D262276
F.A. PROJECT     NO PLANS

PROPOSAL

Proposal Description:
Rehabilitation of 4 Bridges Over NY Route 33 in the Town of Cheektowaga & City of Buffalo.

Letting of 2/21/2013 @ 10:30 A.M.
Submitted in accordance with Standard Specifications officially adopted May 1, 2008 and the Highway Law.

Book 3 of 4
Make the following changes to the Standard Specifications of May 1, 2008:
Page 558 Delete Section 619 Work Zone Traffic Control 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 1/2 mile 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.

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.

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.

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

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  
Precast Concrete Barrier  
Epoxy Polysulfide Grout  
Traffic Signal Heads  
Removable Raised Pavement Markers  
Epoxy Paint  
Permanent Tape  
Glass Beads for Pavement Markings  
Removable Pavement Tape  
Removable Wet-Night Reflective Tape  
Permanent Wet-Night Reflective Tape  
Traffic Paint  
Drums  
Cones  
Temporary Tubular Markers  
Vertical Panels  
Stop/Slow Paddles  
Type II Construction Barricades  
Type III Construction Barricades  
Temporary Sign Supports  
Temporary Impact Attenuators - Redirective  
Temporary Impact Attenuators - Gating  
Truck-Mounted Impact Attenuators  
Temporary Sand Barrels  
Vehicle Arresting Systems  
Arrow Panels  
Portable Variable-Message Signs  
Temporary Glare Screens  
Warning Lights  
Aluminum Sign Panels  
Temporary Plywood Sign Panels  
Temporary Rigid Lightweight Sign Panels  
Reflective Sheeting  
Reflectorized Sheeting Sign Characters (Type IV)  
Reflectorized Sheeting Sign Characters (Type V)  
Temporary Wooden Sign Posts  
Stiffeners, Overhead Brackets and Miscellaneous Hardware  
Fiberglass Reinforced Plastic Sign Panels  
Type A Sign Supports  
Type B Sign Supports

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 10,000 lbs 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 1,000 feet 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 10,000 lbs shall display a minimum 2 inch 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 15 inches and 60 inches above the ground. All other construction equipment shall display a minimum 2 inch wide band of reflective sheeting on the front and rear (100 square inches 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 18,000 lb 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.

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 100 feet 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 \textit{ReflectORIZED SheETING Sign Characters (Type V)}. Black sign characters and background shall be non-reflective and shall conform to §730-13 \textit{ReflectORIZED SheETING Sign Characters (Type V)}.

\textit{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. \textit{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 \textit{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.

\textit{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).

\textit{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 \textit{Temporary Wooden Sign Posts}, §730-24 \textit{Type A Sign Supports}, or §730-25 \textit{Type B Sign Supports} as appropriate.

3. \textit{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 \textit{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. \textit{Arrow Panels}. Arrow panels shall be in accordance with §729-15 \textit{Arrow Panels}.

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

K. \textit{Pavement Edge Drop-off Protection}. (None Specified)

L. \textit{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 \textit{Stop/SLOW Paddles}. Red signal flags shall be a minimum of 24 inches x 24 inches. Automated Flagging Assistance Devices shall be in accordance with §729-19 \textit{Automated Flagging Assistance Devices}. Portable traffic signals shall be in accordance with §729-20 \textit{Portable Traffic Signals}.

M. \textit{Maintain Existing Mailboxes}. (None Specified)

N. \textit{Contract Site Patrol}. (None Specified)

619-2.03 \textit{Basic Work Zone Traffic Control (Daily Operations)}. (None Specified)

619-2.04 \textit{Temporary Business Signs}. Temporary business signs shall conform to the MUTCD. Sign panels shall be in accordance with ‘619-2.02H.1. \textit{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.

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 6 inches, measured in the direction of traffic, with sufficient layers of tape such that each finished rumble strip has a thickness of 3/8 inches ± 1/8 inch.

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 4 inches, measured in the direction of traffic, with a thickness of between ¼ inch and ½ inch.

D. Saw-Cut Rumble Strips. Saw-cut rumble strips shall have a width of 4 inches ± ½ inch measured in the direction of traffic. The depressions shall have a rectangular cross section with a depth of 3/8 inches ± 1/8 inch.

E. Milled-in Rumble Strips. Milled-in rumble strips shall have a nominal width of 6 inches measured in the direction of traffic. The depressions shall have a semicircular, concave cross section with a depth of 3/8 inches ± 1/8 inch.

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.


619-2.11 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 3 x 6 inch, having a minimum area of 18 square inches. 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.


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)
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 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 1 inch 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 ½ mile, 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 1 inch 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 500 feet upstream of the BUMP sign in non-urban areas, and 300 feet 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 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

<table>
<thead>
<tr>
<th>Height of Bump (in)</th>
<th>Anticipated Exposure Time (Calendar Days)</th>
<th>Posted Speed ≤ 45 mph</th>
<th>Posted Speed &gt; 45 mph</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 6</td>
<td>≤ 7</td>
<td>6:1</td>
<td>10:1</td>
</tr>
<tr>
<td></td>
<td>&gt; 7</td>
<td>15:1</td>
<td>30:1</td>
</tr>
</tbody>
</table>

**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 of the temporary facility shall match that of the existing facility where practicable. When it is not possible to meet the minimum width of 5 ft. for the entire length of the facility, a 5 ft. by 5 ft. passing space should be provided every 200 ft. 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.

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>
<thead>
<tr>
<th>Posted Speed Limit (mph)</th>
<th>Placement Distance (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Barrier Vehicles</td>
</tr>
<tr>
<td></td>
<td>18,000 lb</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
</tr>
<tr>
<td>&gt; 55</td>
<td>100</td>
</tr>
<tr>
<td>45 - 55</td>
<td>100</td>
</tr>
<tr>
<td>&lt;45</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>Shadow Vehicles</td>
</tr>
<tr>
<td></td>
<td>&gt; 55</td>
</tr>
<tr>
<td></td>
<td>50 - 55</td>
</tr>
<tr>
<td></td>
<td>≤ 45</td>
</tr>
</tbody>
</table>

2. **Shadow Vehicles.** For posted speed limits of 30 mph or higher, the Contractor shall provide shadow vehicles to guide traffic and protect workers conducting mobile or short duration work operations except where the travel lane is closed to traffic by traffic barriers or by channelizing devices., including, but not limited to, pavement marking application, pavement marking removal and sweeping.

When located in an open travel lane of a multilane roadway, the shadow vehicle shall display the flashing arrow panel in the appropriate mode. When located in a travel lane closed by barrier or channelizing devices, on a shoulder, otherwise not in an open travel lane, or on a two-lane, two-way roadway, the arrow panel shall either display the four-corner flashing caution mode or be turned off.

The shadow vehicle shall be moved as necessary to keep pace with the work operations. The placement distance (distance the shadow vehicle is in advance of the first workers or hazard) shall be as shown in Table 619-2 Placement Distance for Barrier/Shadow Vehicles.

When mobile or short duration work operations occupy a long distance of a travel lane not closed to traffic by barrier or channelizing devices, such that traffic may reenter the lane between work operations, the Contractor shall provide additional shadow vehicles for any gaps in the operation of 500 ft or more.

H. **Construction Signs.** The Contractor shall install and maintain construction signs in good condition to adequately and safely inform and direct motorists, bicyclists and pedestrians. Existing and construction signs shall indicate actual roadway conditions, and shall be covered, uncovered, changed, relocated, or removed immediately to reflect current conditions. Construction signs shall be covered or removed when they no longer indicate actual conditions.

The Contractor shall provide measures to protect workers during placement and removal of construction signs adequate for the prevailing speed, volume of traffic and roadway geometry where the work is to occur. Such protection may include, but is not limited to, the use of flaggers, spotters, and shadow vehicles equipped with truck-mounted or trailer mounted attenuators. Where pedestrian access is prohibited, workers shall not cross or enter travel lanes open to traffic.
All signs shall be kept clean, mounted at the required height on acceptable supports, and installed in the proper position, alignment and orientation so as to give maximum visibility. Construction signs will be evaluated for acceptability in accordance with the American Traffic Safety Services Association (ATSSA) Quality Guidelines for Work Zone Traffic Control Devices. When auxiliary panels are mounted above or below a warning or regulatory sign, they shall not cover any part of the warning or regulatory sign. Signs shall be placed so that each sign is visible at night, at the desired distance, without being obscured by another sign, existing features on the highway, or foliage. The faces of stored signs shall not be visible to traffic in any direction, regardless of the orientation of the sign.

1. Sign Panels. Panels shall be flat and shall not be bowed or warped. Panel shapes shall not be altered, such as trimming corners of diamond shaped panels. If insufficient clearance exists, rectangular and/or smaller signs shall be used to obtain proper clearance. Panels with any wrinkling, delamination, or lack of adhesion of the reflective sheeting or legend will be evaluated for acceptability in accordance with the American Traffic Safety Services Association (ATSSA) Quality Guidelines for Work Zone Traffic Control Devices. Signs shall not bear any advertising message or any other message. A nonretroreflective logo or identifying information of the owner may be located on the back of the sign. The logo shall not exceed 1 square foot. The owner information shall not exceed 2 inches in height.

Flexible, or roll-up, sign panels shall only be used for short-term, daytime use. All 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. Fluorescent-orange colored flexible sign panels shall be approved by the Engineer prior to and for the duration of their use.

2. Mounting Temporary Signs. Unless otherwise noted in the contract documents or in the MUTCD, construction signs shall be mounted on a separate support. In cases where construction signs on an existing support will replace or supplement existing sign(s), they shall be mounted in accordance with the Standard Sheet(s). The type of temporary sign supports used shall be selected by the Contractor. Signs that are erected and removed or relocated on a daily basis, or that must be frequently relocated to adjust to the location of construction operations, may be mounted on portable temporary sign supports. If rigid diagonal bracing is used, the high end of the bracing shall face away from approaching traffic. Signs that are to remain at one location may be supported on fixed temporary sign supports.

Supports for construction signs shielded by barrier or guide rail, and located beyond the deflection distance described in Table 619-6 Guide Rail and Temporary Concrete Barrier Standard Deflection Distances are not required to be NCHRP 350 approved.

When not in service, temporary signs mounted on portable temporary sign supports shall be stored in such a manner and location that they do not interfere with or present a hazard to vehicular, bicycle or pedestrian traffic. No signs or supports shall be stored on the traveled way, shoulders or sidewalks during non-working hours. Portable temporary sign supports stored within the clear zone shall be laid flat such that no part of the support is more than 4 inches above the ground. No portable temporary sign supports shall be leaned against or overhang the traffic side of traffic barrier.

All mounting heights are measured from the bottom of the lower sign panel to the nearest edge of pavement or to the ground directly below the sign, whichever results in a higher mounting. Rigid sign panels shall have a minimum mounting height of 5 feet, or a minimum mounting height of 7 feet, where pedestrians or parked vehicles are present. For signs incorporating an auxiliary panel below the primary panel, the minimum mounting heights shall be 4 feet and 6 feet, respectively. For pedestrian regulatory and guide signs the minimum mounting height shall be 4 feet.

Flexible panel and lightweight rigid panel signs shall be mounted at the same height as rigid panel signs, except they may be mounted, when approved by the Engineer, as low as 1 foot when all the following conditions are met:

a. 1. On two-lane, two-way roadways, or;
   2. When signs are placed on the left and right sides of expressways and freeways.

b. Where there will be no parked vehicles to obstruct the view.

c. Where the first warning sign(s) of a work zone warning sign sequence is mounted at a height of 5 feet or higher, and is located in advance of any flexible signs to alert motorists that they are entering a temporary traffic control zone.

d. When the lower mounting height does not adversely affect visibility of the sign by motorists.
3. **Sign Covers.** Covers for unneeded construction and/or permanent signs shall be attached in such a manner to cover the entire sign face including auxiliary panels above or below the main sign panel. The cover shall be firmly attached to the sign in a secure manner using straps, small hand clamps, small brackets or other means to prevent dislodging. Sign covers shall be maintained in good condition to present a neat appearance and minimize distraction to motorists. Damaged covers which are no longer effective shall be promptly replaced.

Sign covers for permanent signs that are in conflict with long term work zone traffic control patterns shall be covered in accordance with §645-3.09 *Covering Signs* and paid for separately.

4. **State Law Signs.** Signs advising motorists of increased fines or license suspension for speeding within the work zone shall be installed in accordance with the contract documents. The LICENSE SUSPENDED AFTER TWO WORK ZONE SPEEDING TICKETS (NYR9-11) or the FINES DOUBLED FOR SPEEDING IN WORK ZONES (NYR9-12) sign shall be posted in advance of work zones not having a reduced regulatory speed limit. The FINES DOUBLED FOR SPEEDING IN WORK ZONES (NYR9-12) sign shall be posted in advance of work zones having a reduced regulatory speed limit. The state law sign shall be installed approximately 1,000 feet upstream of the first construction warning sign on highways with preconstruction posted speed limits equal to or greater than 45 mph and 300-500 feet upstream of the first construction warning sign on highways with preconstruction posted speed limits of less than 45 mph. For contracts with multiple work zones, the state law sign shall be installed at the aforementioned distances upstream of the ROAD WORK NEXT XX MILES (G20-1) sign or at the contract limits and need not be installed prior to each activity area. If any of the individual activity areas have a reduced regulatory speed limit, the FINES DOUBLED FOR SPEEDING IN WORK ZONES shall be used.

5. **Special Use Work Zone Signs.** Special use work zone signs shall be installed in accordance with the contract documents.

Reduced regulatory speed limits in work zones shall be posted in accordance with contract documents with SPEED LIMIT signs (R2-1) supplemented with WORK ZONE plaques (G20-5aP) of the same width mounted above the speed limit signs. The work zone plaques shall be placed on the same post and as the speed limit signs. REDUCED SPEED LIMIT AHEAD sign(s) (W3-5) shall be posted in advance of the first speed limit sign reducing the speed limit in a work zone.

All reduced regulatory speed limit signs shall be installed on both sides of expressways and freeways. When traffic is reduced to a single lane, reduced regulatory speed limit signs should be installed only on the right side of the highway. Reduced regulatory speed limit signs shall be placed within the work zone activity area at a maximum spacing of ½ mile. Reduced regulatory speed limit signs shall be completely covered or removed, and preconstruction posted speed limit signs shall be uncovered or replaced, after a work zone activity area is restored. A work zone plaque shall not be mounted above preconstruction posted speed limit signs within a work zone.

The END WORK ZONE SPEED LIMIT signs (R2-12) or the preconstruction posted speed limit sign (R2-1) shall be posted 100 ft beyond the end of a work zone activity area having a reduced regulatory speed limit. An END HIGHER FINES sign (R2-11) shall be placed 200 feet beyond the END WORK ZONE SPEED LIMIT sign.

Where shown in the contract documents, the Contractor shall install BE PREPARED TO STOP (W3-4) signs to inform oncoming traffic of potential stopped, queued or very slow conditions upstream of advanced warning signs. Multiple signs may be installed and covered for later use. A PVMS may be used for the sign or as a supplement.

Each BE PREPARED TO STOP sign shall be mounted on a temporary sign support, and shall be equipped with a pair of orange warning flags. For approaches on expressways and freeways with three lanes or more, both sides of the approach shall be signed unless the median is too narrow to fit the sign and the support.

The BE PREPARED TO STOP signs shall be posted approximately ½ mile in advance of the anticipated end of the queue. If the end of the queue is beyond the sign, the sign location shall be adjusted for the subsequent work day until the desired advance warning reflects typical conditions for that location. If the resulting adjustment places the sign in advance of the first warning sign, the Contractor shall also
furnish and place a ROAD WORK (W20-1) sign approximately 1,000 feet in advance of the BE PREPARED TO STOP signs.

I. Arrow Panels. The Contractor shall provide, operate and maintain arrow panels, also known as arrow boards, on highways having two or more travel lanes in the same direction, where the posted speed limit is 40 mph or higher, whenever a lane or lanes are closed to traffic and vehicles are required to merge with traffic in adjacent lanes. One arrow panel shall be provided for each lane closed to traffic regardless of the duration. Arrow panels shall be mounted so that the base of the panel is at least 7 feet above the pavement surface. Arrow panels shall be legible continuously from any point within the roadway (inclusive of shoulders) from 1,500 feet in advance of the lane closure taper to the beginning of the lane closure taper. Any arrow panel which cannot provide a sufficiently bright and clearly legible arrow display at any point within the roadway within the above distance shall be immediately repaired or replaced.

Arrow panels shall not be used where they would interfere with the operation of a traffic signal or flasher or where there is an operation controlled by a signal or flagger(s). Arrow panels will not be permitted for alignment changes or lane diversions where the number of through traffic lanes is not reduced, or for any application on two-lane, two-way roadways except in the caution mode.

J. Channelizing Devices. Where construction operations obliterate pavement markings, or otherwise change or disrupt the normal traffic pattern, the Contractor shall use channelizing devices to physically separate traffic from portions of the roadway not available for travel; to separate traffic from hazards adjacent to the roadway; to separate opposing or adjacent travel lanes; to mark the location of hazards within or adjacent to the roadway; and to clearly define the intended travel path for vehicles, bicycles, and pedestrians. Spacing of devices shall be sufficiently close at all times to provide clear and adequate guidance to ensure that vehicles, bicycles, and pedestrians follow the intended travel path. Channelizing device spacing requirements are stated in center-to-center distances.

Channelizing devices shall be maintained upright, at proper spacing, in proper alignment and orientation, and kept clean. Channelizing devices used at night shall be retroreflective. Channelizing devices shall not bear any advertising or other message. A non-retroreflective logo or identifying information of the owner may be located on the back, base or top of channelizing devices where it does not obstruct the face, color, or reflectivity. The logo shall not exceed 1 square foot. The owner information shall not exceed 2 inches in height. The Contractor shall make frequent checks commensurate with traffic conditions to identify and reset channelizing devices dislodged by traffic. Deformed or damaged devices and devices that do not maintain appearance, color, and reflectivity will be evaluated for acceptability in accordance with the American Traffic Safety Services Association (ATSSA) Quality Guidelines for Work Zone Traffic Control Devices. Ballast and/or mailboxes shall not be placed on top of a device or at any point above ground level. Ballast rings may be added to traffic cones, or traffic cones may be doubled, with one cone on top of the other, to serve as ballast.

One Type A flashing warning light shall be installed on the first channelizing device in each series of a nightwork shoulder or travel lane closure. One Type A flashing warning light shall be installed on channelizing devices used to mark the location of hazards in or adjacent to the travel lane, including, but not limited to, pavement discontinuities, drainage structures, excavations, fixed objects, and other obstructions and potential hazards remaining at the end of the work shift. Where the placement of numerous Type A flashing warning lights may present a distraction to motorists, flashing warning lights may be eliminated at intermediate locations such as driveway entrances or intersections.

Cones may be used in work zones where workers are not exposed to traffic, where the cones are placed to protect the work, and the placement does not create a hazard for traffic. In this application, cones are not considered channelizing devices.

Channelizing device application is summarized in Table 619-3A Channelizing Device Application for Short-Term Stationary Work Zones and Table 619-3B Channelizing Device Application for Intermediate-Term and Long-Term Stationary Work Zones. Where permitted, the Contractor may opt to substitute interim tubular markers or Type III construction barricades for other channelizing devices at no additional cost to the State.

1. Tapers. Tapers are defined as a transition area where motorists are redirected out of their normal path to a new path, including the tapered portion of lane closures, lane shifts, transitions, crossovers, ramps, intersections, or interchanges. The Contractor shall use drums, oversized vertical panels, or Type II construction barricades to delineate tapers. The Contractor may also use standard cones, tall cones, extra
tall cones, and vertical panels for short term work zones during daylight hours only. At stationary work zones where workers are exposed to traffic and the posted speed limit is 40 mph or more, the spacing between channelizing devices shall not exceed 40 feet. Where the posted speed limit is less than 40 mph, the spacing between channelizing devices shall not exceed 20 feet.

