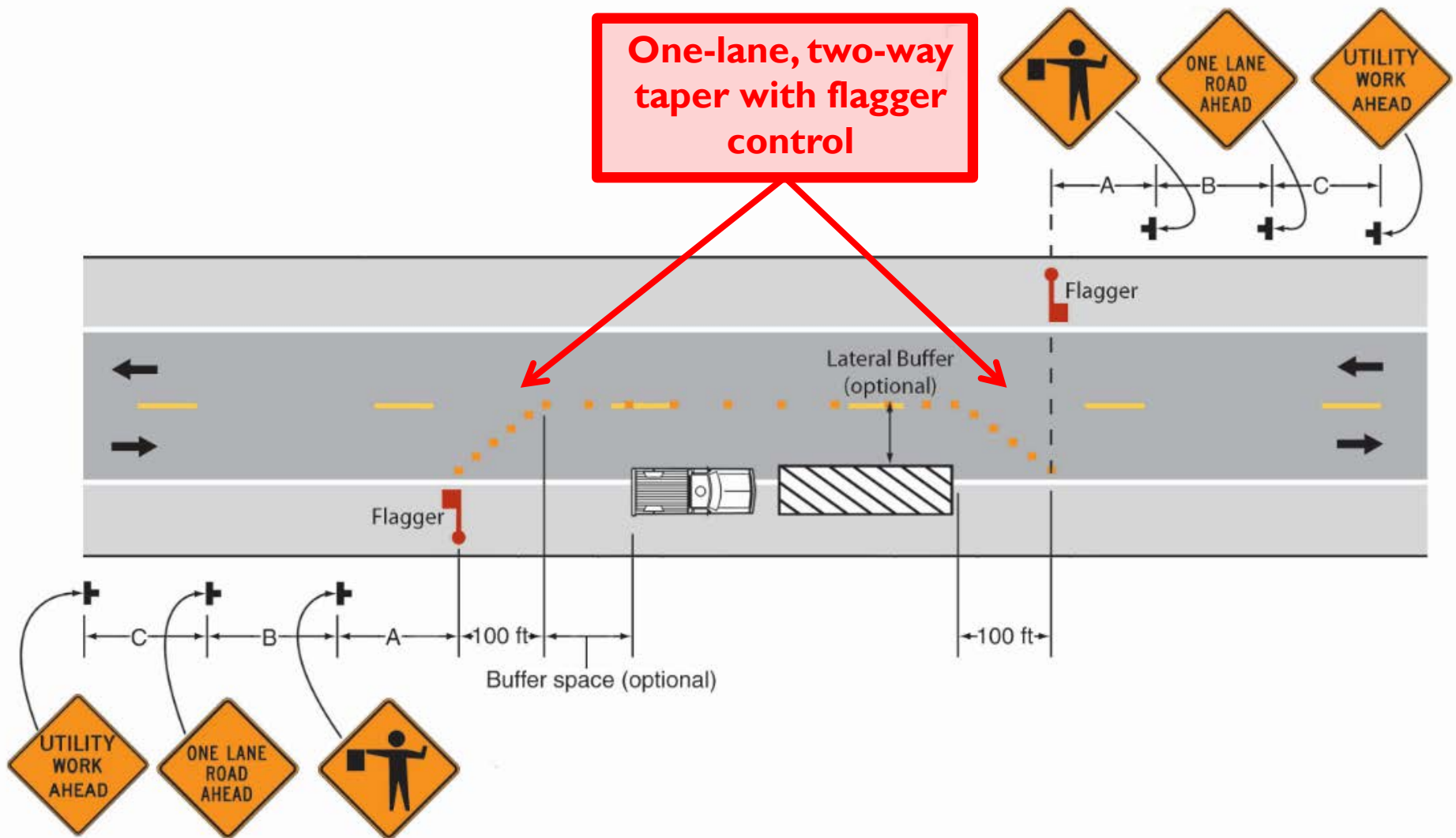
🚧 Potential sight distance issues



UTILITY WORK ON SHOULDER WITH MINOR ENCROACHMENT (HIGH TRAFFIC VOLUMES AND HIGH SPEED)



UTILITY WORK ON SHOULDER WITH ENCROACHMENT (HIGH TRAFFIC VOLUMES AND HIGH SPEED)



WHAT IS WRONG WITH THIS UTILITY OPERATION?



🚧 Is work zone setup compliant for a lane closure on a two-lane road?



