

## 2011 Virginia Work Area Protection Manual Changes

The following information is a list of the most significant changes made in the 2011 VA WAPM.

### WAPM Introduction

- **Each paragraph is now numbered for easier reference.**
- **MUTCD applies to private roads open to the public but not to parking lots.**
- Definition of a Standard statement references Section 1A.09 of the Virginia Supplement to the 2009 MUTCD contains additional guidance related to the application of Standard statements.
- Whether specified as part of a project's plan or contract assembly, or performance of a maintenance operation, or performance of utility work within the right of way, the provisions of the 2011 WAPM shall be used for the establishment of temporary traffic control as well as the modification to an approved Traffic Control Plan.

### Chapter 6A, General

- **Section 6A.01 General**
  - Under Support, states the determination of high volume roadway or low-volume roadway may be made by the public agency or official having jurisdiction.
- **Section 6A.02 Engineering Study and Engineering Judgment**
  - This section describes the use of engineering study and application of engineering judgment when selecting or not selecting a particular traffic control device.
  - An engineering study should be the basis for a decision to deviate from a Standard.
  - Whether specified as part of a project's plan or contract assembly, or performance of a maintenance operation, or performance of utility work within the right of way, the provisions of the 2011 WAPM shall be used for the establishment of temporary traffic control as well as the modification to an approved Traffic Control Plan.
- **Section 6A.03 Definitions**
  - Under Standards, added 26 additional definitions: Advisory Speed, Average Daily Traffic, Conflict Monitor, Crosswalk, Detour (Short Term and Long Term), Downstream, Flagger, Interchange, Parking Lane, Portable Changeable Message Sign, Portable Traffic Signal, Post-Mounted Sign, Posted Speed Limit, Preemption, Private Road Open to Public Traffic, Public Road, Regional Traffic Engineer, Roadway, Roadway Network, Roundabout, Safe-Positioned, Temporary Traffic Control Spotter, Traffic Spotter, Upstream, Warning Light, and Worker.
- **Section 6A.04 Meanings of Acronyms and Abbreviations in this Manual**
  - Under Standard, now lists 44 acronyms and abbreviations.

### Chapter 6B, Fundamental Principles

- **Section 6B.01 Fundamental Principles of TTC**
  - Under Guidance, references IIM-241/TED 351 for development of TMP's and TTCP's.
  - Under Guidance, references the seven fundamental principles of TTC
  - Under Guidance, references that TTC should be reviewed on a periodic basic during nighttime conditions to ensure TTC devices meet the acceptable standard as defined in ATSSA's "Quality Standards for Work Zone Traffic Control Devices" publication.

- Under Standard, states TTC reviews shall be performed after an increment weather event.
- Under Standard, states when work is suspended for short periods of 30 minutes or greater TCD's shall be removed as soon as practical.
- Under Option, "Advanced warning signs and their portable supports may be disassembled and stored behind barrier or guardrail."
- Under Standard, states only individuals trained in Work Zone Traffic Control practices shall supervise the selection, placement, and maintenance of TTC devices.

## **Chapter 6C, Temporary Traffic Control Elements**

- **Section 6C.01 Temporary Traffic Control Plans**
  - Under Standard, states "Speeds shall only be reduced within construction/maintenance work zones by the Regional Traffic Engineer upon completion of an engineering and traffic study warranting the reduction. Also references TE-350 Memorandum, Work Zone Speed Analysis form.
- **Section 6C.04 Advance Warning Area**
  - Under Guidance, added information on sign spacing distances.
  - Table 6C-1, Spacing of Advance Warning Signs, increased sign spacing distances for urban streets with 30 to 35 mph posted speeds.
  - Under Support, added guidance on increasing and decreasing sign spacing distances.
- **Section 6C.05 Transition Area**
  - Under Support, added information on stationary channelization for mobile operations.
- **Section 6C.06 Buffer Space Area**
  - Neither work activity nor storage or placement of equipment, vehicles (including law enforcement), or material shall occur within a buffer space.
  - Table 6C-2, Length of Longitudinal Buffer Space, revised distances and added distances for 75 mph posted speed limit.
- **Section 6C.09 Tapers**
  - Under Options, defines improved shoulders as paved or parking lane and the normal portion of the roadway as the travel portion.
  - Under Guidance, if a shoulder or parking lane is used as a travel lane, a normal merging (L) or shifting (1/2 L) taper should be used.
  - Table 6C-4, Taper Length Chart, revised 9 foot width of offset for 25 and 35 mph posted speed limits.
- **Section 6C.10 Detours and Diversions**
  - Modified Figure 6C-2, Examples of Types of Tapers and Buffer Spaced.
- **Section 6C.11 One-Lane, Two-Way Traffic Control**
  - Added options for traffic control for low-volume streets and roads and the use of channelization for roadway width of 20 foot or less.
  - Added standard for one-lane, two-way taper on low-volume streets and roads.
- **Section 6C.12 Flagger method of One-Lane, Two-Way Traffic Control**
  - Under Guidance, deleted information on the use of channelization for roadway width of 20 foot or less.