2. Traveled Way (Including Lane and Shoulder Closures). The Contractor shall use drums, tall cones, extra tall cones, vertical panels, oversized vertical panels, or Type II construction barricades to delineate the traveled way. The Contractor may also use standard cones and vertical panels for short term work zones during daylight hours only. At stationary work zones, where no workers are exposed to traffic or no workers are present, the spacing between channelizing devices shall not exceed 80 feet. At stationary work zones, where workers are exposed to traffic, the spacing between channelizing devices shall not exceed 40 feet. Where necessary to permit ingress or egress by construction vehicles, wider gaps may be provided between channelizing devices, not to exceed the deletion of every fifth device.

At expressway gores, the Contractor shall use drums, tall cones, extra tall cones, oversized vertical panels, or Type II construction barricades. The Contractor may also use standard cones and vertical panels for short term work zones (during daytime hours) only. The Contractor may opt to substitute Type III construction barricades except in locations where they restrict driver vision. The spacing between channelizing devices shall not exceed 20 feet.

At transverse bumps and other hazards on roadways where the posted speed limit is 40 mph or less, the Contractor shall use drums, extra tall cones or oversized vertical panels.

Along lane or shoulder closures, where traffic will be traveling adjacent to the closures, two channelizing devices consisting of tall cones, extra tall cones, drums, vertical panels, oversized vertical panels or Type II construction barricades shall be placed transversely across each closed lane and shoulder at maximum 800 feet intervals except in locations where it would interfere with milling, paving or other ongoing work, to discourage traffic from driving through the closed lane. The Contractor may also use standard cones for short term work zones (during daytime hours) only. The Contractor may opt to substitute one Type III construction barricade for two transverse devices. These transverse devices may be relocated or adjusted as necessary to permit passage of construction vehicles.

3. Roadway or Pavement Edge. The Contractor shall use drums, tall cones, extra tall cones, vertical panels, oversized vertical panels, or Type II construction barricades where the work introduces or exposes hazards within the roadway or at the outside edge of the roadway, and pavement edge markings or permanent delineators are not installed. The Contractor may opt to substitute Type III construction barricades. The spacing between channelizing devices shall not exceed 200 feet. If barrier is within 4 feet of the nearest travel lane, barrier delineation at a spacing not exceed 20 feet may be provided in place of channelizing devices.

4. Roadway Intersections and Commercial Driveway Radii. The Contractor shall use drums, or extra tall cones to delineate roadway intersections and commercial driveways. The Contractor may also use standard cones, tall cones, and temporary tubular markers for short term work zones during daylight hours only. The spacing between channelizing devices shall not exceed 6 feet. Reduced spacing near roadway intersections and commercial driveways may be necessary to provide clear guidance. Vertical panels, oversized vertical panels, Type II barricades and Type III barricades shall not be used.

A non-signalized intersecting roadway shall be delineated by a new series of channelizing devices, and the series will start with one drum equipped with a Type A flashing warning light, placed along the primary roadway after the intersection.

5. Residential Driveway Radii. The Contractor shall use drums, or extra tall cones to delineate residential driveways. The Contractor may also use standard cones, tall cones, and temporary tubular markers for short term work zones during daylight hours only. The spacing between channelizing devices shall not exceed 6 feet. Reduced spacing near residential driveways may be necessary to provide clear guidance. Vertical panels, oversized vertical panels, Type II barricades and Type III barricades shall not be used.
6. **Removed Existing Guide Rail or Median Barrier.** The Contractor shall use drums, tall cones, extra tall cones, temporary tubular markers, vertical panels, oversized vertical panels, Type II construction barricades, Type III construction barricades to delineate the edge of the shoulder or median in locations where guide rail or median barrier was removed. The spacing between channelizing devices shall not exceed 80 feet where the shoulder width is 4 feet or greater, and shall not exceed 40 feet where the shoulder width is less than 4 feet. A minimum of three devices shall be provided for each individual run of guide rail or median barrier that has been removed.

7. **Placing, Maintaining and Removing Channelizing Devices.** The Contractor shall take all necessary precautions to protect the public and workers during the placement, maintenance, and removal of channelizing devices. Warning signs shall be in place in advance of and prior to the start of channelizing device placement, and shall remain in place until after the channelizing devices have been removed.

   Channelizing devices shall be set up and removed by properly trained worker(s). The Contractor shall protect workers during placement and removal of channelizing devices, using measures adequate for the prevailing speed, volume of traffic and roadway geometry where the work is to occur. Protection shall include the use of automatic devices or from protected areas of a vehicle where practicable. Such protection may include, but is not limited to, the use of cone-setting equipment, cone baskets mounted on work vehicles, flaggers, spotters, and shadow vehicles equipped with impact attenuators. Workers placing or removing traffic control channelizing devices onto/from the roadway from the back or side of a moving vehicle shall be protected by a fall restraint system consisting of side racks, harness and lanyard and/or cone basket so that a worker cannot fall off the vehicle and strike the pavement. Workers shall be seated in seats having seatbelts on moving work vehicles when not in the process of placing or removing channelizing devices.

   A shadow vehicle shall protect the channelizing device placement or removal operation on multi-lane highways, or a vehicle with a side or front cone basket shall meet the requirements of a shadow vehicle. Vehicles with front mounted cone baskets shall be used only on expressways and freeways traveling in the same direction as traffic.
### TABLE 619-3A CHANNELIZING DEVICE APPLICATION FOR SHORT-TERM STATIONARY WORK ZONES

**Work Zone Provisions**

Short-Term Stationary Work Zones involve daytime work that occupies a location for more than one hour and up to a single daylight period.

<table>
<thead>
<tr>
<th>Work Zone Provisions</th>
<th>Channelizing Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Device Spacing (center to center)</td>
<td></td>
</tr>
<tr>
<td>Shoulder/Merging/Shifting Tapers</td>
<td></td>
</tr>
<tr>
<td>&lt; 40 mph</td>
<td>20 ft. X X X X X X X</td>
</tr>
<tr>
<td>≥ 40 mph</td>
<td>40 ft. X X X X X X X</td>
</tr>
<tr>
<td>One-Lane Taper for Alternating Two-Way Traffic</td>
<td>20 ft. X X X X X X X</td>
</tr>
<tr>
<td>Longitudinal Lane or Shoulder Closure w/Workers</td>
<td>40 ft. X X X X X X X</td>
</tr>
<tr>
<td>Longitudinal Lane or Shoulder Closure w/No Workers</td>
<td>80 ft. X X X X X X X</td>
</tr>
<tr>
<td>Freeway / Expressway Gores</td>
<td>20 ft. X X X X X X X</td>
</tr>
<tr>
<td>Marking for Transverse Bumps †</td>
<td>N/A X X X X X X X</td>
</tr>
<tr>
<td>Transverse Device within Closed Traffic Lane and/or</td>
<td>800 ft. X X X X X X X</td>
</tr>
<tr>
<td>Roadway edge exposed with no Edgeline or Permanent</td>
<td>200 ft. X X X X X X X</td>
</tr>
<tr>
<td>Delineators</td>
<td></td>
</tr>
<tr>
<td>Roadway Intersection or Commercial Driveway Radii</td>
<td>6 ft. X X X X X X X</td>
</tr>
<tr>
<td>Residential Driveway Radii</td>
<td>6 ft. X X X X X X X</td>
</tr>
<tr>
<td>Removal of existing guide rail</td>
<td>Shoulder width ≥ 4 ft. 80 ft. X X X X X X X</td>
</tr>
<tr>
<td></td>
<td>Shoulder width &lt; 4 ft. 40 ft. X X X X X X X</td>
</tr>
<tr>
<td>Pavement Drop offs &gt; 2 in. and &lt; 24 in.</td>
<td>See Table 619-4</td>
</tr>
<tr>
<td>Drop off ≥ 24 in. within 10 ft. of active travel way;</td>
<td></td>
</tr>
<tr>
<td>Posted speed ≤ 45 mph; Drop off Length ≤ 100 ft.;</td>
<td>20 ft. X X X X X X X</td>
</tr>
<tr>
<td>Not to last longer than 1 work shift</td>
<td></td>
</tr>
<tr>
<td>Closed Roads</td>
<td>N/A N/A X</td>
</tr>
<tr>
<td>Closed Sidewalks</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**  
X = Allowed  Blank = Not Allowed  O = Optional at Contractor's expense  
1 - A Type 1 Object Marker may be used in lieu of channelizing device  
2 - Channelizing devices shall be equipped with a flashing warning light
### TABLE 619-3B CHANNELIZING DEVICE APPLICATION FOR INTERMEDIATE-TERM AND LONG-TERM STATIONARY WORK ZONES

<table>
<thead>
<tr>
<th>Work Zone Provisions</th>
<th>Channelizing Device</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maximum Device Spacing (center to center)</strong></td>
<td>Drum</td>
</tr>
<tr>
<td>Intermediate-term and Long-Term Stationary Work Zones involve work that occupies a</td>
<td></td>
</tr>
<tr>
<td>location for more than 1 daylight period or nighttime work that occupies a location</td>
<td></td>
</tr>
<tr>
<td>for more than 1 hour</td>
<td></td>
</tr>
<tr>
<td>Shoulder/Merging/Shifting Tapers &lt;40 mph 20 ft. X X X</td>
<td></td>
</tr>
<tr>
<td>≥ 40 mph 40 ft. X X X</td>
<td></td>
</tr>
<tr>
<td>One-Lane Taper for Alternating Two-Way Traffic 20 ft. X X X</td>
<td></td>
</tr>
<tr>
<td>Longitudinal Lane or Shoulder Closure w/Workers 40 ft. X X X</td>
<td></td>
</tr>
<tr>
<td>Longitudinal Lane or Shoulder Closure w/No Workers 80 ft. X X X</td>
<td></td>
</tr>
<tr>
<td>Freeway / Expressway Gores 20 ft. X X X O</td>
<td></td>
</tr>
<tr>
<td>Marking for Transverse Bumps 1</td>
<td></td>
</tr>
<tr>
<td>Transverse Device within Closed Traffic Lane and/or</td>
<td></td>
</tr>
<tr>
<td>Roadway edge exposed with no Edgeline or Permanent Delineators 200 ft. X X X X X X O</td>
<td></td>
</tr>
<tr>
<td>Roadway Intersection or Commercial Driveway Radii 6 ft. X X X</td>
<td></td>
</tr>
<tr>
<td>Residential Driveway Radii 6 ft. X X</td>
<td></td>
</tr>
<tr>
<td>Removal of existing guide rail shoulder width ≥ 4 80 ft. X X X X X X O</td>
<td></td>
</tr>
<tr>
<td>shoulder width &lt; 4 40 ft. X X X X X O</td>
<td></td>
</tr>
<tr>
<td>Pavement Drop offs &gt; 2 in. and &lt; 24 in. See Table 619-4</td>
<td></td>
</tr>
<tr>
<td>Drop off ≥ 24 in. within 10 ft. of active travel way;</td>
<td></td>
</tr>
<tr>
<td>Posted speed ≤ 45 mph; Drop off Length ≤ 100 ft.; Not to last longer than 1 work</td>
<td></td>
</tr>
<tr>
<td>shift</td>
<td></td>
</tr>
<tr>
<td>Two-Lane Two-Way Operations on expressways and freeways at along curves 20 ft. X X O</td>
<td></td>
</tr>
<tr>
<td>along tangents 40 ft. X X X</td>
<td></td>
</tr>
<tr>
<td>Two-Lane Two-Way Operations on expressways and freeways between Crossovers 40 ft. X</td>
<td></td>
</tr>
<tr>
<td>X X X X X</td>
<td></td>
</tr>
<tr>
<td>Closed Roads N/A</td>
<td></td>
</tr>
<tr>
<td>Closed Sidewalks N/A</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**  
X = Allowed  Blank = Not Allowed  O = Optional at Contractor's expense  
1 - A Type 1 Object Marker may be used in lieu of channelizing device.  
2 - Channelizing devices shall be equipped with a flashing warning light.

**K. Pavement Edge Drop-Off Protection.** A drop-off is an abrupt difference in surface elevation of more than 2 inches at approximately 1V:3H or steeper. In the absence of adequate Traffic Control Plans in the contract documents, the Contractor shall submit alternate Traffic Control Plans to the Engineer for approval at least 30 calendar days prior to proposed work which will create a drop-off of over 24 inches within 10 feet from the edge of the traveled way for durations longer than one shift.
The Contractor shall provide pavement edge drop-off protection in accordance with Table 619-4 Pavement Edge Drop-Off Protection. Channelizing devices used to mark drop-offs shall be placed, as practicable, to not reduce the available travel lane width, at the elevation of the open travel lane in order to provide maximum target value and visibility for motorists.

A drop-off of greater than 24 inches within 10 feet from the edge of the traveled way to remain at the end of the work shift shall be separated from traffic with temporary or permanent barrier. For posted speed limit of 45 mph and less, a drop-off of greater than 24 inches within 10 feet from the edge of the traveled way that is 100 feet or less in length will be allowed with channelizing devices consisting of drums, extra tall cones or oversized vertical panels only at a maximum spacing of 20 feet for short durations not to exceed one work shift.

Unless otherwise noted in the contract documents, the Contractor shall begin work to eliminate unprotected drop-offs created by contract work within 7 calendar days of the completion of the work creating the drop-off. Work shall continue in a timely manner until such time as the unprotected drop-off condition is eliminated.

Where pavement edge lines are not provided, channelizing devices shall be preceded by a NO SHOULDER (W8-23) sign, repeated at all ramps and roadway intersections. Signs shall be repeated every ½ mile and supplemented with a NEXT [X] MILES (W7-3aP) plaque where applicable.

Where pavement edge lines are provided, channelizing devices shall be preceded by SHOULDER DROP-OFF (W8-17) signs, repeated at all ramps and roadway intersections. Signing shall be repeated every ½ mile and supplemented with NEXT [X] MILES (W7-3aP) plaque where applicable.

### Table 619-4 Pavement Edge Drop-Off Protection

<table>
<thead>
<tr>
<th>Drop-Off Height</th>
<th>Edge Line Pavement Markings</th>
<th>Drum Spacing (feet)</th>
<th>Vertical Panel Spacing (feet)</th>
<th>Tubular Marker Spacing (feet)</th>
<th>Tall Cone Spacing (feet)</th>
<th>Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DROP-OFF AT OR WITHIN SHOULDER AREA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within 4 ft. from Travel Lane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 – 6 in.</td>
<td>Yes</td>
<td>100</td>
<td>100</td>
<td>N/A</td>
<td>N/A</td>
<td>Shoulder Drop-off</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>40</td>
<td>40</td>
<td>N/A</td>
<td>N/A</td>
<td>No Shoulder</td>
</tr>
<tr>
<td>6 - 24 in.</td>
<td>Yes</td>
<td>40</td>
<td>40</td>
<td>N/A</td>
<td>N/A</td>
<td>Shoulder Drop-off</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>20</td>
<td>20</td>
<td>N/A</td>
<td>N/A</td>
<td>No Shoulder</td>
</tr>
<tr>
<td>More than 4 ft. from Travel Lane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 – 6 in.</td>
<td>Yes</td>
<td>200</td>
<td>200</td>
<td>100</td>
<td>100</td>
<td>Shoulder Drop-off</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>100</td>
<td>100</td>
<td>40</td>
<td>40</td>
<td>No Shoulder</td>
</tr>
<tr>
<td>6 - 24 in.</td>
<td>Yes</td>
<td>40</td>
<td>40</td>
<td>N/A</td>
<td>N/A</td>
<td>Shoulder Drop-off</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>40</td>
<td>40</td>
<td>N/A</td>
<td>N/A</td>
<td>No Shoulder</td>
</tr>
<tr>
<td><strong>DROP-OFF OUTSIDE OF SHOULDER EDGE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shoulder width ≤ 4 ft.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 – 6 in.</td>
<td>Yes</td>
<td>100</td>
<td>100</td>
<td>N/A</td>
<td>N/A</td>
<td>Shoulder Drop-off</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>100</td>
<td>100</td>
<td>N/A</td>
<td>N/A</td>
<td>No Shoulder</td>
</tr>
<tr>
<td>6 - 24 in.</td>
<td>Yes</td>
<td>40</td>
<td>40</td>
<td>N/A</td>
<td>N/A</td>
<td>Shoulder Drop-off</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>40</td>
<td>40</td>
<td>N/A</td>
<td>N/A</td>
<td>No Shoulder</td>
</tr>
<tr>
<td>Shoulder width &gt; 4 ft.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 – 6 in.</td>
<td>Yes</td>
<td>200</td>
<td>200</td>
<td>100</td>
<td>100</td>
<td>Shoulder Drop-off</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>100</td>
<td>100</td>
<td>40</td>
<td>40</td>
<td>No Shoulder</td>
</tr>
<tr>
<td>6 - 24 in.</td>
<td>Yes</td>
<td>100</td>
<td>100</td>
<td>40</td>
<td>40</td>
<td>Shoulder Drop-off</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>40</td>
<td>40</td>
<td>N/A</td>
<td>N/A</td>
<td>No Shoulder</td>
</tr>
</tbody>
</table>

**L. Flagging and Traffic Control.** The Contractor shall provide an adequate number of competent flaggers to control traffic when it is necessary to maintain alternating one-way traffic in one lane of a two-lane, two-way roadway, and at all other locations where construction operations, construction vehicles and equipment, and
temporary traffic patterns related to the construction operations require positive temporary traffic control for safe, efficient traffic operations. These locations include, but are not limited to, locations where construction traffic enters, exits, or crosses open traffic lanes, locations of temporary stoppage of traffic for work operations, rail crossings, locations requiring slowing of traffic adjacent to work operations, on-ramps with restricted site distance, pedestrian crossings, intersections, and other locations where traffic needs to be alerted to unexpected conditions ahead.

Multiple lane approaches shall be reduced to a single lane prior to a flagger station. Automated flagger assistance devices (AFAD), portable traffic signals, and temporary traffic signals used to control traffic at the Contractor’s option in lieu of flaggers shall be at no additional expense to the State.

1. **Flagger Training.** All flaggers shall be adequately trained in flagging operations by recognized training programs, including the American Traffic Safety Services Association, the National Safety Council, unions, or construction industry associations, or by an individual who holds a current certification as a flagger training instructor from such a program. Prior to the start of flagging operations, the Contractor shall provide to the Engineer a list of certified flaggers to be used in the operation, identifying the source of flagger training for each individual. When requested by the Engineer, flaggers shall demonstrate their competency in flagging procedures. Flaggers not competent in flagging procedures shall be retrained or replaced at once.

2. **Flagger Equipment.** Flaggers shall wear orange protective helmets and traffic control apparel in accordance with "107-05A. High Visibility Apparel." Flaggers shall be appropriately dressed, including apparel that covers the legs, torso and arms with sleeves a minimum of 4 inches long and appropriate footwear. Immodest or sloppy dress will not be permitted. Flaggers shall be equipped with an emergency air horn to alert workers of errant vehicles or other dangerous situations. Where flaggers are not within sight of each other, each flagger shall be equipped with a communication device, such as portable phone or two-way radio. The communication device shall only be used to communicate with other flaggers, other workers, or supervisor(s) regarding the flagging operations. Where the distance between flaggers is more than ½ mile or where shown in the contract documents, the Contractor shall use pilot cars to lead lines of vehicles through the work zone.

   The standard signaling device for flagging operations, where one or more flaggers are controlling a single stream of traffic or two alternating streams of traffic in opposite directions, shall be STOP/SLOW signal paddles. Red signal flags may be used where display of the STOP and SLOW faces in opposite directions may be inappropriate or misleading.

3. **Operational Control.** Flaggers shall be located in a position clearly visible to, but not in the path of, approaching traffic, with an available escape path to avoid an oncoming errant vehicle. The number of flaggers to be furnished for each operation shall be sufficient to provide safe, efficient flow of vehicle and pedestrian traffic. A spotter is not a flagger, and shall only direct construction vehicles or equipment, and shall not direct traffic in any manner.

