TRAFFIC CONTROL STRATEGIES FOR URBAN WORK ZONES

Training Program

FHWA GRANT DTFH61-11-RA-00012

DISCLAIMER

- Opinions, findings, and conclusions expressed in this presentation are those of contractor(s) and not necessarily those of USDOT or FHWA
- Materials prepared under contract with FHWA
- Content is 'living' and subject to change

OUTLINE

- Background
- Urban Roadway Environments
- Purpose and Objectives
- Urban Work Zone Characteristics
- Traffic Control Strategies for Urban Work Zones
- Urban Work Zone Example

BACKGROUND

- Aging infrastructure
- Two work zone traffic control objectives:
  - Maintain safety for ALL ROAD USERS
  - Maintain acceptable levels of mobility
- Balancing safety, mobility, and constructability
- Careful planning, design, and implementation of work zone traffic control

THE MUTCD

- MUTCD Chapter 6 presents
  - **Temporary traffic control (TTC)**
    - Creates uniformity and consistency
  - **Typical Applications (TAs)**
    - **C**ommon work zone TTC scenarios
- Adjust TAs to field conditions

A GUIDE TO URBAN WORK ZONES

- Developed as part of 2011 FHWA Work Zone Safety Grant
- Supplement to MUTCD
- Strategies and examples associated with urban work zones
- Characteristics unique to urban work zones
- TTCP development for urban work zones

Source: http://workzone.eng.wayne.edu/GuidetoUrbanWZTempTrafficControl.pdf

U.S. Department of Transportation
Federal Highway Administration

URBAN ROADWAY ENVIRONMENTS

- High traffic demand and low travel speed
- Frequent intersections and driveways

URBAN ROADWAY ENVIRONMENTS

- Right-of-way and space limitations
- On-street parking and other geometric issues
- Bus stops and transit access
- Non-motorized transportation facilities
- Special events

PURPOSE AND NEED

- Characteristics require consideration beyond MUTCD
- Strategies to address site-specific concerns
- Process for developing an effective TTCP
- Example plans for various urban scenarios

URBAN WORK ZONE CHARACTERISTICS

Urban Work Zones

HIGHER OR WIDE RANGING TRAFFIC DEMAND

- Urban WZs often experience high traffic demand
- Demand varies
  - Peak vs. off-peak
- Lane closures may result in queue buildup
- Field conditions may require adjustment

LOWER TRAVEL SPEEDS

- Travel speeds relatively low
  - Dense street network
  - Traffic congestion
  - Extensive queuing for turning movements

FREQUENT INTERSECTIONS AND DRIVEWAY ACCESS

- Increased density of access points
- Potential sight distance issues
- Restricts drivers to conduct turning movements
  - Left turns
- Access needs to adjacent commercial and residential developments

RIGHT-OF-WAY AND SPACE LIMITATIONS

- Challenging roadway geometry
  - Narrow travel lanes
  - Restricted access to utilities
  - Limited space for traffic control devices
- Limited space for buffers or work zone shielding

ON-STREET PARKING AND ROADSIDE ACCESS

- Parking challenges
  - Prohibition of parking
  - Access needs of affected commercial developments

ROADWAY GEOMETRY

- Geometric Issues
  - No paved shoulder
  - Curb and gutter design
  - Adjacent sidewalks
  - Narrow lane widths

Curb and Gutter

TRAFFIC CONTROL ISSUES

- Consideration of existing signage
  - Signs are more frequent and closely spaced
  - Cover or modify existing signage
  - Maintain visibility of applicable signage
  - Be cautious of over signage

TRAFFIC CONTROL ISSUES

- Consideration of permanent traffic signals
  - Cover temporarily
  - Phasing and timing changes (e.g., split phasing) due to:
    - Closing of turn lane(s)
    - Using shared through and turn lanes
    - Temporary relocation of lanes

TRAFFIC CONTROL ISSUES

- Split phasing example to accommodate shared through and left turn lane

Existing Phase Diagram

Modified Phase Diagram

NON-MOTORIZED TRANSPORTATION FACILITIES

- Presence of homes, businesses, transit facilities
  - Increases pedestrian and bicycle traffic
    - Bike lanes
    - Crosswalks
    - Sidewalks

NON-MOTORIZED TRANSPORTATION FACILITIES

- Pedestrian access concerns
  - Continuity of sidewalks
  - Pedestrian traffic detours
  - Natural pedestrian travel routes
  - Separating pedestrian and vehicular traffic
  - Maintaining ADA compliant access

Pedestrian Access?

