

REGULATORY SPEED (IN WORK ZONES)

The maximum permitted travel speed posted for the work zone is indicated by the regulatory speed sign. The work zone speed must be shown or noted in the plans. This speed should be used as the minimum design speed to determine runoff lengths, departure rates, flare rates, lengths of sight, clear zone widths, lateral lengths, crash cushion requirements, marker spacing, super-elevation and other similar features.

ADVISORY SPEED

The maximum recommended travel speed through a curve or a hazardous area.

TRAVEL WAY

The portion of the roadway for the movement of vehicles. For traffic control through work zones, travel way may include the temporary use of shoulders and any other permanent or temporary surface intended for use as a lane for the movement of vehicular traffic.

a. **Travel Lane:** The designated width of roadway pavement marked to carry through traffic and to separate it from opposing traffic or traffic occupying other traffic lanes.

b. **Auxiliary Lane:** The designated width of roadway pavement marked to separate speed change, turning, passing and climbing maneuvers from through traffic.

DETOUR, LANE SHIFT, AND DIVERSION

A detour is the redirection of traffic onto another roadway to bypass the temporary traffic control zone. A lane shift is the redirection of traffic onto a different section of the permanent pavement. A diversion is the redirection of traffic onto a temporary roadway, usually adjacent to the permanent roadway and within the limits of the right of way.

ABOVEGROUND HAZARD

An aboveground hazard is any object, material or equipment other than traffic control devices that intrudes upon the travel way or that is located within the clear zone which does not meet the Department's safety criteria, i.e., anything that is greater than 4 in height and is firm and unyielding or does not meet breakaway requirements.

TEMPORARY TRAFFIC CONTROL DEVICES

All temporary traffic control devices shall be on the Department's Approved Products List (APL). Ensure the appropriate APL number is permanently marked on the device in a readily visible location.

All temporary traffic control devices shall be removed as soon as practical when they are no longer needed. When work is suspended for short periods of time, temporary traffic control devices that are no longer appropriate shall be removed or covered.

Arrow Boards, Portable Changeable Message Signs, Radar Speed Display Trailer, Portable Regulatory Signs, and any other trailer mounted device shall be delineated with a channelizing device placed at each corner when in use and shall be moved outside the travel way and clear zone or be shielded by a barrier or crash cushion when not in use.

PEDESTRIAN AND BICYCLIST

When an existing pedestrian way or bicycle way is located within a traffic control work zone, accommodation must be maintained and provision for the disabled must be provided. Only approved pedestrian longitudinal channelizing devices may be used to delineate a temporary traffic control zone pedestrian walkway.

Advanced notification of sidewalk closures and marked detours shall be provided by appropriate signs.

OVERHEAD WORK

Work is only allowed over a traffic lane when one of the following conditions are met:

OPTION 1 (OVERHEAD WORK USING A MODIFIED LANE CLOSURE)
Overhead work using a modified lane closure is allowed if all of the following conditions are met:

- Work operation is located in a signalized intersection and limited to signals, signs, lighting and utilities.
- Work operations are 60 minutes or less.
- Speed limit is 45 mph or less.
- Aerial lift equipment in the work area has high-intensity, rotating, flashing, oscillating, or strobe lights operating.
- Aerial lift equipment is placed directly below the work area to close the lane.
- Traffic control devices are placed in advance of the vehicle/equipment closing the lane using a minimum 100 foot taper.
- Volume or complexity of the roadway may dictate additional devices, signs, flagman and/or a traffic control officer.

OPTION 2 (OVERHEAD WORK ABOVE AN OPEN TRAFFIC LANE)
Overhead work above an open traffic lane is allowed if all of the following conditions are met:

- Work operation is located on a utility pole, light pole, signal pole, or their appurtenances.
- Work operations are 60 minutes or less.
- Speed limit is 45 mph or less.
- No encroachment by any part of the work activities and equipment within an area bounded by 2 feet outside the edge of travel way and 18 feet high.
- Aerial lift equipment in the work area has high-intensity, rotating, flashing, oscillating, or strobe lights operating.
- Volume or complexity of the roadway may dictate additional devices, signs, flagman and/or a traffic control officer.
- Approach precautions are taken to prevent parts, tools, equipment and other objects from falling into open lanes of traffic.
- Other Governmental Agencies, Rail Facilities, or Codes may require a greater clearance. The greater clearance required prevails as the rule.