   Work zones utilizing flaggers shall comply with the Standard Sheet for flagger operation and a Flagger symbol (W20-7) sign shall be provided in advance of each flagger.

   For control of alternating one-way traffic, one flagger shall be provided at each end of the one-way section, with additional flaggers provided to control traffic entering the one-way section from intermediate intersections and major commercial driveways. Where the length of the one-way section is less than 150 feet, the posted speed limit is less than 40 mph, traffic volumes are such that queues do not develop, and sight distances are adequate, the Contractor may request approval from the Engineer to use a single flagger.

   For intersection control, at least one flagger shall be provided for each intersection approach. Where traffic speeds and/or volumes are unusually low, and adequate sight distance is available, such that safe operations can be ensured with fewer flaggers, the Contractor may request approval from the Engineer to use fewer flaggers. When flagging at an intersection with a traffic signal, the signal shall be turned off unless directed otherwise by the Engineer.

   The Contractor shall provide enhanced flagger stations consisting of a Flag Tree (6F.57) and additional cones at all approaches to flaggers, in accordance with the Standard Sheet, in order to provide effective advanced warning to motorists. Flag Trees shall display a minimum of 3 orange warning flags, with the flags mounted such that the lowest corners of the flags are at a minimum height of 8 feet. On roadways
with posted speed limits less than 40 mph, in locations having obstructed traffic flow, such as those having controlled intersections along the approach or approaches, where conditions do not permit placing the devices in a manner that will provide effective advanced warning to motorists, enhanced flagger stations need not be provided.

Flaggers shall be alert at all times, and shall not stand with their backs to approaching traffic. Flaggers shall only direct traffic to stop, to slow or to proceed, using hand signals to supplement the signaling device in accordance with the flagging procedures shown in the MUTCD. Flaggers shall be provided periodic breaks (minimum 15 minutes every 4 hours) throughout the work day, with competent substitutes provided during breaks to maintain continuous coverage of the flagging operation.

A spotter shall be provided at all locations where construction vehicles or equipment must back across or into open travel lanes, sidewalks, or pedestrian walkways. A spotter shall only direct construction vehicles or equipment, and shall not direct traffic in any manner.

For ongoing flagging operations at a specific location, the Contractor may request approval from the Engineer to substitute portable traffic signals in lieu of flaggers.

**4. Automated Flagging Assistance Devices (AFAD).** AFADs are devices to control traffic through work zones remotely by a single flagger at a central location or at one end of the work zone.

A minimum of 7 calendar days prior to initial deployment of the AFAD system, the Contractor shall submit a traffic control plan to the Engineer, for review and approval, detailing AFAD operation including a list of competent flaggers trained to operate the AFAD. AFADs shall be used only on two-lane two-way or single lane one-way roadways. AFADs shall not be used where there are intersections and/or commercial driveways or where construction operations within the controlled highway segment frequently disrupt traffic flow. Appropriate flagger apparel and equipment shall be maintained near each AFAD to facilitate flagging in the event of a malfunction or operational need due to frequent disruptions of traffic flow. The Contractor shall immediately provide traffic control with flaggers if a AFAD malfunctions; fails to properly or adequately control traffic; creates congestion, queues or gridlock which cannot be remedied by timely on-site adjustments to the signal operation; or is otherwise inadequate.

A competent flagger, who has been trained on the operation of the AFAD, shall operate and not leave the AFAD(s) unattended at any time. The flagger shall have an unobstructed view of the AFAD(s) and approaching traffic in both directions at all times. The distance between AFADs shall not exceed ½ mile. Work zones utilizing AFADs shall comply with the Standard Sheet for flagger operation on a 2-lane 2-way roadway, where the AFAD is used in lieu of a flagger and a BE PREPARED TO STOP sign (W3-4) is to be used in lieu of the Flagger symbol sign. Red/Yellow lens AFAD shall have a STOP HERE ON RED (R10-6) sign installed on the right-hand shoulder at least 8 ft in advance of the AFAD where vehicles are expected to stop.

A portable traffic signal may be used, at the Contractor’s option, as an AFAD. A Signal Ahead symbol (W3-3) sign shall replace the Flagger symbol sign. An 18 inch wide removable stop line with a STOP HERE ON RED (R10-6) sign shall be installed at intended stopping point. The Engineer may waive the requirement for a stop line if the roadway is unpaved or it is otherwise impractical to install a stop line and the STOP HERE ON RED sign is in place.

When the work no longer necessitates use of the AFAD or portable traffic signal, the units shall be removed or turned off and moved out of view from the traveled way.

**M. Maintain Existing Mailboxes.** The Contractor shall not move any mailbox which contains mail. The Contractor will advise the owner to remove mail before the box is moved. Mailboxes shall be mounted, either permanently or temporarily, on a post. Before acceptance of the work, any mailbox which has been disturbed or moved shall be restored by the Contractor at a location consistent with the requirements of the U.S. Postal Service and the contract documents.

**N. Contract Site Patrol.** The Contractor shall provide adequate personnel and supervision to conduct operations and patrol the contract site to ensure that conditions are adequate for public safety and convenience at all times. The Contractor shall patrol the site as often as necessary during working and non-working hours to adjust and maintain signs, channelizing devices, and other traffic control devices and safety features.
619-3.03 Basic Work Zone Traffic Control (Daily Operations). The Contractor shall control traffic in accordance with §619-3.02 Basic Work Zone Traffic Control paragraphs A. Surface Condition; C. Maintain Public Access; D. Maintain Existing Roadside Signs; F. Construction Vehicles; G. Barrier/Shadow Vehicles; H. Construction Signs; I. Arrow Panels; J. Channelizing Devices; L. Flagging; M. Maintaining Existing Mailboxes; and O. Portable Traffic Signals so that a person who has no knowledge of conditions may safely and with a minimum of discomfort and inconvenience drive, ride, or walk, during the day or at night, over all or any portion of the highway and/or structure under construction where traffic is to be maintained. The Contractor will not be required to repair or maintain the roadway except to repair any damages resulting from its operations.

The Contractor shall cease operations and clear the traveled way, shoulders, and clear zones of all obstructions including traffic control devices, construction equipment, and materials at the end of each work shift.

619-3.04 Temporary Business Signs. The Contractor shall provide temporary business signs (NYI8-4) mounted on temporary sign supports to identify business entrances in accordance with the contract documents. Entrances shall be identified by only a single sign. Temporary business signs shall be mounted at a minimum height of 7 feet, and at a location that will guide traffic seeking access to the business, but where they will not interfere with traffic flow or other traffic control devices.

619-3.05 Covering or Removal of Pavement Markings. The Contractor shall remove or cover existing permanent pavement markings and interim pavement markings, when indicated in the contract documents or directed by the Engineer, to accommodate traffic pattern changes by covering the markings with preformed removable pavement marking masking tape, or by removing the markings. Masking tape shall be placed in blocks to prevent the underlying shape of pavement marking symbols or letters from being confused with existing markings.

A. Removal of Pavement Markings. The removal method will be at the Contractor’s option, subject to its ability to achieve satisfactory results. Removal shall be completed prior to the installation of temporary pavement markings or interim pavement markings. Grinding to remove pavement markings will typically remove 1/8 to ¼ inch of pavement surface. Prior to installation, the existing marking and adjacent pavement shall be cleaned of debris by compressed air or sweeping.

B. Masking Pavement Markings. Removable pavement marking masking tape shall be installed in accordance with the manufacturer’s written instructions. Prior to installation, the existing pavement marking and adjacent pavement shall be cleaned by compressed air, sweeping, or other means adequate to remove debris, but that does not result in damage to the existing pavement marking. The width of the removable pavement marking masking tape shall be sufficient to completely cover the existing pavement marking.

The masking tape shall firmly adhere to the entire length and width of the existing pavement marking to be covered. The Contractor shall maintain the tape for the duration of its use. Any tape that is loosened, removed, or that fails to retain its original matte finish, or that for any other reason fails to obliterate the existing pavement marking shall be replaced immediately, at no additional expense to the State.

When the covered pavement markings are to be restored to service, masking tape shall be removed. Temporary adhesive residues will be allowed to remain, providing that the existing pavement marking visibility is not impaired.

Any damage to the existing pavement markings or to the pavement surface that results from the removal of the masking tape shall be repaired at no additional cost to the State. If the existing marking cannot be repaired satisfactorily, the Contractor shall remove damaged pavement markings completely and/or replace the pavement section at no additional cost to the State.

619-3.06 Temporary Pavement Markings. The Contractor shall install and maintain temporary pavement markings in accordance with the contract documents, using patterns and colors shown in the MUTCD to establish temporary traffic pattern(s) during construction on any pavement, including milled or grooved surface, resurfaced, new pavement, or other paved surface without pavement markings, for a maximum of 14 calendar days. Within 14 calendar days after placement, the Contractor shall either (1) install the succeeding pavement course or (2) install the remaining pavement markings including edge lines, stop bars, and simple crosswalks, with no hatching. Pavements which will be open to traffic shall be properly marked before being opened, before nightfall, or before the end of the work day, whichever is soonest, except areas that are open during the work shift and delineated with
channelizing devices or flaggers. Traffic paint need not be removed before placing a subsequent course. Removable
pavement tape, removable wet-night reflective tape, temporary overlay markers and removable raised pavement
markers shall be removed before placing a subsequent course. No additional payment will be made for removal of
temporary pavement markings.

Temporary pavement marking stripes shall be 4 inches in width. Temporary pavement markings shall be
applied to a clean, dry pavement in accordance with the manufacturer’s recommendations. Temporary pavement
markings on roadways open to traffic shall be applied in the direction of traffic. Hatch lines and symbols will not be
required as temporary pavement markings unless required by the contract documents.

Traffic paint pavement markings shall be applied at a minimum wet film thickness of 20 mil, immediately
followed by an application of glass beads, at a rate of 6 lb/gal of paint.

Where specified, removable raised pavement markers shall be used to supplement line pavement markings.
The raised markers shall not be a substitute for line pavement markings, letters or symbols. Removable raised
pavement markers spaced every 5 feet may be used to supplement line pavement markings. Two removable raised
pavement markers spaced at each end of the 2 foot marking may be used to supplement a 2 foot broken line
pavement marking.

If unanticipated weather or other conditions prevent the application of temporary pavement markings, the
Contractor shall apply 2 foot removable pavement tape markings or temporary overlay markers at 40 foot spaces at
no additional cost to the State, for a maximum of 3 days until such time as temporary pavement markings may be
applied, or the next pavement course is installed.

A. Divided Highways. On freeways, expressways and parkways, the Contractor shall install broken lines a
minimum of 2 feet long at 40 foot spacing to separate traffic lanes in the same direction. The Contractor shall
install solid edge lines for a minimum of 100 feet on either side of the apex of a gore.

B. Undivided Multilane Highways. On three or more lane highways, and two or more lane highways with
center two way left turn lanes, the Contractor shall install white broken lines a minimum of 2 feet long at 40
foot spacing to separate traffic flows in the same direction, and partial barrier or full barrier centerline to
separate traffic flows in opposite directions.

C. Two-Lane, Two-Way Highways. For two-lane, two-way highways, the Contractor shall install a
temporary pavement markings consisting of full barrier centerline markings in no passing zones and 2 foot
broken line markings at 40 foot spacing in passing zones.

Two-lane, two-way highways may for a maximum of 3 days have the centerline marked with yellow 2 foot
by 4 inch removable pavement tape or yellow temporary overlay markers at 40 foot spaces with NO CENTER
STRIPE (W8-12) signs and DO NOT PASS (R4-1) signs at no additional cost to the State. A NO CENTER
STRIPE sign shall be installed in advance of the area marked with yellow 2 foot removable pavement tape
markings or temporary overlay markers, as well as after major intersections and after major traffic generators
within the area marked with the removable pavement tape markings or temporary overlay markings. A DO
NOT PASS sign shall be installed within 100 feet of the beginning of the area with the removable pavement
tape markings or temporary overlay markers, and a second DO NOT PASS sign shall be installed within 1,100
feet of the first DO NOT PASS sign and subsequent DO NOT PASS sign(s) shall not exceed 3,000 feet
spacing. On an approach without centerline pavement markings where passing will not be permitted, a black
on orange NO PASSING ZONE (W14-3) pennant shaped sign shall be installed on that approach. Full barrier,
partial barrier or broken line temporary centerline pavement markings shall be placed within three calendar
days.

619-3.07 Interim Pavement Markings. The Contractor shall install and maintain interim pavement markings
in accordance with the contract documents, to establish a construction traffic pattern or diversion during a
construction phase or season, for a maximum of one year. After a winter season, interim pavement markings which
are illegible shall be reapplied, if necessary, and for which additional payment will be made. Interim pavement
marking stripes shall be 4 inches or 6 inches in width, to match preconstruction conditions. Epoxy pavement
markings should not be applied to existing pavement that will not be replaced or overlaid, in order to prevent
conflicting and/or confusing guidance to motorists. Any marking material that fails to provide both satisfactory
daytime and nighttime visibility upon installation shall be replaced by the Contractor at no additional cost to the
State.
A. **Installation.** Interim pavement markings shall be applied to a clean, dry pavement in accordance with the manufacturer’s recommendations. Interim pavement markings on roadways open to traffic shall be applied in the direction of traffic. Traffic paint and epoxy paint pavement markings shall be applied at a minimum wet film thickness of 20 mils, immediately followed by an application of glass beads at a rate of 6 lb/gal of paint.

Painted markings may be supplemented with removable raised pavement markers. Removable raised pavement markers shall be spaced at 5 feet to supplement a solid line, and 4 markers spaced shall be used to supplement a 10 foot segment of broken line. When used to supplement a solid or broken line, markers shall be spaced a maximum of 80 feet on tangents and a maximum of 40 feet for curves with a radius less than 2,800 feet. Removable raised pavement markers shall not be used alone to simulate interim pavement markings.

B. **Maintenance/Replacement.** Traffic paint or removable tape shall be replaced upon (1) abrasion of the line such that more than 10 percent of the underlying pavement is visible within any 300 feet segment of line or (2) loss of more than 2 consecutive skip lines or (3) loss of more than 50 feet of continuous line or (4) failure of any line to be clearly visible at night under low-beam headlamp illumination when viewed from a distance of 200 feet.

Missing removable raised pavement markers shall be replaced upon (1) loss of more than 10 percent of the markers within a 300 feet long segment of line or (2) loss of more than 3 consecutive markers or (3) failure of any line to be clearly visible at night under low-beam headlamp illumination when viewed from a distance of 200 feet.

The Contractor will not be responsible for damage or loss caused by snowplowing. In the event that such pavement markings are damaged or lost, the Engineer will determine whether to replace the lost pavement markings in kind or with other marking materials. Separate payment will be made for pavement markings replaced, or installed due to damage or loss caused by snowplowing.

**619-3.08 Temporary Rumble Strips.** The Contractor shall install temporary rumble strips in three sets of 6-stripe patterns with 10 foot between individual strips. The type of strip installed will be at the Contractor’s option, except that sawcut or milled-in strips shall not be installed on new top course surfaces or existing surfaces that will not be paved over. Where there is nousable shoulder, or the shoulder is less than 3 feet wide, the rumble strips should be ended 3 feet short of the edge of usable pavement. On curved roadways, rumble strips should end a minimum of 3 feet from the curb in order not to interfere with drainage. Rumble strips shall typically be placed in advance of each of the last three long-term advance warning signs such that drivers are alerted in time to see and read the signs. Rumble strips will typically be installed for a minimum of one week.

A. **Raised Asphalt Rumble Strips.** The roadway surface on which the rumble strips are to be attached shall be dry, free of surface contaminants such as dust or oil, and thoroughly swept with a stiff broom. The surface temperature of the pavement shall be 45°F or greater unless otherwise authorized by the Engineer. The pavement surface shall be cleaned with compressed air just prior to tack coating and subsequent installation of the rumble strips. The strips shall be formed using a rumble strip paver (drag box) pulled transversely across the pavement, or by hand placement between forms fixed to the pavement. If forms are used, they shall be removed prior to compaction of the asphalt mixture. Compaction shall be accomplished using a plate tamper or a static roller. Raised asphalt rumble strips shall have a width of 6 to 9 inches, measured in the direction of traffic, and have a final compacted thickness of 3/8 inch ± 1/8 inch.

B. **Raised Removable Tape Rumble Strips.** Raised removable tape rumble strips shall be formed by applying one or more layers of removable preformed pavement marking masking tape. The tape shall be applied to a clean, dry pavement surface in accordance with the manufacturer’s recommendations. The pavement surface shall be swept or cleaned with compressed air just prior to application of the tape.

C. **Raised, Preformed Rumble Strips.** Raised preformed rumble strips shall be applied to a clean, dry pavement surface in accordance with the manufacturer’s recommendations. The pavement surface shall be swept or cleaned with compressed air just prior to application of the strip.

D. **Saw-cut Rumble Strips.** Saw-cut rumble strips shall be saw cut into existing pavement using wet cutting methods. The blade or blades shall be of such configuration that the desired dimensions of the saw cut can be made with one pass. No spacers between blades will be allowed.
Before a travel lane with saw-cut rumble strips is reopened to traffic, the pavement shall be cleaned by sweeping, flushing, or with a stream of compressed air. Sawing slurry from the wet-sawing process shall be flushed from the pavement surface immediately.

**E. Milled-in Rumble Strips.** Milled-in rumble strips shall be milled into existing pavement using a rotary-type cutting head with a maximum nominal outside diameter of 24 inches. The cutting head shall be on its own suspension system, independent from that of the power unit, to allow the head to align itself with the slope of the pavement and/or any irregularities in the pavement surface. The pattern of cutting tips on the head shall be arranged to produce a relatively smooth cut with no more than 3/32 inches between peaks and valleys. Prior to beginning work, the Contractor shall demonstrate to the Engineer the ability to achieve the desired surface without tearing or snagging the pavement.

Before a travel lane with milled-in rumble strips is reopened to traffic, the pavement shall be cleaned by sweeping, flushing, or with a stream of compressed air.

**F. Removing Temporary Rumble Strips.** The Contractor shall either completely remove raised rumble strips from the pavement or fill in the depressions from saw-cut or milled-in rumble strips prior to the start of the winter plowing season, prior to the placement of successive pavement courses, or as directed by the Engineer. Any damage to the pavement surface resulting from the removal of raised rumble strips shall be repaired at no additional cost to the State.

Rumble strip depressions shall be filled in with hot mix asphalt. Before they are filled, the depressions shall be cleaned by sweeping, flushing, or with a stream of compressed air, and coated with Asphalt Emulsion Tack Coat. The rumble strips shall be overfilled slightly and compacted using a plate tamper or static roller so that the final compacted surface is flush with the existing pavement.

619-3.09 **Interim Tubular Markers.** The Contractor shall install interim tubular markers in accordance with the contract documents. The Contractor shall attach interim tubular markers to the pavement in a manner that prevents them from being moved or dislodged by traffic. Interim tubular markers shall be installed on pavement that has been cleaned to remove pavement markings, oil, dirt, or other debris or substances that may interfere with a proper bond. Attachment to the pavement shall be by mechanical fastener or by adhesive, in accordance with the manufacturer’s recommendations. Bonding agents shall be of sufficient amount or size to ensure proper bonding of the base to the pavement.

Interim tubular markers removed or damaged by the Contractor’s operations or by traffic shall be replaced immediately, so that positive separation is maintained between opposing lanes of traffic at all times. Damaged reflective sheeting on interim tubular markers shall be replaced before nightfall as necessary to maintain adequate visibility of the markers. In cases where only isolated individual markers are lost or damaged, and adequate visibility is maintained by the remaining markers, replacement will not be required until more than 3 consecutive markers, or 25 percent of all markers within ½ mile have been damaged or lost. The replacement of markers damaged or lost by traffic, where the Contractor has demonstrated reasonable effort to collect the costs from the person(s) responsible for damage will be considered extra work.