UTILITY OPERATION ISSUES

⚠ Noncompliant work zone setup for a lane closure on a two-lane road

Taper Length
Incorrect

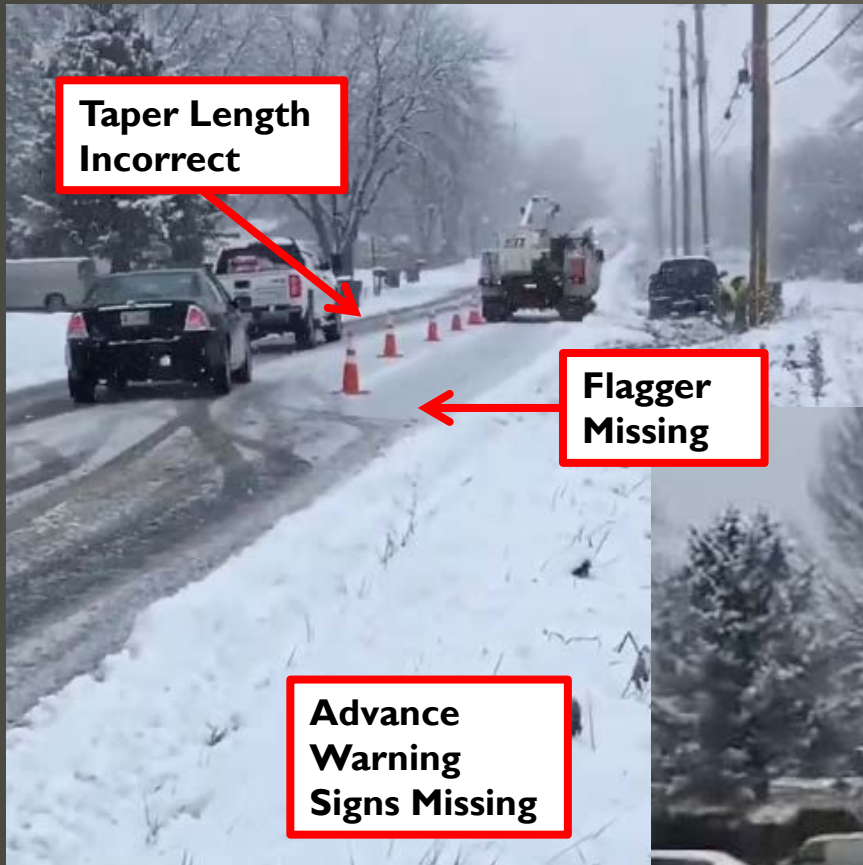
←
Flagger
Missing

Advance
Warning
Signs Missing

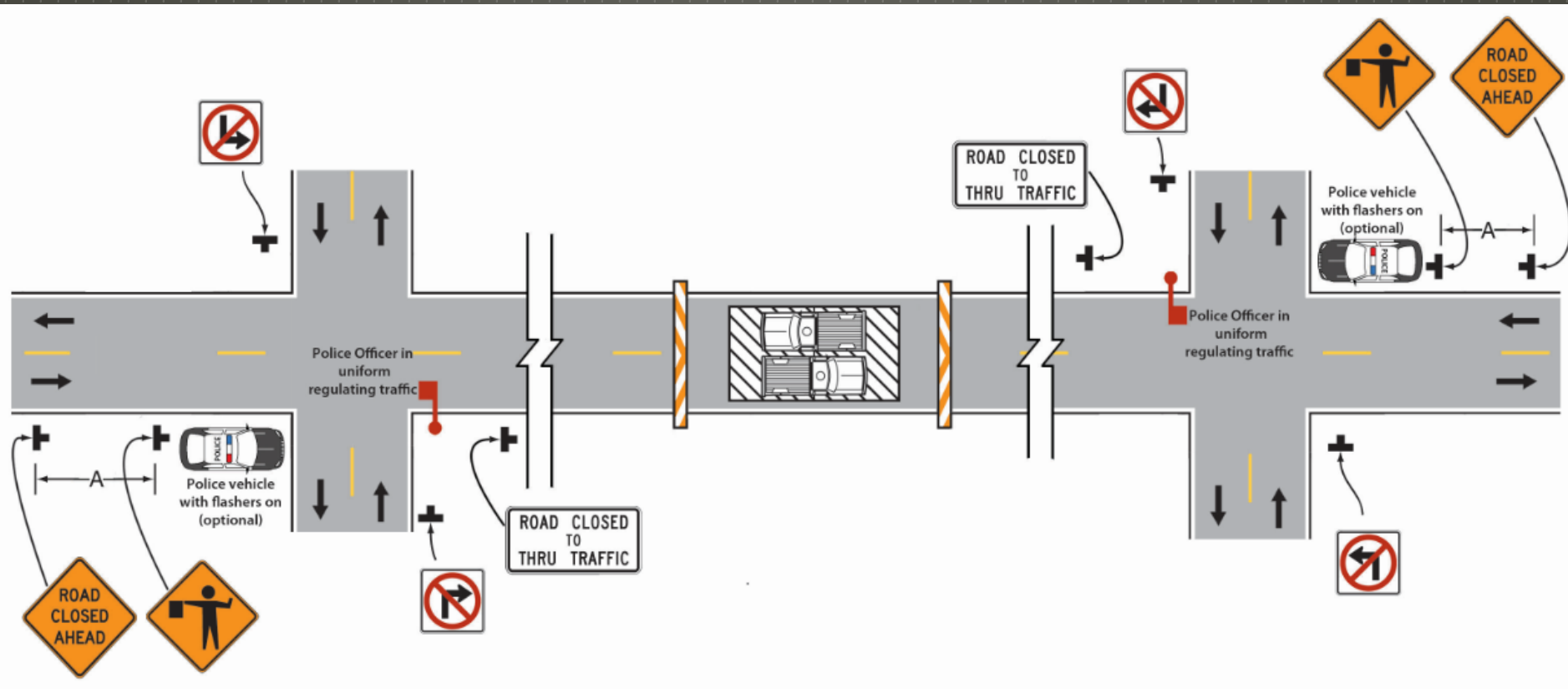
One-Lane,
Two-Way
Traffic Taper
Missing

Flagger
Missing

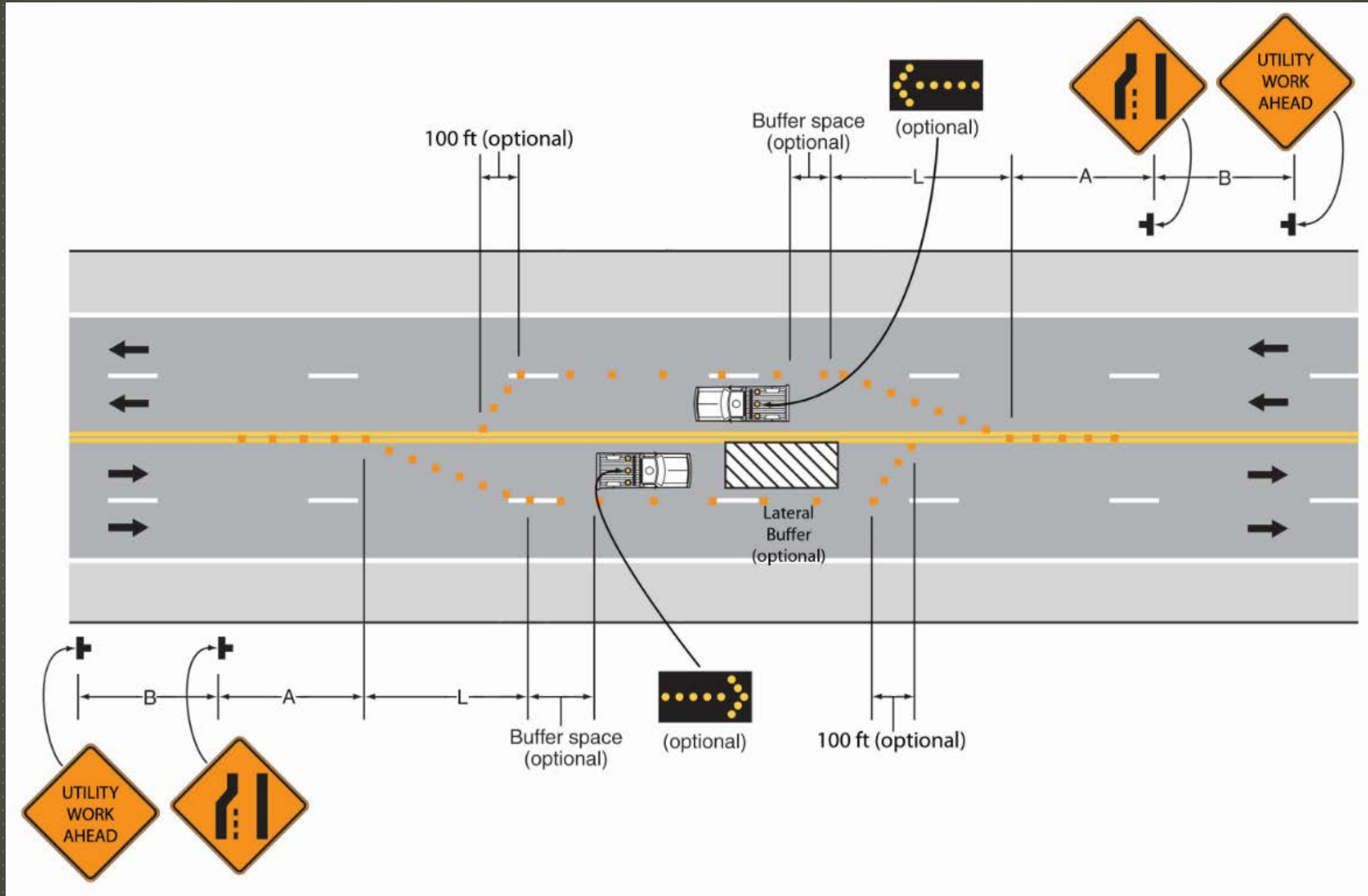
⚠ May want to delay work until salt trucks de-ice roadway



TEMPORARY ROAD CLOSURE



CENTER LANE CLOSURE ON A MULTI-LANE ROAD



CONSIDERING PEDESTRIANS

“When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility.”

- 2009 MUTCD



PEDESTRIAN ISSUES

- ▶ Must identify pedestrian needs
- ▶ Pedestrian paths must be maintained
- ▶ Should not be forced to enter into work zone
- ▶ Should not be forced to enter into roadway
- ▶ High pedestrian areas may require additional consideration