## **Chapter 6D, Pedestrian and Work Safety**

- **Section 6D.01 Pedestrian Considerations**
  - Under Options, defined knowledgeable persons as individuals that have received training or certification in work zone traffic control.
- **Section 6D.03 Worker Safety Considerations**
  - Under Guidance, refers to Traffic Engineering Division TE-345 Memorandum for Work Zone Traffic Control Training Requirements.
  - Under Guidance, refers to Appendix A Guidelines for Use of Barrier/Channelization Devices for guidance on the use of barriers and channelization devices.
  - Under Standard, until July 1, 2012 adds media, towing and recovery personnel, and others within the right-of-way who are exposed either to traffic or work vehicles and construction equipment within in a TTC zone shall wear high-visibility safety apparel that meets the Performance Class 2 or 3 requirements of the ANSI/ISEA 107–2004 publication entitled “American National Standard for High-Visibility Safety Apparel and Headwear”
  - Under Standard, beginning July 1, 2012 adds media, towing and recovery personnel, and others within the right-of-way who are exposed either to traffic or work vehicles and construction equipment within in a TTC zone shall wear high-visibility safety apparel that meets the Performance Class 3 requirements of the ANSI/ISEA 107–2010 publication entitled “American National Standard for High-Visibility Safety Apparel and Headwear”
  - Under Standard, requires all workers installing, maintaining and removing traffic control devices in night-time work zones wear Class 3 apparel with Class E trousers beginning July 1, 2012.
  - Under Guidance, refers to Appendix C Guidelines for use of Virginia State Police in Construction/Maintenance Work Zones.

## Chapter 6E, Flagger Control

- **Section 6E.01 Qualifications for Flaggers**
  - Under Standard, states the flagger shall be certified in accordance with the Virginia Flagger Certification Program, the American Traffic Safety Services Association Flagger Certification Program or other VDOT approved flagger programs.”
  - Under Standard, states under the VDOT Flagger Certification Program a flagger shall be recertified every two years or every three years for ATSSA Flagger Certification Program.
- **Section 6E.02 High-Visibility Safety Apparel**
  - Under Standard, states foot protection shall comply with ASTM F-2412-2005 and ASTM F-2413-2005 or ANSI Z41-1999. Head protection shall comply with ANSI Z89.1-1997.
  - Under Standard, states the employer must designate a person responsible for worker safety to select the appropriate class of safety garments.
  - Under Standard, requires Class 2 or 3 high-visibility safety apparel that meets ANSI/ISEA 107-2004 garment until July 1, 2012.
  - Under Standard, requires Class 3 high-visibility safety apparel that meets ANSI/ISEA 107-2010 garment beginning July 1, 2012.
  - Under Standard, defines nighttime activities from 30 minutes before sunset until 30 minutes after sunrise.
  - Under Standard, requires flaggers to wear Class E trousers along with Class 3 high-visibility safety apparel beginning July 1, 2012 during nighttime and low light conditions (fog, rain, sleet, snow, etc.).
  - Under Option, allows law enforcement personnel within the TTC zone to wear ANSI/ISEA 207-2006 safety apparel.

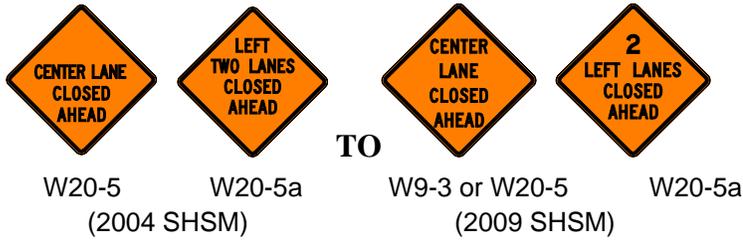
- **Section 6E.03 Hand-Signaling Devices**
  - Under Standard, defines the nighttime use of a flashlight with steady burn glow-cone or traffic baton/wand to supplement the STOP/SLOW paddle or flag.
- **Section 6E.04 Automated Flagger Assistance Devices**
  - Under Support, lists two types:
    - An AFAD that uses a remotely controlled STOP/SLOW sign
    - An AFAD that uses remotely controlled red and yellow lenses and a gate arm
  - Under Standard, defines the conditions when AFADs can be used on two-lane roadways.
- **Section 6E.05 STOP/SLOW Automated Flagger Assistance Devices**
  - New Section – includes new figure 6E-1 Example of the Use of a STOP/SLOW Automated Flagger Assistance Device.
- **Section 6E.06 Red/Yellow Lens Automated Flagger Assistance Devices**
  - New Section – includes new figure 6E-2 Example of the Red/Yellow Lens Automated Flagger Assistance Device.
- **Section 6E.07 Flagger Procedures**
  - Under Standard, states flagger shall use a STOP/SLOW paddle, a flag or an AFAD to control road users and prohibits hand signals without the use of a paddle or flag – hand signal only allowed by law enforcement and emergency responders.
  - Under Guidance, flagger stands on shoulder or inside of a closed lane and moves into the travel lane after traffic has stopped.
  - New Figure 6E-4 Flagger Requirements from the Flagger Certification kit.
  - Under standard, states a flagger shall be clearly visible at all times and stationed sufficiently to warn workers.
  - Under Standard, flaggers shall not direct traffic through a red signal (Code of VA).
  - Under Standard, updated a flagger shall control only one lane of traffic approaching an intersection as shown in Figure TTC-30.
- **Section 6E.08 Flagger Stations**
  - Under Standard, states flagger symbol sign shall be removed, covered, or turned away from road users when the flagger operation is suspended for 30 minutes or longer.
  - Under Standard, states the intensity of the light source for the flagger station in foot-candle shall be available in written documentation. Under Support, guidance is given in determining foot-candle intensity.
  - Under standard, states additional flagger stations shall be located on intersecting roadways within the work zone such that approaching road users will have sufficient distance to stop and be controlled by the flagger.
  - Under Guidance, added... The distances in Table 6E-1 should also be used to provide a clear line of sight to traffic approaching the flagger station. Generally speaking, motorists should be able to see the flagger at the flagger station when they reach the position of the graphic flagger symbol sign. These distances should be increased for downgrades and other geometric conditions that affect stopping distance.
  - Under Guidance, supplemental flagger should be considered when geometric conditions prohibit adequate sight distance to the primary flagger.
  - Under Option, the supplemental flagger may be replaced with a 48" x 48" SLOW sign.
- **Section 6E.10 Temporary Traffic Control Spotter**
  - New section.