ADA Compliant?

ADA Compliant?
SIDEWALK
CLOSED
USE
OTHER SIDE

BUS STOPS AND TRANSIT ACCESS

- Access needs to bus stops and public transit stations
  - Identification of alternate routes if inhibited by work zone
  - Closure of sidewalks and crosswalks
- Impact of bus volumes in traffic stream
  - Work zone-related closures reduce capacity

SPECIAL EVENTS

- Includes parades, fairs, concerts, sporting events
  - Unique traffic operation related scenarios
  - Require specific traffic control
  - Complicates implementation of TTC
- Plan work to avoid if possible

SIGNIFICANT PROJECTS

- Due to the **Rule on Work Zone Safety and Mobility**, operations which are deemed **"significant projects"** require:
  - Temporary Traffic Control Plan
  - Public Information Strategies
  - Transportation Operations Strategies
- Significant projects defined as:

Section 630.1010 of the Rule defines a significant project as one that, alone or in combination with other concurrent projects nearby, is anticipated to cause sustained work zone impacts that are greater than what is considered tolerable based on State policy and/or engineering judgment. All Interstate system projects within the boundaries of a designated Transportation Management Area (TMA) that occupy a location for more than three days with either intermittent or continuous lane closures shall be considered as significant projects.

TRAFFIC CONTROL STRATEGIES FOR URBAN WORK ZONES

Urban Work Zones

TRAFFIC CONTROL STRATEGIES

- These characteristics may result in impacts to **safety and mobility** if not adequately addressed
- TTCPs for urban work zones must:
  - Provide access for all road users
    - Both motorized and non-motorized
  - Provide access for adjacent properties
  - Provide clear, consistent traffic control that accommodates access

ACCESS TO ADJACENT HOMES AND BUSINESSES

- Impact on access to adjacent land
- Access driveways
- Driveway access-related traffic conflicts
- Driveway closure
  - Alternative access
  - Flagger control
  - TTCPs should allow at least limited access
- Construction staging to avoid disruptions
- Public hearings may help to identify relevant issues

ACCESS TO PARKING FACILITIES

- Maintain parking access
- Provide additional space for TTC/storage of work vehicles/equipment
- TTC should include:
  - Channelizing devices
    - Similar to a shoulder taper (1/3L)
    - Follow states' practice
  - Prohibit on-street parking
  - Shield work area and use buffer

ACCESS TO PARKING FACILITIES

- Parking spaces may need to be closed
  - Maximum taper spacing
    - Don't exceed distance (feet) equal to 1.0 times speed limit (mph)
  - Maximum tangent spacing
    - Don't exceed distance (feet) equal to 2.0 times speed limit (mph)
- Reduce device spacing to prevent vehicle parking

INTERSECTIONS AND/OR DRIVEWAYS

- Access to intersections and/or driveways
  - Higher traffic conflicts or queues
- Avoid lane closures restricting turning movements
  - Left turn lane with high turning volumes
- Restrict left turns during construction period
- Sight distance impact

PEDESTRIANS AND OTHER NON-MOTORIZED USERS

- Maintain existing accessibility features
  - ADA compliant sidewalks and crosswalks
  - Devices which assist visual or auditory impaired road users
  - Channelizing devices with detectable edges

- Encourage safe crossing behavior
  - Encourage intersection crossing and discourage mid-block crossing
  - Ensure TTC, work vehicles or equipment do not interfere with sidewalks

PEDESTRIANS AND OTHER NON-MOTORIZED USERS

- Maintain safety and mobility for all road users when developing TTCP
- "Complete Streets" allows for safe travel by walking, bicycling, vehicles, public transportation
  - Pedestrian infrastructure
    - Sidewalks
    - Crosswalks
    - ADA compliance
  - Bicycle accommodations
    - Bicycle lanes
    - Paved shoulders
  - Transit stops

ACCOMMODATING PUBLIC TRANSIT

- Coordinate with transit authorities
- Access to terminal and/or stops
- If access can not be maintained:
  - Relocate bus stops