EXAMPLES OF IMPROPER PEDESTRIAN TRAFFIC CONTROL

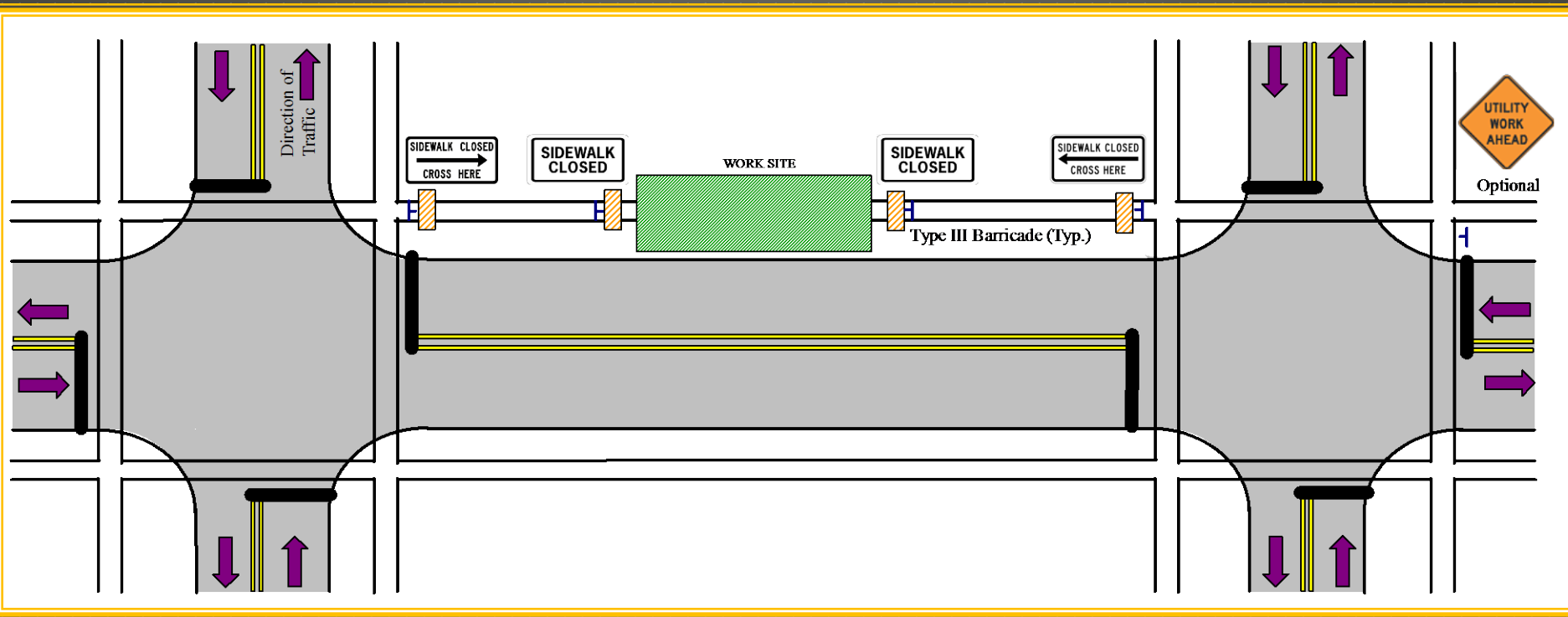


PEDESTRIAN TRAFFIC CONTROL PLANS

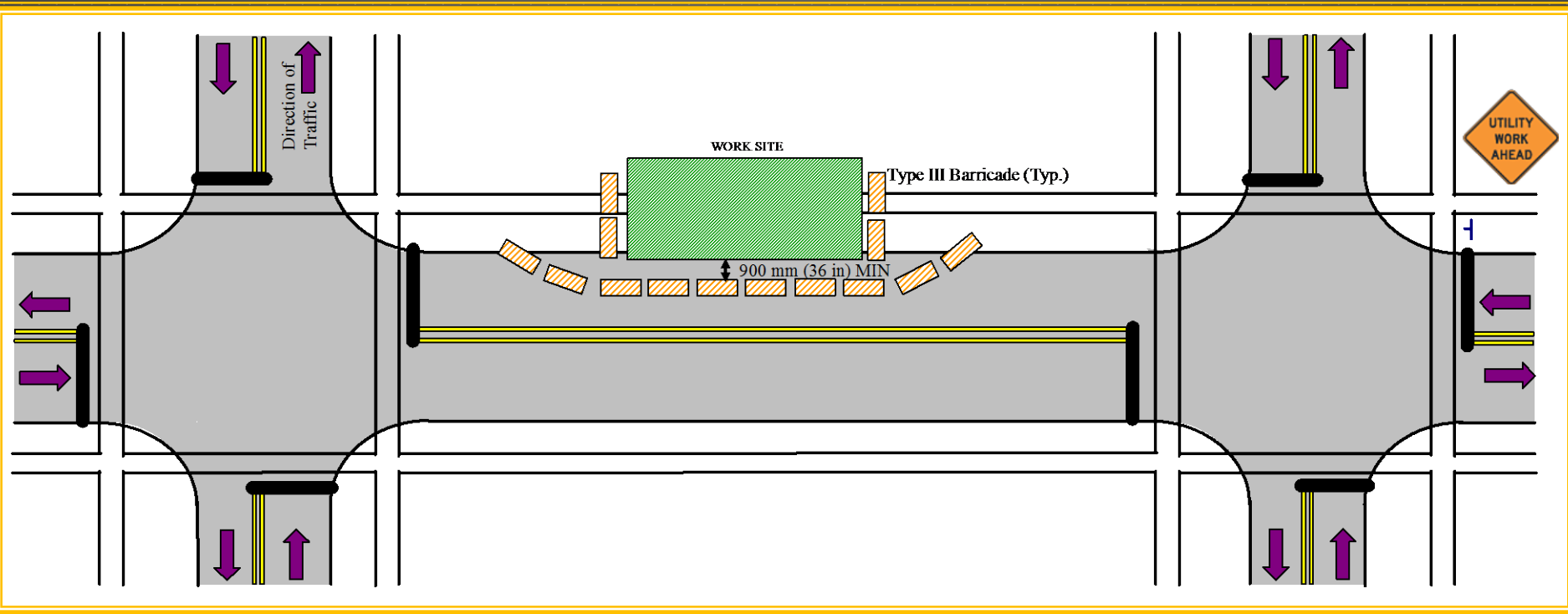
- 🚧 Pedestrian Detour for Sidewalk Closure
- 🚧 Pedestrian Diversion for Sidewalk Closure
- 🚧 Must be ADA Compliant
- 🚧 Barrier or barricade detectable by a person with a visual disability is sufficient