## Chapter 6F, Temporary Traffic Control Zone Devices

- **Section 6F.01 Types of Devices**
  - Under Support, defines crashworthy as meeting NCHRP Report 350 or AASHTO Manual for Assessing Safety Hardware (MASH) crash testing requirements.
- **Section 6F.02 General Characteristics of Signs**
  - Under Standard, states reflective sheeting used for all TTCZ signs including incident management signs shall be fluorescent prismatic (high observation angle) lens.
  - Under Guidance, fabrication design found in Standard Highway Sign Manual (SHSM) book and the Virginia Standard Highway Sign (VSHS) book.
  - Under Standard, states any proposed or modified Regulatory or Warning signs not in the 2009 MUTCD, the Virginia Supplement to the 2009 MUTCD, or this Manual shall be submitted for review and approval by VDOT's Office of the State Traffic Engineer prior to submission to FHWA.
  - Under Standard, rollup signs only allowed on temporary sign supports and shall not be post mounted.
  - Under Standard, post-mounted signs rigid material now includes:
    - aluminum 0.100-inch thickness
    - 0.4" thick corrugated polypropylene or polyethylene plastic material
    - 0.079 inch thick aluminum/plastic laminate material
- **Section 6F.03 Sign Placement**
  - Under Standard, median barrier width shall be used in determining shoulder width for sign placement.
  - Under Option, smaller size signs may be placed on roadways having a median less than 8 foot but greater than 6.5 foot wide.
  - Under Guidance, barrier mounted sign stands should be considered for use on barrier.
  - Under Standard, adds Directional Indicator Barricades and changes name of Type 3 Barricade.
  - New table added, Table 6F-1 TTCZ signs, showing new numbering system, where sign information can be found in 6F, roadway types. Virginia signs highlighted in orange shading.
  - Revised Figure 6F-1, Height & Lateral Location of Signs and added ED-3 delineator and covering requirements.
  - Under Guidance added except as provided in Paragraph 17 or Figures TTC-57 through TTC-59, signs mounted on portable sign supports should not be used for a duration of more than 3 consecutive days (72 consecutive hours).
  - Under Guidance, states 25 lb. sand bags should be placed on the legs of portable supports for long-term pedestrian signs & under Option on other temporary signs.
  - Under Standard, state portable sign stands shall support a 20-square-foot sign.
- **Section 6F.04 Sign Maintenance**
  - Under Standard, states sign shall be review after setup and throughout the work day.
  - Under Standard, addresses the covering of signs with silt fences and plywood, no duct tape allowed on face.
  - Under Option, states signs & portable supports may be stored behind barrier, guardrail or outside the construction clear zone.

- **Section 6F.05 Regulatory Sign Authority**
  - Revised Figure 6F-2, Regulatory Signs and Plaques in TTC and includes VA regulatory signs.
- **Section 6F.11 RESTRICTED WIDTH ROUTE Sign (R5-V1)**
  - Modified this section with requirements from TE-339 Memorandum.
  - Under Guidance added additionally, signs should be installed on the approaches of intersecting routes and alternate routes to the restricted route to alert traffic intending to turn onto the restricted route.
- **Section 6F.12 Do Not Pass Signs (R4-1) and Stay in Lane Sign (R4-9)**
  - Under Standard requires A DO NOT PASS (R4-1) sign shall be used when the centerline has been obliterated or until pavement markings have been installed. Also, discusses the installation of the sign and directs you to Figure TTC-59.
  - Under Standard, requires the Stay in Lane sign to be used in pavement resurfacing operations and requires weighting of portable sign support legs.
- **Section 6F.13 Notice Fines Up To \$500 For Exceeding Speed Limit In Work Zone (R2-V2)**
  - Added requirements from TE-340 Memorandum.
- **Section 6F.14 Work Zone Plaque (G20-5aP, G20-5aP (V)), Speed Limit (R2-1), Fines Higher Plaque (R2-6P), and End Work Zone Speed Limit Sign (R2-12)**
  - Added requirements from TE-340 Memorandum.
  - Under Standard, defines Fine Higher sign assembly. Work Zone plaque is now a standard MUTCD sign. If a Fine Higher sign is posted than an End Work Zone Speed Limit shall be used.
  - Under Guidance, states to locate FINE HIGHER sign assembly as close to the work area as possible as shown in TTC 51.
  - Revised Figure 6F-3, Warning Signs and Plaques in TTC and includes VA warning signs and new plaques.
- **Section 6F.20 REDUCED SPEED LIMIT AHEAD Sign (W3-5)**
  - New section added.
- **Section 6F.21 ROAD (STREET) WORK AHEAD Sign (W20-1) & ROAD WORK NEXT 2 MILES Sign (W2-V2)**
  - Under Standard, prohibits the use of the WORKERS or Worker Symbol sign.
- **Section 6F.22 Mowing Ahead Sign (W21-8), Mowing Next 2 Miles Sign (W21-V3), Watch For Slow Moving Vehicle Sign (W21-V1), Line Painting Next 5 Miles Sign (W21-V4), and Spraying Next 5 Miles Sign (W21-V5)**
  - New section added.
- **Section 6F.24 ROAD (STREET) CLOSED AHEAD Sign (W20-3), Ramp Closed Ahead (W20-V12) and ROAD CLOSED HIGH WATER Sign (W20-V11)**
  - Sets standards for ROAD CLOSED AHEAD, RAMP CLOSED AHEAD and ROAD CLOSED HIGH WATER signs.
- **Section 6F.26 Lane(s) Closed Signs (W20-5, W20-5a) and Turn Lane(s) Closed Signs (W20-V13)**