619-3.10 **Portable Variable-Message Signs (PVMS).** The Contractor shall provide, operate and maintain PVMSs for the duration of the contract until the progress of work no longer requires their use. The contractor shall relocate or reorient PVMSs with a pay unit of each, if necessary, up to four (4) times per year as conditions dictate, at no additional cost to the State. The message to be displayed shall be as required by the contract documents and may change on a daily basis or more frequently as conditions dictate. PVMS with a pay unit of each shall be made available to the Regional Transportation Management Center for emergency incident management within the contract limits.

The Contractor shall provide, operate, and maintain PVMSs with pay units of weeks at the general location and duration stated in the contract documents. The message to be displayed shall be as required by the contract documents or as directed by the Engineer.

When in use, PVMS shall be placed so that the base of the message panel is at least 7 feet above the adjacent pavement surface and aligned to provide optimum viewing by approaching motorists.

The Contractor shall supply the Engineer with an accurate log of the text of all messages and times messages were displayed monthly, not later than the 15th of the following month. The log of messages may be either a listing
in a manual register or printouts from the control software. The Contractor shall inform the Engineer of PVMS locations and update as they are relocated and removed.

PVMS with Cellular Communications Option shall have cellular telephone service provided by the Contractor. The Contractor shall supply the Engineer with a copy of control software a minimum of 14 calendar days prior to installation of the first unit.

619-3.11 Type III Construction Barricades. Type III construction barricades shall be installed at all locations where a highway, bridge, ramp, or other segment of the roadway is closed to traffic. Type III construction barricades shall be maintained upright, in proper alignment and orientation. If ballast is used to maintain alignment and position of the barricade, it shall consist of dry sand contained in a closed waterproof bag, and shall be placed at ground level.

Barricade rails shall be oriented such that the stripes slope downward toward the side on which traffic is to pass. If traffic may pass to either side, adjacent barricades shall be arranged such that the stripes slope downward toward each side starting at the center. Where no passage is intended or permitted, the stripes shall slope downward toward the center of the barricade or barricades.

At night, each Type III construction barricade used to close a roadway, a segment of a roadway or a sidewalk shall be equipped with one flashing warning light.

619-3.12 Temporary Concrete Barrier. The Engineer will inspect temporary concrete barrier segments upon delivery to the contract. Any barrier segment having damage and/or defects in the concrete and/or joint connections will be rejected if the performance of the barrier may be affected.

Temporary concrete barrier segments shall be fastened together with connection keys to form a continuous string. When joined together, the barrier segments shall form a smooth and continuous barrier. Any segments damaged or misaligned shall be corrected or replaced.

Tapered end sections shall not be used in traversable medians, gores, and other areas where impacts on a tapered end section could allow vehicles to penetrate into opposing or adjacent lanes of traffic. Where the posted speed limit is 45 mph or higher, a temporary impact attenuator or temporary sand barrel array shall be provided on approach ends of temporary concrete barrier when the offset from the edge of the traveled way to end of the barrier is less than 12 feet, and will be paid for separately.

Temporary delineation shall be provided with each segment of temporary concrete barrier in accordance with the Standard Sheet. When temporary glare screen is attached to the barrier, temporary delineation shall be mounted such that its visibility is not blocked by the glare screen.

Where space is available, approach ends of the barrier string shall be flared away from the traveled way at the taper rate shown in Table 619-5 Flare Rates for Positive Barrier and terminated in a tapered end section, embedded in a slope, or otherwise protected against impact by errant vehicles.

The Contractor shall install unpinned temporary concrete barrier where indicated in the contract documents, with one segment at either end of the string pinned using a minimum of four pins on the construction, or non-traffic side, and with the segment immediately adjacent to the pinned segment, towards the center of the string, pinned using two pins on the construction side. Where pins extend above the top surface of the barrier anchor recess, they shall be capped.

The Contractor shall install pinned temporary concrete barrier where indicated in the contract documents, with each segment pinned with a minimum of 4 pins on the construction, or non-traffic side, in order to reduce movement of temporary concrete barrier on structures and in other locations where limited deflection is desired. Where an unpinned portion of a barrier string is connected to a pinned string in the direction of approaching traffic, the barrier segment immediately prior to the pinned segment shall be pinned using two pins on the construction side.

<table>
<thead>
<tr>
<th>Table 619-5 FLARE RATES FOR POSITIVE BARRIER</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSTED PRECONSTRUCTION SPEED LIMIT (mph)</td>
</tr>
<tr>
<td>TEMPORARY CONCRETE BARRIER</td>
</tr>
<tr>
<td>BOX BEAM OR HEAVY POST CORRUGATED BEAM</td>
</tr>
</tbody>
</table>
### TABLE 619-6
GUIDE RAIL AND TEMPORARY CONCRETE BARRIER
STANDARD* DEFLECTION DISTANCES

<table>
<thead>
<tr>
<th>BARRIER TYPE</th>
<th>POST SPACING (ft)</th>
<th>DEFLECTION DISTANCES (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CABLE GUIDE RAIL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>11.0</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>9.5</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>8.0</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>7.0</td>
<td></td>
</tr>
<tr>
<td><strong>CORRUGATED W-BEAM (WEAK POST)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GUIDE RAIL</td>
<td>12.5</td>
<td></td>
</tr>
<tr>
<td>6.25</td>
<td>8.0</td>
<td></td>
</tr>
<tr>
<td>4.16</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td><strong>CORRUGATED W-BEAM (HEAVY POST BLOCKED OUT)</strong></td>
<td>6.25</td>
<td>4.0</td>
</tr>
<tr>
<td>GUIDE RAIL</td>
<td>3.12</td>
<td></td>
</tr>
<tr>
<td><strong>BOX BEAM GUIDE RAIL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.0</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>3.0</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td><strong>CORRUGATED W-BEAM (WEAK POST)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEDIAN BARRIER</td>
<td>12.5</td>
<td></td>
</tr>
<tr>
<td>6.25</td>
<td>7.0</td>
<td></td>
</tr>
<tr>
<td><strong>CORRUGATED W-BEAM (HEAVY POST)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEDIAN BARRIER</td>
<td>6.25</td>
<td></td>
</tr>
<tr>
<td><strong>BOX BEAM MEDIAN BARRIER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.0</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td><strong>TEMPORARY CONCRETE BARRIER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNPINNED STIFFENED WITH BOX BEAM PINNED</td>
<td>Not Applicable</td>
<td>3.3**</td>
</tr>
<tr>
<td><strong>MASH Standard Deflection</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>caused by 5000 lb test vehicle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>traveling 62mph impacting the</td>
<td></td>
<td></td>
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<tr>
<td>barrier at a 25° angle</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Note: Standard Deflection is caused by a 4400 lb test vehicle traveling 62mph impacting the barrier at a 25° angle.

** Note: MASH Standard Deflection caused by 5000 lb test vehicle traveling 62mph impacting the barrier at a 25° angle.

The Contractor shall install temporary concrete barrier stiffened with box beam where indicated in the contract documents, in accordance with the Standard Sheet, in order to reduce deflection of temporary concrete barrier on structures and in other locations where limited deflection is desired. Temporary concrete barrier stiffened with box beam shall be installed at least 50 feet prior to, be continuous through, and extend at least 50 feet beyond the area requiring limited deflection wherever practicable. Where space limits extending the string of barrier stiffened with box beam, one segment at either end of the string shall be pinned with 4 pins on the construction, or non-traffic side and the segment immediately adjacent to the pinned segment, towards the center of the string, shall be pinned using a minimum of two pins on the construction side.

The Contractor shall install pinned temporary concrete barrier stiffened with box beam where indicated in the contract documents, with each segment pinned with a minimum of 4 pins, on the construction, or non-traffic side.

Pins shall have the following minimum pin embedment lengths:
- Bridge Decks and Cement Concrete Pavement 5 in.
- Flexible Pavement 18 in.
- Unpaved Areas 30 in.

After removal of the barrier, holes created in the surface to pin the barrier shall be filled, unless that area will be further disturbed. Holes in flexible pavement or unpaved areas shall be filled with material consistent with the...
subbase, base and surface material. Holes in portland cement concrete pavement or structural decks shall be filled with material meeting the requirements of §701-05 Concrete Grout Material or §721-03 Epoxy Polysulfide Grout.

A. Barrier Without Warning Lights. Where warning lights for temporary concrete barrier are not required, the Contractor shall provide and maintain delineation on the temporary concrete barrier. The delineation shall be maintained visible and free of dirt and snow, including during shutdown periods. The maximum spacing of delineation shall be 20 feet.

B. Barrier With Warning Lights. Type C warning lights shall be provided on temporary concrete barrier with warning lights. The maximum spacing of warning lights shall be 40 feet in tangents and 20 feet in curves with radii less than 2,800 feet. Warning lights shall be attached to the barrier so that the lights remain securely in place and so that the attachment minimizes damage to the barrier.

All warning lights shall be kept clean, properly aligned and in operating condition. Batteries shall be replaced as necessary to maintain adequate visibility of the warning lights at night.

Where channelizing devices with Type A flashing warning lights are not provided immediately preceding a run of barrier to be marked with warning lights, the first warning light on that run of barrier shall be a Type A warning light.

619-3.13 Temporary Glare Screen. Temporary glare screen shall be installed in accordance with the manufacturer's instructions. All components of the glare screen shall be maintained in a safe and functional condition. Damaged components shall be repaired or replaced.

If blades are utilized, the blades shall be spaced and angled to provide approximately a 22° headlight cutoff angle. The screen shall not overhang the face of the barrier and shall not cover delineation or lights. The screen shall be kept plumb and properly positioned on the barrier, with reflectorization securely affixed to the screen. Cleaning of the reflectorization shall be by a method that does not damage the paddles, reflectorization or barrier, and is not hazardous to traffic.

The Contractor shall remove and dispose of the temporary glare screen upon completion of the contract or when it is no longer required. Upon removal of the temporary glare screen, there shall be no protrusions remaining on the top face of the barrier. Bolt holes or other damage to permanent barrier from glare screen installation shall be repaired by the Contractor at no additional cost to the State.

619-3.14 Temporary Impact Attenuator. The Contractor shall install temporary impact attenuators in accordance with the contract documents, the manufacturer's instructions and materials details. The Contractor shall provide the Engineer a copy of the manufacturer's materials details and installation instructions a minimum of 7 calendar days prior to use, to allow verification of the attenuator supplied and proper installation. The selection of the manufacturer and model of temporary impact attenuator shall be at the Contractor’s option, provided the attenuator supplied is of the type indicated, gating or redirective; shields the hazard; and fits in the location without encroachment into travel lanes or required offsets.

The Contractor shall maintain temporary impact attenuators for continuous operation. If an attenuator is out of operation, the Contractor shall immediately mark the hazard with drums, vertical panels and or extra tall cones until repairs are made or a new attenuator is installed. The Contractor shall promptly begin repairs to damaged attenuators, and shall complete repairs to a damaged attenuator or mitigate the hazard within 1 work day. Attenuators damaged beyond repair shall be replaced within 3 work days.

When temporary impact attenuators are removed or moved to another location, the Contractor shall restore the location to match the surrounding area.

619-3.15 Temporary Sand Barrel Arrays. The Contractor shall install sand barrel arrays in accordance with the patterns shown on the Standard Sheet or a NCHRP 350 approved pattern and fill the barrels with sand to provide the desired module weight, plus or minus 5 percent. Units that will be in use between November 1 and March 31 shall have sodium chloride, as dry rock salt, equal to 3% - 5% by weight of the sand, thoroughly mixed into the sand to prevent freezing. The sand shall be placed in the modules loose, not in bags or sacks. If the contract documents indicate that the site necessitates securing of the modules, the work shall be performed as recommended by the manufacturer.

The Contractor shall maintain sand barrel arrays for continuous 24 hour operation. If an array is out of operation, the Contractor shall immediately mark the hazard with drums, vertical panels and or extra tall cones until...
repairs are made or new module(s) are installed. The Contractor shall promptly begin repairs to damaged arrays, and shall complete repairs to a damaged array or mitigate the hazard within one work day.

619-3.16 Vehicle Arresting Barrier (VAB). Vehicle arresting barriers (VAB) shall be installed in accordance with the contract documents and the manufacturer’s instructions and materials details. The Contractor shall provide the Engineer a copy of the manufacturer’s materials details and installation instructions a minimum of 5 work days prior to use, to allow verification of the barrier supplied and proper installation. The deceleration area behind the VAB shall be kept clear of workers, vehicles or stored materials. The Contractor shall provide for periodic surveillance of each VAB by workers or by electronic device.

The Contractor shall maintain vehicle arresting barrier for continuous operation. If a barrier is out of operation, the entire barrier shall be restored within 4 hours after the incident, or prior to the next shift the barrier will be used. No work may be progressed in an unprotected area, and the hazard shall be eliminated or minimized, until restorations have been completed.

The VAB, except anchorages, shall be dismantled and removed prior to reopening the road to traffic. After the last day of use, if directed by the Engineer, temporary anchorages shall be removed and disturbed areas shall be restored to match the surrounding area.

619-3.17 Maintain or Modify Traffic Signal Equipment. Traffic signals shall be maintained in proper operation, including the maintenance of all features of the traffic signal operation in effect and operating at the time any work begins on the contract. Traffic-actuated phases shall remain actuated, and signals operating within signal systems shall remain coordinated with the remainder of the system unless otherwise approved by the Engineer. Except for emergencies, no changes in the signal operation or timing shall be made without prior approval by the Engineer. If emergency conditions dictate a change in the operation, the Engineer shall be notified by the start of the next work day. Unless otherwise approved by the Engineer, an altered signal operation must be returned to the original signal operation within 24 hours.

The Contractor shall maintain in operation all equipment including signal heads, supports, cable, wiring, span-wire-mounted signing, controllers, master controllers, detector systems, conflict and current monitors, relays, switch packs, and all other accessory and necessary equipment. Maintenance shall also include the repair and replacement of existing detector loops, paid for separately.

The Contractor shall have capable traffic signal repair personnel on call 24 hours a day, seven days a week, and shall provide to the Engineer a single telephone number for contacting them. If for any reason a signal is not functioning properly, the Contractor shall commence work on the signal within 2 hours of notification. If directed by the Engineer, the Contractor shall notify the appropriate police agency for traffic control operations. If the police agency cannot or will not provide traffic control, the Contractor shall provide flaggers at locations specified by the Engineer within the 2-hour time period. The Contractor shall continue the flagger services until the signal is in proper operation. A flagger warning (W20-7 or W20-7a) sign shall be used on all approaches to an intersection controlled by flaggers.

If the malfunction is in the equipment supplied by the State, due to an area wide power outage, or due to a localized power outage beyond the Contractor’s control, the Contractor shall notify the Engineer and, if directed by the Engineer, provide flaggers until the malfunction is corrected or State personnel take over. Such flagging operations in excess of 4 hours for the first call and for any subsequent call will be considered extra work.

The Contractor shall provide the Engineer, on a monthly basis, with a record of all maintenance calls received and responded to, as well as a record of all corrective action taken by the Contractor.

A. Requirement A. The Contractor shall maintain in proper operation the indicated existing, relocated, modified, and newly installed signals in accordance with the contract documents. If such signals are to be removed, the Contractor shall be responsible for operation and maintenance until the signals are removed. The Contractor shall be responsible for their continuous operation except for reasonable shutdown periods authorized by the Engineer during relocation and transfer operations.

B. Requirement B. The State shall assume operation and maintenance responsibility for the signal from the Contractor following successful completion by the Contractor of the installation /modification testing as required by Section 680 Traffic Signals. The six month warranty/guarantee period shall be measured from the day the State assumes maintenance responsibility.
C. Requirement C. At relocated, modified or newly installed signals, the Department will assume responsibility for the following items after successful testing as required by Section 680 Traffic Signals has been completed. Assumption of the below listed responsibilities by the State will not relieve the Contractor of the responsibility for operation and maintenance of the signal. At existing microcomputer controlled traffic signals, the Department will be responsible for the following items:

1. Supply and maintenance of the microcomputer assembly and software.
2. Programming of the microcomputer furnished by the State.
3. Operation or timing changes directed by the Engineer.
4. Normal (no abuse or vandalism) equipment failures of existing, relocated, modified or new traffic signal equipment furnished by the State.

D. Modify Traffic Signal Equipment. Where the Contractor is required to temporarily modify or relocate existing traffic signals because of construction operations, all existing equipment, fittings, wire, cable, conduit, and related materials shall be reinstalled and extended where necessary. Temporary timber poles, guys, and related material shall be furnished and installed where necessary.

619-3.18 Temporary Traffic Signals. The Contractor shall install temporary traffic signals in accordance with the contract documents and the MUTCD. The Contractor shall maintain traffic signal systems, including traffic detectors, in proper operation until approved removal, and be responsible for its continuous 24-hour operation except for reasonable shutdown during relocation and transfer operations. Substitution of temporary traffic signals for flaggers shall be at no additional cost to the State.

If for any reason a signal does not function as required, the Contractor shall commence repair work on this signal within 2 hours after notification of a malfunction. In the event flashing operation occurs, all signal faces shall show flashing red indications. Flashing operation of a signal is considered a malfunction. The Contractor shall provide an adequate number of flaggers to control traffic at each malfunctioning traffic signal, in accordance with 619-3.02L. Flagging and Traffic Control until the signal is restored to proper operation.

If the malfunction is due to an area wide power outage or due to a localized power outage beyond the Contractor’s control, the Contractor shall notify the Engineer and, if directed by the Engineer, provide flaggers until the malfunction is corrected or State personnel take over. Flagging operations in excess of 4 hours for the first maintenance call shall be paid for as extra work.

619-3.19 Nighttime Operations. Work occurring after sunset and before sunrise will be considered nighttime operations. All workers involved in nighttime operations shall wear protective helmets and nighttime apparel in accordance with §107-05A. High Visibility Apparel at all times.

Vehicles operating on the pavement of a closed roadway or travel lane shall display four-way flashers or rotating amber beacons at all times. Vehicles using headlights, except for rollers and vehicles retrieving channelizing devices, shall travel facing in the same direction as adjacent traffic in order to avoid glare and confusion to drivers.

The Contractor shall meet the following additional requirements for work zone traffic control during nighttime operations.

A. Nighttime Operations and Lighting Plan. Thirty days prior to the start of nighttime operations, the Contractor shall submit a written Nighttime Operations and Lighting Plan to the Engineer for approval. The plan shall detail all aspects of the traffic control setup, the functions, responsibilities and identities of the nighttime traffic control competent person and other details as necessary. It shall include a contingency plan identifying foreseeable problems and emergencies that may arise, and the approach that will be used to address them. This plan shall be revised and updated by the Contractor as necessary during the progress of the work to accommodate conditions on the contract.

The Contractor shall submit a Nighttime Operations and Lighting Plan to the Engineer, at a scale and printed size similar to the contract plans and appropriate to adequately describe the work, including the following:

- Layout showing location of light towers, including typical spacing, lateral placement and mounting height, and clearly show the location of all lights necessary for all work to be done at night.
- Description of light towers to be used and electrical power source.
Specific technical details on all lighting equipment, including brand names, model numbers, power rating and photometric data.

Details of any hoods, louvers, shields or other means to be used to control glare.

Attachment and mounting details for lights to be attached to equipment.

Lighting calculations confirming that the illumination requirements will be met by the layout.

The Contractor shall maintain a supply of emergency flares for use in the event of unanticipated situations such as traffic accidents, equipment breakdowns, failure of lighting equipment, etc.

**B. Lighting for Nighttime Operations.** Prior to the first night of nighttime operations, the Contractor shall set up and operate the lighting equipment at night as a trial run to demonstrate its ability to establish a safe, properly illuminated, nighttime operation. The Contractor shall furnish the Engineer with a photometer, capable of measuring the level of illumination, for use as necessary to check the adequacy of illumination throughout nighttime operations.