SPECIAL EVENTS AND OTHER CONSIDERATIONS

- Special events
  - Planned event
  - Unplanned event
    - Modify TTC in field
- Special consideration
  - No uniform guidelines
  - May occur at other long-term work
  - Requires higher level of planning
  - Schedule work to avoid special events
  - Temporarily suspend work and restore roadway if unable to avoid

USE OF SPECIFIC TEMPORARY TRAFFIC CONTROL DEVICES

- Channelizing devices, **Type 3 Barricades**
- Urban WZ space limitations
  - Prevents non-motorized traffic from entering work areas
  - Shielding to project highway workers
  - Removable barricades
  - Drums/cones
  - Vertical panels may be useful alternative in Urban WZ

USE OF SPECIFIC TEMPORARY TRAFFIC CONTROL DEVICES

- MUTCD's maximum spacing of channelizing devices
  - Maximum taper spacing
    - Equal in feet to posted speed limit
  - Maximum tangent spacing
    - Equal in feet to 2.0 times posted speed limit
  - No device spacing reduction techniques
  - May not address urban characteristics

Speed Limit	Taper Channelization		Tangent Channelization
	Merging Taper, Shifting Taper, and Shoulder Taper	One-Lane, Two-Way, and Downstream Taper	
[mph]	[ft]	[ft]	[ft]
20	20	20	40
25	25	20	50
30	30	20	60
35	35	20	70
40	40	20	80
45	45	20	90
50	50	20	100
55	55	20	110
60	60	20	120
65	65	20	130
70	70	20	140
75	75	20	150

USE OF SPECIFIC TEMPORARY TRAFFIC CONTROL DEVICES

- Conditions that require reduce spacing for channelizing devices
  - To deter vehicles from entering work area
  - Road workers exposed to traffic
  - Conflict between existing pavement markings
  - Roadway curve locations
  - Intersections
  - Nighttime operations

USE OF SPECIFIC TEMPORARY TRAFFIC CONTROL DEVICES

- California allows for device space reduction for conflict areas
  - Equal in feet to ½ times posted speed
- Consider on-street parking conflict area
  - Conflict between parking lines and channelizing devices
- Example Problem
  - Posted speed limit: 30 mph
    - Device spacing for conflict area: 15 feet
  - Is spacing sufficient enough to prevent on-street parking?

California

Table 6F-101(CA). Maximum Spacing of Channelizing Devices

Speed (mph)	Maximum Channelizing Devices Spacing		
	Taper* (feet)	Tangent (feet)	Conflict** (feet)
20	20	40	10
25	25	50	12
30	30	60	15
35	35	70	17
40	40	80	20
45	45	90	22
50	50	100	25
55	55	110	27
60	60	120	30
65	65	130	32
70	70	140	35

* Maximum channelizing device spacing for all speeds on one-lane/two-way tapers is 20 feet.
Maximum channelizing device spacing for all speeds on downstream tapers is 20 feet.
All other tapers are as shown.

** Use on intermediate and short-term projects for taper and tangent sections where there are no pavement markings or where there is a conflict between existing pavement markings and channelizers (CA)

USE OF SPECIFIC TEMPORARY TRAFFIC CONTROL DEVICES

- Maryland's maximum spacing of channelizing devices
  - Device space reduction techniques for unique conditions
    - 20 feet for low speed
    - 40 feet for high speed

Table 1. Channelizing device spacing for particular work zone conditions

Work Zone Location/Condition	Spacing in Feet	
	Low-speed (45 mph or less)	High-speed (Greater than 45 mph)
Transitions and Curves[1]	20'	40'
Work Zone Activity Area[2]		
Intersections		
Conflict Areas[3]		
Hazardous conditions[4]		
Nighttime Operations		

[1] Use on curves with a degree of curvature greater than 6 degrees.

[2] Where work is taking place.

[3] Areas with no pavement markings or where there is a conflict between existing pavement markings and channelizing devices.

[4] e.g., equipment very near the traffic stream, unusual conditions hidden from the motorists, trucks entering and leaving the traffic stream, etc.