SIDEWALK DETOUR FOR PEDESTRIANS



SIDEWALK DIVERSION FOR PEDESTRIANS



**WORK
ZONE**

🚧 How do you select a proper
traffic control plan?

TRAFFIC CONTROL PLAN SELECTION

- ▲ Location of utility work
- ▲ Traffic volume of adjacent road
- ▲ Travel speed of vehicles on adjacent road
- ▲ Location of lane closure
- ▲ Roadway type



LOCATION OF UTILITY WORK

🚧 Beyond the shoulder

- ▶ > 15 ft from edge of travel way or > 2 ft beyond curb

🚧 On the shoulder

🚧 On the roadway



Utility Work on Shoulder



Utility Work on Roadway



Utility Work
Beyond Shoulder

LOCATION OF LANE CLOSURE

🚧 Mid-Block

- 🚧 Intersection – right lane on near side, left lane on near side, right lane on far side, left lane on far side, center of intersection



ROADWAY TYPE

🚧 Rural vs. Urban

🚧 Two-Lane vs. Multi-Lane



Lane Closure on
Urban Multi-Lane Road



Lane Closure on
Rural Two-Lane Road
(Poor layout of traffic control)

OTHER RESOURCES FOR UTILITY WORK ZONES

⚠ Further information on highway work zone safety can be found through the following organizations:

- ▶ Federal Highway Administration - Work Zone Safety: <http://safety.fhwa.dot.gov/wz/>
- ▶ National Work Zone Safety Information Clearinghouse: <http://www.workzonesafety.org/>
- ▶ Manual on Uniform Traffic Control Devices: <http://mutcd.fhwa.dot.gov/>
- ▶ FHWA Work Zone Safety and Mobility Rule: http://www.ops.fhwa.dot.gov/wz/resources/final_rule.htm
- ▶ American Road and Transportation Builders Association: <http://www.artba.org/>
- ▶ American Traffic Safety Services Association: <http://www.atssa.com/>
- ▶ Institute of Transportation Engineers: <http://www.ite.org/>
- ▶ National Highway Institute: <http://www.nhi.fhwa.dot.gov/home.aspx>
- ▶ Occupational Safety and Health Administration: <http://www.osha.gov/>
- ▶ Texas Transportation Institute: <http://tti.tamu.edu>
- ▶ Transportation Research Board: <http://www.trb.org/>

**WORK
ZONE**

Utility Work Zone Example

UTILITY WORK NEAR A SIGNALIZED INTERSECTION



UTILITY WORK ZONE EXAMPLE

- 🚧 Repair of underground sewer line located adjacent to intersection
- 🚧 Requires closure of right travel lane on far side of intersection
- 🚧 Expected work duration is approximately 3-4 hours



STEP 1: COLLECT AND IDENTIFY NECESSARY SITE AND WORK CHARACTERISTICS

Site Characteristics

- ▶ Signalized four-legged intersection
- ▶ 30 MPH posted speed limit
- ▶ Total five lanes including two-way left turn lane (12' wide lanes)
- ▶ Curb and gutter
- ▶ Driveways and other intersections within TTC area
- ▶ Moderate traffic volumes
- ▶ Low pedestrian volumes

STEP 1: COLLECT AND IDENTIFY NECESSARY SITE AND WORK CHARACTERISTICS

Work Characteristics

- ▶ Utility work sewer line repair underground
- ▶ Work vehicle(s) may be present
- ▶ Expect workers on foot within the work area
- ▶ Work duration expected to last 3-4 hours
- ▶ Activities likely to include:
 - ▶ Repair of sewer line damage/collapse
 - ▶ Replacement of drainage structure
 - ▶ Other

STEP 2: SELECT APPROPRIATE TYPICAL APPLICATION

⚠ Temporary Traffic Control Plan Selection Software

- ▶ **Workzone.eng.wayne.edu**
- ▶ Follow the flowchart logic towards the appropriate plan
- ▶ Be sure to check for state-standards first!



⚠ **OR** select an appropriate typical application from the MUTCD without using the software

⚠ Which plan is the **most appropriate** for this scenario?

