

MODIFIED BY  
**EI 14-002**  
EFFECTIVE **5/8/14**

MODIFIED BY  
**EI 13-013**  
EFFECTIVE **1/9/14**

MODIFIED BY  
**EI 14-014**  
EFFECTIVE **1/8/15**

ENGINEERING  
INSTRUCTION

11-016

Title: **STANDARD SPECIFICATIONS –SECTION 619 WORK ZONE TRAFFIC CONTROL**

**SUPERSEDED BY**  
**EB 15-031**  
**EFFECTIVE 9/28/15**

|                                      |                                                              |                                |                |
|--------------------------------------|--------------------------------------------------------------|--------------------------------|----------------|
| ors (33)<br>tants (34)<br>ctors (39) | Approved:                                                    | <i>[Signature]</i> <b>P.E.</b> | <b>9-21-11</b> |
|                                      | James F. Tyran, P.E.<br>Deputy Chief Engineer (Construction) |                                | Date           |

#### ADMINISTRATIVE INFORMATION:

- This Engineering Instruction (EI) is effective beginning with projects submitted for the letting of 01/12/12.
- This EI supersedes EI 07-006 and EI 08-036. This EI modifies EI 08-017 by superseding the portion containing §619-3.02L.2.
- This revision will be incorporated into a future update of the Standard Specifications.

#### PURPOSE:

The purpose of this EI is to issue a revised Standard Specifications Section 619 *Work Zone Traffic Control*.

#### TECHNICAL INFORMATION:

- This EI is being issued concurrently with EI 11-017 Standard Specifications Section 727 *Pavement Marking Materials* and EI 11-018 Standard Specifications Section 729 *Temporary Traffic Control Devices*.
- Included are minor revisions to further clarify the specifications and to ensure consistency between the Standard Specifications, Standard Sheets, and the 2009 MUTCD.
- This section is written using a parallel-modular format, where §619-1.01 corresponds to §619-2.01, §619-3.01, §619-4.01 and §619-5.01. The explanations below use the notion §619-X to refer to any of the major portions of the specifications. For example, §619-X.01 may refer to §619-2.01, §619-3.01, and §619-4.01
- §619-1.01, 3.01, and 3.19 A - Consistently uses the term competent person, replacing trained person, responsible person or supervisor.
- §619-3.01 *General* – Requires maintaining pedestrian traffic on at least one side of the highway at all times and maintaining existing facilities accessible for persons with disabilities in accordance with the Americans with Disabilities Act.
  - Prohibits workers from crossing or entering travel lanes where pedestrian access is prohibited.
- §619-3.02B. *Seasonal Operations and Snow and Ice Control* – Deletes Contractor maintenance responsibility for sidewalks open to the public prior to contract final acceptance.
- §619-X.02F. - Construction Vehicles and Equipment – Updates warning lights, escort vehicle signs, haul vehicles and reorganizes material details.
  - The *Construction Vehicle Do Not Follow* sign on the back of trucks has been eliminated. The sign was inappropriate more often than needed, and did not provide added value.
  - Allows use of a light emitting diode (LED) or rotating amber beacon(s).
  - Requires escort vehicles to be equipped with SLOW MOVING VEHICLE sign (W21-4) for compliance with the MUTCD.

- §619-X.02H. *Construction Signs*:
  - Removes the schedule for implementation of Type IX sign sheeting, as the dates are no longer applicable.
  - Permits flexible panel and lightweight rigid panel signs mounted on sign stands as low as 1 foot for certain conditions
  - Permits construction signs to have a non-retroreflective contractor logo or name on the back of the sign.
- §619-X.02H.3. *Sign Covers*: Permits using lightweight panels or hinged sign panels as sign cover options.
- Clarifies that the use of sign covers for permanent traffic signs in conflict with long term work zone traffic control patterns shall be in accordance with §645-3.09 *Covering Signs* and paid for separately.
- §619-X.02H.4. *State Law Signs* –FINES DOUBLED FOR SPEEDING IN WORK ZONES signs are required for work zones having reduced regulatory speed limits and LICENSE SUSPENDED AFTER TWO WORK ZONE SPEEDING TICKETS signs are required for work zone not having reduced regulatory speed limits.
- §619-X.02H.5. *Special-Use Work Zone Signs* – Updates BE PREPARED TO STOP sign for compliance with the MUTCD and §619-2.02 H 1.
- §619-3.02J. *Channelizing Devices* – Tables 619-3A&B were created to summarize channelizing device applications.
  - Requires Type A, instead of Type B, flashing warning lights be installed on the channelizing devices identifying hazards and night work.
  - Permits channelizing devices to have a non-retroreflective contractor logo or name on the back, base or top of channelizing devices where it does not obstruct device face, color, or retroreflectivity.
- §619-3.02J.7. *Placing, Maintaining, and Removing Channelizing Devices* - Updates placing, maintaining and removing channelizing devices:
  - Requires workers placing or removing traffic cones, drums, and other traffic control channelizing devices from the back or side of a moving work vehicle to be protected by a fall-restraint system consisting of side racks, harness and lanyard and/or cone basket.
  - Requires workers to be restrained in seats having seatbelts on work vehicles when not in the process of actually placing or removing signs or channelizing devices.
  - Requires work vehicles with front-mounted cone baskets to be used only on multi-lane divided highways traveling in the same direction as traffic.
  - Requires work vehicles placing channelizing devices on multi-lane highways equipped with side or front fall-restraint system to meet the requirements of a shadow vehicle or have shadow vehicle follow the work vehicle.
- §619-3.02K. *Pavement Edge Drop-Off Protection* - Updates pavement edge drop-off protection provisions to comply with the 2009 MUTCD's requirements for No Shoulder and/or Shoulder Drop-off signs.
- §619-X.02L.4. *Automated Flagging Assistance Devices (AFAD)* – Permits a single flagger to remotely operate AFADs for work zone traffic control.
- §619-X.02O. *Portable Traffic Signals* – Eliminates the paragraph for portable traffic signal. A portable traffic signal may be used as an AFAD, in accordance with §619-3.02L.4., or as a temporary traffic signal in accordance with §619-3.18. Material requirements were moved to §729-20 *Portable Traffic Signals*.

- §619-3.03 *Basic Work Zone Traffic Control (Daily Operations)* - Clarifies that Basic Work Zone Traffic Control (Daily Operations), Contract Pay Item 619.0101 shall be in accordance with listed paragraphs of §619-3.02 Basic Work Zone Traffic Control.
- §619-X.06 *Temporary Pavement Markings*:
  - Updates temporary pavement markings material specifications to include Removable Raised Pavement Markers, or removable pavement tape, removable wet-night reflective tape, traffic paint, or temporary overlay markers.
  - Includes temporary overlay markers as an alternative temporary pavement marking when unanticipated rainfall or other weather conditions prevent the application of temporary pavement markings.
  - Clarifies the use of removable raised pavement markers to supplement certain temporary pavement markings when specified in contract documents.
  - Permits the use of 2-foot reflective pavement marking strips or temporary overlay markers when inclement weather prohibits the application of temporary pavement markings for up to three days.
- §619-3.07C. - *Removal of Pavement Markings* – Removed the paragraph. Removal of interim pavement markings is addressed under §619-3.05 *Covering or Removing of Pavement Markings*.
- §619-3.09 *Interim Tubular Markers* - Provides for interim tubular markers damaged or lost by traffic to be considered extra work, unless costs are collected from responsible parties.
- §619-X.10 *Portable Variable Message Signs (PVMS)* – Better differentiates between PVMSs with pay units of each and with pay units of weeks.
- §619-X.10 *Portable Variable Message Signs (PVMS)* – Relocations are limited to 4 for the each item to allow Contractors the ability to provide an informed bid. Additional movements will be extra work, paid for via agreed price or force account.
- §619-X.12 *Temporary Concrete Barrier*:
  - Updates Guide Rail & Concrete Barrier Standard Deflections Table 619-6 with deflections consistent with NCHRP crash testing data.
  - Requires the pinning of temporary concrete barrier end section or first (last) segment to reduce deflections.
  - Updates pinning temporary concrete barrier with four (4) pins on the construction (non-traffic) side, which eliminates the exposure of workers pinning barrier adjacent to traffic lanes.
  - Requires the full section of barrier immediately adjacent to a pinned end section or pinned full section of barrier to be pinned with two pins on the construction (non-traffic) side.
  - Includes a new item for concrete barrier stiffened with box beam, which enables reducing barrier deflection without pinning and updates deflection distances consistent with NCHRP crashing testing data.
- §619-X.21 *Temporary Structures and Approaches* – NYSDOT Load and Resistance Factor Design (LRFD) design live load updated to HL-93 and NYSDOT Standard Specifications for Highway Bridges design live load updated to HS 20.
- §619-X.23 *Mailboxes* - References the requirements of the U.S. Postal Service for mailbox mounting post, location and height, and deletes standard sheet reference.