- Sets Standards for sign legends for



Optional until Dec. 31, 2012      Optional now but required after Dec. 31, 2012

- **Section 6F.27 EMERGENCY SCENE AHEAD Sign (W20-V25)**
  - New sign for Incident Management activities.
- **Section 6F.29 LANE ENDS LEFT/RIGHT MERGE (W9-2), KEEP LEFT/RIGHT (R4-V7) and LANE ENDS (W4-2), Signs**
  - Sets Standards for the use of LANE ENDS MERGE and KEEP LEFT/RIGHT and LANE ENDS signs.
- **Section 6F.30 ONE-DIRECTION LARGE ARROW (W1-6(V)) Sign**
  - New section, adds requirements from TE-272 Memorandum.
- **Section 6F. 31 On Ramp Plaque (W13-4P) and Ramp Work Ahead Sign (W21-V16)**
  - New signs and section.
- **Section 6F.32 SIGNAL WORK AHEAD (W21-V17) Sign**
  - New sign and section.
- **Section 6F.33 RAMP NARROWS Sign (W5-4) and LANE WIDTH Plaque (W5-VP1)**
  - Under Standard, states LANE WIDTH Plaque are required on long-term projects.
- **Section 6F.34 SHADOW VEHICLE & WORK VEHICLE MOUNTED Signs**
  - Sets Standards for shadow vehicle mounted signs ROAD WORK AHEAD RIGHT/LEFT SHOULDER CLOSED AHEAD and other appropriate messages; LANE CLOSED, 2 LEFT/RIGHT LANE CLOSED, LINE PAINTING AHEAD, SPRAYING AHEAD, PRESTORM TREATMENT AHEAD, PRESTORM TREATMENT, KEEP BACK 100 FT and SLOW TRAFFIC AHEAD.
- **Section 6F.36 EXIT ONLY (E5-3) and EXIT ONLY Sign (E5-1 (V))**
  - Under Standard, states Exit sign shall be mounted a minimum of 7 feet from the pavement surface to the bottom of the sign.
- **Section 6F.37 NEW TRAFFIC PATTERN AHEAD Sign (W23-2)**
  - Upgraded to a Guidance (“should”) statement from an Option (“may”) statement.
- **Section 6F.38 Flagger Symbol Signs (W20-7), XX Feet Plaque (W16-VP3) and Slow Sign (W21-V10)**
  - Under Standard, requires the use of the flagger symbol sign only and prohibits the word message sign.
  - Under Option, allows the use of a smaller distance plaque until December 31, 2012. Larger plaque required January 1, 2013.

- Under Option, the SLOW sign is allowed to be used in flagger operations and as directed by the project's Engineer.
- **Section 6F.39 ....Parallel Road Closed Sign (W6-VP1)**
  - New information added on the use of this sign.
- **Section 6F.40 Motorized Traffic Signs - Truck Crossing symbol (W11-10), Truck Crossing Sign (W8-6), Watch for Turning Vehicle Sign (W11-V3), Truck Entering Highway Sign (W11-V4) and Construction Entrance Sign (W11-V2)**
  - New Guidelines and Options on the use of these signs.
- **Section 6F.41 Rough Road Sign (W8-8) and Motorcycle Plaque (W8-15P)**
  - New Guidelines and Options on the use of these signs.
- **Section 6F.42 SHOULDER WORK SIGNS (W21-5, W21-5a, W21-5b, W-21-V11, W21-V12)**
  - Adds a new sign, BOTH SOULDER WORK AHEAD.
- **Section 6F.43 Pull-Off Area Signs (W21-V13, W21-V14, W21-V15, E5-V2) and Supplemental Plaques (W16-VP1, W16-VP2, W16-VP3, W16-VP4, W16-VP5)**
  - New section added on signing for pull-off areas on Limited Access Highways.
- **Section 6F.44 Survey Crew Ahead Sign (W21-Va)**
  - Under Option, Shoulder Drop-Off word message will replace the Shoulder Drop-off symbol on Jan. 1, 2013.
- **Section 6F.50 Soft Shoulder (W8-4), Low Shoulder (W8-9), Shoulder Drop-Off (W8-V5), and Shoulder Drop-Off plaque (W8-17P)**
  - Under Option, Shoulder Drop-Off word message will replace the Shoulder Drop-off symbol on Jan. 1, 2013.
- **Section 6F.53 NO CENTER LINE and UNMARKED PAVEMENT AHEAD Sign**
  - New section deletes the No Center Stripe sign and replaces with the No Center Line sign on Jan. 1, 2013.
- **Section 6F.54 Reverse Curve Signs (W1-4 Series)**
  - Under Standard, the number of lanes illustrated on the sign shall be the same as the number of through lanes available to road users.
  - Under Option, all lanes plaque may be used and sign panel may be altered.
- **Section 6F.55 Double Reverse Curve Signs (W24-1 Series)**
  - Under Standard, the number of lanes illustrated on the sign shall be the same as the number of through lanes available to road users.
  - Under Option, all lanes plaque may be used and sign panel may be altered.
- **Section 6F.58 Advisory Speed Plaque (W13-1P)**
  - Smaller plaque allowed until December 31, 2012. Larger plaques require January 1, 2013.
  - Under Standard, requires the Regional Traffic Engineer or official having jurisdiction to determine the recommended speed.
- **Section 6F.59 Supplementary Distance Plaque (W16-VP1)**
  - Smaller plaque allowed until December 31, 2012. Larger plaques require January 1, 2013.