OPTION 3 (OVERHEAD WORK ADJACENT TO AN OPEN TRAFFIC LANE)
Overhead work adjacent to an open traffic lane is allowed if all of the following conditions are met:

- Work operation is located on a utility pole, light pole, signal pole, or their appurtenances.
- Work operations are 1 day or less.
- Speed limit is 45 mph or less.
- No encroachment by any part of the work activities and equipment within 2 feet from the edge of travel way up to 18' height.
- Above 18' in height, no encroachment by any part of the work activities and equipment over the open traffic lane except as allowed in Option 2 for work operations of 60 minutes or less.
- Aerial lift equipment in the work area has high-intensity, rotating, flashing, oscillating, or strobe lights operating.
- Volume or complexity of the roadway may dictate additional devices, signs, flagman and/or a traffic control officer.
- Approach precautions are taken to prevent parts, tools, equipment and other objects from falling into open lanes of traffic.
- Other Governmental Agencies, Rail Facilities, or Codes may require a greater clearance. The greater clearance required prevails as the rule.

OPTION 4 (OVERHEAD WORK MAINTAINING TRAFFIC WITH NO ENCROACHMENT BELOW THE OVERHEAD WORK AREA)

Traffic shall be detoured, shifted, elevated or paced as to not encroach the area directly below the overhead work operations in accordance with the appropriate interim drawing or detailed in the plans. This option applies to, but not limited to, the following construction activities:

- Beam, girder, segment, and basket/pair cap placement.
- Form and falsework placement and removal.
- Concrete placement.
- Railing construction located at edge of deck.
- Structure demolition.

OPTION 5 (CONDUCTOR/CABLE PULLING ABOVE AN OPEN TRAFFIC LANE)
Overhead cable and/or de-energized conductor installations shall be pulled to proper tension shall be done in accordance with the appropriate index or temporary traffic control plan.

Continuous pulling operations of secured cable and/or conductors are allowed over open lanes of traffic with no encroachment by any part of the work activities, materials or equipment within the minimal vertical clearance above the travel way. The utility shall take precautions to ensure that pull ropes and conductors/cables at no time fall below the minimum vertical clearance.

On Limited Access facilities, a site specific temporary traffic control plan is required. The temporary traffic control plan shall include:

- The temporary traffic control set up for the initial pulling of the pull rope across the roadway.
- During pulling operations, advance warning consisting of no less than a Changeable Message Sign upstream of the work area with alternating messages, "Overhead Work Ahead" and "Be Prepared to Stop" followed by a traffic control officer and police vehicle with blue lights flashing during the pulling operation.

RAILROADS

Railroad crossings affected by a construction project should be evaluated for traffic control to reduce congestion on the tracks. The evaluation should include as a minimum: traffic volumes, distance from the tracks to the intersections, lane closure or taper locations, signal timing, etc.

SIGHT DISTANCE

Tapers: Transition tapers should be obvious to drivers. If restricted sight distance is a problem (e.g., a sharp vertical or horizontal curve), the taper should begin well in advance of the view obstruction. The beginning of tapers should not be hidden behind curves.

Intersections: Traffic control devices at intersections must provide sight distances for the road user to perceive potential conflicts and to traverse the intersection safely. Construction equipment and materials shall not restrict intersection sight distance.

Interruptions: Traffic control devices at interruptions must provide sight distances for the road user to perceive potential conflicts and to traverse the interruption safely. Construction equipment and materials shall not restrict interruption sight distance.

Aboveground hazard (see definitions) area to be considered work areas during working hours and treated with appropriate work zone traffic control procedures. During nonworking hours, all objects, materials and equipment that constitute an aboveground hazard must be stored/placed outside the travel way and clear zone or be shielded by a barrier or crash cushion.

For aboveground hazards within a work zone the clear zone required should be based on the regulatory speed posted during construction.