**IMPLEMENTATION:**

- Main Office Design Quality Assurance Bureau will insert the Standard Specification revision into contract proposals beginning with projects submitted for the letting of 1/12/2012.
- The following standard contract pay items are approved:

|          |                                                                                        |        |
|----------|----------------------------------------------------------------------------------------|--------|
| 619.1705 | Temporary Concrete Barrier (Stiffened with Box Beam)                                   | Meters |
| 619.1706 | Temporary Concrete Barrier (Stiffened with Box Beam) with Warning Lights               | Meters |
| 619.1707 | Temporary Concrete Barrier (Stiffened with Box Beam and Pinned)                        | Meters |
| 619.1708 | Temporary Concrete Barrier (Stiffened with Box Beam and Pinned)<br>with Warning Lights | Meters |

**BACKGROUND:**

A major revision to Standard Specification Section 619 was issued during 2007. Work Zone Traffic Control Standard Sheets were issued on 5/16/08. The National Manual of Uniform Traffic Control Devices (MUTCD) was adopted by New York State on 9/13/07 and the 2009 Edition of the MUTCD was adopted by New York State on 01/15/10.

**TRANSMITTED MATERIALS:**

This EI transmits Standard Specification revisions in both USC and Metric formats.

**CONTACT:**

Questions regarding this EI should be directed to:

Brian DeWald ([BDeWald@dot.state.ny.us](mailto:BDeWald@dot.state.ny.us)) of the Office of Construction at (518) 457-6472

Rochelle Hosley ([RHosley@dot.state.ny.us](mailto:RHosley@dot.state.ny.us)) of the Office of Traffic Safety at (518) 457-0368

## WORK ZONE TRAFFIC CONTROL

Make the following changes to the Standard Specifications of May 4, 2006:  
Page 551 **Delete** Section 619 *Maintenance and Protection of Traffic* and **Replace** it with the following:

### SECTION 619 - WORK ZONE TRAFFIC CONTROL

#### 619-1 DESCRIPTION

**619-1.01 General.** Work zone traffic control shall consist of all work necessary to provide for the safe and efficient movement of traffic through or around work zones, and to protect workers and the public from damage to person and property which may result, directly or indirectly, from any construction operations. Work zone traffic control shall be completed under the direction of a trained, competent person, as shown in the contract documents, the MUTCD and as directed by the Engineer. The duration of this work shall be from the date any work is started on the contract site, including mobilization of equipment, signs, offices, and shops until the date of contract final acceptance. Temporary materials and components that are furnished by the Contractor shall remain the property of the Contractor.

See Figure 619-1 *Component Parts of a Typical Highway Work Zone* for definitions of terms.

**619-1.02 Basic Work Zone Traffic Control.** Work shall consist of controlling traffic over a reasonably smooth traveled way which shall be marked by signs, delineators, channelizing devices, pavement markings, and other devices as shown in the contract documents or as directed by the Engineer. Work after sunset and before sunrise shall include additional requirements for nighttime operations including, but not limited to, a written plan for nighttime operations, additional worker and equipment protection, additional channelizing devices and contract site patrol.

The Contractor shall conduct its operations to ensure the safety and convenience of travelers and abutting property owners as well as the safety of all workers on the contract. Travelers include, but may not be limited to motorists, motorcyclists, bicyclists and pedestrians.

Work shall be scheduled to keep the time and distance that existing pavement is removed or substantially disturbed to a minimum and consistent with the physical requirements of the contract. Unless otherwise indicated in the contract documents, the distance over which traffic is maintained on an unpaved surface shall not exceed 800 m at any one time. During seasonal shutdown periods, no part of the highway shall be closed to traffic unless provided for in the contract documents, or the Contractor has submitted and the Engineer has approved a detailed schedule of operations reflecting a proposal to close the highway to traffic.

Basic work zone traffic control shall include the following:

**A. Surface Condition, Debris, Drainage and Dust Control.** Work shall consist of maintaining the surface condition of the traveled way, including detours, consistent with the preconstruction posted speed limit; including maintaining positive drainage, dust control and keeping the roadway free from debris and materials spilled from or tracked by vehicles or equipment. Debris and dust shall be controlled on all operations.

**B. Seasonal Operations and Snow and Ice Control.** Work shall consist of maintaining the traveled way to facilitate safe, efficient travel and permit snow and ice control by others during winter months and during any period that work is suspended.

**C. Maintain Public Access.** Work shall consist of maintaining public access to intersecting roads, residences, business establishments, adjacent property, bus stops and transportation facilities for vehicles, pedestrians, and bicyclists.

**D. Maintain Existing Roadside Signs, Delineators and Markers.** Work shall consist of maintaining, in their existing condition, existing highway signs, delineators, and markers within the contract limits.

## WORK ZONE TRAFFIC CONTROL

**E. Maintain Existing Guide Rail, Median Barrier and Bridge Rail.** Work shall consist of maintaining existing traffic barriers and other safety devices, in their existing condition, within the contract limits.

**F. Construction Vehicles and Equipment.** Work shall consist of equipping construction vehicles and equipment with warning lights and reflective markings; and maintenance of vehicles and equipment in safe operating condition.

**G. Barrier/Shadow Vehicles.**

**1. Barrier Vehicles.** Work shall consist of furnishing barrier vehicles to guide traffic and protect workers in stationary lane and shoulder closures and other stationary temporary traffic control zones, as shown in the contract documents or as directed by the Engineer.

**2. Shadow Vehicles.** Work shall consist of furnishing shadow vehicles to guide traffic and to protect workers in mobile or short duration work zones not protected by stationary lane or shoulder closures, as shown in the contract documents or as directed by the Engineer.

**H. Construction Signs.** Work shall consist of furnishing, installing, moving, maintaining, deactivating, and removing construction signs, including warning lights, as shown in the contract documents or as directed by the Engineer.

**I. Arrow Panels.** Work shall consist of furnishing, installing, maintaining, and removing arrow panels as shown in the contract documents or as directed by the Engineer. Arrow panels are used to warn and guide traffic when travel lanes are temporarily closed by construction activities.

**J. Channelizing Devices.** Work shall consist of furnishing, placing, maintaining and removing channelizing devices, with warning lights where required, including drums, vertical panels, construction barricades, cones, and temporary tubular markers. Type III construction barricades and interim tubular markers may be specified under separate pay items.

**K. Pavement Edge Drop-Off Protection.** Work shall consist of furnishing and maintaining protection for edge drop-offs adjacent to the pavement or shoulder.

**L. Flagging and Traffic Control.** Work shall consist of furnishing the necessary traffic control equipment and flaggers for adequate traffic control. Portable traffic signal systems authorized by the Engineer may be utilized only on a highway designated as a Restricted Highway.