USE OF SPECIFIC TEMPORARY TRAFFIC CONTROL DEVICES

- Minnesota's maximum spacing of channelizing devices
  - Common taper cone spacing for two speed limit groups
    - 0-30 mph – 25 feet
    - 45-75 mph – 50 feet
  - May need to reduce spacing to deter vehicle intrusion

Posted Speed Limit (mph)	Merging Taper, Shifting Taper, Shoulder Taper (feet)	Tangent (feet)
0-30	25	50-100
35-40	25	50-100
45-50	50	100-200
55	50	100-200
60-65	50	100-250
70-75	50	100-300

USE OF SPECIFIC TEMPORARY TRAFFIC CONTROL DEVICES

- Other state techniques for reducing device spacing
  - Michigan
    - One-lane, two-way taper: 16 feet spacing for short taper of 100 feet or less
  - New York
    - Night and urban work zones: Use close channelizing device spacing in combination with larger devices
    - Road workers exposed to traffic: Maximum device spacing of 40 feet

Visual clutter?

USE OF SPECIFIC TEMPORARY TRAFFIC CONTROL DEVICES

- **Portable Changeable Message Signs**
  - Can convey complex messages
  - Useful in Urban WZ's where complex messages may be necessary
    - Cross street closures
    - Business closures
  - Useful to convey frequently changing information
  - Avoid information overload

USE OF SPECIFIC TEMPORARY TRAFFIC CONTROL DEVICES

Arrow Boards

- Provides additional warning and directional guidance
- Such dominant devices may minimize the need for further signage
- Consider visual clutter

USE OF SPECIFIC TEMPORARY TRAFFIC CONTROL DEVICES

- Temporary Traffic Control Signals
  - May be used only when other means are ineffective
  - Suitable alternative for specific scenarios
    - Increased traffic volumes at un-signalized intersections
    - Alternating one-way traffic control
    - Rail-highway grade crossing or other unique situations
  - Must be used in conjunction with other devices to alert road users

LAYOUT OF TEMPORARY TRAFFIC CONTROL DEVICES

- Location of TCD as per TA may be impractical due to:
  - Existing traffic control devices
  - Proximity to intersections and/or driveways
  - Sight distance obstructions – fixed objects
  - Information overload
- TTC devices must be visible and conspicuous
  - May require relocation of TCDs preferably upstream
  - Increase buffer space

GUIDE SIGNS MUST BE CONSPICUOUS AND WELL-MARKED

- Urban roadways often involve complex navigational tasks
  - Especially for unfamiliar drivers
  - Complicated by TTC, workers, work vehicles, and equipment
- Clear and effective guide signs
  - Utilize large street signs with block numbering where possible
  - Advance signage should be provided to notify alternative land access
  - Detour signs should be legible and recognizable

MODIFICATION OF EXISTING SIGNAL TIMING

- Traffic operations may be impacted by TTC
  - Lane closures or prohibited turning movements
- Existing signal timing plans should be analyzed and altered if operations are impacted
  - Cycle lengths, phasing, and splits
  - Pedestrian walk times
  - Work vehicles, equipment and TTC should not obscure signal heads
    - Signal heads not intended for use should be bagged or covered

GEOMETRIC CONSIDERATIONS

- Maximize turning radii of affected intersections and/or driveways based on available geometry
  - Improves maneuverability
  - Ensure that this does not encourage higher speeds/turning
- Minimize the space needed for storage of work vehicles and equipment
  - Maximize the space for road users
  - Provide buffer space

IMPACT OF WORKING NEAR AN INTERSECTION

- No uniform guidelines can cover all of the potential issues which may occur
- May involve work area:
  - Before or upstream of an intersection
  - After or downstream of an intersection
  - Within an intersection

WORK SPACE BEFORE (UPSTREAM) AN INTERSECTION

- Consider early closure or adjustment to longitudinal buffer space
  - Channelizes traffic in advance of the work area
- Consider separating the traffic stream (through movements vs. turning movements) upstream of the closure
  - Reduces downstream traffic conflicts and queuing

WORK SPACE WITHIN AN INTERSECTION

- Use warning devices to warn motorists in all directions
  - Use "Road Work Ahead" signs
- Use of flaggers when TTC require alteration of normal operations
- Provide closures as early as reasonable
  - Early closures may be impractical due to traffic demand
    - Ensure work space is well defined and shielded

WORK SPACE AFTER (DOWNSTREAM) AN INTERSECTION

- Consider an early closure or increase longitudinal buffer space
  - Channelizes traffic well in advance of the work area
  - Consider traffic demand which may make such closures impractical
    - Right-turning movements may require exclusive lane
- Ensure work areas are well defined and shielded for highway workers