CLEAR ZONE WIDTHS FOR WORK ZONES

The term "clear zone" describes the unobstructed relatively flat area, impacted by construction, extending outward from the edge of the travel lane. The table below gives clear zone widths in work zones for medians and roadside conditions other than for roadside canals, where roadside canals are present, clear zone widths are to conform with the distances to canals as described in the FDM 21.2.2.

WORK ZONE SPEED (MPH)	TRAVEL LANES & MULTILANE RAMP (feet)	AUXILIARY LANES & SINGLE LANE RAMP (feet)
60-70	70	18
55	24	14
45-50	18	10
30-40	14	10

All SPEEDS 4' BEHIND FACE OF CURB OR CUTTER OF CURB

Continuous pulling operations of secured cable and/or conductors are allowed over open lanes of traffic with no encroachment by any part of the work activities, materials or equipment within the minimal vertical clearance above the travel way. The utility shall take precautions to ensure that pull ropes and conductors/cables at no time fall below the minimum vertical clearance.

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- The temporary traffic control set up for the initial pulling of the pull rope across the roadway.
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SUPERELEVATION

Horizontal curves constructed in conjunction with work zone traffic control should have the required super-elevation applied to the design radii under conditions where normal crown controls construction, the minimum radii that can be applied are listed in the table below.

WORK ZONE POSTED SPEED (MPH)	MINIMUM RADIUS (feet)
70	4090
65	2130
60	2460
55	1840
50	1390
45	1080
40	820
35	610
30	430

Superelevate When Smaller Radii Is Used

LENGTH OF LANE CLOSURES

Lane closures must not exceed the following lengths: 1 mile for two-lane roads and work space in given direction on multi-lane roads or on state roadways with a posted speed of 55 mph or greater:

- 1.3 miles for ground-in-run-in strip operations on two-lane roadways.
- 2.0 miles for all other operations.

OVERWEIGHT/OVERSIZE VEHICLES

Restrictions to Lane Widths, Heights or Load Capacity can greatly impact the movement of over-dimensioned loads. The contractor shall notify the Engineer who in turn shall notify the State Permits Office, phone no. (850) 410-5777, at least seven calendar days in advance of implementing a maintenance of traffic plan which will impact the flow of overweight/oversize vehicles. Information provided shall include location, type of restriction (height, width or weight) and restriction time frames. When the roadway is restored to normal service the State Permits Office shall be notified immediately.

LANE WIDTHS

Lane widths of through roadways should be maintained through work zone travel ways wherever practical. The minimum widths for work zone travel lanes shall be as follows: 11' for Interstate with at least one 12' lane provided in each direction, unless formally executed by the Federal Highway Administration; 11' for freeways; and 10' for all other facilities.

HIGH-VISIBILITY SAFETY APPAREL

All high-visibility safety apparel shall meet the requirements of the International Safety Equipment Association (ISEA) and the American National Standards Institute (ANSI) for "High-Visibility Safety Apparel", and labeled as ANSI/ISEA 107 or 109. The apparel background (outer) material color shall be either fluorescent orange-red or fluorescent yellow-green as defined by the standard. The retro-reflective material shall be orange, yellow, white, silver, green, or a fluorescent version of these colors, and shall be visible at a minimum distance of 1,000 feet. Class 3 apparel may be substituted for Class 2 apparel that is not visible at 1,000 feet.

WORKERS: All workers within the right of way shall wear ANSI/ISEA Class 2 apparel. Workers operating machinery or equipment in those situations where they become entangled during operations shall wear fitted high-visibility safety apparel. Workers inside the bucket of a lift truck are not required to wear high-visibility safety apparel.

UTILITIES: When other industry safety standards require utility workers to wear apparel that is inconsistent with the requirements of ANSI/ISEA 107, ANSI, and the other standards for apparel shall prevail.

For daytime activities, flaggers shall wear ANSI/ISEA Class 2 apparel. For nighttime activities, flaggers shall wear ANSI/ISEA Class 3 apparel.

REGULATORY SPEEDS IN WORK ZONES

Traffic Control Plans (TCPs) for all projects must include specific regulatory speeds for each phase of work. This can either be the posted speed or a reduced speed. The speed shall be noted in the TCPs; this includes including the existing speed if no reduction is to be made. Regulatory speeds are to be uniformly established through each phase.

