Provide additional employees to assist the TCC as approved by the RE. The RE may request the TCC or additional employees to demonstrate their competency at any time. Notify the RE before performing daily inspections to provide the RE with the opportunity to observe the inspections.

### 159.03.02 Traffic Control Devices

Ensure that FHWA category 1, 2, 3, and 4 traffic control devices (TCDs) conform to the requirements of the 2016 Edition of the Manual for Assessing Safety Hardware (MASH), except that TCDs manufactured on or before December 31, 2019 must have been purchased by the Contractor on or before December 31, 2019, and conform to the requirements of NCHRP 350, MASH 2009, or MASH 2016. Provide each device's applicable MASH 2016, MASH 2009, or NCHRP 350 test results and FHWA Eligibility letter, if issued by the FHWA, to the RE. Provide the RE with the purchase date certification for devices not meeting the MASH 2016 requirements upon delivery to the site. Ensure that traffic control devices meet or exceed an acceptable condition as described in the ATSSA Guide Quality Standards for Work Zone Traffic Control Devices. Traffic control devices need not be new but must be in good condition. Provide traffic control devices according to MUTCD.

Erect traffic control devices before beginning construction operations. Trim vegetation that obscures the sight distance of traffic control devices. Keep the traffic control devices clean, and maintain in acceptable condition until no longer required. Relocate traffic devices as directed by the RE. Place traffic control devices as directed to provide traffic control for Department personnel doing inspections, sampling, testing, and taking measurements required for the Project.

1. **Construction Signs.** Install anchor posts with soil anchor plates, except when installing in rock or in concrete.

   If construction signs are required for less than 3 days, the Contractor may place construction signs on portable sign stands instead of sign posts with the approval of the RE.

   When construction signs or existing signs do not reflect work zone traffic conditions, cover the signs with black polyethylene sheeting. Ensure that the cover is opaque under all lighting conditions and completely conceals the entire front of the sign panel. Securely attach the cover to the back side of the sign without damaging the reflective sheeting. Do not tape the cover to the face of the sign. Ensure that the cover remains secure in all weather conditions. Overhead signs and large guide signs with areas greater than 200 square feet do not need a cover over the entire sign, but require a cover over the conflicting information. Do not alter the face of a sign with revised messages. Remove construction signs when no longer required, and restore the post hole to match the surrounding conditions.

2. **Construction Barrier Curb.** Alternate A or B construction barrier curb may be used interchangeably in any location. The Contractor may use construction barrier curb that is constructed using gray or white concrete. Do not place different colors of construction barrier curb in a continuous run. Do not use construction barrier curb having any of the following deficiencies:

   a. Exposed steel at the connector flangeway.
   b. Exposed reinforcement steel.
   c. Cracking through the cross section.
   d. An area of concrete missing larger than a 3 inch by 3 inch right triangle.
   e. Debris in the keyway.
   f. Non-functioning anchor bolt holes.
   g. Non-functioning anchor rod hole.
   h. Paint applied to the surface.
   i. Objects protruding from the surface.
   j. Previous repairs.
   k. Damaged, kinked, or bent connection key or box beam stiffener.

   At least 30 days before delivering construction barrier curb to the Project Limits, provide the RE notice that the barrier curb is available for inspection. Ensure the barrier curb is not stacked for this inspection. The RE will inspect the barrier curb, along with a Contractor representative, to determine what pieces are not approved for delivery to the Project Limits. Final determination of construction barrier approval will be made at the time of placement at the Project.

   Ensure that anchor pins do not project above the plane of the barrier curb. Install the Construction Barrier Curb stiffened with box beams as indicated in the Contract documents.

Replace construction barrier curb that does not meet the specified requirements. Do not patch or repair construction barrier curb.

Provide top and side mounted flexible delineators on the construction barrier curb. For delineators located on the right side when facing in the direction of traffic, ensure that the retroreflective sheeting is white. For delineators located on the left side when facing in the direction of traffic, ensure that the retroreflective sheeting is yellow. Attach flexible delineators according to the manufacturer's recommendations.

Starting at the beginning of the construction barrier curb section mount top delineators at 100 foot intervals on tangent sections, or curves of radii greater than 1,910 feet, and at 50 foot intervals on curves of radii of 1,910 feet or less.

Mount side delineators at the lead end of each barrier segment with the top of the delineator 3 inches from the top of the barrier.

3. **Flashing Arrow Board.** Provide a flashing arrow board as specified in 1001.01.

4. **Portable Variable Message Sign (PVMS).** Place the PVMS at the locations directed by the RE. Ensure that a designated representative familiar with the operation and programming of the unit is available on the Project. Only display messages authorized by the Department for the Project. Repair or replace malfunctioning PVMS within 12 hours of notification by the RE.

5. **Temporary Crash Cushion.** Install inertial barrier systems as specified in 611.03.01. Install temporary compressive crash cushions as specified in 611.03.02. Immediately repair or replace crash cushions that become damaged or become inoperable. Begin repair or replacement of the temporary crash cushion within 1 hour of receiving notice of damage from the Department. Ensure that workers assigned to such repair or replacement work continuously until the temporary crash cushion is repaired or replaced. If the Contractor fails to respond to a damage notification and begin work within 1 hour of notification, or does not continue to work until the temporary crash cushion is repaired or replaced, the Department, will require closure of the adjacent live lane. Lane occupancy charges will be imposed as specified in 108.08 for the period of time the adjacent lane is closed. Should the Department have to respond to a repair with its own forces because of a Contractor's lack of response to a damage notification, the Contractor agrees to pay the Department a sum of $3,000 for costs of mobilizing its forces and equipment. In addition, the Contractor must pay the Department the actual cost of material used for the repair and pay the actual costs of police traffic protection. Maintain an adequate number of replacement parts to repair damaged units at all times. Keep the areas in front, atop, and around the crash cushions clear of snow accumulation of more than 4 inches in depth.