1. **Equipment.** The Contractor shall supply all lighting equipment required to provide a work zone safe for the workers and traffic. Material and/or equipment shall be in good operating condition and in compliance with applicable safety and design codes.

   a. **Light Towers.** Light towers shall be provided as a primary means of illumination, and shall provide Level I illumination throughout the work space. They may be supplemented to the extent necessary by lighting fixtures mounted on construction equipment to provide Level II or Level III illumination where required for paving, milling and similar moving operations. Light towers shall be sturdy and free-standing without the aid of guy wires or bracing, and shall be capable of being moved as necessary to keep pace with construction operations. Light towers shall be positioned to minimize the risk of being impacted by traffic on the roadway or by construction traffic or equipment.

   b. **Light Towers on Paving, Milling, and Finishing Machines.** If needed to supplement portable and/or trailer-mounted light towers, towers shall be affixed to paving, milling, and finishing machines to provide the required level of illumination for the specified distance in front of and behind the machine. Luminaires shall be aimed and adjusted to provide uniform illumination with a maximum uniformity ratio of 5:1. The hopper, auger, and screed areas of pavers and the operator's controls on all machines shall be uniformly illuminated.

   c. **Construction Equipment Lights.** All construction equipment, including rollers, backhoes, loaders, and other equipment operating in areas not illuminated to a minimum of Level I Illumination, shall be equipped with a minimum of two 500 watt flood lights facing in each direction to provide a minimum of 1 foot-candle of horizontal illumination measured 60 feet in front of and behind the equipment. In areas illuminated to a minimum of Level I, construction equipment may move unescorted. In non-illuminated areas, construction equipment shall be equipped with conventional vehicle headlights, shall be illuminated with flood lights on the vehicle, or shall be escorted to permit safe movement. Headlights shall not be permitted as the sole means of illumination while working.

   d. **Equipment Mounting.** The Contractor shall provide suitable brackets and hardware to mount lighting fixtures and generators on machines and equipment. Mountings shall be designed so that light fixtures can be aimed and positioned as necessary to reduce glare and to provide the required illumination. Mounting brackets and fixtures shall not interfere with the equipment operator or any overhead structures, and shall provide for secure connection of the fixtures with minimum vibration.

   e. **Portable Generators.** The Contractor shall provide portable generators to furnish adequate power to operate all required lighting equipment. Fuel tank capacity and availability of fuel on site shall be sufficient to permit uninterrupted operation throughout the planned shift. Adequate switches shall be provided to control the various lights. All wiring shall be weatherproof and installed in accordance with 29 CFR 1926 Subpart K. All power sources shall be equipped with a Ground-Fault Circuit Interrupter.
2. **Illumination Requirements.** Tower-mounted luminaires, whether fixed, portable, trailer-mounted, or equipment-mounted, shall be of sufficient wattage and/or quantity to provide the required level of illumination and uniformity over the area of operation while minimizing glare.

The uniformity of illumination, defined as the ratio of the average illumination to the minimum illumination over an area requiring an indicated illumination level, shall not exceed 5:1. Illumination levels on approach roadways should be increased sequentially to prevent motorists from becoming disoriented by rapid changes from full dark to very bright conditions.

Existing street and highway lighting shall not eliminate the need for the Contractor to provide lighting. Consideration will be given to the amount of illumination provided by existing lights in determining the wattage and/or quantity of lights to be provided. Such consideration shall be presented in the Contractor's lighting plan. In the event of any failure of the lighting system, nighttime operation(s) shall be discontinued until the required level of illumination is restored.

- **a. Level I (5 foot-candles).** Level I illumination shall be provided for all areas of general construction operations to include all work operations by Contractors' personnel, including work zone traffic control set-up and operations, staging, excavation, cleaning and sweeping, pavement marking, spoil disposal, landscaping, planting and seeding, layout and measurements ahead of the actual work, borrow areas, spoil areas, and truck cleanout areas. Level I illumination shall be provided near the beginning of lane closure tapers and at road closures for nighttime work zones, including the setup and removal of the closure tapers. Level I illumination shall be provided a minimum of 400 feet ahead and 800 feet behind a paving or milling machine, or for the entire area of concrete placement or pavement work if less than this distance. This area shall be extended as necessary to incorporate all vehicle and equipment operations associated with the paving operation.

  The only exception to the requirement for Level I illumination throughout the area of construction operations is that finish rollers can work beyond the area of Level I illumination using floodlights mounted on the roller.

- **b. Level II (10 foot-candles).** Level II illumination shall be provided for flagging stations, asphalt paving, milling, and concrete placement and/or removal operations, including bridge decks, 50 feet ahead of and 100 feet behind a paving or milling machine.

- **c. Level III (20 foot-candles).** Level III illumination shall be provided for pavement or structural crack filling, joint repair, pavement patching and repairs, installation of signal equipment or other electrical/mechanical equipment, and other tasks involving fine details or intricate parts and equipment.

3. **Glare Control.** All lighting shall be designed, installed, and operated to avoid glare that affects traffic on the roadway or that causes annoyance or discomfort for residences adjoining the roadway. The Contractor shall locate and aim lighting fixtures to provide the required level of illumination and uniformity in the work zone without the creation of objectionable glare. The Engineer will determine when glare exceeds acceptable levels, either for traffic or for adjoining residences.

The Contractor shall provide shields, visors or louvers on luminaires as necessary to reduce objectionable levels of glare. As a minimum, the following requirements shall be met to avoid objectionable glare on roadways open to traffic in either direction:

- $ Tower-mounted luminaires shall be aimed either generally parallel or perpendicular to the roadway.
- $ Luminaires shall be aimed such that the angle between the center of the beam axis and the vertical mounting pole is no greater than 45°.
- $ No luminaires shall be permitted that provide a luminous intensity greater than 20,000 candelas at an angle of 72° above the vertical.
- $ Except where prevented by overhead utilities or structures, towers shall be extended to their full working height when in use to reduce glare and provide uniform illumination.

619-3.20 **Traffic Control Supervisor.** When indicated in the contract documents, the Contractor shall provide a dedicated traffic control supervisor having adequate training, experience, and authority to implement and
maintain all traffic control operations. The traffic control supervisor shall not be assigned other duties that interfere with performance as a traffic control supervisor.

The traffic control supervisor shall be adequately trained in traffic control operations by recognized training programs, including the American Traffic Safety Services Association Traffic Control Supervisor @the National Safety Council, unions, or construction industry associations, or by an individual instructor from such a program. Traffic control supervisors not competent to the satisfaction of the Engineer shall be replaced immediately.

During setup and removal of lane closures and other traffic control setups, the traffic control supervisor shall be assisted by additional workers as necessary. The traffic control supervisor shall patrol the contract area to ensure that conditions on the site are adequate for public safety and convenience at all times, to monitor worker safety from intrusions into the work area, and to ensure that the work adheres to the provisions for work zone traffic control. The traffic control supervisor shall ensure signs, channelizing devices, barricades, barrier, impact attenuators and other traffic control devices are adjusted and maintained as necessary. The Contractor shall provide workers to install, maintain, adjust, and remove traffic control devices as required by the work operations.

When the work does not require closure of an active lane, roadway, or ramp; when no construction operations occur within 30 feet of active traffic lanes; and when there is no delivery of materials or equipment; the Engineer may waive the requirements for a traffic control supervisor.

619-3.21 Temporary Structures and Approaches. The Contractor shall design, construct, maintain and remove temporary structures and their approaches, or move and remove existing structures to provide temporary structures along with their temporary approaches. The Contractor shall install temporary approaches, including necessary earth support structures, in such a manner and sequence that interference with and inconvenience to the traveling public and the abutting owners is kept to a minimum. The Contractor shall be responsible for the workmanship, upkeep, and safety of all temporary structures and approaches. All fabrication shall conform to the AASHTO Standard Specifications for Highway Bridges, Division II or AASHTO LRFD Bridge Construction Specifications, except as modified herein. Fabrication shall be performed by an AISC Category III-Certified Fabricator. Plans and design computations shall bear the stamp and signature of a Professional Engineer.

When specific details are not included in the contract documents, or when the Contractor receives approval to vary from the contract documents, the Contractor shall design all elements of the temporary structure and approaches including the railing system. Design shall be done in conformance with the NYSDOT Load and Resistance Factor Design (LRFD) Bridge Design Specifications, except that the only design live load shall be HL-93. Alternatively, the design shall be in conformance with the NYSDOT Standard Specifications for Highway Bridges, except that the minimum design live load shall be HS 20. The bridge rail shall be designed for a minimum of TL-2.

Any structure that is expected to be in service for more than 5 years, shall be designed as a permanent structure according to the NYSDOT Load and Resistance Factor Design (LRFD) Bridge Design Specifications, including the Permit Vehicle and seismic loading.

Load rating calculations for the temporary structure shall be submitted to the DCES. Load ratings shall be computed based on Load Factor Design (LFD) or Allowable Stress Design (ASD), and shall be based on an HS-20 loading. Additionally, if the structure is designed using the NYSDOT LRFD specifications, load ratings shall also be computed by the Load and Resistance Factor Rating (LRFR) method. LRFR ratings shall be shown at the Inventory and Operating levels as rating factors of the AASHTO HL-93 live load. All Load Ratings shall be calculated in accordance with the AASHTO Manual for Bridge Evaluation.

Prior to beginning construction of any temporary structure designed by the Contractor, the Contractor shall submit detailed plans and calculations to the DCES for review and approval in accordance with §585-3.02 Working Drawings. Such review, however, shall not relieve the Contractor of the responsibility for the adequacy and design of such temporary structures and approaches. If the Contractor proposes to construct with used materials, the Contractor's Professional Engineer shall submit with the plans the method for documenting that all primary member material meets the physical properties required by the design. In the absence of record plans or other valid documentation for the used materials, physical testing shall be performed. Excluded from this provision are proprietary structures. All welding required for the fabrication of temporary steel structures shall be performed in accordance with the provisions of the NYS Steel Construction Manual. Complete penetration groove welds in primary members shall be radiographed as described therein. The DCES reserves the right to perform in-process fabrication inspection. The Contractor shall notify the DCES of the fabrication schedule 7 calendar days prior to commencement of fabrication.
Prior to opening a temporary structure to traffic, the structure shall be inspected by a Professional Engineer who shall certify in writing to the Engineer that the structure was constructed in accordance with the design. The Contractor shall have the temporary structure inspected, under the direction of a Professional Engineer, by a person familiar with bridge construction at least once a month. On or before each anniversary of the opening of a temporary structure that has been open to traffic for one year or more, the structure shall be inspected by a Professional Engineer, who shall certify in writing that:

1. The plans of the structure, including its foundations, have been reviewed.
2. A hands-on inspection of the structure has been performed in accordance with the latest edition of the NYSDOT Bridge Inspection Manual by an inspection team whose leader is a Professional Engineer and who was present for the inspection.
3. A detailed inspection of those areas of the structure critical to its integrity has been performed.
4. The structure is currently adequate for its design loads.

A signed and stamped copy of the inspection results shall be provided to the Engineer within one week of the inspection.

619-3.22 Pavement Patching. The Contractor shall place paving materials suitable to provide temporary pavement patches on paved surfaces where vehicular, bicycle or pedestrian traffic is to be maintained, including the traveled way, shoulders, sidewalks, and other paved surfaces damaged by traffic or environmental factors and not by Contractor operations. During periods of active work on the contract, the Contractor shall complete needed patches on a daily basis. During periods of winter shutdown, the Contractor shall inspect the contract on a regular basis, and pavement patches shall be installed as needed.

The Contractor shall place pavement patches to provide a relatively smooth, uniform driving surface suitable for safe travel at the posted speed limit. Pavement patches shall be placed to repair surface irregularities including, but not limited to, holes, depressions, cracks and uneven joints. Areas to be patched shall be adequately cleaned and tack-coated if necessary, and patching material shall be thoroughly compacted by hand or by roller.

619-3.23 Mailboxes. In the event the original mounting post has been lost, damaged, is unusable, or is not consistent with U.S. Postal Service requirements, the Contractor shall furnish and install a new mounting post and/or mailbox with mounting post at the designated location and at the proper height in accordance with the requirements of the U.S. Postal Service.

619-4 METHOD OF MEASUREMENT

619-4.01 General. (None Specified.)

619-4.02 Basic Work Zone Traffic Control. The work under basic work zone traffic control will be measured for payment on a lump sum basis.

619-4.03 Basic Work Zone Traffic Control (Daily Operations). The work under basic work zone traffic control (daily operations) will be measured for payment on a lump sum basis.

619-4.04 Temporary Business Signs. The quantity to be measured for payment will be in square feet to the nearest 0.1 square feet of business signs installed.

619-4.05 Covering or Removal of Pavement Markings. The quantity to be measured for payment will be in feet to the nearest whole foot along the centerline of the pavement stripes covered or removed, and will be based on a 4 inch wide stripe. No measurement will be made for the gaps between broken and dotted line segments. If preformed tape is used to cover an existing line, payment will be based on the width of the line covered. Measurement for covering or removal of striping with a width greater than 4 inches will be made by the following method:

\[
\text{Width of Striping (in) x Number of Feet} / 4 \text{ (in)}
\]

Letters and symbols will be measured by each unit covered or removed. A unit will consist of one letter or one symbol except that a double-headed arrow will be measured as two units and triple headed arrow will be measured...
as three units. Example: SCHOOL would be measured as six units. Each R in a railroad crossing marking will be measured as a single unit, but the AX will be measured by the number of feet of 4 inch stripe.

619-4.06 Temporary Pavement Markings. The quantity to be measured for payment will be in feet to the nearest whole foot along the centerline of the pavement stripes installed, and will be based on a 4 inch wide stripe. No measurement will be made for the length of skips in the dashed line. Measurement for installation of striping with a width greater than 4 inches will be made by the following method:

\[
\text{Width of Striping (in) x Number of Feet} = \frac{\text{4 (in)}}{4 (in)}
\]

619-4.07 Interim Pavement Markings. The quantity to be measured for payment will be in feet to the nearest whole foot along the centerline of the pavement stripes installed, and will be based on a 4 inch wide stripe. No measurement will be made for the length of skips in the dashed line. Measurement for installation of striping with a width greater than 4 inches will be made by the following method:

\[
\text{Width of Striping (in) x Number of Feet} = \frac{\text{4 (in)}}{4 (in)}
\]

Letters and symbols will be measured by each unit installed. A unit will consist of one letter or one symbol except that a double-headed arrow will be measured as two units and triple headed arrow will be measured as three units. Example: SCHOOL would be measured as six units. Each R in a railroad crossing marking will be measured as a single unit, but the AX will be measured by the number of feet of 4 inch stripe.

619-4.08 Temporary Rumble Strips. The quantity to be measured for payment will be in feet to the nearest whole foot of individual temporary rumble strip installed, measured transverse to the direction of traffic flow.

619-4.09 Interim Tubular Markers. The quantity to be measured for payment will be the number of interim tubular markers installed.

619-4.10 Portable Variable-Message Signs (PVMS). The quantity of PVMS with a pay unit of each to be measured for payment will be the number of signs provided. The quantity of PVMS with a pay unit of weeks to be measured for payment will be in weeks to the nearest whole week.

619-4.11 Type III Construction Barricades. The quantity to be measured for payment will be the number of barricade units installed.

619-4.12 Temporary Concrete Barrier. The quantity to be measured for payment of temporary concrete barrier will be in feet to the nearest foot along the centerline of temporary concrete barrier installed.

- The quantity to be measured for payment of pinned temporary concrete barrier will be in feet to the nearest foot along the centerline of pinned temporary concrete barrier installed.
- The quantity to be measured for payment of temporary concrete barrier stiffened with box beam will be in feet to the nearest foot along the centerline of temporary concrete barrier stiffened with box beam installed.
- The quantity to be measured for payment of temporary concrete barrier with barrier warning lights installed will be in feet to the nearest foot along the centerline of temporary concrete barrier installed.

619-4.13 Temporary Glare Screen. The quantity to be measured for payment will be in feet to the nearest whole foot along the length of the temporary glare screen installed.

619-4.14 Temporary Impact Attenuator. The quantity to be measured for payment will be the number of temporary impact attenuators installed.

619-4.15 Temporary Sand Barrel Arrays. The quantity to be measured for payment will be the number of individual sand barrel modules installed.

619-4.16 Vehicle Arresting Barrier. The quantity to be measured for payment will be the number of barriers installed.
619-4.17 Maintain or Modify Traffic Signal Equipment. The quantity of signalized intersections maintained to be measured for payment will be in months to the nearest 1/4 month. The quantity of traffic signal equipment modified to be measured for payment will be on an each location basis.

619-4.18 Temporary Traffic Signals. The work under temporary traffic signals will be measured for payment on each location basis.

619-4.19 Nighttime Operations. The work under nighttime operations will be measured for payment on a lump sum basis.

619-4.20 Traffic Control Supervisor. The work under traffic control supervisor will be measured for payment on a monthly basis to the nearest 1/4 month.

619-4.21 Temporary Structures and Approaches. The quantity to be measured for payment will be the number of temporary structures and approaches installed.

619-4.22 Pavement Patching. The quantity to be measured for payment will be in cubic yards to the nearest 0.1 cubic yard of pavement patching installed.

619-4.23 Mailboxes. The quantity to be measured for payment will be the number of mailboxes installed.

619-5 BASIS OF PAYMENT

619-5.01 General. The price bid shall include all labor, materials and equipment necessary to complete the work. No payment will be made for damage caused by vehicle accidents, vandalism, or any other similar causes.

A. Non-Payment. For each calendar day during which there are substantial deficiencies in compliance with the requirements of this section, no payment will be made under basic work zone traffic control. The amount of such calendar day nonpayment will be deducted from monies due the Contractor in accordance with Table 619-7 Basic Work Zone Traffic Control Nonpayment.

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B. Liquidated Damages. If the Contractor fails to adequately correct substantial cited deficiencies within 24 hours of notification by the Engineer for any item under this section, or those deficiencies reoccur on a subsequent, but not necessarily concurrent calendar day, liquidated damages will be assessed for each calendar day or part thereof in addition to non-payment for deficiencies.

C. Major Non-Conformance. Where major non-conformance with the requirements of this specification is noted by the Engineer, and prompt Contractor compliance is deemed not to be obtainable, the Engineer may stop contract work.

Where major non-conformance with the requirements of this specification is noted by the Engineer, and the Contractor fails to correct deficiencies for a period of 24 hours, the Department may correct the adverse conditions by any means deemed appropriate, and will deduct the cost of the corrective work from any monies...
due the Contractor. The cost of this corrective work will be in addition to the non-payment for basic work zone traffic control, non-payment of any other items of work under this section and liquidated damages assessed.

619-5.02 Basic Work Zone Traffic Control. The lump sum price bid for basic work zone traffic control shall include all labor, materials and equipment necessary to complete the work. Construction signs; arrow panels; warning lights on signs, barricades and channelizing devices; the cost of temporarily terminating guide rail, median barrier, or bridge rail during non-work hours; work required to maintain drainage facilities during construction operations; and dust control shall be included in the lump sum price bid for basic work zone traffic control. Removal of debris from drainage features that was present at the time of contract award shall be paid for separately.

Progress payments will be made at 20 percent of the lump sum price bid when 10 percent of the contract work, excluding basic work zone traffic control, contingency items and mobilization, has been completed. The remaining 80 percent will be paid in subsequent contract payments, in proportion to the amount of other contract work completed, less any non-payment for deficient work zone traffic control. If the contract completion date is extended, no additional payment will be made for basic work zone traffic control.

619-5.03 Basic Work Zone Traffic Control (Daily Operations). The lump sum price bid for basic work zone traffic control (daily operations) shall include all labor, materials and equipment necessary to complete the work. Construction signs; arrow panels; warning lights on signs, barricades and channelizing devices; and the cost of temporarily terminating guide rail, median barrier, or bridge rail during non-work hours; shall be included in the lump sum price bid for basic work zone traffic control (daily operations).