In general, the regulatory speed should be established to route vehicles safely through the work zone as close as to normal highway speed as possible. The regulatory speed should not be reduced more than 10 mph below the posted speed and never below the minimum statutory speed for the class of facility. When a speed reduction greater than 10 mph is imposed, the reduction is to be done in 10 mph per 500' increments.

Temporary regulatory speed signs shall be removed as soon as conditions requiring the reduced speed no longer exist. Once the work zone regulatory speeds are removed, the regulatory speed existing prior shall automatically go back into effect unless new speed limit signing is provided for in the plans.

On projects with interspersed work zones, conditions should be allocated to proximity to those activities which will cause speed signs to be placed for the entire project. At the end of the project or such activities, the regulatory speed should be posted to give the driver advance notice of the speed to be resumed.

If the existing regulatory speed is to be used, the contractor should be given to supplementing existing signs. On projects where the reduced speed conditions exist for greater than 1 mile in rural areas (non-interstate) and on rural or urban interstates, additional signs are to be placed at no more than 1 mile intervals. Engineering judgment should be used in placement of the additional signs. Lacking those signs, the contractor should place additional signs at the following intervals: 1 mile for rural areas, 0.5 mile for urban situations (non-interstate), additional speed signs are to be placed at a maximum of 1000' apart.

When field conditions warrant speed reductions different from those shown in the TCP, the contractor may submit to the project engineer for approval by the project engineer a signed and sealed study to justify the need for further reducing the speed or, the engineer may request the District Traffic Operations Engineer (DTOE) to investigate the need. It will not be necessary for the DTOE to issue regulations for regulatory speeds in work zones due to the revision of the TCP. The DTOE will issue regulations for regulatory speeds in work zones due to the revision of the TCP. The DTOE will issue regulations for regulatory speeds in work zones due to the revision of the TCP. The DTOE will issue regulations for regulatory speeds in work zones due to the revision of the TCP.

For additional information, refer to the Plans Preparation Manual, Volume I, Chapter 10.

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FLAGGER CONTROL

Where flaggers are used, a FLAGGER symbol or legend sign must replace the WORKERS symbol or legend sign.

The flagger must be clearly visible to approaching traffic for a distance sufficient to permit proper response by the motorist to the flagging instructions, and to permit traffic to reduce speed or to stop as required before entering the work site. Flaggers shall be positioned to maintain maximum color contrast between the flaggers high-visibility safety apparel and equipment and the work area background.

Hand-Signaling Devices
STOP/SLOW paddles are the primary hand-signaling device. The STOP/SLOW paddle shall have an octagonal shape on a rigid handle. If the STOP/SLOW paddle is placed on a rigid staff, the minimum length of the staff, measured from the bottom of the paddle to the end of the staff that rests on the ground, must not be less than 6 ft. STOP/SLOW paddles shall be at least 24 inches wide with letters at the bottom 6 inches high and should be fabricated from light semirigid material. The background of the STOP face shall be red with white letters and border. The background of the SLOW face shall be orange with black letters and border. When used at night-time, the STOP/SLOW paddle shall be retro-reflective.

Flag use is limited to immediate emergencies, intersections, and when working on the centerline or shared left turn lanes where two (2) flaggers are required and there is opposing traffic in the adjacent lanes. Flags, when used, shall be a minimum of 24 inches square, made of a good grade of red material, and securely fastened to a staff that is approximately 36 inches in length. When used at nighttime, flags shall be retro-reflective red.

Flashlight, lantern or other lighted signal that will display a red warning light shall be used at night.

Flagger Stations
Flagger stations shall be located far enough in advance of the work space so that approaching road users will have sufficient distance to stop before entering the work space. When used at nighttime, the flagger station shall be illuminated.

SURVEY WORK ZONES

The SURVEY CREW AHEAD symbol or legend sign shall be the principal Advance Warning Sign used for Traffic Control Through Survey Work Zones and may replace the ROAD WORK AHEAD sign when lane closures occur, at the discretion of the Party Chief.

ADJOINING AND OVERLAPPING WORK ZONE SIGNING
Adjoining and overlapping work zone signing shall be used in the placement of signs and traffic control devices in advance warning areas or in some cases other work zone traffic control signs. Where such restrictions or conflicts occur, one of the following signing methods will be employed to avoid conflicts, prevent conditions that could lead to misunderstanding on the part of the traveling public as to the intended travel way by the traffic control procedure as applied.