   Upon removal of the crash cushion, cut anchor bolts at least 3 inches below the surface of the surrounding roadway. Repair HMA pavement as specified in 401.03.03. Repair concrete pavement as specified in Section 452.

6. **Traffic Control Truck with Mounted Crash Cushions.** Provide the RE with a copy of the crash cushion manufacturer's recommendations. Position the traffic control truck to ensure that there is adequate stopping distance after impact and to prevent errant vehicles from traveling around the truck and endangering workers. When used in a fixed position, place manual transmission vehicles in second gear and place automatic transmission vehicles in park. Ensure that the parking brake is set, and the wheels are turned to avoid rolling into active traffic lanes. Do not use traffic control trucks in place of other temporary impact attenuators for more than 24 hours. Relocate the traffic control truck as specified by the TCP, or as directed by the RE. Do not use the truck to carry additional equipment, materials, or debris. When using ballast, ensure that it is secured to the truck. Submit drawings to the RE detailing the manner of securing the ballast, signed and sealed by a Professional Engineer, certifying that it is capable of withstanding the impact forces for which the impact attenuator is rated.

7. **Channelizing Guide Posts.** Prepare the pavement surface to provide a clean, sound area to affix the post. Apply an epoxy or butyl adhesive according to the manufacturer's recommendations and bond the base of the post to the pavement surface. Provide only 4 inch diameter tubular channelizing markers. Remove when no longer required.

8. **Portable Variable Message Sign with Remote Communication (PVMSRC).** Place the PVMSRC at the locations directed by the RE for the duration of the project. Ensure that a designated representative familiar with the operation and programming of the unit is available on the Project for On-Site Configuration. Only

display messages on the PVMSRC authorized by the Department for the Project in accordance with the plans or as directed by the RE and make the signs available for use remotely from the Traffic Operation Center (TOC) specified in 105.07.01.B. Program within 8 hours, any message requested by the RE to be displayed on the PVMS at a scheduled time and verify that the message is displayed correctly and notify the RE. If the PVMSRC fails to function, repair the equipment within 48 hours of receiving notice from the Department that the PVMSRC is not functioning.

Integrate the PVMSRC for remote operation from TOC using Vanguard DMS software or the Department's central DMS control software at the time of installation as directed by the RE.

Provide for 1 week of testing by the TOC for remotely operating the PVMSRC before the start of construction operations that require lane or shoulder closures, or other impacts to traffic. At least 10 days before testing, submit to the RE for approval a plan for any work to be completed in the TOC. Submit a request to the RE at least 4 days in advance to access the TOC for any work.

9. **Portable Trailer Mounted CCTV Camera Assembly (PTMCCA).** Place the PTMCCA at the location directed by the RE. Ensure that a designated representative familiar with the operation and programming of the unit is available on the Project for initial installation. If the PTMCCA fails to function, repair the equipment within 48 hours of receiving notice from the Department that the PTMCCA is not functioning.

   Provide a system that includes a robotic network camera remotely controllable, including Pan, Tilt and Zoom (PTZ). Provide broadband internet service connection and On-Site Camera Configuration for remote operation and control of the camera via the Department's existing Head-End Camera Control System, Genetec. No other Head-End Camera Control System substitution is permitted. A Management user system is also to be provided for remote system programming to the camera sites. This includes a website that is to be provided and hosted by the vendor. This website is to have secure authentication and is to show the current devices with their location, status, and display links for each device. Provide continuous viewable image at a minimum of 320H x 240V resolution and 1 frame per sec (fps) through the website. As directed by the Traffic Operation Center (TOC) specified in 105.07.01.B, establish password level designations, camera presets, and camera image displays. Provide all incidental equipment and material required for successful remote operation and communications.

   Provide for 1 week of testing by the TOC for remotely operating the PTMCCA before the start of construction operations that require lane or shoulder closures, or other impacts to traffic.

### 159.03.03 Removable Black Line Masking Tape

Apply black line masking tape over existing traffic stripes according to the manufacturer's recommendations and when the weather is favorable, as determined by the RE. Ensure that the black line masking tape completely covers existing stripes. Replace black line masking tape that becomes loose after placement within 2 hours. When black line masking tape is no longer required, carefully and completely remove without using heat, solvents, grinding, sanding, or water.

### 159.03.04 Temporary Pavement Markers

Apply temporary pavement markers with butyl adhesive pads to clean, dry pavement surfaces free of cracking, checking, or spalling. If the layout locates a marker at a joint or defect, relocate the marker longitudinally at least 2 inches beyond the joint or defect. Replace lost or damaged temporary pavement markers.

Only remove temporary pavement markers that will be replaced by striping in the same day. If striping cannot be finished in the same day, reinstall temporary pavement markers before opening the road to traffic.

### 159.03.05 Temporary Pavement Marking Tape

Install tape according to the manufacturer's recommendations when the weather is favorable as determined by the RE. Immediately before marking the pavement surface, clean the surface of dirt, oil, grease, and foreign material, including curing compound on new concrete. Clean the surface 2 inches beyond the perimeter of the marking to be placed.

Install tape on dry surfaces having a surface temperature between 50 °F and 150 °F, when the ambient temperature is at least 50 °F and rising. When splicing is required, install the tape using butt splices. Do not overlap the tape.