**M. Maintain Existing Mailboxes.** Work shall consist of maintaining postal route mailboxes serviced from vehicles, in a useable condition and location consistent with U.S. Postal Service requirements.

**N. Contract Site Patrol.** Work shall consist of furnishing personnel to patrol the contract area as necessary to ensure conditions on the site are adequate for public safety and convenience at all times.

**619-1.03 Basic Work Zone Traffic Control (Daily Operations).** Work shall consist of controlling and protecting traffic during a single work shift as shown in the contract documents, or as directed by the Engineer. The Contractor will not be required to repair or maintain the surface of the traveled way and other roadway features not part of the work, except to repair damage resulting from the Contractor's operations.

## WORK ZONE TRAFFIC CONTROL

**619-1.04 Temporary Business Signs.** Work shall consist of furnishing, installing, moving, covering, maintaining, and removing temporary business signs as shown in the contract documents or as directed by the Engineer.

**619-1.05 Covering or Removal of Pavement Markings.** Work shall consist of removing or covering existing permanent pavement markings or, if shown in the contract documents, interim pavement markings, including, but not limited to: edge lines, lane lines, center lines, crosswalks, stop bars, arrows, symbols, and diagonal markings in gores and medians as shown in the contract documents or as directed by the Engineer.

**619-1.06 Temporary Pavement Markings.** Work shall consist of furnishing, applying and removing temporary pavement markings as shown in the contract documents or as directed by the Engineer. Temporary pavement markings are intended for use on any new pavement or milled surface until the subsequent course is placed or interim pavement markings or final pavement markings are installed.

**619-1.07 Interim Pavement Markings.** Work shall consist of furnishing, applying, maintaining, and removing interim pavement markings as shown in the contract documents or as directed by the Engineer. Interim pavement markings are intended for use in diversions, temporary pavement realignments and crossovers, lane shifts and closures, and other traffic patterns associated with construction activities. Interim pavement markings are intended for use for a given phase or season, for a maximum of 1 year.

**619-1.08 Temporary Rumble Strips.** Work shall consist of installing, maintaining, and removing temporary rumble strips at the locations shown in the contract documents or as directed by the Engineer.

**619-1.09 Interim Tubular Markers.** Work shall consist of furnishing, installing, moving, and maintaining interim tubular markers attached to the pavement as shown in the contract documents or as directed by the Engineer. Interim tubular markers are typically used for 2-way, 2-lane freeway work zones and long-term closures where available width is limited.

**619-1.10 Portable Variable Message Signs (PVMS).** Work shall consist of furnishing, installing, operating, maintaining, relocating, and removing PVMSs as shown in the contract documents or as directed by the Engineer.

PVMS with a pay unit of each shall be provided for the duration of the contract at the general locations specified in the contract documents.

PVMS with a pay unit of weeks shall be provided at general locations and durations in accordance with the Special Note *Requirements for Portable Variable Message Signs (PVMS)* and the contract documents.

PVMSs are intended to supplement other traffic control devices by displaying symbolic or word messages, but are not to be used alone to replace conventional traffic control devices.

**619-1.11 Type III Construction Barricades.** Work shall consist of furnishing, installing, moving, maintaining, and removing Type III construction barricades, with warning lights where specified, as shown in the contract documents or as directed by the Engineer.

**619-1.12 Temporary Concrete Barrier.** Work shall consist of furnishing, installing, moving, maintaining, and removing temporary concrete barrier, including barrier warning lights where specified, as shown in the contract documents or as directed by the Engineer.

**619-1.13 Temporary Glare Screen.** Work shall consist of furnishing, installing, moving, maintaining, and removing glare screen mounted on a concrete barrier as shown in the contract documents or as directed by the Engineer.

## WORK ZONE TRAFFIC CONTROL

**619-1.14 Temporary Impact Attenuator.** Work shall consist of furnishing, installing, maintaining, repairing, moving and removing temporary impact attenuators as shown in the contract documents or as directed by the Engineer.

**619-1.15 Temporary Sand Barrel Arrays.** Work shall consist of furnishing, installing, maintaining, relocating and removing temporary sand barrel arrays as shown in the contract documents or as directed by the Engineer.

**619-1.16 Vehicle Arresting Barrier.** Work shall consist of providing vehicle arresting barriers (net-type) and their anchorages as shown on the Standard Sheets to prevent errant vehicles from entering a closed work area as shown in the contract documents or as directed by the Engineer.

**619-1.17 Maintain or Modify Traffic Signal Equipment.** Work shall consist of modifying or maintaining in proper operation, existing, relocated, modified, or newly installed traffic signals as shown in the contract documents or as directed by the Engineer.

**619-1.18 Temporary Traffic Signals.** Work shall consist of furnishing, installing, moving, maintaining, and removing temporary traffic signals and necessary components as shown in the contract documents or as directed by the Engineer. Temporary signals shall be installed only on a highway designated as a Restricted Highway.

**619-1.19 Nighttime Operations.** Work shall consist of developing a Nighttime Operations and Lighting Plan, and furnishing, installing, operating, maintaining, moving and removing lighting equipment for nighttime construction operations as shown in the contract documents or as directed by the Engineer.

**619-1.20 Traffic Control Supervisor.** Work shall consist of providing a full-time traffic control supervisor having adequate training, experience, and authority to implement and maintain all traffic control operations, as shown in the contract documents or as directed by the Engineer.

**619-1.21 Temporary Structures and Approaches.** Work shall consist of designing, constructing, moving, maintaining, and removing temporary structures, and necessary appurtenances, as shown in the contract documents or as directed by the Engineer. Temporary structures may also include temporary structural elements added to an existing structure to allow temporary use, or staged removal, of the structure.

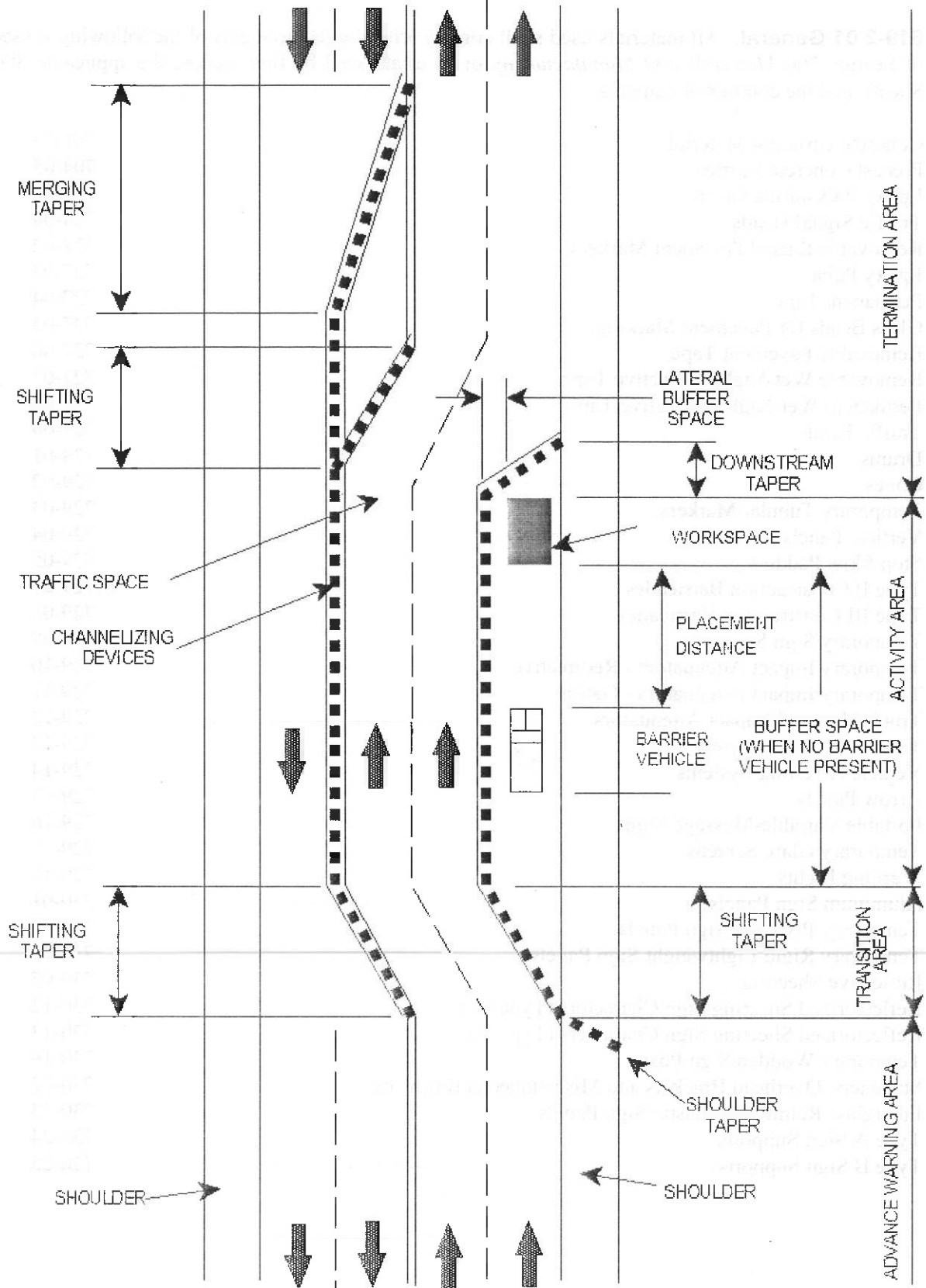
**619-1.22 Pavement Patching.** Work shall consist of providing and installing pavement patching materials to maintain pavements open to traffic in acceptable condition as shown in the contract documents or as directed by the Engineer.