ROLE OF HIGHWAY WORKERS AND FLAGGERS

- Ensure devices are properly implemented, clean and conspicuous during operations
- Remove or cover devices not intended to be in use
- Use of flaggers a critical concern in Urban WZ's
  - Use as suggested in typical applications
  - Consider conspicuity of flaggers
  - Consider staging of flaggers for work
- Use where limited right-of-way is available

SELF-REGULATION WHERE FLAGGERS MAY BE REQUIRED

- Limited right-of-way

URBAN WORK ZONE STRATEGIES

WORK SITE CHARACTERISTICS	CHALLENGES THAT REQUIRE FIELD ADJUSTMENT	POSSIBLE MITIGATION STRATEGIES
Work on traveled way	• Driveway access • Turning movement at intersection • Lane closure interfere with land access	• Use flagger • Turning movement prohibition • Use of alternate access where feasible • Use of self-regulating TCDs for low volume roads • Advance warning for lane closure, turn prohibition
Work interferes with crosswalk/sidewalk	• Pedestrian facility continuity	• Sidewalk detour • ADA compliant • Portable barrier
	• Pedestrian crossing interruption	• Pedestrian detour signs • ADA compliant • Use flagger
Work on traveled way requiring lane closure	• Traffic congestion and unacceptable level of service (LOS)	• Consider advance warning • Peak hour reopening to traffic • Plan for off-peak work • Consider staged operation • Night work

URBAN WORK ZONE STRATEGIES

WORK SITE CHARACTERISTICS	CHALLENGES THAT REQUIRE FIELD ADJUSTMENT	POSSIBLE MITIGATION STRATEGIES
Presence of grade/ horizontal curve	• Sight distance problem due to grade	• Move lane closure taper to top of vertical curve • Use arrow board • Extend work zone
	• Sight distance problem at horizontal curve	• Provide lane closure taper and arrow board at the tangent section
Lane closure	• Sight distance problem due to roadside fixed objects	• Move taper forward (upstream) • Increase longitudinal buffer
	• Visual clutter due to existing signs and billboards	• Use portable changeable message signs • Traffic control devices (signs) with orange flags • Extend work zone to avoid visual clutter
Work space adjacent to sidewalk	• Separating pedestrian traffic from work space	• Pedestrian detour • Portable barriers • Pedestrian route guidance signs

URBAN WORK ZONE EXAMPLES

Temporary Traffic Control Plans

LANE SHIFT ON ROADS WITH PARKING LANE √

- Closed utilizing a taper length of 1/3L
- Provide Type 3 Barricades or other channelizing devices to divert traffic to and from parking lanes
- Prohibition and availability of parking should be well marked at both ends
- Shield work area from errant vehicles
  - Provide longitudinal buffer
- End taper can be omitted to increase parking spaces

CLOSURE OF RIGHT LANE ON ROADS WITH MULTIPLE DRIVEWAYS

- Early closure helps traffic to early merge
  - Alleviates access-related concerns
  - Right turning traffic
- Use **Type 3 Barricades** as shown
- Optional **arrow board** shown on this plan improve WZ recognition

CLOSURE OF TWO INSIDE LANES NEAR AN INTERSECTION

- Lane closure creates driveway access problem
- Provide alternate routes to driveways should be considered
- Use **Type 3 Barricades** with arrow boards (optional)
- Prohibit left turns
- Check left turn queue build-up

WORK ON FAR RIGHT LANE NEAR SIGNALIZED INTERSECTION

- Early closure of the right lane is helpful
  - Stabilize traffic flow and allow reopening of closed lane as right turn only lane
  - High right turn volumes at the intersection may require an alternate solution
- Provide **"Road Work Ahead"** signs on all four approaches
- **"No Turn on Red"** sign on right side may be added
- Prohibited left turn at the affected driveway
  - Sight distance issue

SIDEWALK CLOSURE INVOLVING MINOR STREET IN URBAN AREA

- WZ may require closing or relocating pedestrian facilities
- Accessibility features must be maintained
- Use portable plastic or concrete barriers to shield pedestrians
- While only the TTC for pedestrians are shown in this example, additional devices will be required for vehicular traffic

PEDESTRIAN FACILITY REROUTED INTO TRAVELED LANES

- WZ may require rerouting of pedestrian facilities
- Consider rerouting these facilities into the traveled way
  - Mobility impact on the existing traffic system must be considered
- Shielding the pedestrian facility from the traffic key consideration