Progress payments will be made at 20 percent of the lump sum price bid when 10 percent of the contract work, excluding basic work zone traffic control, contingency items and mobilization, has been completed. The remaining 80 percent will be paid in subsequent contract payments, in proportion to the amount of other contract work completed, less any non-payment for deficient work zone traffic control. If the contract completion date is extended, no additional payment will be made for basic work zone traffic control.

619-5.04 Business Signs. The unit price bid for temporary business signs shall include the cost of labor, materials and equipment necessary to complete the work, including sign supports.

619-5.05 Covering or Removal of Pavement Markings. The unit price bid for the removal of pavement markings shall include the cost of all labor, materials and equipment necessary to complete the work, including the costs of any repairs or replacement of damaged pavement or existing pavement markings resulting from pavement marking removal or covering operations.

Payment for removal of temporary pavement markings and interim pavement markings is included in those items, and additional payment will not be included under covering or removal of pavement markings.

619-5.06 Temporary Pavement Markings. The unit price bid for temporary pavement markings shall include the cost of furnishing all labor, materials and equipment necessary to complete the work. Payment shall be provided each time temporary pavement markings are first applied on a pavement course in accordance with the contract requirements.

No additional payment shall be provided for the installation of construction signs, temporary delineators, and channelizing devices necessitated by the Contractor’s failure to place temporary pavement markings before the pavement is opened to traffic, or for temporary roadside pavement channelization, until edge lines are placed. No additional payment shall be provided for markings required because the Contractor failed to place the next pavement course or the final pavement markings within 14 calendar days.

619-5.07 Interim Pavement Markings. The unit price bid for interim pavement markings shall include the cost of furnishing all labor, materials and equipment necessary to complete the work.

619-5.08 Temporary Rumble Strips. The unit price bid for temporary rumble strips shall include the cost of all labor, materials and equipment necessary to complete the work. Payment will include the cost of pavement cleaning, asphalt concrete, and other materials used to form or fill in the rumble strips, and tack coat. On multiyear contracts where it is desired to have rumble strips in place for more than one construction season, the rumble strips will be paid for separately each year they are installed.
619-5.09 Interim Tubular Markers. The unit price bid for interim tubular markers shall include the cost of furnishing all labor, materials and equipment necessary to complete the work, including removal and the cost of replacing damaged markers. Interim tubular markers that are in satisfactory condition may be relocated. When interim tubular markers are relocated, payment will be made for another interim tubular marker.

619-5.10 Portable Variable-Message Signs (PVMS). The unit price bid for PVMS shall include the cost of all labor, materials and equipment necessary to complete the work, including cellular telephone service initial start-up and monthly charges for the cellular communications option.

Progress payments for PVMS with a pay unit of each will be made for 90 percent of the unit price bid when each unit has been satisfactorily installed and is operational at the first location. The remaining 10 percent will be paid upon removal.

619-5.11 Type III Construction Barricades. The unit price bid for Type III construction barricades shall include all labor, materials and equipment necessary to complete the work, including lighting when required. When barricades are relocated or the diagonal stripes are changed to allow traffic to pass on the other side of the barricade, additional payment will be made for another barricade. Movements of the barricade from one side of the roadway to the other side, movements within 100 feet of the initial location, or daily replacement to approximately the same location, not requiring any change in the diagonal stripes, will not be considered as relocation and will not be paid for as additional barricades.

No payment will be made for Type III construction barricades used at the option of the Contractor in lieu of channelizing devices.

619-5.12 Temporary Concrete Barrier. The unit price bid for temporary concrete barrier shall include all labor, materials, and equipment necessary to satisfactorily complete the work, including any required connection devices, end treatments, end section pinning, temporary delineation and repair of pavement after removal of temporary concrete barrier. Temporary impact attenuators, if required, will be paid for separately. When temporary concrete barriers are relocated, except movements necessary to maintain, realign, or replace damaged units and daily relocation of segments to allow access to the work area which are restored at the end of the work shift, additional payment will be made for additional length of temporary concrete barrier.

The unit price bid for pinned temporary concrete barrier shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work, including pinning.

The unit price bid for temporary concrete barrier stiffened with box beam shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work, including the box beam.

The unit price bid for temporary concrete barrier with warning lights shall include the cost of furnishing all labor, materials, equipment, and electrical power necessary to complete the work. Should a barrier that is equipped with warning lights be moved to a new location where temporary concrete barrier with warning lights is required, payment will be made for additional length of temporary concrete barrier with warning lights.

Progress payments will be made at the unit price bid for 90 percent of the quantity, after placement and demonstration of satisfactory operation. The remaining 10 percent will be paid upon removal. No payment will be made for temporary concrete barrier installed at the Contractor's option, required solely due to a delay caused by the Contractor's operations, or installed to protect pavement edge drop-offs, unless required in the contract documents.

619-5.13 Temporary Glare Screen. The unit price bid for temporary glare screen shall include all labor, materials and equipment necessary to complete the work. When glare screens are relocated, except movements necessary to maintain, realign, or replace damaged units and daily relocation of temporary concrete barrier segments with glare screen attached to allow access to the work area which are restored at the end of the work shift, additional payment will be made for the length of glare screen relocated. No payment will be made for repair or replacement of damaged components.

619-5.14 Temporary Impact Attenuator. The unit price bid shall include the cost of all labor, materials, and equipment necessary to complete the work, including the connection to temporary or existing barrier, the back-up system, the pad, if indicated, and any excavation or backfill. When attenuators are relocated, payment will be made for a new temporary impact attenuator, except minor movements within a site, such as movements to maintain,
realign, or adjust an attenuator. No payment will be made to repair, restore or replace an attenuator damaged by public traffic or by the Contractor's operations.

619-5.15 Temporary Sand Barrel Arrays. The unit price bid for temporary sand barrel arrays shall include the cost of all labor, materials and equipment necessary to complete the work, including the cost of the sand fill and salt additive. Replacement of individual modules damaged by public traffic will be paid for at the unit price bid for each temporary sand barrel. Relocation of barrels to a new location will be paid for as a new installation.

619-5.16 Vehicle Arresting Barrier. The unit price bid for vehicle arresting barrier shall include the cost of all labor, materials and equipment necessary to complete the work. No payment will be made to repair, restore or replace an attenuator damaged by public traffic or by the Contractor's operations.

619-5.17 Maintain or Modify Traffic Signal Equipment. The unit price bid for maintaining traffic signal equipment shall include the cost of all labor, materials and equipment necessary to perform the work, with the exception of inductance loop replacement, if necessary, which will be paid for separately. The cost of the electric power shall be the responsibility of the original maintaining agency. No payment will be made during any period for which the Contractor has been granted an extension of time with engineering charges.

The unit price bid for modifying traffic signal equipment per location shall include the cost of all labor, materials and equipment necessary to perform the work.

619-5.18 Temporary Traffic Signals. The unit price bid for temporary traffic signals per location shall include the cost of all labor, materials and equipment necessary to complete the work, including the cost of electric power necessary to operate the signal until its removal is approved or directed by the Engineer. A location may be an intersection, a work zone with two or more signal faces interconnected and operating together, or other limits as defined in the contract documents. Portable or temporary traffic signals used at the Contractor's option in lieu of flaggers shall be included in the lump sum price bid for basic work zone traffic control.

Progress payments will be made at 50 percent of the unit price bid for each location after installation and demonstration of satisfactory operation. The remaining 50 percent will be paid in progress payments per week of temporary traffic signal provided. The amount of such weekly payment will be determined by dividing 50 percent of the unit price bid by the number of weeks the temporary traffic signal is to remain in operation, as shown on the approved progress schedule.

619-5.19 Nighttime Operations. The lump sum price bid for portable lighting shall include all labor, materials and equipment necessary to complete the work.

Progress payments will be made based on the lump sum price bid as follows: 20 percent when the Nighttime Operations and Lighting Plan has been accepted and satisfactory lighting of nighttime operations has begun; the remaining 80 percent will be paid in progress payments per week of nighttime operations completed. The amount of such weekly payment will be determined by dividing 80 percent of the lump sum amount bid by the number of weeks of nighttime operations in the approved Nighttime Operations and Lighting Plan.

619-5.20 Traffic Control Supervisor. The unit price bid for traffic control supervisor shall include the cost of furnishing all labor, materials, equipment, training and direct supervision necessary to provide and support the activities of a traffic control supervisor.

619-5.21 Temporary Structures and Approaches. The unit price bid for temporary structures and approaches shall include the cost of all labor, materials and equipment necessary to complete the work including design preparation. Two temporary structures separated by a portion of an existing structure greater than 3 feet in length will be paid for as two separate structures.

Progress payments will be made at the unit price bid for 90 percent of the quantity after the temporary structures and approaches are complete and operable. The remaining 10 percent will be paid upon removal.

619-5.22 Pavement Patching. The unit price bid for pavement patching shall include the cost of furnishing all labor, materials and equipment necessary to patch pavement during periods of winter shutdown when work on the contract is inactive, or when hot mix asphalt material is not available, including mobilization of work crews and work zone traffic control.
The cost of all work associated with providing and installing suitable pavement patching materials to maintain pavements open to traffic in acceptable condition when work on the contract is active, or when hot mix asphalt material is available, will be paid under a hot mix asphalt sidewalk item if that item is in the contract, or alternatively, under a top course paving item, regardless of the material actually used.

**619-5.23 Mailboxes.** The unit price bid for mailboxes shall include all labor, materials and equipment necessary to complete the work. Only one payment for each mailbox will be made regardless of the number of times it is moved or replaced and shall be made when the mailbox has been placed in its final location. Where multiple mailboxes are installed on a single post, payment will be based upon the number of individual mailboxes so installed.

**Payment will be made under:**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
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<tbody>
<tr>
<td>619.01</td>
<td>Basic Work Zone Traffic Control</td>
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<tr>
<td>619.0101</td>
<td>Basic Work Zone Traffic Control (Daily Operations)</td>
<td>Lump Sum</td>
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<tr>
<td>619.04</td>
<td>Type III Construction Barricades</td>
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<tr>
<td>619.06mm</td>
<td>Temporary Structures and Approaches</td>
<td>Each</td>
</tr>
<tr>
<td>619.0701</td>
<td>Temporary Business Signs</td>
<td>Square Feet</td>
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<td>Remove Existing Pavement Marking Stripes</td>
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<tr>
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<td>Remove Existing Pavement Marking Letters or Symbols</td>
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<tr>
<td>619.0803</td>
<td>Cover Existing Pavement Marking Stripes (Removable Tape)</td>
<td>Feet</td>
</tr>
<tr>
<td>619.0804</td>
<td>Cover Existing Pavement Marking Letters or Symbols (Removable Tape)</td>
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<td>619.09xx</td>
<td>Temporary Pavement Markings, Stripes</td>
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<tr>
<td></td>
<td>xx = Material</td>
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<td></td>
<td>01= Traffic Paint, 03= Removable Tape, 04= Removable Wet Reflective Tape,</td>
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<tr>
<td>619.1001xx</td>
<td>Interim Pavement Markings, Stripes</td>
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<td>619.1002xx</td>
<td>Interim Pavement Markings, Symbols</td>
<td>Each</td>
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<td>619.1003xx</td>
<td>Interim Pavement Markings, Letters</td>
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<tr>
<td></td>
<td>xx = Material</td>
<td></td>
</tr>
<tr>
<td></td>
<td>01= Traffic Paint, 02= Epoxy Paint, 03= Removable Tape, 04= Removable Wet Reflective Tape, 05= Traffic Paint Supplemented with Raised Markers</td>
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<td>Portable, Variable Message Sign (PVMS) (Hybrid Flip Disk)</td>
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<tr>
<td>619.1102xx</td>
<td>Portable, Variable Message Sign (PVMS) (LED)</td>
<td>Each</td>
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<td>619.1103xx</td>
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<td></td>
<td>01= None, 02= Cellular Communications</td>
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</tr>
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<td></td>
<td>03= Radar, 04= Cellular Communications and Radar</td>
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<td>619.12</td>
<td>Temporary Glare Screen</td>
<td>Feet</td>
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<td>619.13nn</td>
<td>Temporary Traffic Signals</td>
<td>Each Location</td>
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<td>619.1611</td>
<td>Maintain Traffic Signal Equipment (Requirement A)</td>
<td>Intersection Month</td>
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<td>Maintain Traffic Signal Equipment (Requirement B)</td>
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<td>Maintain Traffic Signal Equipment (Requirement C)</td>
<td>Intersection Month</td>
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<td>Modify Existing Traffic Signal Equipment (Temporary)</td>
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<td>Temporary Concrete Barrier (Unpinned)</td>
<td>Feet</td>
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<td>Temporary Concrete Barrier (Unpinned) with Warning Lights</td>
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<td>619.1703</td>
<td>Temporary Concrete Barrier (Pinned)</td>
<td>Feet</td>
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<td>619.1704</td>
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<td>619.1707</td>
<td>Temporary Concrete Barrier (Stiffened with Box Beam and Pinned)</td>
<td>Feet</td>
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<td>619.1708</td>
<td>Temporary Concrete Barrier (Stiffened with Box Beam and Pinned)</td>
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<td>with Warning Lights</td>
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<td>Temporary Impact Attenuator - Redirective (Test Level 2)</td>
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<td>619.1803</td>
<td>Temporary Impact Attenuator - Redirective (Test Level 3)</td>
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<tr>
<td>619.1812</td>
<td>Temporary Impact Attenuator - Gating (Test Level 2)</td>
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<td>619.1813</td>
<td>Temporary Impact Attenuator - Gating (Test Level 3)</td>
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<td>619.20</td>
<td>Interim Tubular Markers</td>
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<td>619.21</td>
<td>Temporary Sand Barrel Module</td>
<td>Each</td>
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<td>619.22</td>
<td>Temporary Rumble Strips</td>
<td>Feet</td>
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<td>619.23</td>
<td>Vehicle Arresting Barrier</td>
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<td>619.24</td>
<td>Nighttime Operations</td>
<td>Lump Sum</td>
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<td>619.25</td>
<td>Traffic Control Supervisor</td>
<td>Month</td>
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<td>619.26</td>
<td>Pavement Patching, Winter</td>
<td>Cubic Yards</td>
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<tr>
<td>619.27</td>
<td>Mailboxes</td>
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CLEANING CULVERTS AND DRAINAGE STRUCTURES

Make the following changes to the Standard Specifications dated May 1, 2008:

Page 606, Delete SECTIONS 621 AND 622 (VACANT) and Replace it with the following:

SECTION 621 – CLEANING CULVERTS, DRAINAGE STRUCTURES AND EXISTING ROADSIDE SECTIONS

621-1 DESCRIPTION

621-1.01 General. This work shall consist of cleaning and keeping clean, existing culverts, closed drainage systems, drainage structures, and existing roadside sections as shown in the contract documents.

621-1.02 Definitions. The following general definitions shall be used in conjunction with this section:

1. Culvert. A culvert is defined as an enclosed channel open at both ends carrying water from a stream or water course through an artificial barrier such as a roadway embankment.

2. Closed Drainage System. A closed drainage system is a collection system for stormwater runoff that carries water to a discharge point. A closed drainage system consists of enclosed channel(s) closed at either one or both ends by a drainage structure, and may include intermediate drainage structures at junction points.

3. Drainage Structure. A drainage structure includes catch basins, manholes, drop inlets, leaching basins and similar structures that collect and/or redirect runoff water.

4. Materials Removed. Materials removed have been presumed not to include non-hazardous industrial waste or hazardous waste in accordance with §107-10 Managing Surplus Material and Waste.

5. Clean and Keeping Clean. Clean and keeping clean is the activity of removing accumulated sediment, debris, and vegetation which impedes the flow of water to maintain a proper drainage path and re-establish the design capacity.

6. Graded Surfaces. Grading surfaces entails forming and trimming surfaces to the lines and grades shown in the contract documents.

621-2 MATERIALS. None specified.

621-3 CONSTRUCTION DETAILS

621-3.01. General. Provide appropriate control and discharge practices for all water throughout the cleaning process. Include methods and schedules to be consistent with the soil erosion and sediment control plan in accordance with §209-3.01 General and perform all work in accordance with §107-12 Water Quality Protection.

621-3.02. Cleaning Culverts. Culvert locations identified in the contract documents shall be cleaned. Materials removed shall be disposed of in accordance with §203-3.02 B. Disposal of Surplus Excavated Materials. Removal of contaminated material shall be disposed of in accordance with Section 205 Contaminated Soil.

It is not guaranteed that placement of surplus materials of spoil will be allowed within the right of way. Additionally, disposal of turbid water generated via the cleaning process shall be subject to appropriate environmental regulations.

621-3.03 Cleaning Closed Drainage System. Closed drainage systems identified in the contract documents shall be cleaned. Materials removed shall be disposed of in accordance with §203-3.02 B. Disposal of Surplus Excavated Materials. Removal of contaminated material shall be disposed of in accordance with Section 205 Contaminated Soil.

It is not guaranteed that placement of surplus materials of spoil will be allowed within the right of way. Additionally, disposal of turbid water generated via the cleaning process shall be subject to appropriate environmental regulations.
CLEANING CULVERTS AND DRAINAGE STRUCTURES

621-3.04 Cleaning Drainage Structures. Drainage structures identified in the contract documents shall be cleaned. Materials removed shall be disposed of in accordance with §203-3.02 B. Disposal of Surplus Excavated Materials. Removal of contaminated material shall be disposed of in accordance with Section 205 Contaminated Soil.

It is not guaranteed that placement of surplus materials of spoil will be allowed within the right of way. Additionally, disposal of turbid water generated via the cleaning process shall be subject to appropriate environmental regulations.

621-3.05 Cleaning, Grading and Shaping Existing Roadside Section. The Contractor shall remove earth, turf, brush and debris, or provide necessary fill material to restore adequate roadside drainage. Ditches shall be shaped as shown in the contract documents. Material removed shall be disposed of in conformance with the provisions of §203-3.02 B. Disposal of Surplus Excavated Materials. Removal of contaminated material shall be disposed of in accordance with Section 205 Contaminated Soil.

The Contractor shall protect all fences, markers, culverts, underground structures, utilities and other appurtenances adjacent to the work area. Any damaged facilities and/or disturbed areas shall be replaced in kind at no additional cost to the state.

621-4 METHOD OF MEASUREMENT

621-4.01. General. None specified.

621-4.02. Cleaning Culverts. Cleaning culverts will be measured in linear feet of culvert cleaned, measured along the invert, to the nearest foot. Multiple barrel culverts will be measured along each individual barrel.

621-4.03 Cleaning Closed Drainage System. Cleaning closed drainage systems will be measured in linear feet of pipe cleaned, measured along the invert of the pipe, from the inside wall surface of the drainage structure to the inside wall surface of the next drainage structure, measured to the nearest foot.

621-4.04 Cleaning Drainage Structures. Cleaning drainage structures will be measured as the number of drainage structures cleaned.

621-4.05 Cleaning, Grading and Shaping Existing Roadside Section. Cleaning, grading, and shaping existing roadside section will be measured as the number of linear feet along the edge of the adjacent roadway.

621-5 BASIS OF PAYMENT

621-5.01. General. None specified.

621-5.02. Cleaning Culverts. The unit price bid shall include the cost of all labor, materials, and equipment necessary to satisfactorily complete the work including the cost of managing and disposing the materials used to clean and the materials removed from the culverts. Payment for cleaning culverts will be made only for those facilities designated in the contract documents. Only one payment for each length of facility will be made regardless of the number of times it is cleaned.

621-5.03 Cleaning Closed Drainage System. The unit price bid shall include the cost of all labor, materials, and equipment necessary to satisfactorily complete the work including the cost of managing and disposing the materials used to clean and the materials removed from the closed drainage system. Payment for cleaning closed drainage systems will be made only for those facilities designated in the contract documents. Only one payment for each facility will be made regardless of the number of times it is cleaned. Cleaning intermediate drainage structures at junction points within a closed drainage system shall be paid for under its respective item.