**619-1.23 Mailboxes.** Work shall consist of relocating or replacing postal route mailboxes and/or mailbox supports consistent with U.S. Postal Service requirements, as shown in the contract documents or as directed by the Engineer.



# WORK ZONE TRAFFIC CONTROL

FIGURE 619-1 COMPONENT PARTS OF A TYPICAL HIGHWAY WORK ZONE



## WORK ZONE TRAFFIC CONTROL

### 619-2 MATERIALS.

**619-2.01 General.** All materials used shall comply with the requirements of the following subsections of Section 700 *Materials and Manufacturing*, or as established by this section, the applicable Standard Sheets, and the contract documents.

|                                                          |        |
|----------------------------------------------------------|--------|
| Concrete Grouting Material                               | 701-05 |
| Precast Concrete Barrier                                 | 704-05 |
| Epoxy Polysulfide Grout                                  | 721-03 |
| Traffic Signal Heads                                     | 724-04 |
| Removable Raised Pavement Markers                        | 727-02 |
| Epoxy Paint                                              | 727-03 |
| Permanent Tape                                           | 727-04 |
| Glass Beads for Pavement Markings                        | 727-05 |
| Removable Pavement Tape                                  | 727-06 |
| Removable Wet-Night Reflective Tape                      | 727-07 |
| Permanent Wet-Night Reflective Tape                      | 727-08 |
| Traffic Paint                                            | 727-09 |
| Drums                                                    | 729-01 |
| Cones                                                    | 729-02 |
| Temporary Tubular Markers                                | 729-03 |
| Vertical Panels                                          | 729-04 |
| Stop/Slow Paddles                                        | 729-05 |
| Type II Construction Barricades                          | 729-07 |
| Type III Construction Barricades                         | 729-08 |
| Temporary Sign Supports                                  | 729-09 |
| Temporary Impact Attenuators - Redirective               | 729-10 |
| Temporary Impact Attenuators - Gating                    | 729-11 |
| Truck-Mounted Impact Attenuators                         | 729-12 |
| Temporary Sand Barrels                                   | 729-13 |
| Vehicle Arresting Systems                                | 729-14 |
| Arrow Panels                                             | 729-15 |
| Portable Variable-Message Signs                          | 729-16 |
| Temporary Glare Screens                                  | 729-17 |
| Warning Lights                                           | 729-18 |
| Aluminum Sign Panels                                     | 730-01 |
| Temporary Plywood Sign Panels                            | 730-02 |
| Temporary Rigid Lightweight Sign Panels                  | 730-03 |
| Reflective Sheeting                                      | 730-05 |
| Reflectorized Sheeting Sign Characters (Type IV)         | 730-12 |
| Reflectorized Sheeting Sign Characters (Type V)          | 730-13 |
| Temporary Wooden Sign Posts                              | 730-19 |
| Stiffeners, Overhead Brackets and Miscellaneous Hardware | 730-22 |
| Fiberglass Reinforced Plastic Sign Panels                | 730-23 |
| Type A Sign Supports                                     | 730-24 |
| Type B Sign Supports                                     | 730-25 |

## WORK ZONE TRAFFIC CONTROL

### 619-2.02 Basic Work Zone Traffic Control.

**A. Surface Condition, Debris, Drainage and Dust Control.** Materials used to repair pavement surfaces shall be compatible with the pavement. In general, plant-mixed hot mix asphalt is suitable for all pavement surfaces to be repaired. Material other than plant-mixed hot mix asphalt may be used if approved by the Engineer.

Environmentally compatible, approved dust palliatives may be used in conformance with any conditions placed on their use.

**B. Seasonal Operations and Snow and Ice Control.** (None Specified)

**C. Maintain Public Access.** (None Specified)

**D. Maintain Existing Roadside Signs, Delineators and Markers.** All materials used to maintain existing roadside appurtenances shall be consistent with the features to be maintained.

**E. Maintain Existing Guide Rail, Median Barrier and Bridge Rail.** All materials used to maintain existing roadside appurtenances shall be consistent with the features to be maintained.

**F. Construction Vehicles and Equipment.** All vehicles with a GVWR greater than 4,600 kg and with restricted visibility to the rear shall be equipped with an operational audible backup alarm. Any vehicle with a non-operational backup alarm shall be taken out of service until the alarm is repaired.

All vehicles and equipment within the contract limits and on the roadway shall be equipped with a rotating amber or flashing Light Emitting Diode (LED) beacon visible from all directions for a minimum of 300 m during daylight. Flashing LED beacons shall meet the requirements of SAE J845 Class 2. Strobe lights shall not be used.

All trucks with a GVWR greater than 4,600 kg shall display a minimum 50 mm wide band of reflective sheeting on the front, rear and each side. The sheeting need not be continuous, but the sum of the length of the segments shall be at least one-half the length of the body or trailer. The centerline of the sheeting shall be between 375 mm and 1525 mm above the ground. All other construction equipment shall display a minimum 50 mm wide band of reflective sheeting on the front and rear (60 000 mm<sup>2</sup> per end minimum) as practicable. Reflective markings on construction vehicles and equipment shall conform to §730-05 *Reflective Sheeting* ASTM Type III, Type VII or Type IX.

**G. Barrier/Shadow Vehicles.** Barrier/Shadow vehicles shall weigh a minimum of 8,200 kg and shall be equipped with a Type B or Type C Arrow Panel. Ballast may be used to bring a lighter vehicle up to the indicated weight provided the ballast is securely contained within an enclosed body or otherwise securely fastened to the vehicle such that the ballast will not separate from the vehicle upon impact. Where the preconstruction posted speed limit is 55 mph or less, barrier/shadow vehicles shall be equipped with a Test Level-2 truck mounted or trailer mounted impact attenuator. Where the preconstruction posted speed limit is more than 55 mph, barrier/shadow vehicles shall be equipped with a Test Level-3 truck mounted or trailer mounted impact attenuator. Impact attenuators meeting the requirements of NCHRP 350 Test Level 3 are also acceptable as Test Level 2 devices.