LANE CLOSURE WITH BICYCLE LANE

Typical Application 104 (CA)

- Bicycle lanes must be considered when developing TTCP
- Rightmost lane is utilized as an exclusive right turn lane with the closure on the far side of the intersection
- Use **"Share the Road"** bicycle signage located upstream of the closure

SHOULDER CLOSURE ON URBAN LOCATION WITH BICYCLE TRAFFIC

Typical Application 101 (CA)

- Work zone may interrupt bike lanes
- Ensure adequate lane width for bicyclists and motorists to drive side by side, otherwise a ***"Bicyclists May Use Full Lane"*** sign is recommended
- Crash cushion, barrier and lights appropriate for long-term work zone scenarios
- Place advance warning signs so path of travel for bicyclists is not blocked
  - Maintain good visibility for drivers

OTHER RESOURCES FOR URBAN WZ

- Further information on highway work zone safety can be found through the following organizations:
  - American Road and Transportation Builders Association: http://www.artba.org/
  - American Traffic Safety Services Association: http://www.atssa.com/
  - Federal Highway Administration: http://www.fhwa.dot.gov/
  - Institute of Transportation Engineers: http://www.ite.org/
  - Manual on Uniform Traffic Control Devices: http://mutcd.fhwa.dot.gov/
  - National Highway Institute: http://www.nhi.fhwa.dot.gov/home.aspx
  - National Work Zone Safety Information Clearinghouse: http://www.workzonesafety.org/
  - Occupational Safety and Health Administration: http://www.osha.gov/
  - Texas Transportation Institute: http://tti.tamu.edu
  - Transportation Research Board: http://www.trb.org/

Urban Example

URBAN WORK NEAR A SIGNALIZED INTERSECTION – ATLANTA, GA

URBAN WORK ZONE EXAMPLE

- Road work within travel way
- Requires 40’ x 8’ closure of left travel lane on far side of intersection
- Work duration expected to last more than two days

STEP 1: COLLECT AND IDENTIFY NECESSARY SITE AND WORK CHARACTERISTICS

- Site Characteristics
  - Signalized four-legged intersection
  - 30 MPH posted speed limit
  - Total four lanes (10' wide lanes)
  - Curb and gutter
  - Commercial driveways and intersections within TTC area
  - On-street parking on southbound approach
  - Pedestrian facilities available (sidewalks and crosswalks)
  - Moderate pedestrian volume
  - Nearby land use includes hotels, restaurants, and Fox Theater

STEP 1: COLLECT AND IDENTIFY NECESSARY SITE AND WORK CHARACTERISTICS

- Work Characteristics
  - Road work within travel way
  - Work vehicle(s) may be present
  - Expect workers on foot within the work area
  - Work duration expected to be approximately 2-3 days

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 6H-23 is the most appropriate
  - Figure 6H-23 could also be selected from the MUTCD
- 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)	150
Maximum Taper Channelizing Device Spacing	30
Maximum Tangent Channelizing Device Spacing	60

Figure 6H-23. Left-Hand Lane Closure on the Far Side of an 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?
  - Urban nature of the work area
  - Adjacent parking lane
  - Presence of commercial driveways
  - Different cross street geometry from TA
  - Nearby intersections within advance warning area
  - Presence of pedestrian facilities (sidewalks & crosswalks) along the affected roadway

STEP 3: DEVELOP APPROPRIATE TEMPORARY TRAFFIC CONTROL PLAN

- What needs to be modified due to field conditions?

STEP 3: MODIFY TA BASED ON ADDITIONAL CONSIDERATIONS

- What aspects of the **Figure 6H-23** should be modified to fit the work/site conditions?
  - Adjust advance warning sign locations to avoid intersection
  - Adjust "Road Work Ahead" sign to avoid driveway
  - Add a "Left Turn Prohibited" sign at the northern parking lot driveway
  - Add Type III barricades to prevent vehicles from turning left from parking lot driveway
  - Pedestrian detour plan may be added (depending upon the scenario)

Figure 6H-23. Left-Hand Lane Closure on the Far Side of an 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 4: DEVELOP OPTIMAL TEMPORARY TRAFFIC CONTROL PLAN

STEP 5: PERFORM FIELD REVIEW OF TTC AS APPROPRIATE

- Field conditions may vary from expectations
- 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/