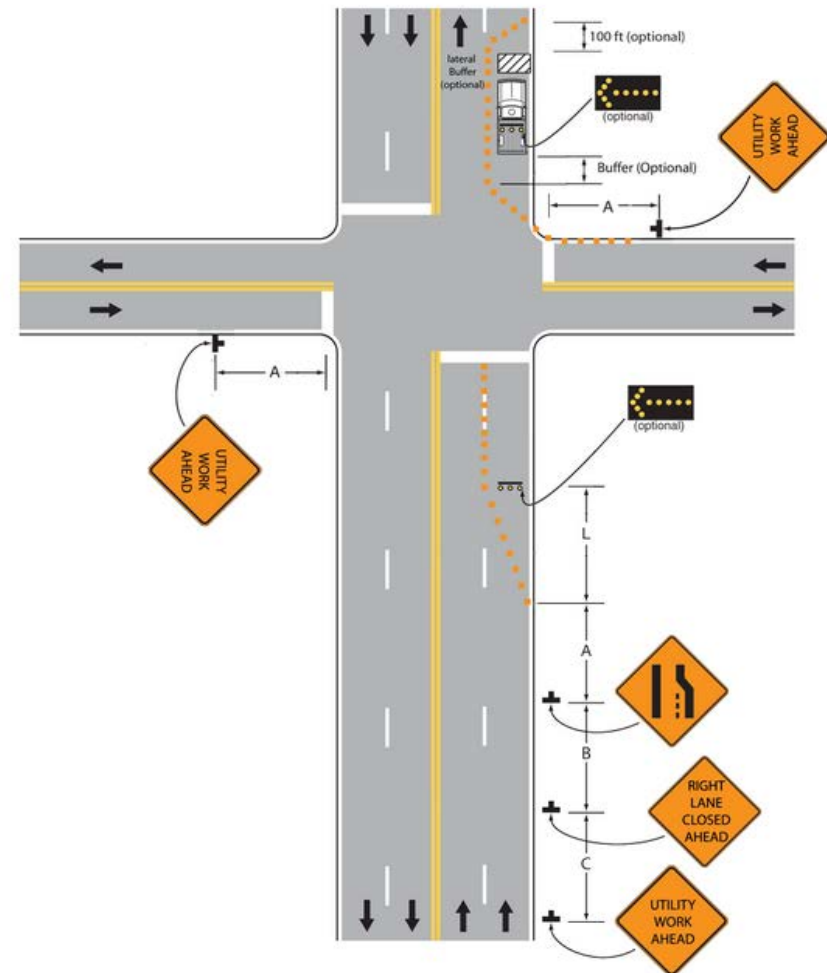
STEP 2: SELECT APPROPRIATE TYPICAL APPLICATION

Using the **TTCP Selection Software**, Figure J. is the most appropriate

Dimensions and supplementary notes are provided based on the information entered into the drop down menus

DIMENSIONS	FEET
A (Distance Between Signs)	100
B (Distance Between Signs)	100
C (Distance Between Signs)	100
L (Merging Taper Length)	180
Maximum Taper Channelizing Device Spacing	30
Maximum Tangent Channelizing Device Spacing	60

Figure J. Right Lane Closure on Far Side of Intersection



STEP 3: MODIFY TA BASED ON ADDITIONAL CONSIDERATIONS

- ▲ Having selected a typical application or example plan, it must still be modified to fit the **specific work/site conditions**