Where a barrier vehicle remains stationary for extended periods of time, the Contractor may utilize a barrier trailer in lieu of a barrier vehicle. A barrier trailer is a trailer that may be detached from the tow vehicle and that meets barrier vehicle weight, arrow board, attenuator and placement distance requirements.

## WORK ZONE TRAFFIC CONTROL

**H. Construction Signs.** Fabrication of all components shall produce a finished sign panel. Holes may be punched or drilled. Edges shall be smooth and true and free from burrs or ragged breaks. Sign panels, including face shape, color, dimensions, and characters shall be fabricated using colors, character series, character sizes, symbols, route shields and borders as shown in the MUTCD or in the contract documents.

**1. Sign Panels.** Modification of sign legends by overlaying an existing legend with a revised legend, changing a single word or distance, such as changing LEFT to RIGHT or 1000 to 1500 will be permitted if the overlay is a match to the rest of the sign in terms of legend size and type, sheeting color and reflectivity. The overlay shall be firmly adhered to the underlying panel. Any such overlays shall provide a visual match to the rest of the sign when viewed from a distance of 30 m or greater during all periods in which the sign will be used.

*a. Rigid Sign Panels.* Rigid sign panels shall be aluminum, fiberglass, plywood, or lightweight plastic. Orange signs on rigid panels shall conform to §730-05 *Reflective Sheeting* fluorescent-orange ASTM Type IX (Class E) sheeting. All other colors of construction sign faces on rigid panels shall conform to §730-05 *Reflective Sheeting* ASTM Type III (Class B) sheeting. White characters and borders shall conform to §730-12 *Reflectorized Sheeting Sign Characters (Type IV)* or §730-13 *Reflectorized Sheeting Sign Characters (Type V)*. Shields shall be either demountable or directly applied panels and shall conform to §730-13 *Reflectorized Sheeting Sign Characters (Type V)*. Black sign characters and background shall be non-reflective and shall conform to §730-13 *Reflectorized Sheeting Sign Characters (Type V)*.

*b. Flexible Sign Panels.* Flexible sign panels shall be a solid, fluorescent-orange, durable elastomeric material. Flexible panels fabricated from mesh will not be allowed. Flexible sign panels shall be mounted on supports with adequate bracing, so as to minimize flutter and to support the intended shape of the sign.

**2. Mounting Temporary Signs.** Temporary sign supports, except those located beyond the deflection distances of guide rail or temporary barrier as given in Table 619-6 *Guide Rail & Concrete Barrier Standard Deflection Distances* or otherwise protected against impact by errant vehicles, shall meet the following requirements for portable or fixed supports. If rigid diagonal bracing is used, the high end of the bracing shall face away from approaching traffic. All wood supports shall be painted white.

*a. Portable Temporary Sign Supports.* Ballast used to stabilize supports shall be bagged sand or other suitable material, and shall be located at ground level. Portable supports shall be a configuration which is NCHRP 350 approved, or be constructed in accordance with a Standard Sheet(s).

*b. Fixed Temporary Sign Supports.* The Contractor shall provide NCHRP 350 approved Type A, Type B or wooden sign posts in accordance with §730-19 *Temporary Wooden Sign Posts*, §730-24 *Type A Sign Supports*, or §730-25 *Type B Sign Supports* as appropriate.

**3. Sign Covers.** Covers used to inactivate unneeded construction signs shall be a single dark color, opaque material containing no wording or images. Rigid covers shall match the size and shape of the sign panel(s). Fabric sign covers may require more than one layer of fabric to prevent legibility of the sign being covered. Rigid Lightweight panels used as covers shall meet the requirements §730-03 *Temporary Rigid Lightweight Sign*. Signs hinged on the back side of the sign face to fold at the center and completely cover the sign face may be used.

**I. Arrow Panels.** Arrow panels shall be in accordance with §729-15 *Arrow Panels*.

## WORK ZONE TRAFFIC CONTROL

**J. Channelizing Devices.** Drums shall be in accordance with §729-01 *Drums*. Standard cones, tall cones and extra tall cones shall be in accordance with §729-02 *Cones*. Temporary tubular markers shall be in accordance with §729-03 *Temporary Tubular Markers*. Standard and oversized vertical panels shall be in accordance with §729-04 *Vertical Panels*. Type II construction barricades shall be in accordance with §729-07 *Type II Construction Barricades*.

**K. Pavement Edge Drop-off Protection.** (None Specified)

**L. Flagging and Traffic Control.** Hand signaling devices used to control traffic shall meet the requirements of the MUTCD. The standard signaling device shall be STOP/SLOW signal paddles in accordance with §729-05 *Stop/Slow Paddles*. Red signal flags shall be a minimum of 600 mm x 600 mm. Automated Flagging Assistance Devices shall be in accordance with §729-19 *Automated Flagging Assistance Devices*. Portable traffic signals shall be in accordance with §729-20 *Portable Traffic Signals*.

**M. Maintain Existing Mailboxes.** (None Specified)

**N. Contract Site Patrol.** (None Specified)

### 619-2.03 Basic Work Zone Traffic Control (Daily Operations). (None Specified)

**619-2.04 Temporary Business Signs.** Temporary business signs shall conform to the MUTCD. Sign panels shall be in accordance with §619-2.02H.1. *Sign Panels*, except that the panels shall be white on a blue background. Supplemental arrows, as required, shall be white on a blue background (M5-1 to M6-2). Temporary business signs shall be mounted on temporary sign supports.

**619-2.05 Covering or Removal of Pavement Markings.** Tape used to cover existing pavement markings shall be non-reflective, pavement marking masking tape, substantially similar in color to the pavement surface, in accordance with §727-06 *Removable Pavement Tape*.

**619-2.06 Temporary Pavement Markings.** Temporary pavement markings shall consist of removable raised pavement markers in accordance with §727-02 *Removable Raised Pavement Markers*, or removable pavement tape in accordance with §727-06 *Removable Pavement Tape*, or removable wet-night reflective tape in accordance with §727-07 *Removable Wet-Night Reflective Tape*, or traffic paint in accordance with §727-09 *Traffic Paint* and §727-05 *Glass Beads for Pavement Markings*, or temporary overlay markers in accordance with §729-21 *Temporary Overlay Markers*.

**619-2.07 Interim Pavement Markings.** Interim pavement markings shall consist of traffic paint in accordance with §727-09 *Traffic Paint* and §727-05 *Glass Beads for Pavement Markings*, epoxy paint in accordance with §727-03 *Epoxy Paint* and §727-05 *Glass Beads for Pavement Markings*, removable pavement tape in accordance with §727-06 *Removable Pavement Tape*, removable wet-night reflective tape in accordance with §727-07 *Removable Wet-Night Reflective Tape*. Interim pavement markings shall be supplemented, where specified, with removable raised pavement markers in accordance with §727-02 *Removable Raised Pavement Markers*.

## WORK ZONE TRAFFIC CONTROL

### 619-2.08 Temporary Rumble Strips.

**A. Raised Asphalt Rumble Strips.** Raised asphalt rumble strips shall be formed from 6.3 or 9.5 hot mix asphalt. Asphalt Emulsion Tack Coat shall be used to adhere the rumble strip to the existing pavement.

**B. Raised, Removable-Tape Rumble Strips.** Removable-tape rumble strips shall be formed from black, non-reflectorized, removable pavement-marking tape. Raised, removable-tape rumble strips shall have a minimum width of 150 mm, measured in the direction of traffic, with sufficient layers of tape such that each finished rumble strip has a thickness of  $10 \text{ mm} \pm 3 \text{ mm}$ .

**C. Raised, Preformed Rumble Strips.** Raised, preformed rumble strips shall be manufactured specifically as temporary rumble strips. Raised, preformed rumble strips shall have a minimum width of 100 mm, measured in the direction of traffic, with a thickness of between 6 mm and 13 mm.