- **Section 6F.61 ROAD WORK NEXT XX MILES Sign (G20-1 (V))**
  - Under Guidance, should be first sign seen by motorist - installed in advance of TTC zone that are more than 2 miles in length.
- **Section 6F.62 END ROAD WORK Sign (G20-2 (V)), END MOWING Sign (G20-V2) and END SURVEY Sign(G20-V3)**
  - New Figure 6F-4, Vehicle Mounted Signs in Temporary Traffic Control added.
- **Section 6F.64 WORK VEHICLE DO NOT FOLLOW Sign (G20-V1) – (Vehicle Mounted)**
  - Sign mounted on the rear of a vehicle hauling/delivering material to the work space.
- **Section 6F.65 CAUTION FREQUENT STOP Sign (G20-V4) – (Vehicle Mounted)**
  - New section allowing the sign to be mounted on the rear of a vehicle
- **Section 6F.66 Detour Signs (M4-8, M4-8a, M4-V2, M4-V3, M4-V4, M4-9, M4-9(V), M4-9a, M4-9b, M4-9c, and M4-10)**
  - Expanded section adding additional information on signing Detours with various turn arrows; Advance Turns, 45° Advance Turns, and Vertical Arrow.
  - Addresses Short-term (A detour that occupies a location for more than 2 hours within a single work period but not longer than three consecutive days which uses M4-9 and M4-V sign series to direct traffic along an alternate route.) and long-term (A detour that occupies a location longer than three consecutive days) detours and provides guidance on signing and sign spacing.
- **Section 6F.67 Business Entrance Sign (M4-V6a, M4-6b)**
  - Provides guidance for urban business signs relocated for more than 3 months during construction.
  - New Figure 6F-5, Exit, Pull-Off Area, Exit Open and Detour Signs in Temporary Traffic Control added.
- **Section 6F.68 PCMS**
  - Under Standard, shall be delineated by four drums in a taper, shown in Figure 6F-6.
  - Under Guidance added messages on a PCMS should consist of no more than two phases (two screen displays), and a phase should consist of no more than three lines of text.
- **Section 6F.69 Arrow Boards**
  - Changed the name from arrow panels to arrow boards.
  - Under Standard, added a trailer mounted arrow board shall be disconnected from the tow-vehicle when used in stationary operations and the vehicle removed from the transition area.
  - Under Standard, A PCMS trailer shall be delineated on a permanent basis by affixing retroreflective material, known as conspicuity material.
  - Under Standard, allows sequential chevron mode.
  - Under Guidance, should be delineated by four Group 1 or 2 channelizing devices in a taper, shown in Figure 6F-6.
  - Figure 6F-7, Advanced Warning Arrow Board Display Specifications has been modified.
- **Section 6F.75 Drums**
  - Under Standard, changed requirement to Drums shall be use in all unmanned work zones, in all merging and shifting tapers on Limited Access highways during nighttime operations, and

in tapers providing delineation for PCMS's. On long-term stationary TTC zones, drums shall be used in tapers providing delineation of the Arrow Board. Section

- **6F.76 Type 3 Barricade**
  - Changed the device name from type III to Type 3.
  - Under Standard, changed the responsibility for ensuring the placement of Type 3 barricades at the end of the day to the proper location from a "should" to a "shall" condition.
  - Includes Figure 6F-8, Type 3 Barrier placement guidelines.
- **Section 6F.79 Longitudinal Channelizing Devices**
  - Added additional information on their use for pedestrian traffic control.
  - Modified Figure 6F-9, Channelizing Devices, adding Type 3 Barricades and longitudinal channelizing devices.
- **Section 6F.80 Temporary Lane Separators**
  - New section added on these devices.
- **Section 6F.83 Temporary Raised Island**
  - Under Option, modified when temporary raised island could be used.
  - Under Standard, removed the use of temporary raised island from Limited Access Highways.
- **Section 6F.86 Temporary Markings**
  - Under Option, Temporary Pavement Markers may be used for up to ten days.
  - Added new Figure 6F-10, Construction Pavement Marking for Tapers and Turn Lanes.
  - Added new Figure 6F-11, Temporary Pavement Marking and Temporary Pavement Markers for Tapers and Acceleration, Deceleration and Turn Lanes.
  - Under Standard, prohibits the use of "pavement dotting" as a substitute for temporary pavement markings or temporary pavement markers.
- **Section 6F.90 Floodlights**
  - Under Guidance, states if glare from standard types of floodlight equipment cannot be eliminated, then consideration should be made for the use if non-glare lighting devices.
- **Section 6F.92 Vehicle Warning Lights**
  - Under Standard, removed size of Rotating, Oscillating, Flashing and High Intensity Strobe Amber Lights and replaced with "amber lights shall be visible under either day and night conditions a minimum of 1/2 mile on Limited Access Highways, or a minimum of 1500 feet on all other roadways."
  - Under Standard, prohibits the use of white lights on construction/maintenance vehicles.
  - Under Guidance, states that parked vehicles should not have their warning lights in operation unless the vehicle is a perceived hazard.
- **Section 6F.93 Temporary Traffic Control Signals**
  - Under Standard, TTCS's shall not be used within 200 feet of a grade crossing unless provided with preemption or a uniform flagger is present.
- **Section 6F.94 Temporary Traffic Barriers**
  - Under Standard, requires the use of a Type B warning light at the run-on end of a barrier, and at the breakpoint.
  - Under Standard, decreases the spacing of barrier vertical panels from 96' and 48' to 80' and 40'.
- **Section 6F.95 Crash Cushions**

- Under Standard, states “A TMA shall not be used more than 3 consecutive days to protect a fixed object.”
- Under Standard, adds shoulder of interstate and Limited Access Highways to locations where TMA’s are required.
- Under Standard, requires the use of a TMA for the installation and removal of TCD’s on 45 mph and greater multilane roadways with posted speeds of 45 mph or greater.
- Under Standard, increases the width of the stripes on the back of the cushion from 6 inches to 6 - 8 inches.
- Under Standard, adds the following language: The TMA shall be used in accordance with the manufacturer’s specifications including the weight of the support truck.
- Under Standard, increases the distance of the TMA from a hazard from 50'-100' to 80'-120'.
- Under Standard, adds the following language: “Channelizing devices or signs shall not be stored or installed from the shadow vehicle with a TMA.”
- Under Option, allows additional vehicles in an operation to have a TMA as long as it isn’t serving as the shadow vehicle.
- **Section 6F.96 Rumble Strips**
  - Under Standard, allows rumble strips to be white, black, or orange.