STEP 3: MODIFY TA BASED ON ADDITIONAL CONSIDERATIONS

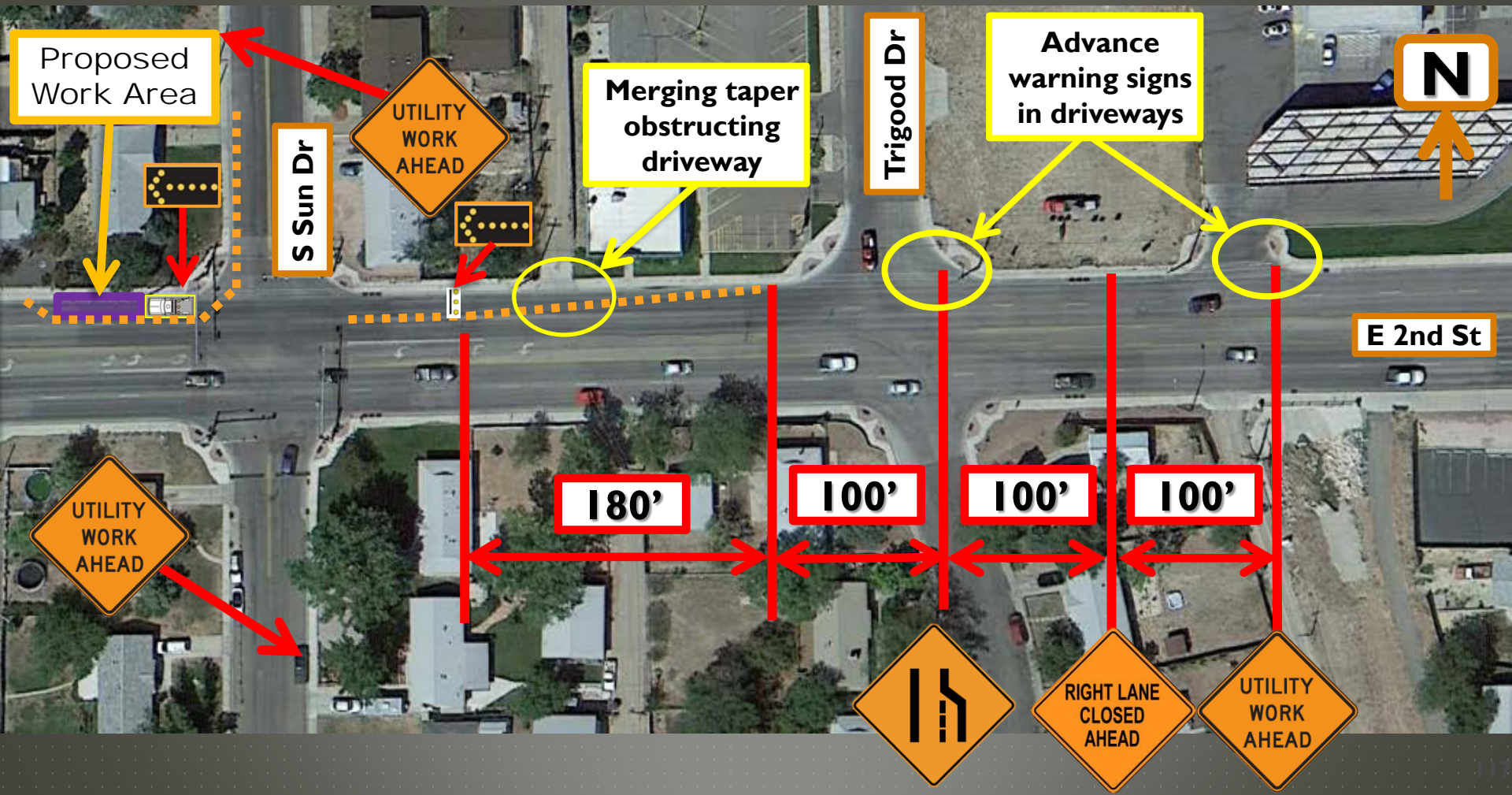
⚠ What is unique/different about the given scenario vs. the selected TA?

- ▶ Presence of the two-way left turn lane on the affected roadway
- ▶ Presence of driveways and other intersections
- ▶ Presence of non-motorized facilities (sidewalks) along the affected roadway

STEP 3: DEVELOP APPROPRIATE TEMPORARY TRAFFIC CONTROL PLAN

🚧 What are the conflict points?

👉 Conflict Point

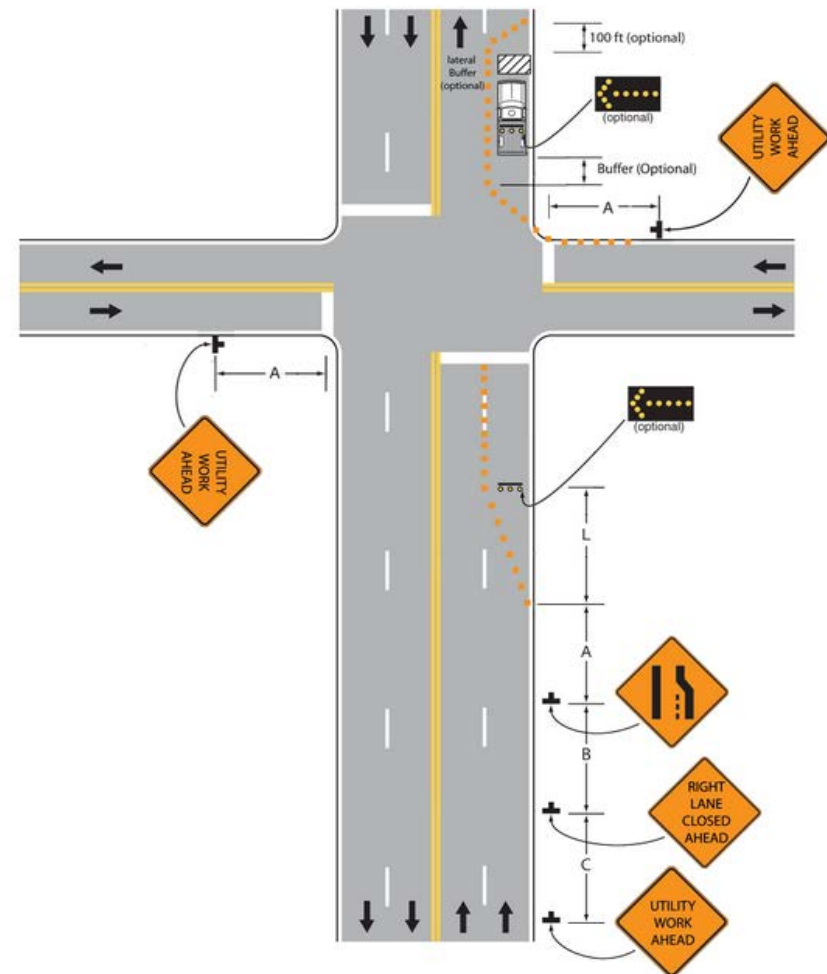


STEP 3: MODIFY TA BASED ON ADDITIONAL CONSIDERATIONS

What aspects of the Example Plan should be modified to fit work/site conditions?