**D. Saw-Cut Rumble Strips.** Saw-cut rumble strips shall have a width of  $100 \text{ mm} \pm 13 \text{ mm}$  measured in the direction of traffic. The depressions shall have a rectangular cross section with a depth of  $10 \text{ mm} \pm 3 \text{ mm}$ .

**E. Milled-in Rumble Strips.** Milled-in rumble strips shall have a nominal width of 150 mm measured in the direction of traffic. The depressions shall have a semicircular, concave cross section with a depth of  $10 \text{ mm} \pm 3 \text{ mm}$ .

**F. Removing Temporary Rumble Strips.** Rumble strip depressions shall be filled in with a 6.3 or a 9.5 hot mix asphalt meeting the requirements of Section 402, Hot Mix Asphalt (HMA) Pavements.

**619-2.09 Interim Tubular Markers.** Interim tubular markers shall be in accordance with §729-03 *Temporary Tubular Markers*.

**619-2.10 Portable Variable-Message Signs (PVMS).** Portable Variable-Message Signs shall be in accordance with §729-16 *Portable Variable-Message Signs (PVMS)*.

**619-2.11 Type III Construction Barricades.** Type III construction barricades shall be fabricated in accordance with §729-08 *Type III Construction Barricades*. All barricades used at night shall be equipped with warning lights in accordance with §729-18 *Warning Lights*.

**619-2.12 Temporary Concrete Barrier.** Temporary concrete barrier segments shall be precast concrete units in accordance with the Standard Sheets or approved Materials Details. All temporary concrete barrier supplied after January 1, 2015 shall be produced in accordance with the requirements of §704-05 *Precast Concrete Barrier*, and shall have a legible permanent marking. Temporary concrete barrier supplied prior to January 1, 2015 which was not produced in accordance with the requirements of §704-05 *Precast Concrete Barrier*, shall be material certified in accordance with specific Standard Sheets or Materials Details used for fabrication.

Warning lights for temporary concrete barrier with warning lights shall be in accordance with §729-18 *Warning Lights*. Where warning lights are not required, temporary concrete barrier segments shall be delineated using reflective panels covered with ASTM Type IX sheeting, approximately 75 mm x 150 mm, having a minimum area of  $11\,000 \text{ mm}^2$ . Where warning lights are required, barrier need not be delineated with panels. Reflective pavement marking material applied to the face of the barrier shall not, by itself, be considered acceptable delineation.

**619-2.13 Temporary Glare Screen.** Temporary glare screen shall be in accordance with §729-17 *Temporary Glare Screens*.

## WORK ZONE TRAFFIC CONTROL

**619-2.14 Temporary Impact Attenuator.** Temporary impact attenuators shall be in accordance with §729-10 *Temporary Impact Attenuators - Redirective* or §729-11 *Temporary Impact Attenuators - Gating*.

**619-2.15 Temporary Sand Barrel Arrays.** Temporary sand barrels shall meet the requirements of §729-13 *Temporary Sand Barrels*. Sand fill shall meet the material requirements of §703-06 *Cushion Sand* or §203-2.02I. *Sand Backfill*. Deicing material shall meet the requirements of §712-03 *Sodium Chloride*.

**619-2.16 Vehicle Arresting Barrier (VAB).** Vehicle arresting barriers shall meet the requirements of §729-14 *Vehicle Arresting Systems*. Portland Cement Concrete used for bases shall be Class A or C, except that requirements for automated batching shall not apply.

**619-2.17 Maintain or Modify Traffic Signal Equipment.** All traffic signal hardware, including but not limited to wire, cable, conduit, pull boxes, switch packs, modules and relays, detectors, signal heads, poles, and pedestrian push buttons used to maintain proper operation, shall meet the applicable requirements of Section 680 *Traffic Signals*. Materials which will be permanently incorporated into the work shall be in accordance with Section 680 *Traffic Signals*.

**619-2.18 Temporary Traffic Signals.** Equipment for temporary traffic signals shall meet the requirements of Section 680 *Traffic Signals*, except that used equipment in good operating condition may be furnished, and for which material certifications are not required. All span wire, inductance-loop wire, shielded lead-in cable, traffic signal cable, and other wire used for temporary traffic signals shall be new material. Portable traffic signals shall be in accordance with §729-20 *Portable Traffic Signals*.

All other equipment for temporary traffic signals shall meet the requirements of Section 680 *Traffic Signals* except for the following modifications:

**A. Temporary Poles.** Temporary timber poles shall be ANSI O5.1, Class 2, treated with an appropriate waterborne wood preservative. Preservative retention shall be appropriate for the species when used in ground-contact application.

**B. Signal Controller.** The signal controller may be either solid-state or electro-mechanical.

**C. Traffic Signal Heads.** The materials and painting requirements of §724-04 *Traffic Signal Heads* shall not apply except that the signal head housing shall be dark green.

**D. Conflict Monitor.** Means shall be provided to prevent the signal from displaying indications which will result in two or more conflicting traffic movements being permitted simultaneously.

---

**619-2.19 Nighttime Operations.** (None Specified)

**619-2.20 Traffic Control Supervisor.** (None Specified)

## WORK ZONE TRAFFIC CONTROL

**619-2.21 Temporary Structures and Approaches.** When specific details and materials are shown in the contract documents for temporary structures, substitutions or alterations may be permitted if approved by Deputy Chief Engineer (Structures) (DCES).

When specific details are not shown in the contract documents, the Contractor shall assume all liability and responsibility for determining that all materials required conform to the AASHTO Standard Specifications for Highway Bridges or AASHTO LRFD Bridge Design Specifications, unless otherwise approved by the DCES. Used material shall not be furnished for fracture-critical members. Mill certifications shall be provided for all fracture critical material. Excluded from this provision are pedestrian and pre-engineered (fabricated) proprietary structures.

**619-2.22 Pavement Patching.** In general, hot mix asphalt (HMA) is suitable for all pavement surfaces. During winter months when HMA is not available, a bituminous cold-patch material shall be used.

**619-2.23 Mailboxes.** Materials used shall meet the requirements of the U.S. Postal Service.

### 619-3 CONSTRUCTION DETAILS

**619-3.01 General.** The Contractor shall designate a work zone traffic control competent person who has the primary responsibility and sufficient authority for implementing the work zone traffic control plan and other safety and mobility aspects as necessary. The Contractor's work zone traffic control competent person shall be appropriately experienced and adequately trained in traffic control operations by recognized training programs, including the American Traffic Safety Services Association (ATSSA) "Traffic Control Supervisor", the National Safety Council, unions, or construction industry associations, or by an individual instructor from such a program in accordance with the level of decisions that the individual will be required to make, reflecting current industry practices and Department requirements.

The Contractor shall generally maintain a traveled way suitable for moving traffic, in accordance with the contract documents and ensure construction equipment, vehicles, and materials are safely stored beyond the clear zone or behind protective barrier during non-working hours so as not to constitute a hazard to vehicles, bicycles and pedestrians. Construction operations shall be conducted to ensure a minimum of delay to traffic. Stopping traffic for more than 5 minutes shall not be permitted unless specifically authorized in the contract documents or in writing by the Engineer. All operations shall be carried out in a manner that provides workers with safe access to the worksite and protects workers from moving traffic. The work zone traffic control competent person shall routinely inspect all work zone traffic control equipment and devices to make sure they are in a safe operating condition in accordance with §619-3.02N *Contract Site Patrol*. Unless otherwise noted, temporary items supplied in accordance with this section shall remain the property of the Contractor.