(A) For situations where the engineer in responsible charge of project design will resolve any work zone conflicts during the development of the project traffic control plans. This may entail revision of plans on preceding projects and coordination of plans on concurrent projects.

(B) Unanticipated conflicts arising between adjoining in progress highway construction projects will be resolved by the Resident Engineer for projects under his jurisdiction, and, by the District Construction Engineer for in progress projects under adjoining jurisdictions.

(C) The District Maintenance Engineer will resolve anticipated and occurring conflicts with scheduled maintenance operations.

(D) The Unit Maintenance Engineer will resolve conflicts that occur within routine maintenance works; between routine maintenance work, unscheduled work and/or permitted work; and, between unit controlled maintenance works and highway construction projects.

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Survey Between Active Traffic Lanes or Shared Left Turn Lanes

The following provisions apply to Main Roadway Traffic Control Work Zones. These provisions must be adjusted by the Party Chief to fit roadway and traffic conditions when the Survey Work Zone includes Intersections.

(A) A STAY IN YOUR LANE (W02-1-06) sign shall be added to the Advance Warning Sign sequence as the second most immediate sign from the work area.

(B) Elevation Surveys-Cones may be used at the discretion of the Party Chief to protect prism holder and flaggers). Cones, if used, may be placed up to 50' intervals along the break line throughout the work zone.

(C) Horizontal Control-With traffic flow in the same direction, cones shall be used to protect the backside tripped and/or instrument. Cones shall be placed at the equipment, and up to 50' intervals for at least 200' towards the flow of traffic.

(D) Horizontal Control-With traffic flow in opposite directions, cones shall be used to protect the backside tripped and/or instrument. Cones shall be placed at the equipment, and up to 50' intervals for at least 200' in both directions towards the flow of traffic.

SIGNS

SIGN MATERIALS
Mesh signs and non-retro-reflective vinyl signs may only be used for daylight operations. Non-retro-reflective vinyl signs must meet the requirements of Specifications Section 994.

Retro-reflective vinyl signs meeting the requirements of Specification Section 994 may be used for daylight or night operations not to exceed 1 day except as in the indexes.

Rigid or lightweight sign panels may be used in accordance with the APL drawing for the sign panel to which they are attached.

INTERSECTING ROAD SIGNING

Signing for the control of traffic entering and leaving work zones by way of intersecting crossroads shall be designed to make drivers aware of work zone conditions. When work operations are 60 minutes or less, the advance warning sign on the S1 shall be replaced by the ROAD WORK AHEAD sign.

ADJOINING AND OVERLAPPING WORK ZONE SIGNING

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(A) For situations where the engineer in responsible charge of project design will resolve any work zone conflicts during the development of the project traffic control plans. This may entail revision of plans on preceding projects and coordination of plans on concurrent projects.

(B) Unanticipated conflicts arising between adjoining in progress highway construction projects will be resolved by the Resident Engineer for projects under his jurisdiction, and, by the District Construction Engineer for in progress projects under adjoining jurisdictions.

(C) The District Maintenance Engineer will resolve anticipated and occurring conflicts with scheduled maintenance operations.

(D) The Unit Maintenance Engineer will resolve conflicts that occur within routine maintenance works; between routine maintenance work, unscheduled work and/or permitted work; and, between unit controlled maintenance works and highway construction projects.

SIGN COVERING AND INTERMITTENT WORK STOPPAGE SIGNING

Existing or temporary traffic control signs that are no longer applicable or are located with needed travel paths shall be removed or fully covered.

Sign blanks or other available coverings must completely cover the existing rigid sign with needed travel paths shall be removed or fully covered.

Sign covers are incidental to work operations and are not paid for separately.

SIGNING FOR DETOURS, LANE SHIFTS AND DIVERSIONS

Detours should be signed clearly over the entire length of the detour so that motorists can easily determine the route to return to the main roadway. The reverse (R1) or warning sign should be used for the advanced warning for a lane shift. A diversion should be signed as a lane shift.