## Chapter 6G, Type of Temporary Traffic Control Zone Activities

- **Section 6G.02 Work Duration**
  - Under Standard, states that “When used in moving/mobile operations, law enforcement vehicles shall be placed as shown in TTC-11 and TTC-12 in Chapter 6H to minimize their exposure to traffic. Law enforcement vehicles shall not be placed into an open travel lane for planned work operations without the protection of a shadow vehicle.
- **Section 6G.07 Work on the Shoulder with No Encroachment**
  - Under Standard, states “A shadow vehicle shall be used whenever a person is required to operate equipment mounted on or in the work vehicle; such as buckets, augers, post drivers, etc. For other operations occurring on the shoulder with duration greater than 1 hour where workers are present, a shadow vehicle shall be used. A truck-mounted attenuator (TMA) shall be used on the shadow vehicle on Limited Access highways and multi-lane roadways with posted speed limit equal to or greater than 45 mph.”
- **Section 6G.08 Work on the Shoulder with Minor Encroachment**
  - Under Standard, added the following: “Figure TTC-10 in 6H illustrates the method of handling vehicular traffic where non-licensed vehicle operations encroach into the Travelway of a Limited Access highway.”
  - Under Option, states a lane width of 10 feet may be used for intermediate-term stationary operations such as milling/paving operations where the restriction is limited to the areas where the work activities are occurring by moving the channelizing devices out as work progresses and then back once the work activity has past.
  - Under Option, states for long-term stationary operations, a travel lane width of no less than 10 feet may be allowed only when a traffic engineering study is made and documented by the Regional Traffic Engineer or authority with jurisdiction over the roadway.
  - Under Standard, states A traffic engineering study shall consider as a minimum, traffic volumes, vehicle mix, speed, capacity, and type of operation. This assessment must demonstrate that if not allowed, traffic delays and back-ups will create unacceptable safety factors and/or road network failure.
- **Section 6G.09 Work Within the Median**

- Under Guidance, Group 2 devices should be placed in a taper in both travel directions for trailer mounted TCD's in the median.
- **Section 6G.11 Work Within the Traveled Way of an Urban Street**
  - Under Support, added the following: "For urban conditions, it is generally better to place all advance warning signs within a one block area versus spreading out over several blocks.
- **Section 6G.12 Work Within the Traveled Way of a Multi-Lane, Non-Access Controlled Highway**
  - Under Support, added language explaining why work cannot be performed over an open travel lane or shoulder.
  - Under Standard, states when the center lane of a multi-lane roadway must be closed for work activities, an additional adjoining lane on one side shall be closed such that through traffic is not split around the work area, see Figure TTC- 18.
  - Under Standard, states if the center lane closure must encroach on the remaining lanes, a minimum 11 foot travel lane(s) shall be maintained.
  - Under Standard, states a center lane shall not be closed when work is only being performed in an adjacent lane unless the lane closure encroaches into the center lane resulting in a travel lane width of less than 11 feet.
- **Section 6G.13 Detours and Diversions**
  - Under Support, gives definition of Long Term and Short Term detours.
  - Under Standard, states "Detours and diversions shall be reviewed and approved by the Regional Traffic Engineer prior to implementation."
- **Section 6G.14 Work Within the Traveled Way at an Intersection**
  - Under Standard, states "When work will occur near an intersection where operational, capacity, or pedestrian accessibility problems are anticipated, the appropriate Virginia Department of Transportation Regional Operations or highway agency having jurisdiction shall be contacted."
  - Under Standard, states "Certified flaggers shall not direct vehicles through a red signal or stop vehicles at a green signal at an intersection since they are not authorized to do so (see Section 46.2-834 of Highway Laws of Virginia)."
- **Section 6G.16 Work Within the Traveled Way at a Roundabout**
  - New section added to go along with new TTC layouts TTC-32 through 34.
  - Under Guidance added when designing the traffic control and installing the TTC devices for work activities at roundabouts, accommodations for the turning radius of tractor trailer vehicles or other large vehicles should be considered and the work zone designed accordingly.
- **Section 6G.18 Pull-off Areas in Limited Access Highway and Expressway Work Zones**
  - New section added with design and usage requirements to go along with TTC-8.
  - Under Guidance, added pull-off area should be consider for Category C or significant projects.
  - Under Guidance, added spacing for pull-off areas for projects with activity areas greater than 1.0 mile but less than 2.0 miles in length, one every 0.5 to 0.75 mile.
  - Under Guidance, update sign information for pull-off areas
- **Section 6G.24 Slow Roll Temporary Traffic Control Operations**
  - New section added to give instruction on how to use Slow Roll Traffic Control once RTE approval has been given (from TE-352 Memorandum).

- **Section 6G.25 Installing/Removing Temporary Traffic Control**
  - New section giving guidance on how to safely install and remove work zone traffic control devices from information in the 2007 WZS Guidelines for Temporary Traffic Control pocket guide.
- **Section 6G.26 Temporary Traffic Control During Nighttime Hours**
  - Under Standard, added definition of nighttime traffic control requirements as the time from 30 minutes prior to sunset to 30 minutes after sunrise on the next calendar day.
  - Under Standard, states “Except in emergencies, temporary lighting providing a minimum horizontal luminance of 5 foot candles (50 lux) shall be provided at all flagger stations during nighttime operations.
  - Under Standard, states “Floodlighting shall not produce a disabling glare condition for approaching road users, flaggers, or workers.”
  - Under Guidance added the following: “Consideration should be given to the use of non-glare type lighting such as non-glare balloon lights for nighttime activities.”
- **Section 6G.27 Work Area Ingress/Egress Considerations**
  - New section covering the need to plan for construction access to and from the work area.
  - Under Standard, requires the use of WORK VEHICLE DO NOT FOLLOW signs on the rear of trucks hauling/delivering material to the work area.
  - Added Stopping Sight Distance Table 6G-1.