Where pedestrians are not prohibited from the street or highway, pedestrian traffic shall be maintained to allow their safe passage as shown in the contract documents. Where sidewalks, walkways, or shoulders must be temporarily closed to facilitate construction operations, safe pedestrian passage shall be maintained on at least one side of the roadway at all times, unless other temporary pedestrian accommodations are provided in the contract documents or are approved by the Engineer. Where pedestrian access is prohibited, workers shall not cross or enter travel lanes open to traffic.

The requirements in this section refer to posted speed limits. If prevailing or operating speeds for a highway exceed the preconstruction posted limits, the contract documents may direct the Contractor to assume that the preconstruction posted speed limits are different than posted.

**619-3.02 Basic Work Zone Traffic Control.** The Contractor shall control traffic so that a person who has no knowledge of conditions may safely and with a minimum of discomfort and inconvenience ride, drive, or walk, day or night, over all or any portion of the highway and/or structure under construction where traffic is to be maintained.

The Contractor shall cease operations and restore the traveled way to safe operating condition during any specific periods listed in the contract documents, at such times as traffic renders conditions unsafe to



## WORK ZONE TRAFFIC CONTROL

continue work, and during periods of darkness (before sunrise or after sunset), fog, snow or rain, high winds, or other inclement weather that renders conditions unsafe to continue work, for either the traveling public or the workers. The Engineer will determine when traffic or weather conditions render work operations unsafe.

**A. Surface Condition, Debris, Drainage and Dust Control.** The traveled way, sidewalks and pedestrian walkways shall be kept reasonably smooth and hard at all times, and shall be well drained and free of potholes, bumps, irregularities, and depressions that hold water. Except when construction operations necessitate disturbance of the normal surface, the Contractor shall maintain the pavement surface in such a condition as to permit the safe, comfortable passage of vehicles at the posted speed limit. A satisfactory riding surface shall be maintained both when work is underway, and when work is inactive. Special attention shall be given to maintenance of the traveled surface during hours of inactivity, including nights, weekends, holidays, and the winter season.

Milling operations shall be conducted to prevent pavement runoff from collecting along milled joints. Bumps and transverse irregularities shall be eliminated to the extent practical. Pavement joints and milling rebates resulting in longitudinal or transverse vertical faces exceeding 25 mm in height that would be exposed to traffic during non-work hours shall be sloped or tapered with temporary patches or shims providing a taper rate in accordance with Table 619-1 *Required Treatment for Transverse Bumps*.

Where longitudinal tapered wedge paving joints are used, temporary pavement markings shall be provided prior to reopening lanes to traffic. The joints may be left open to traffic provided traffic is not expected to frequently change lanes, and UNEVEN LANES (W8-11) signs are posted in advance of the condition, posted at each ramp and roadway intersection and repeated every 800 m, supplemented with NEXT [X] MILES (W7-3aP) auxiliary signs.

Transverse bumps or vertical faces, unpaved surfaces, milled or grooved pavement, rough pavement, and other surface irregularities 25 mm or more in height shall be adequately sloped or tapered, or BUMP (W8-1) or other appropriate warning signs shall be posted in advance of the condition. A Type 1 Object Marker (OM1-3) or a drum with a flashing warning light shall be installed on the right side of the roadway at the bump or other condition. On expressways and freeways, an object marker or a drum with a flashing warning light shall be installed on both sides of the roadway.

Where traffic will be riding on milled pavement, the Contractor shall install GROOVED PAVEMENT (W8-15) signs on the approaches. On multilane highways where only one lane in a direction is milled and multiple lanes are open to traffic, the Contractor shall supplement the GROOVED PAVEMENT sign with a black on orange LEFT LANE (M5-4), CENTER LANE (M5-5) or RIGHT LANE (M5-6) panel below the warning sign. Where only an entrance or exit ramp is milled, the Contractor shall sign the mainline with a GROOVED PAVEMENT sign and a supplemental ON RAMP (W13-4) panel.

Where both BUMP and GROOVED PAVEMENT signs are warranted, the GROOVED PAVEMENT sign shall be installed 150 m upstream of the BUMP sign in non-urban areas, and 100 m upstream in urban areas. Where the posted speed limit is 45 mph or higher, the Contractor shall place a portable variable message sign (PVMS) in advance of pavement that has been milled or grooved and is open to traffic, warning motorcycle riders to use caution. The PVMS will be paid for separately.

For expressways where the posted speed limit is 45 mph or higher, the Contractor shall not leave milled or grooved pavement for more than 7 calendar days before placement of the next pavement course.

The Contractor shall keep the traveled way, sidewalks, and walkways free of construction materials and foreign objects that fall from vehicles or equipment. Materials spilled by, dropped from, or tracked by traffic or by any vehicle used in the Contractor's operations along or across any public traveled way shall be removed immediately.

The Contractor shall keep all surface drainage facilities operative at all times. Positive drainage shall be provided at all times, even during grading operations and periods of accumulated plowed

## WORK ZONE TRAFFIC CONTROL

snow, to adequately drain the traveled way and the remainder of the right-of-way areas. Maintaining positive drainage shall include cleaning of drainage grates on roadway pavements. Cleaning of drainage structures and drainage pipes of material not deposited due to the Contractor's operations will be paid for separately. Repair of drainage structures will be paid for separately.

Dust control measures shall be applied to control dust resulting from traffic on unpaved surfaces and from Contractor operations on or adjacent to the roadway. Dust control shall be adequate to prevent dust which hinders driver visibility or which creates a nuisance condition for property owners and residents adjacent to the contract. Dusty conditions resulting from the Contractor's operations may be corrected by the use of calcium chloride and/or water. If used, water shall be distributed uniformly using a suitable spray head or spray bar.

| TABLE 619-1 REQUIRED TREATMENT FOR TRANSVERSE BUMPS |                                           |                            |                         |
|-----------------------------------------------------|-------------------------------------------|----------------------------|-------------------------|
| Height of Bump (mm)                                 | Anticipated Exposure Time (Calendar Days) | Posted Speed $\leq 45$ mph | Posted Speed $> 45$ mph |
| 25 to 150                                           | $\leq 7$                                  | 6:1                        | 10:1                    |
|                                                     | $> 7$                                     | 15:1                       | 30:1                    |

**B. Seasonal Operations and Snow and Ice Control.** The Contractor shall maintain the traveled way in such a condition and conduct operations in such a manner that snow and ice may readily be controlled by others as and when necessary, and in such a manner that proper drainage is provided for the melting of snow banks resulting from normal plowing. The Contractor will not be responsible for snow and ice control on the pavement, shoulder, or sidewalks which are not restricted by construction operations and open to the public.

During periods of seasonal shutdown, the traveled way shall be maintained in an acceptable manner for travel, and all traffic control devices and safety features maintained in a safe, operable condition. All construction signs and temporary traffic control devices that are not needed during shutdown periods shall be covered or removed.

**C. Maintain Public Access.** The Contractor shall provide and maintain at all times safe and adequate ingress and egress for intersecting roads, residences, business establishments, adjacent properties, bus stops and other transportation facilities for vehicles, pedestrians and bicycles; at existing or at new access points, consistent with the work, unless otherwise authorized by the Engineer. Whenever construction operations disrupt or interfere with normal traffic patterns, intersections, business establishment access points, and driveways shall be clearly marked using channelizing devices.

A ROAD CLOSED (R11-2) sign on a temporary sign support and Type III construction barricades with warning lights shall be used whenever an entire roadway or ramp is closed to traffic.

Where pedestrian facilities exist, or where pedestrian traffic is reasonably anticipated, the Contractor shall maintain pedestrian access on at least one side of the highway or street at all times, in accordance with the contract documents and the MUTCD. Where an existing pedestrian facility is disrupted, closed or relocated, the temporary facility shall include accessibility features consistent with the features in the existing pedestrian facility. Pedestrian access may be provided using existing pedestrian facilities, temporary sidewalks or walkways, or alternate paths. Where a sidewalk is closed, it shall be marked with a Type II or Type III construction barricade and a SIDEWALK CLOSED (R9-9) sign. Advance warning signs and directional guidance shall be provided to direct pedestrians to alternate paths and crosswalks and to alert motorists. Where bus service is maintained, the Contractor shall provide suitable areas or locations for the loading and unloading of passengers.