EXTENDED DISTANCE ADVANCE WARNING SIGN

Advance Warning Signs shall be used at extended distances of one-half mile or more when limited sight distance or the nature of the construction requires a motorist to bring their vehicle to a stop. Extended distance Advance Warning Signs shall be required on any type roadway, but particularly be required on high speed roadways where vehicle speed is generally in excess of 45 mph.

UTILITY WORK AHEAD SIGNING

The ROAD WORK AHEAD (W02-1-06) sign may be used as an alternate to the ROAD WORK AHEAD or ROAD WORK XX FT (W02-1-07) sign for utility operations or adjacent to a utility.

ROAD WORK SIGN

The length of road work sign (W02-1-06) bearing the legend ROAD WORK NEXT MILES is required for all projects of more than 2 miles in length. The number of miles entered shall be rounded up to the nearest mile. The sign shall be located at begin construction points.

SPEEDING FINES DOUBLED WHEN WORKERS PRESENT SIGN

The SPEEDING FINES DOUBLED WHEN WORKERS PRESENT sign should be installed on all projects, but may be omitted if the work operation is less than 1 day. The placement should be 300 feet beyond the ROAD WORK AHEAD sign or midway to the next sign whichever is less.

GROOVED PAVEMENT AHEAD SIGN

The GROOVED PAVEMENT AHEAD sign is required 300 feet in advance of a milled or grooved surface open to traffic. The WB-15P placard shall be used in conjunction with the GROOVED PAVEMENT AHEAD sign.

END ROAD WORK SIGN

The END ROAD WORK sign (W02-2) should be installed on all projects, but may be omitted where there are no work zone conflicts during the development of the project traffic control plans. This may entail revision of plans on preceding projects and coordination of plans on concurrent projects.

PROJECT INFORMATION SIGN

The Project information sign shall be installed when called for in the plans.

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TEMPORARY SIGN SUPPORT NOTES:

1. All signs shall be post mounted when work operations exceed one day except for:

- Road closure signs mounted in accordance with the vendor drawing for the Type III Barricade shown on the APL.
- Pedestrian advanced warning or pedestrian regulatory signs mounted on sign supports in accordance with the vendor drawing shown on the APL.
- Median barrier mounted signs per Index 700-013.

2. Unless shielded with barrier or outside of the Clear Zone, signs mounted on temporary supports or barricades, and barricade/sign combination must be crashworthy in accordance with Section 990 and requirements as included on the Approved Products List (APL).

3. Use only approved systems listed on the Department's Approved Products List (APL).

4. Manufacturers seeking approval of U-channel and steel square tube sign support assemblies for inclusion on the Approved Products List (APL) must submit an APL application, design calculations (for square tube only), and detailed drawings showing the product meets all the requirements of this Index.

5. Provide 3 1/2" Steel U-Channel Posts with a minimum section modulus of 0.42 in⁴ for 60 ksi steel, a minimum section modulus of 0.37 in⁴ for 70 ksi steel, a minimum section modulus of 0.34 in⁴ for 80 ksi steel.

6. Provide 4 1/2" Steel U-Channel Posts with a minimum section modulus of 0.56 in⁴ for 60 ksi steel, or a minimum section modulus of 0.47 in⁴ for 70 ksi or 80 ksi steel.

7. U-channel posts shall conform with ASTM A 495, Grade 60, or ASTM A 575, Grade 100 (with a minimum yield strength of 60 ksi). Square tube posts shall conform with ASTM A 652, Grade 50, or ASTM A 1011, Grade 50.

8. Sign attachment bolts, washers, nuts, and spacers shall conform with ASTM A307 or A 36.

9. For diamond warning signs with supplemental plaque (up to 3' H in area), use 4 1/2" posts for up to 10' H. Clear height (measure to the bottom of diamond warning sign).

10. Install 4 1/2" Steel U-Channel Posts with approved breakaway splice in accordance with the manufacturer's detail shown on the APL.

11. The contractor may install 3 1/2" Steel U-Channel Posts with approved breakaway splice in accordance with the manufacturer's detail shown on the APL.

12. Install all posts plumb.

13. The contractor may set posts in preformed holes to the specified depth with suitable backfill tamped securely on all sides, or drive 3 1/2" sign posts with any size base