621-5.04 Cleaning Drainage Structures. The unit price bid for each shall include the cost of all labor, materials and equipment necessary to satisfactorily complete the work including the cost of managing and
CLEANING CULVERTS AND DRAINAGE STRUCTURES

disposing the materials used to clean and the materials removed from the drainage structures. Payment for cleaning drainage structures will be made only for those facilities designated in the contract documents. Only one payment for each facility will be made regardless of the number of times it is cleaned.

621-5.05 Cleaning, Grading and Shaping Existing Roadside Section. The unit price bid shall include the costs of furnishing all labor, material and equipment necessary to complete the work including the cost of disposing the materials removed from the roadside section and/or fill material to restore the shape.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
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<tbody>
<tr>
<td>621.01</td>
<td>Cleaning Culverts with Span of 50 in. or Less</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>621.02</td>
<td>Cleaning Culverts with Span of More Than 50 in.</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>621.03</td>
<td>Cleaning Closed Drainage Systems</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>621.04</td>
<td>Cleaning Drainage Structures</td>
<td>Each</td>
</tr>
<tr>
<td>621.05</td>
<td>Clean, Grade and Shape Existing Roadside Section</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>621.11</td>
<td>Cleaning Culverts (Contaminated Material) with Span of 50 in. or Less</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>621.12</td>
<td>Cleaning Culverts (Contaminated Material) with Span of More Than 50 in.</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>621.13</td>
<td>Cleaning Closed Drainage Systems (Contaminated Material)</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>621.14</td>
<td>Cleaning Drainage Structures (Contaminated Material)</td>
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<tr>
<td>621.15</td>
<td>Clean (Contaminated Material), Grade and Shape Existing Roadside Section</td>
<td>Linear Foot</td>
</tr>
</tbody>
</table>
Make the following changes to the Standard Specifications dated May 1, 2008:
Page 609 - 614, **Delete** Section 625 in its entirety and **Replace** it with the following:

**SECTION 625 - SURVEY OPERATIONS**

**625-1 DESCRIPTION**

**625-1.01 General.**
Some survey work is required be completed under the direction of a Land Surveyor or Professional Engineer in accordance with the professional license requirements contained in NYS Education Law.

**625-1.02 Survey Operations.**
This work shall consist of providing all necessary survey work to establish, spatially position, and verify the locations of existing and proposed terrain features and measure quantities of items in accordance with the contract documents or as directed by the Engineer. This work includes but is not limited to the establishment, reestablishment or localization of primary and secondary control, the stakeout or layout of proposed features, the initialization, calibration and navigation of automated equipment operations, the location or verification of existing terrain or of constructed features, the verification of geospatial data for proposed construction work and the coordination and sharing of engineering data with the Department or other contract stakeholders.

**625-1.03 Right of Way Markers.**
This work shall consist of furnishing, installing and certifying right of way markers at the positions described on the right of way appropriation maps, in accordance with the contract documents and the Standard Sheet.

**625-1.04 Permanent Survey Markers.**
This work shall consist of furnishing, installing, and certifying permanent survey markers in accordance with the details shown on the appropriate Standard Sheet.

**625-1.05 Supplemental Site Survey.**
This work shall consist of providing all necessary field survey and terrain mapping necessary to locate, spatially position, verify and digitally map the locations of existing above or below ground terrain features as described in the contract documents or as directed by the Engineer. The limits of this supplemental survey will be described in the contract documents.

**625-1.06 GPS Inspection Units.**
This work shall consist of furnishing, configuring, installing, maintaining and removing Global Positioning System (GPS) units as needed for use by the Engineer and their inspection staff, including the training of the Engineer and their representatives on the use of the GPS units provided.

**625-2 MATERIALS**

**625-2.01 General.** None specified.

**625-2.02 Survey Operations.** None specified.

**625-2.03 Right of Way Markers.**

**A. Concrete Right of Way Markers.**
Concrete ROW Markers shall conform to the requirements of §712-05 Precast Concrete Right-of-Way Markers, and shall be in accordance with the details shown on the Standard Sheet.

**B. Steel Pin and Cap Right of Way Markers.**
SURVEY OPERATIONS

Reinforcing steel used for the shank shall conform to ASTM A615, Grade 300 or Grade 420. It shall be epoxy coated for its entire length in accordance with §705-14 Longitudinal Joint Ties or §709-04 Epoxy Coated Bar Reinforcement.

The cap shall be aluminum or a corrosion resistant aluminum alloy. The cap shall weigh a minimum of 50 grams and fasten to the shank by means of threading or force fitting.

A commercial grade silicone sealant shall be used between the cap and the shank. Steel Pin and Cap-Type Markers shall be anchored into rock using Concrete Grouting Material meeting the requirements of §701-05 Concrete Grouting Material.

625-2.04 Permanent Survey Markers.
The concrete shall meet the requirements of Class A Concrete in Section 501 Portland Cement Concrete--General, except that the requirements for inspection facilities, automated batching controls and recordation do not apply. The batching, mixing and curing methods and the inspection facilities shall meet the approval of the Department. The Contractor may submit for approval by Director, Materials Bureau, a mix at least equivalent to Class A Concrete.

625-2.05 Supplemental Site Survey. None specified.

625-2.06 GPS Inspection Units.
Each GPS Unit shall include all necessary components, communication devices, integrated antennae and receiver, controller and/or data collector, cables, software, operating manuals, attachments, and fastening hardware to meet the minimum requirements described below.

A. All GPS Inspection Units.
1. All GPS units provided for a single contract shall be of the same model and manufacturer; and shall include, and be licensed to operate, the same versions of GPS planning software, data collection software, navigation software, stakeout software and post processing software. All software provided (including firmware) shall be the most current available from the manufacturer at the time of delivery of the GPS units. GPS units should be of the same manufacturer as those used by the Contractor. GPS units shall not be more than 2 years old from the date of manufacturing to the time of delivery. To verify the age of the GPS units, the Contractor shall provide a dated copy of the manufacturer’s receipt(s) for the purchase, lease or rental of the units.
2. GPS units shall include both standard USB cable and Bluetooth wireless technology for data transfer.
3. Data shall be capable of being copied onto or from a removable industry standard data storage card (eg: secure digital SD Card). Each GPS Unit shall include 2 data storage cards, each with a minimum capacity of 4 GB.
4. GPS units shall include the ability to import/export and display point and alignment data which is in XML format, and also import graphics files which are in DGN or DXF format.
5. GPS units shall have an internal, or modular, rechargeable battery system capable of operating a minimum of 8 hours (may include interchangeable batteries), including the battery charger.
6. GPS units shall include a hard or soft shell carry case, and all appropriate operation manuals.

B. Survey Grade GPS Inspection Units.
1. GPS units shall be equipped to receive Global Positioning System (GPS), GLONASS and GNSS position data.
2. GPS units shall be equipped to receive, and be capable of utilizing, Real Time Kinematics (RTK) correctional data (current version of RTCM format) through internet protocol as provided from the NYS Continuously Operating Reference System (NYS CORS) Network. This shall include all necessary communication devices, repeaters and systems, data service plans and communications to meet the minimum required accuracy and not exceed a 2 second latency at the rover. Whichever communication method is utilized by the Contractor to broadcast the NYS CORS RTK correctional data, the Contractor shall ensure that the RTK data shall be available at all locations across the entire contract site during all hours of construction and inspection operations.
SURVEY OPERATIONS

3. GPS units shall include the capability to “localize” both the horizontal and vertical control to local project monumentation (also known as calibrate), while utilizing RTK corrections from a reference network.

4. GPS units shall include either an integrated or modular communication device capable of receiving RTK correctional data to satisfy the requirement of using NYS CORS RTK corrections.

5. GPS units shall have the ability to display the number of satellites tracked at any one time, and indicate the accuracy quality of each measurement relative to the strength of signals, and the GDOP (Geometric Dilution of Precision).

6. GPS Unit shall include dual frequency receivers.

7. Minimum Required Kinematic Accuracy relative to primary project control (CORS): Horizontal: 0.033 ft + 1.0 ppm; Vertical: 0.065 ft + 1.0 ppm

8. All necessary hardware and software shall be included (including communication drivers) to connect the GPS unit to a Department provided Tablet PC and communicate/exchange positional data with Bentley™ OnSite software. Firmware used on the GPS unit shall be verified as interoperable with Bentley™ OnSite software. If the firmware cannot be verified as being interoperable with Bentley™ OnSite, the next older version may be used.

9. The data controller shall permit the user to program and store multiple configurations (also known as user preferences) prior to the actual field measurements. Configurations shall be capable of being stored and recalled in the field.

10. GPS units shall include one fixed height rover rod of 6.56 feet in length, one attachable bipod which is compatible with the rover rod, and one topo shoe.

11. A GPS unit set up to operate as a base station shall include all necessary additional cables, hardware, fasteners or accessories necessary to install it in a fixed semi-permanent location, will not be considered as a rover unit, and therefore will not require a rover rod, a bi-pod, or a topo shoe.

C. Mapping Grade GPS Inspection Units.

1. Minimum Required Kinematic Accuracy: less than 3.0 feet in real time.

2. GPS units shall also provide standard support for the Wide Area Augmentation System (WAAS) position correction services.

625-3 CONSTRUCTION DETAILS

625-3.01 General.

A. Professional Responsibilities.

The following types of Survey Operations shall be completed by the Contractor under the direction of a Land Surveyor. This requirement is directly or indirectly associated with the professional license requirements contained in Article 145 of the NYS Education Law.

1. Establishment, reestablishment or localization of primary or secondary control which shall be used for:
   a. Establishing boundaries of new right of way appropriated for this contract.
   b. Location of property or highway boundary markers.
   c. Tie measurements to, or resetting of control points.

2. Location or resetting of existing highway and property boundary markers by reference ties to or from contract control to protect their integrity.

3. Establishment or certification of location of right of way markers and permanent survey markers.

The following types of Survey Operations shall be completed by the Contractor under the direction of either a Land Surveyor or Professional Engineer.

1. Establishment, reestablishment or localization of primary or secondary control which shall be used for:
   a. Establishing location for horizontal or vertical roadway alignment.
   b. Establishing location for the horizontal or vertical alignment of a structure.
   c. Establishing or localizing reference base station for Global Positioning System (GPS) control work.
2 Establishing new horizontal or vertical roadway alignment in the field from contract control either by conventional stakeout methods or by use of automated equipment operations.

B. Survey/Engineering Geospatial Data.

All establishments or reestablishment of contract primary or secondary control, and the survey collection of terrain data shall be performed in accordance with the standards and procedures required in the Department’s Land Surveying Standards and Procedures Manual. The Contractor shall incorporate the NYS CORS network into contract control to facilitate the use of GPS survey within the site and on the same datum by other project stakeholders, or to align with other adjacent projects.

When the Department provides electronic copies of engineering data to the Contractor, files should follow the standard file naming conventions listed in Appendix 14 of the Department’s Project Development Manual.

1. Existing Terrain Data. When an existing digital terrain model was developed during design and provided for construction purposes, and possibly updated during construction by supplemental survey, the Department and Contractor shall use that information as a basis from which to develop contract pay item quantities. The Contractor shall consider all existing terrain data supplied by the Department as being within acceptable tolerances, except where changes or additions have been approved by the Engineer. If the Contractor questions the accuracy of the existing terrain data provided, the Contractor may verify any or all portion(s) of the existing terrain model, at no additional cost to the State, in accordance with §105-10 Survey and Stakeout. All exceptions or discrepancies found with the supplied existing terrain data shall be brought to the attention of the Engineer, in writing, and terrain data modifications shall be mutually agreed upon and shared with both parties prior to beginning construction operations within those areas being modified. Changes to existing terrain data will not be accepted by the Department where existing terrain is verified to be within Departmental accepted positional tolerances in accordance with the Department’s Land Surveying Standards and Procedures Manual, or after the Contractor has disturbed the existing ground surface.

2. Proposed Data. When proposed digital terrain models (or surfaces), proposed alignments and proposed graphics were developed during design and provided for construction purposes, or revised during construction due to site changes or redesign, the Department and Contractor shall use that information from which to position and compute applicable contract pay item quantities and to field verify positional locations of constructed items. When the Contractor and Department agree to utilize the proposed digital terrain data (surface), alignments or graphics the Contractor shall first review its consistency with all other contract information, and review for any perceived physical conflicts or inconsistencies of information prior to using the data in the field for any construction purpose. All exceptions or discrepancies with the supplied data shall be brought to the attention of the Engineer, in writing, and terrain data, alignment or graphics modifications shall be approved by the Engineer prior to beginning construction operations within those areas being modified. All approved changes shall be shared electronically with both the Department and the Contractor, and both parties shall acknowledge acceptance of such changes before beginning the work.

When proposed digital terrain model (or surfaces), alignments or graphics are not provided by the Department, the Contractor may choose to develop their own terrain model surfaces from the contract plans to facilitate their use of Automated Machine Guidance, at no additional cost to the State. A request by the Contractor to use Automated Machine Guidance shall be made as part of the Contract Control Plan. The Contractor developed terrain model surfaces shall be shared with the Engineer in a Department accepted format prior to beginning construction operations. Generation of proposed terrain model surfaces or other electronic engineering data does not constitute a redesign of the project, and the Contractor retains all responsibility to complete the work in accordance with the engineering intent conveyed in the contract documents unless otherwise agreed to in writing by the Engineer.

625-3.02 Survey Operations.

All Survey Operations shall follow either Traditional Survey Stakeout or Automated Stakeout and Automated Machine Guidance Operations, or a combination of both, for the establishment, positioning, equipment guidance or
verification of construction items. The proposed method shall be approved by the Engineer as part of the Contract Control Plan prior to beginning any field construction operations. Both methods include the same basic requirements that: (1) both parties (Contractor and Department) utilize the same contract control, the same existing terrain data, and the same proposed feature data; (2) both parties utilize the same accuracy and tolerance limits; and (3) both parties utilize equivalent survey verification techniques to ensure that field features are constructed as proposed.

The Contractor shall establish the center line of bearings for all bridge abutments and piers, by setting offset hubs or reference points, so located and protected to ensure they remain undisturbed until such time as they are no longer needed. The Contractor shall mark the location of anchor bolts to be installed, establish the elevation of bearing surfaces and check bearing plates to ensure installation at their proper elevation. Before the erection of structural steel or concrete beams the Contractor shall verify the locations, both vertically and horizontally, of all bearings and the distances between associated bearings. Control used to establish center line of bearings shall be included in the contract control plan.

On contracts which include proposed and existing roadway alignments and profiles, the Contractor shall verify the roadway tie-in locations of where existing and proposed alignments meet prior to beginning construction operations and report the results to the Engineer. This requirement is intended to verify that no changes have occurred to the existing roadway and that the proposed design is buildable as designed.

A. Contract Control Plan.

The Contractor shall develop and submit a Contract Control Plan for all contracts which include the contract pay item for Survey Operations. Contract control includes all statewide or local primary and secondary horizontal and vertical control which will be used for the geospatial positioning of work items. Upon the Contractor’s completion of initial survey reconnaissance and control verification, but prior to beginning primary field operations, the Contractor shall submit a Contract Control Plan document which is to be signed and sealed by a Land Surveyor or Professional Engineer in accordance with §625-3.01. Professional Responsibilities, for acceptance by the Engineer. The Contract Control Plan shall include the below listed required control information and follow the acceptance procedure.

All revisions or additions to contract control for the purpose of stakeout or layout of proposed work items shall be provided in writing to the Engineer prior to beginning that revised portion of stakeout or layout work.

1. Acceptance Procedure.
   a. The Contractor shall document required information and submit electronically to the Engineer at least 10 work days prior to beginning field operations.
   b. The Engineer will coordinate review with the Regional Land Surveyor and provide comments.
   c. Upon acceptance of the procedure by the Engineer, the Contractor shall submit 2 signed and sealed copies to the Engineer.

2. Control Information.
The Contractor shall list the following control information (tabular format is acceptable):
   a. All contract control shown in the contract documents or in the Survey Control Report. Note: The NYS CORS Network provides primary control for most Department contracts.
   b. The following elements shall be submitted for all contract control points or benchmarks:
      (1) Recovered in the field and did it appear undisturbed?
      (2) Contract indicated coordinate or elevation.
      (3) Field determined coordinate or elevation.
      (4) Contractor adjusted coordinate or elevation, if necessary.
      (5) Point or benchmark intended to be used for construction purposes.
   c. Adjustment method is used to balance or adjust the control (ex: Compass Rule for Baseline or Calibration Report for GPS, etc). Attach a copy of the adjustment/calibration report.
   d. Control network diagram (drawn to a legible scale) with roadways indicated.
   e. New York State Plane Coordinate System (NYSPCS) Zone utilized.
   f. Horizontal Datum used.
   g. Vertical Datum used.
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h. Combined Factor used to account for the ellipsoidal reduction factor and the grid scale factor.
i. Additional (new) control is anticipated to be needed and where will they be set?
j. When a GPS base station(s) is utilized on a project either for inspection or stakeout, provide the determined coordinate and elevation value of the station, and the datum differential from that localized value to a NYS CORS determined value.

3. Methods or Procedures.
The Contractor shall document and provide the following survey information on methods or procedures to be used:

a. Survey method used to verify the control (ex: Total Station, GPS/RTK, Auto Level, etc).
b. Survey method(s) used to stakeout which types of proposed features.
c. Survey method(s) used to stakeout proposed ROW Markers.
d. Survey method used for stakeout of proposed bridge structures (if applicable). How will control be set up and maintained around the bridge(s)?
e. Proposed manufacturer, model and software version for GPS Inspection Units.
f. Automated Machine Guidance (AMG) proposed for use on this contract.
g. Type and frequency of quality control measures included to maintain the proper calibration and adjustment of the AMG systems.
h. If GPS will be used for stakeout or for AMG, will the NYS CORS Network be used as its reference network or will base station(s) be used?
i. If a base station is to be used, describe the mounting location, attachment technique, and instrumental protection included which ensures a sound and reliable reference station will be provided.

B. Traditional Survey Stakeout.
The Contractor shall field locate all features to be constructed from survey control points which are identified in the Contract Control Plan. Any error, apparent discrepancy or absence in the data shown or required to appropriately accomplish the stakeout survey shall be referred to the Engineer immediately for interpretation when such is observed or required.

The Contractor shall place two offset stakes or references points along the center line at maximum intervals of 50 feet and at such intermediate locations as required to determine location and direction. From computations and measurements made by the Contractor, these stakes shall be clearly and legibly marked with the center line station number, offset and cut or fill from which the establishment of the centerline location and elevation can be determined. If markings become illegible for any reason the markings shall be restored by the Contractor. The Contractor shall locate and place all cut, fill, slope, fine grade, or other stakes and points for the proper progress of the work with a maximum station spacing of 50 feet. All control points shall be properly protected and flagged for easy identification.

The Contractor shall be responsible for the accuracy of the work and shall maintain all applicable reference points, stakes, etc. Damaged or destroyed reference points or bench marks made inaccessible by the progress of the construction shall be replaced or transferred by the Contractor. All control points shall be referenced by ties (4 minimum) to specific points on acceptable objects and recorded. Any alterations or revisions in the ties shall be so noted and the information furnished to the Engineer. All stakeout survey work related to highway control shall be referenced to the control line (or survey baseline) shown in the contract documents. Computations and survey notes necessary to establish the position of the work from control points, shall be made and maintained in a neat, legible and acceptable format by the Contractor. Computations, survey notes and other survey information shall be made available to the Engineer within 3 work days from the request. The Engineer may check all or any portion of the stakeout survey work or notes made by the Contractor. Such checking by the Engineer shall not relieve the Contractor of any responsibilities for the accuracy or completeness of the work.