## Chapter 6H, Typical Applications

- **Section 6H.01 Typical Applications**
  - Added Table 6H-3, Buffer Space/ Flagger Distance from Work Area, Table 6H-4, Channelizing Device Spacing, and Table 6H-5, Advance Warning Sign Spacing.
  - Under Support, added note that TTC applications illustrate work activities utilizing portable (self-erecting) sign stands placed on the shoulder.
  - Under Standard, added note that for long-term stationary work activities or as directed by the engineer, post mounted signs placed outside of the shoulder per Figure 6F-1 shall be required.
  - Added offset widths for posted speed limit of 70 mph in Table 6H-2, Taper Lengths (L).
  - Updated Table 6H-1, Index to Typical Temporary Traffic Control Figures and Notes, by adding new TTC applications (63 total TTC’s).
  - Revised Figure 6H-1, Symbols Used in Typical Temporary Traffic Control Figures Application, by adding symbols for: Longitudinal Channelizing devices, Active Traffic Signal, Inactive Traffic Signal, Traffic or Pedestrian Signal, High-Level Warning device, 1-Way Pavement Markers, 2-Way Pavement Markers, Slow Moving Vehicle Emblem, Law Enforcement Vehicle, Milled Pavement, Rumble Strips, Impact Attenuator and Automated Flagger Assistance device. Revised Type 3 Barricade and Work Space symbols.
  - Under Standards, added the following notes to various Temporary Traffic Control Figures as applicable
    - Vehicle hazard warning signals are not be used instead of the required high-intensity amber lights.
    - Added 70 MPH row to Taper Tables.
    - Barrier panels 8 inches in width and 12 inches in height shall be placed on top of the concrete barrier and spaced 80' on centers along the parallel or tangent sections and 40' on centers along the transition or taper sections. ReflectORIZED surface shall be fluorescent orange prismatic lens sheeting.

- The light at the beginning of the barrier run and at the breakpoint where the barrier becomes parallel to the roadway shall be a Type B flashing light. Type B flashing light at the beginning of the barrier run and at the breakpoint where the barrier becomes parallel to the roadway.
- Barrier delineators shall be installed along the traffic side of the concrete barrier in-between and at the same spacing as the barrier panels approximately 24 inches up from the roadway surface.
- TMA vehicle shall be in a position 80'-120' in advance of workers or the work operations vehicle.
- When the work operations vehicle is moving, the Shadow Vehicle following the operations vehicle shall follow at a distance of  $\pm 240'$ .
- Under Guidance, added the following notes to various Temporary Traffic Control Figures as applicable
  - If drivers cannot see a pull-off area beyond the closed shoulder, information regarding the length of the shoulder closure shall be provided in feet or miles, as appropriate.
  - An emergency pull-off area should be provided per Section 6G-17 and Temporary Traffic Control Figure TTC-8.
- Added the following new Temporary Traffic Control (TTC) Figures:
  - TTC-4, Stationary Operation on a Shoulder
    - Updated note 1. For long-term stationary work on divided highways having a median wider than 8', sign assemblies on both sides of the roadway shall be required as shown (ROAD WORK AHEAD, RIGHT SHOULDER CLOSED AHEAD, even though only one shoulder is being closed. For operations less than 3 days in duration, sign assemblies will only be required on the side where the shoulder is being closed and a RIGHT SHOULDER CLOSED sign shall be added to that side.
  - TTC-5, Shoulder Operation with Minor Encroachment
    - Updated note 1. On divided highways having a median wider than 8', right and left sign assemblies shall be required.
  - TTC-8, Pull-Off Areas on Limited Access Highway
    - Updated note 6. – sign guidance statements.
  - TTC-10, Non-Licensed Vehicle Operation with Encroachment on Limited Access Highways
  - TTC-11, Moving/Mobile Operations on Limited Access Highway (Single Lane Closure)
  - TTC-12, Moving/Mobile Operations on Limited Access Highway (Multiple Lane Closure)
  - TTC-21, Center Turn Lane Closure Operation
  - TTC-22, Right Lane Closure Operation on a Three Lane Roadway
  - TTC-25, Lane Closure Operation on a Two-Lane Roadway Using Traffic Control Signals
    - TTC Figure updated XXXX FEET (W16-VP3) sign panel..
  - TTC-30, Flagging Operation at a Signalized Intersection
  - TTC-31, Flagging Operation on a Single Lane Roundabout
    - Guidance Note 13 - When designing the traffic control and installing the channelizing devices for work activities at roundabouts, accommodations for the turning radius of tractor trailer vehicles and other large vehicles should be considered and the work zone designed accordingly.