Potentially hazardous areas adjacent to sidewalks, walkways, or other areas used by pedestrians shall be protected to prevent pedestrian intrusion in accordance with §107-05F. *Restricted Areas*.

Open sidewalks and walkways shall be maintained and kept smooth and free from holes, obstructions, and tripping hazards. Surfaces shall consist of pavement, firmly compacted granular material, or other surfaces noted in the contract documents or approved by the Engineer. The width

## WORK ZONE TRAFFIC CONTROL

of the temporary facility shall match that of the existing facility where practicable. When it is not possible to meet the minimum width of 1.5 m. for the entire length of the facility, a 1.5 m by 1.5 m passing space should be provided every 60 m. Construction materials, vehicles, equipment, debris, temporary sign supports or other materials shall not be placed or stored on open sidewalks or walkways unless expressly shown in the contract documents or approved by the Engineer.

Where bicycles are not prohibited from the highway, adequate accommodations for bicyclists shall be maintained in the travel lanes, on the shoulder, or on alternate paths or facilities.

**D. Maintain Existing Roadside Signs, Delineators and Markers.** Existing Department authorized signs, delineators, markers and their supports within the contract limits shall remain under the control and jurisdiction of the Engineer. Signs not authorized by the Department shall be removed from the right of way, as directed by the Engineer, in accordance with Section 647 *Removing, Storing and Relocating Signs*.

**1. Maintenance.** Existing signs, delineators, markers and their supports shall be maintained by the Contractor. Adequate visibility of route markers and directional signing shall be provided for drivers at all times. If relocation of route markers and directional signing is necessary to accommodate construction operations, the temporary or new locations shall be subject to approval by the Engineer. Existing roadside delineators shall be removed or relocated only to the minimum extent necessary to accommodate the work under the contract. Where contract operations require the temporary removal of existing delineators to facilitate work operations, temporary roadside delineation consisting of the existing delineators, temporary delineators, or channelizing devices shall be in place each night and at any time work operations at that location are suspended. Temporary devices shall be placed at the outer edge of the shoulder, at a spacing similar to the existing delineator spacing.

**2. Storage.** Existing signs, delineators, markers, and their supports which directly interfere with the construction operations shall be removed, stored, protected, cleaned and replaced in accordance with the contract documents and the provisions of Section 647 *Removing, Storing and Relocating Signs* and will be paid for separately. Existing signs, delineators and markers removed for the Contractor's convenience shall be stored, cleaned and replaced at no additional cost to the State. Existing signs, delineators and markers lost or damaged due to negligence of the Contractor shall be replaced at no additional cost to the State.

**E. Maintain Existing Guide Rail, Median Barrier, and Bridge Rail.** When construction operations require the temporary removal of existing bridge rail, guide rail or median barrier; or when existing rail will be removed and replaced with new rail, the Contractor shall schedule operations to minimize the time period that rail is not installed. Unless otherwise specified in the contract documents, guide rail or median barrier shall be replaced or the location otherwise protected within 14 calendar days.

Bridge rail systems shall be maintained in service at all times on any structure on which vehicle or pedestrian traffic is maintained, unless a temporary barrier is installed, or other means are used to ensure that vehicles, bicyclists and pedestrians are not exposed to the unprotected edge of a bridge.

During non-work hours when traffic is being maintained on the facility, all temporary ends (free ends) of guide rail, median barrier and bridge rail shall be temporarily terminated and marked with a channelizing drum or object marker equipped with a Type A flashing warning light. Corrugated beam guide rail and median barrier, and heavy-post, blocked-out, corrugated beam guide rail and median barrier shall be temporarily terminated by having the exposed ends (free ends) dropped to the ground and pinned. The approach ends of box beam guide rail, median barrier and bridge rail shall be temporarily terminated with box beam guide rail end assemblies utilizing two splice plates and the proper number of bolts per connection. No posts for anchorages will be required. Special temporary splice plates are required to adapt box beam guide rail end assemblies to box beam median barriers.

## WORK ZONE TRAFFIC CONTROL

During any overnight period when existing guide rail or median barrier is temporarily removed, the Contractor shall install channelizing devices in the location where the guide rail or median barrier was removed in accordance with §619-3.02J.6. *Removed Existing Guide Rail or Median Barrier.*

**F. Construction Vehicles and Equipment.** All construction vehicles and equipment operating within the contract limits, whether in the work space, in the traffic space, in spoil areas, in storage areas, or any other areas under the contract, shall be operated at all times with due consideration for the safety of the public and workers.

All vehicles and equipment within the contract limits and on the roadway shall operate a rotating or flashing amber beacon. If visibility of the beacon is blocked by a portion of the vehicle or equipment, additional beacons shall be provided. Beacons shall be mounted in a manner which does not cause glare for the driver or operator. Short-term delivery vehicles not equipped with rotating or flashing amber beacon shall display four-way emergency flashers when in the temporary traffic control zone.

Other than vehicles registered and meeting all applicable requirements of the NYS Vehicle and Traffic Law, no construction vehicle or equipment used in the performance of the work shall be permitted to operate in travel lanes or shoulders open to traffic unless proper traffic control devices and other safety measures are in place to warn drivers of the presence of the equipment.

On any highway where the posted speed limit is 45 mph or higher, no construction vehicle or equipment shall operate in a travel lane or shoulder open to and unimpeded by traffic at a speed less than 15 mph slower than the posted speed limit unless followed by a vehicle equipped with flashing warning lights and *SLOW MOVING VEHICLE* (W21-4) sign on the rear.

The Contractor shall ensure that all construction vehicles and equipment are safely stored beyond the clear zone during non-working hours so as not to constitute a hazard to vehicles and pedestrians, unless protected by traffic barrier.

### G. Barrier Vehicles/Barrier Trailers/Shadow Vehicles.

**1. Barrier Vehicles.** The Contractor shall provide barrier vehicles to guide traffic and protect workers at the beginning of stationary shoulder closures, lane closures and other stationary work zones in accordance with the contract documents.

When located in the taper of a lane closure and another arrow panel is not present, arrow panels on barrier vehicles shall be operated in the appropriate flashing arrow mode. For all other applications, arrow panels shall either display the four-corner flashing caution mode, or shall be turned off. Barrier vehicles should normally be unoccupied, with transmission in gear, parking brakes set and wheels straight, except when being moved. Barrier trailers should have parking brakes set and arrow panels shall be operated in the appropriate flashing arrow mode.

Barrier vehicles and barrier trailers shall be moved if necessary as the work progresses. The placement distance (distance a barrier vehicle or barrier trailer is located in advance of the first workers or hazard) shall be based on Table 619-2 *Placement Distance for Barrier/Shadow Vehicles.*

| Table 619-2 PLACEMENT DISTANCE FOR BARRIER/SHADOW VEHICLES |                         |         |           |         |
|------------------------------------------------------------|-------------------------|---------|-----------|---------|
| Posted Speed Limit (mph)                                   | Placement Distance (ft) |         |           |         |
|                                                            | Barrier Vehicles        |         |           |         |
|                                                            | 8,200 kg                |         | 10,900 kg |         |
|                                                            | Minimum                 | Maximum | Minimum   | Maximum |
| > 55                                                       | 30                      | 60      | 30        | 60      |
| 45- 55                                                     | 30                      | 60      | 25        | 50      |
| <45                                                        | 25                      | 50      | 15        | 30      |
| Shadow Vehicles                                            |                         |         |           |         |
| > 55                                                       | 70                      | 100     | 55        | 85      |
| 50 - 55                                                    | 55                      | 85      | 45        | 75      |