- ▶ Modify taper at driveway
- ▶ Adjust the advance warning sign locations to avoid driveways

Figure J. Right Lane Closure on Far Side of Intersection

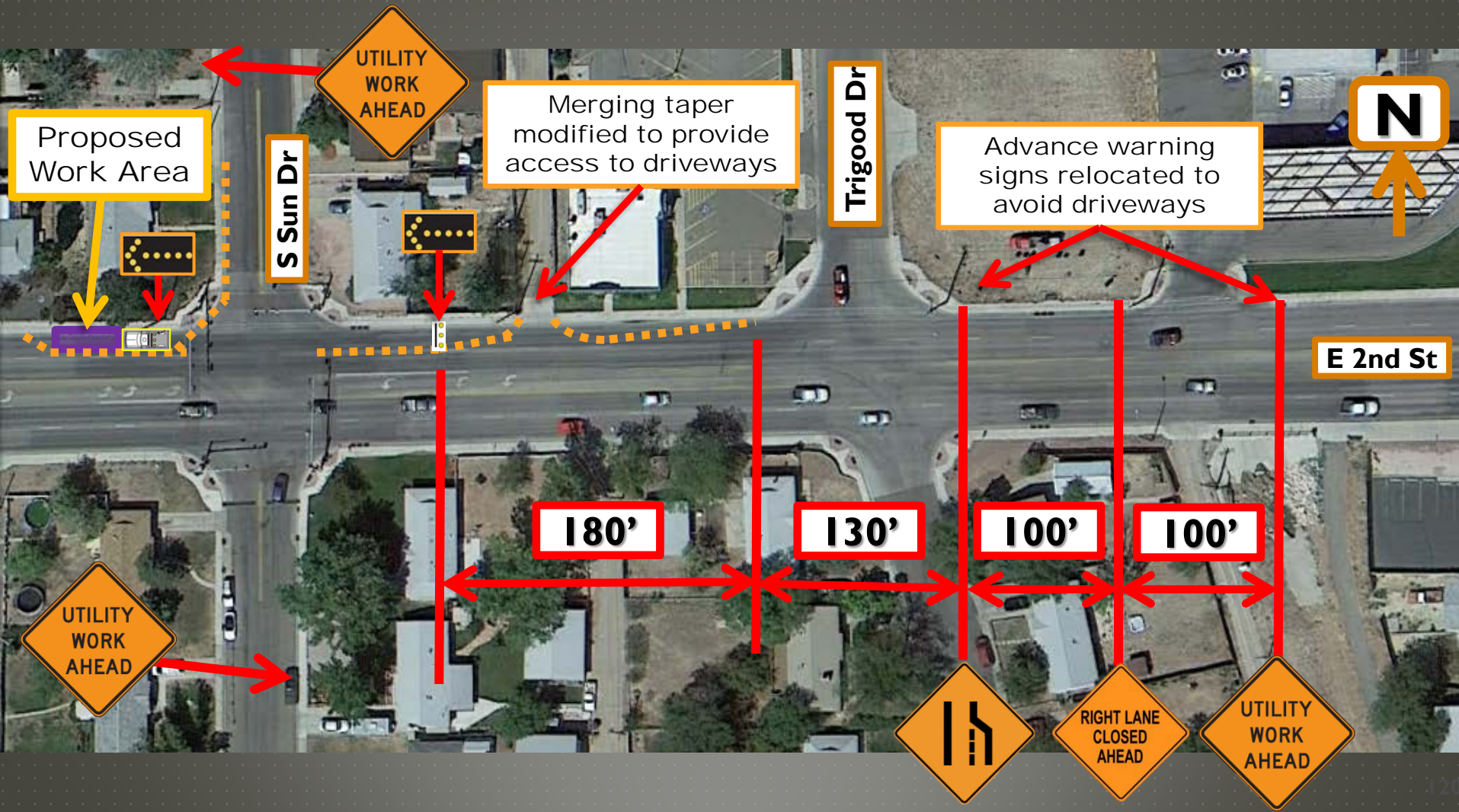


STEP 4: DEVELOP OPTIMAL TEMPORARY TRAFFIC CONTROL PLAN

🚧 Final TTCP should include:

- ▶ Schematic drawing of the modified plan including:
 - ▶ All necessary temporary traffic control devices
 - ▶ Dimensions / layout of devices
- ▶ Supplementary notes or guidance for field personnel
 - ▶ Instructions on how to modify TTC for various field conditions

STEP 4: DEVELOP OPTIMAL TEMPORARY TRAFFIC CONTROL PLAN



STEP 5: PERFORM FIELD REVIEW OF TTC AS APPROPRIATE

- ⚠ Field conditions may vary from expectations
 - ▶ Especially for unexpected or emergency work
- ⚠ Ensure TTC in place is appropriate for actual conditions
 - ▶ Heavier than expected vehicular or pedestrian volumes
 - ▶ More expansive work area than anticipated
 - ▶ Duration exceeding one daylight period
 - ▶ Other considerations

THANK YOU

🚧 Work Zone Safety Website

▶ <http://workzone.eng.wayne.edu/>



THANK YOU