- TTC-32, Inside Lane Closure Operation on a Multi-Lane Roundabout
  - Guidance Note 8 – same as TTC-31
- TTC-33, Outside Lane Closure Operation on a Multi-Lane Roundabout
  - Guidance Note 14 – same as TTC-31
  - TTC Figure updated.
- TTC-34, Street Closure Operation with Detour
- TTC-41, Half Road Closure Operation on a Multi-Lane Roadway
- TTC-42, Interior Lane Closure Operation on a Multi-Lane Roadway
- TTC-43, Road Closure Operation with a Diversion
  - All notes revised.
- TTC-44, Median Cross-Over Operation on a Multi-Lane Roadway
- TTC-46, Limited Access Highway Closure Operation with a Short Term Detour
  - Updated note 3. Detour signs with an Advanced Turn Arrow (M4-V3) should have a spacing distance of 300' minimum in advance of the intersection. The Detour signs with the Point of Turn Arrow (M4-9) should be placed at the intersection.
- TTC-47, Limited Access Highway Closure Operation with a Long Term Detour
  - Updated note 3. The detour sign assemblies with the Advanced Turn Arrow (M5-1) sign should have a spacing distance of 300' minimum in advance of the intersection. The detour sign assemblies with the Point of Turn arrow (M6-3 and M6-1) signs should be placed at the intersection.
- TTC-48, Road Closure Operation with a Detour
  - Update drawing – added additional signs
  - Updated note 8. For short-term duration work the M4-9 or M4-V4 series of signs...
  - New note 11. For long-term stationary work when a grade differential of 1 foot or greater is present, temporary barrier should be placed at a 45° angle to the travelway a sufficient distance beyond the Type 3 Barricade but before the work space while providing equipment access to the work space.
  - New note 12. Barrier panels 8 inches in width and 12 inches in height shall be placed on top of the temporary concrete barrier, perpendicular to traffic, and spaced 20' on centers along the taper sections. Reflectorized surface shall be fluorescent orange prismatic lens sheeting. Barrier delineators shall be installed along the traffic side of the concrete barrier in-between and at the same spacing as the barrier panels approximately 24 inches up from the roadway surface.
  - New note 13. An END DETOUR (M4-8a) sign shall be used to terminate the detour route.
- TTC-57, End of Day Signing for Partial Paving Operations on a Multi-Lane Roadway
- TTC-58, End of Day Signing for Full Paving Operations on a Multi-Lane Roadway
- TTC-59, End of Day Signing for Paving Operations on a Two-Lane Roadway
- TTC-60, Temporary Pavement Marking and Marker Guidelines
- TTC-61, Pre-Storm Treatment Operation
- TTC-62, Litter Pick-Up on Limited Access Highways
- TTC-63, Logging Operations
  - Renamed Table to “Stopping Sight Distance (SSD) for Intersecting Roadways” and modified values shown in the table.

TTC Figures that were in 2005 WAPM updated in 2011 WAPM

- Temporary Traffic Control Figure TTC-1, under Options defined vertical curb as a Standard CG-2 or CG-6 on urban roadways.

- Temporary Traffic Control Figure TTC-3, under Guidance noted that in those situations where multiple work locations within a limited distance make it practical to place stationary signs, the distance between the advance warning sign and the work should not exceed 5 miles.
- Temporary Traffic Control Figure TTC-9, under Standard noted that all vehicles traveling at speeds below 30 mph shall display a slow moving vehicle emblem per OSHA regulation 1910.145(d)(10).
- Temporary Traffic Control Figure TTC-12, re-numbered the Shadow Vehicles.
- Temporary Traffic Control Figure TTC-37, under Options noted that an EXIT sign placed in the temporary gore may be either black on orange or white on green and that an alternative procedure may be used to channelize exiting vehicular traffic onto the right-hand shoulder
- Temporary Traffic Control Figure TTC-52,
  - Note 1. The Regional Traffic Engineer must approve reducing the speed limit in a work zone per Traffic Engineering Division Memorandum TE-350 and added that after the approval to use the R2-V2 sign the FINES HIGHER (R2-6P) plaque and END FINE HIGHER (R2-12) sign shall also be used.
  - Standard - Added to Note 7. When part of a project is signed for a reduced speed then the original speed limit shall be posted 500'± past the work area.

## Chapter 6I, Incident Management Traffic Control

- Chapter has been expanded and revised with VDOT Incident Management policy included.
- Includes long term Incident management typical traffic control layouts

## Appendix A

### ● Introduction

- Complete revision on the guidance on the selection and use of channelization and barrier devices. Defined the process on the selection and use of channelization and barrier devices.

### ● 1. Channelization Device/Barrier Selection Process

- Clarified formula variables – Traffic volumes V (vph); Run off the Road (ROR) Crashes Frequency Factor (Charts), f; Length of Work Area, L (miles)
- Developed seven (7) step process for determining the devices to be used. Includes both narrative and process flow chart. Examples on the use of the 7 step process are provided.
- 4. Updated determine the Expected Accident Factor... Construction Time, T in years (use fraction of years if necessary, example 9 months = 0.75 year) and Expected Accident Factor,  $p = f \times L \times T$ .
- 5. Added If  $p \leq 0.5$
- Includes Figures on clear zone and drop-off requirements, ROR charts, and the types of channelizing devices and barriers.
- A Preliminary Channelizing Device - Barrier Chart (Table 1) to be used in conjunction with the 7 step process is also provided.

### ● Figure 2, Clear Zone and Drop-Off Requirements

- Updated Slopes steeper than 4:1
- Added 3 Examples to determine TTC for drop-offs.

### ● Figure 3a. ROR Frequency Factor Chart for Limited Access Highways

- Updated Example and Example for Night or Day only Work Zones ...Expected Accident Frequency Factor, p... and Since the expected Accident Frequency factor...

### ● Figure 3b. ROR Frequency Factor Chart for All Other Highways

- Updated Example and Example for Night or Day only Work Zones ...Expected Accident Frequency Factor, p... and Since the expected Accident Frequency factor...
- **2. A Checklist for Guideline of Channelization Device/Barrier Selection Process**
  - A checklist as part of a required engineering study was developed to be used, as appropriate, in conjunction with the seven (7) step process to assist in determining and designing the devices to be used. Includes both narrative and process flow chart.
- **3. Barrier Design Considerations**
  - Provides guidance on the type of barrier and the barrier design once it has been determined that a barrier is recommended.
  - Includes information on barrier anchorage and deflection per NCHRP 350/MASH testing, longitudinal channelization devices, Construction Access Techniques, and the use of Temporary Asphalt Medians/Temporary Raised Islands.
- **4. References and Other Related Material**
  - Contains links to related VDOT memorandums and manuals, national manuals and publications, and FHWA and national web sites.

#### **Appendix D**

- **Revised this section showing only approved abbreviations and unacceptable abbreviations**