Should the Contractor choose automated methods for the establishment, layout, measurement, equipment guidance or verification of work to be constructed, they shall submit their proposed automated methods including quality control measures as part of their contract control plan for acceptance by the Engineer. When
utilizing these methods, all horizontal and vertical survey control, roadway alignment control, existing terrain data and proposed design engineering data shall be shared/exchanged electronically and kept current between the Contractor and the Engineer. All original version files of electronic contract data shall be maintained and stored by the Department. Prior to beginning field operations, the Contractor and Engineer shall mutually determine acceptable uses of and procedures for the technology being used, and how data can be exchanged for use in stakeout, automated machine operations, positional verification, quantity measurements and calculations. All record copies of engineering data shall be stored and shared in Department accepted standard formats, and shall be derived primarily from the original electronic data, when provided by the Department.

Automated survey operations have a high reliance on accurate control networks from which to make measurements, establish positions, and verify geospatial locations of features. Therefore, a strong contract control network in the field which is consistent with the project control used during the design of the contract is essential to the successful use of these technologies with the proposed digital terrain model and alignments. Consistent and well designed site calibration (localization) for all automated machine guidance, as described above under Contract Control Plan, is required to ensure the quality of the contract deliverables. The Contract Control Plan is intended to document which local horizontal and vertical control will be used for calibration during construction operations and how that calibration or adjustment will be maintained along the entire contract length. Continued incorporation of NYS CORS Network is essential to maintaining the integrity of positional locations and elevations of features.

The Engineer may perform quality assurance verifications of feature positions at any time during the contract. Dimensional tolerances shall hold a higher order of precedence than positional tolerances, but both may require verification. Quality assurance activities by the Engineer will not relieve the Contractor of any responsibilities for the quality control of the accuracy or completeness of the work.

The Department’s verification of the positional locations of features, calculation and merging of supplemental terrain data surfaces, and the measurement and calculation for quantity payments will be performed using Department standard software. Both the Contractor and the Department shall utilize the following standards: (1) All terrain data collected for the purpose of being used for or merged with Department provided terrain data for the calculation of pay quantities shall be delivered in a format and correctly display in accordance with the current Departmental CADD Standards. (2) The Department will maintain record copies of electronic data files which will be available to the Contractor using the Department’s designated file management system or other method. This will ensure that both parties utilize the same credible data from which to establish locations and measure quantities. The Department will provide all available CADD resource files for use by the Contractor.

The Contractor may choose to introduce an additional new automated survey method or technology which involves a new technique for positioning features, measuring quantities, or verifying constructed locations. The quality and accuracy of this data produced by this method shall be demonstrated to the Engineer, for acceptance, by a comparison of this method to previously accepted techniques over a mutually agreed upon portion of the work. The new technology shall meet or exceed the quality and accuracy results provided by previously accepted techniques, and the Engineer shall make the final determination as to the acceptability of its use based on the resulting performance, cost savings, safety and effectiveness of the operation. Previous uses of this same method on other contracts or by other contractors are not acceptable evidence of a technology’s viability, due to inherent variations in operator’s experience levels, data availability, changing field conditions and differing technologies.

625-3.03 Right of Way Markers.

The Contractor shall verify with the Engineer that it has the most current vested Right of Way Acquisition Maps to determine the geospatial positions of all proposed right of way markers. Right of way markers are indicated in the contract for approximate locations and quantities, and shall not be positioned according to the contract information, but rather by the positions shown for the equivalent points on the ROW Maps.

Right of way marker locations shall be determined under the direction of a Land Surveyor from a closed traverse or GPS network which is included in the contract control plan and in accordance with Federal Geographic Data Committee (FGDC) C2-II, Second-Order, Class II (1 part in 20,000) accuracy, ensuring a local accuracy of 0.065 ft as described in the Department’s Land Surveying Standards and Procedures Manual.
The Contractor shall install right of way markers at the station/offset positions specified on the vested Right of Way Acquisition Maps in accordance with the Standard Sheets to within an absolute positional tolerance of 0.065 ft relative to the primary project control network.

The Land Surveyor shall certify the as-built location of each installed right of way marker on certification forms provided by the Engineer, including contract information, and control line station and offset (proposed and as-built) to the marker. The record location of all right of way markers shall be recorded to the nearest 0.01 ft and reflect as-built coordinates from a closed traverse or GPS network which is included in the contract control plan and in accordance with FGCC C2-II, Second-Order, Class II (1 part in 20,000) accuracy.

Prior to placing the cap on a steel pin right of way marker, the cap shall be filled 2/3 full of silicone sealant and then fastened to the bar by threading or by force fit. During the driving operation for the steel pin right of way marker, the lettering on the cap shall be protected by the use of a metal sleeve or cushion block. The marker shall be driven so that the cap is flush with the ground surface.

625-3.04 Permanent Survey Markers.

The Contractor shall install permanent survey markers in accordance with the standard sheet at locations described in the contract documents and approved by the Engineer prior to installation. The Engineer will provide the Contractor with the sequential numbering required on the permanent survey marker caps in coordination with the Regional Land Surveyor.

The Contractor shall provide the as-built location of each installed permanent survey marker on certification forms provided by the Engineer, including contract information, as-built NYSPCS values, control line and centerline station and offset to the marker, distance and direction to adjacent markers, the elevation of the marker, and a sketch which shows the relative positions to the control line points, four physical ties to the markers, and a north arrow. The certification form shall be sealed and signed by a licensed Land Surveyor. The record location of all permanent survey markers shall be recorded to the nearest 0.01 ft and reflect as-built coordinates from a closed traverse or GPS network which is included in the contract control plan and in accordance with FGCC C2-II, Second-Order, Class II (1 part in 20,000) accuracy as described in the Department’s “Land Surveying Standards and Procedures Manual.”

625-3.05 Supplemental Site Survey.

The Contractor shall perform supplemental site survey work in accordance with §625-3.01 General and §625-3.02. Survey Operations. The limits of the survey and mapping and the need for property line or right of way determination shall be as described in the Special Note entitled Supplemental Site Survey Requirements. Changes to the contract established limits by the Engineer shall be considered changes to the scope of work. The work shall include:

1. The Engineer shall determine what level of detailed information may need to be added to the Contract Control Plan for a supplemental site survey. Significant additional requirements will be considered extra work.
2. For new locations, a minimum of 3 inter-visible horizontal control points and 2 benchmarks shall be set at each site.
3. All survey control and terrain data collection shall be performed in accordance with the standards and procedures required in the Department’s Land Surveying Standards and Procedures Manual.
4. Survey shall include all readily identifiable surface and subsurface utilities, including, but not limited to drainage, sanitary, water supply, gas, electric and telephone. The Contractor shall contact the appropriate one call center to identify all underground utilities so they can be marked in the field at each site prior to survey.
5. If property or right of way markers are found inside of or within 30 ft of the survey limits, they shall be located and described as part of the survey.
6. For traffic signal intersection work, elevations of above-ground utilities at the poles and at sag points shall be provided for primary and secondary electric lines, telephone lines and cable television lines. Utility poles shall be identified, including pole numbers. The next pole by number, and next manhole or valve. Sign inventory shall include only a type designation (e.g. stop sign, no parking sign, etc.) without MUTCD code, or a brief description of a private sign.
7. For underground utility surveys, the horizontal positions and vertical elevations of all exposed public and private utilities within the described limits shall be located, mapped and appropriately identified by the
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Contractor according to the utility’s identification. Horizontal positions and vertical elevations shall be determined from project control to within 2 inches of its absolute location. Linear utilities shall be located at all bend or angle points, junctions or termini, and at a spacing of no more than 50 feet.

8. Copies of original survey field data, tie diagrams, and control diagrams shall be provided in Department accepted formats.

9. All terrain mapping deliverables (DGN & DTM) shall conform to the requirements included in Chapter 20 and 22 of the Department’s *Highway Design Manual*.

10. File naming convention shall conform to standards listed in Appendix 14 of the Department’s *Project Development Manual*.

**625-3.06 GPS Inspection Units.**

The Contractor shall furnish, configure, install, maintain and remove the GPS units, and provide the Engineer and/or their representatives with training on the operation of the GPS units. The Contractor shall ensure all GPS units are fully operational and training has been provided before construction begins.

All projects shall utilize the NYS CORS as the spatial reference datum network from which RTK corrections are derived. The Contractor shall choose which communication technique and devices will be used which will insure the consistent and reliable delivery of RTK correctional data from the NYS CORS to the GPS units. When geographic location or lack of a reliable communications network prohibits the use of the NYS CORS, the Engineer may approve the use of a Survey Grade GPS Inspection unit as a base station in place of the NYS CORS, which will be paid for separately. The Contractor shall semi-permanently mount the base station in a stable and secure location where it shall not be disturbed by construction activities nor be easily damaged by vandalism and where it shall be capable of providing radio signal coverage over the entire contract area. If the base station cannot broadcast a signal that covers the entire site, the Contractor shall provide adequate repeater radios or other communications. A GPS unit installed as a base station for inspection operations shall only be moved with the approval of the Engineer.

The GPS units shall be maintained and remain in service until either: (a) a maximum of one week after the Engineer requests its removal in writing, or (b) the State relinquishes the Engineer’s Field Office. The Contractor shall maintain all GPS units and software in good working condition and shall provide replacement due to breakdown, damage, or theft within 2 work days. The Contractor shall retain ownership of all supplied GPS units at the end of the contract.

**A. GPS Training Provisions.**

1. For all GPS units, the Engineer and/or their representatives shall be provided with a minimum of one 8 hour training session for GPS localization/calibration of the contract site.

2. For all Survey Grade GPS units, the Engineer and/or their representatives shall be provided with a minimum of two separate 8 hour minimum training sessions on the use and operation of the GPS units during the first year of the contract. One of these two sessions shall occur within one week of delivery of GPS units to the site. The second of the two classes shall occur upon the request of the Engineer. One additional 8 hour minimum training session shall be provided during each additional contract year that the GPS units are in service.

3. For all Mapping Grade GPS units, the Engineer and/or their representatives shall be provided with a minimum of one training session during the first year of the contract, being at least 8 hours in length, and to occur within one week of delivery of GPS units to the site. This training shall be separate from the Survey Grade GPS Unit training.

4. All training shall be performed by a manufacturer-verified trainer who is approved by the Engineer. The training shall occur at the Engineer’s Field Office or at a location agreed to by the Engineer.

**625-4 METHOD OF MEASUREMENT**

**625-4.01 General.** (Vacant)

**625-4.02 Survey Operations.** This work will be measured on a lump sum basis.
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625-4.03 Right of Way Markers. The quantity to be measured for payment will be the number of right of way markers installed.

625-4.04 Permanent Survey Markers. The quantity to be measured for payment will be the number of permanent survey markers installed.

625-4.05 Supplemental Site Survey. This work will be measured on a lump sum basis for each site location.

625-4.06 GPS Inspection Units. The quantity to be measured for payment will be the number of GPS Inspection units provided.

625-5 BASIS OF PAYMENT

625-5.01 General. (Vacant)

625-5.02 Survey Operations. The price bid shall include the cost of furnishing all labor, materials and equipment necessary to satisfactorily complete the work, including preparation of the contract control plan. Progress payments will be made in proportion to the amount of work completed.

625-5.03 Right of Way Markers. The unit price bid shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work. Payment will be made after the complete and proper installation of the marker, receipt of the certification form by the Engineer, and after approval of the certification by the Regional Land Surveyor.

625-5.04 Permanent Survey Markers. The unit price bid shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work. Payment will be made after the complete and proper installation of the marker, receipt of the certification form by the Engineer, and after approval of the certification by the Regional Land Surveyor.

625-5.05 Supplemental Site Survey. The price bid shall include the cost of furnishing all labor, materials and equipment necessary to satisfactorily complete the work. Payment will be made upon the satisfactory submission of the completed and certified mapping deliverables. Substantive additions to the work limits described in the contract will be considered extra work.

625-5.06 GPS Inspection Units. The unit price bid shall include the cost of labor, materials and equipment necessary to satisfactorily complete the work, including the cost of the required training and necessary maintenance.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>625.01</td>
<td>Survey Operations</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>625.03</td>
<td>Concrete Right of Way Markers Type H (High)</td>
<td>Each</td>
</tr>
<tr>
<td>625.04</td>
<td>Concrete Right of Way Markers Type L (Low)</td>
<td>Each</td>
</tr>
<tr>
<td>625.05</td>
<td>Steel Pin and Cap Right of Way Markers</td>
<td>Each</td>
</tr>
<tr>
<td>625.06</td>
<td>Permanent Survey Markers</td>
<td>Each</td>
</tr>
<tr>
<td>625.07mmm</td>
<td>Supplemental Site Survey</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>625.11mmm</td>
<td>Survey Grade GPS Inspection Unit</td>
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</tr>
<tr>
<td>625.12mmm</td>
<td>Mapping Grade GPS Inspection Unit</td>
<td>Each</td>
</tr>
</tbody>
</table>
SECTION 637 ENGINEER’S FIELD OFFICE, LABORATORY AND EQUIPMENT

Make the following changes to the Standard Specifications dated May 1, 2008:

Page 622 Delete SECTION 637 – Engineer’s Field Office, Laboratory and Equipment in its entirety, and Replace it with the following:

SECTION 637 - ENGINEER’S FIELD OFFICE, LABORATORY AND EQUIPMENT

637-1 DESCRIPTION. This work shall consist of providing, furnishing and maintaining an Engineer’s Field Office and a Field Laboratory in good working condition and appearance for the exclusive use of, and occupancy by the inspection staff. The buildings shall be habitable environments, readily accessible to the public and free of any recognizable health or safety hazards. The work shall also consist of providing and maintaining equipment for use by the inspection staff.

637-1.01 Engineer’s Field Office. This work shall consist of providing for the Engineer’s use a building, or a portion thereof, or a modular trailer of a specified type erected at a location approved by the Engineer.

637-1.02 Field Laboratory. This work shall consist of providing a Field Laboratory for soils and materials testing at a location approved by the Engineer.

637-1.03 Concrete Cylinder Curing Box. This work shall consist of providing a concrete cylinder curing box.

637-1.04 Digital Camcorder. This work shall consist of providing and maintaining a fully operational digital camcorder system.

637-1.05 Rain Gauge. This work shall consist of providing and maintaining a wireless rain gauge system.

637-1.06 Inspection Vehicle. This work shall consist of providing and maintaining motor vehicle(s) for exclusive use by the Engineer and the Inspection Staff.

637-1.07 Inspection Boat. This work shall consist of providing and maintaining a motorized boat for exclusive use by the Engineer and the Inspection Staff.

637-1.08 Office Technology Supplies. This work shall consist of providing technology-related materials and supplies for use by the inspection staff.

637-1.09 Construction Testing Supplies - Consumables. This work shall consist of providing consumable testing supplies to be used by inspection staff.

637-1.10 Partnering Workshop. This work shall consist of a partnering workshop coordinated and facilitated by an independent facilitator. The Department and the Contractor will share the cost of the partnering workshop equally.

637-2 MATERIALS.
637-2.01 Engineer’s Field Office. The Engineer’s Field Office shall be within a secured, weatherproof building or mobile trailer. If two or more mobile trailer units are provided, they shall be joined with weatherproof connections. Mobile trailers shall be in new or like new condition. The Contractor may furnish equivalent facilities in an existing building, provided that the building is located to provide convenient service. The Contractor shall supply the Engineer with a copy of the Certificate of Occupancy for the existing building.

The Engineer’s Field Office shall be in accordance with the requirements of the New York State Uniform Fire Prevention and Building Code, 19 NYCRR, and any applicable local codes.

The electrical system shall be able to continuously operate all equipment and be provided with adequate receptacles. To accommodate computer equipment, the field office shall be provided with a dedicated 20 amp electrical service and a vacant floor-to-ceiling area with a 3 foot x 3 foot footprint along a wall for the installation of a computer hardware rack/cabinet. Electric light shall be provided by non glare-type luminaries to provide a minimum illumination level of 100 foot-candles at desk-height level. An ambient air temperature of 70°F ±5°F shall be maintained.

Fire extinguishers and smoke and carbon monoxide detectors shall be provided and installed.

The Engineer’s Field Office shall be partitioned to provide separate rooms, defined as either “small” or “large”, with adjoining doors. Table 637-1 below contains the minimum area requirements for each of the office types.

<table>
<thead>
<tr>
<th>Physical Requirement</th>
<th>Engineer’s Field Office Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Min. total floor area (sf)</td>
<td>530</td>
</tr>
<tr>
<td>Min. number of small rooms</td>
<td>2</td>
</tr>
<tr>
<td>Min. floor area of small rooms (sf)</td>
<td>100</td>
</tr>
<tr>
<td>Min. number of large rooms</td>
<td>1</td>
</tr>
</tbody>
</table>

A. Potable Water. From a local municipal water supply, certified well or bottled with a heating/refrigerator unit to provide hot and cold water. An exterior frost-free hose bib shall be provided in a location adjacent to the Engineer’s Field Office. The hose bib need not be installed on a potable water line, and if the water in the line is not potable, it shall be clearly marked as such.

B. Restroom. A separately enclosed room, lockable from the inside, that is properly ventilated and in compliance with applicable sanitary codes. The Contractor shall provide all lavatory amenities, necessary paper and soap products, hot and cold running water and a toilet. The toilet shall be flush-type where sanitary facilities are available, and a type approved by the Engineer prior to installation where sanitary facilities are not available. The minimum required number of restrooms to be provided is specified in Table 637-2.

C. Parking Area. The Contractor shall provide and/or construct paved or hard surfaced (gravel or bankrun material) secure parking area with dedicated parking spaces adjacent to the Engineer’s Field Office. Each parking space shall be 9 feet by 18 feet, and the minimum required number of spaces to be provided is specified in Table 637-2.
SECTION 637 ENGINEER’S FIELD OFFICE, LABORATORY AND EQUIPMENT

D. Field Office Signs. The sign panel material shall be aluminum, fiberglass, plywood or lightweight plastic. The sign sheeting shall be ASTM Type III. The sign panel shall be 36 inches high by 48 inches wide with white legend on green background with the phrases as positioned and described below. If erected at a location where the sign might be struck by an errant vehicle, the sign support shall be a breakaway type.

The letters in the phrase “FIELD OFFICE” shall be 6 inches C series with the top of the letters 6 inches below the top of the panel. The letters in the phrase “ENGINEER-IN-CHARGE” shall be 6 inches B series with the top of the letters 18 inches below the top of the panel. The letters in the phrase “N.Y.S. DEPT. OF TRANSPORTATION” shall be 1 1/2 inches E series with the top of the letters 30 inches below the top of the panel. All phrases shall be centered horizontally on the panel.

If the Engineer’s Field Office is not located within or adjacent to the contract limits, two additional signs shall be displayed conspicuously within the contract limits. The signs shall be similar to the above description, except that they shall be 48 inches high by 64 inches wide and have an additional bottom line of text containing the street address of the Engineer’s Field Office. The letters in the street address shall be 6 inch B series with the top of the letters 36 inches below the top of the panel and centered horizontally on the panel.

E. Mailbox. Standard mailbox (with post if necessary) or post office box meeting the requirements of the U.S. Postal Service.

F. Telephone and Answering System. A separate telephone and answering system for the exclusive use of the inspection staff. The minimum required number of telephone voice lines to be provided is specified in Table 637-2 (these lines are in addition to the separate line to be provided for the facsimile machine, and one of these lines must be made available for remote troubleshooting of computer equipment, if necessary). The telephone and answering system shall provide the ability to answer all voice lines from each voice line, transfer calls to all voice lines and be equipped with a single, dedicated answering system.

A minimum of one telephone shall be cordless and a minimum of one telephone shall be equipped with speaker and conference call capability. The remaining telephones, at least one per required voice line, shall be extension telephones with minimum 25 foot long cords. The answering system shall be capable of recording outgoing messages up to 60 seconds long and receiving a minimum of 40 incoming messages of 60 seconds duration. The system must include automated voice marking of time and day of each message received and provide a message mark so that new messages may be played back without erasing old messages. The system shall include remote programming of playback, backspace, and outgoing message re-record and allow for the retrieval of messages without a remote control unit.

G. Facsimile Machine. Plain paper laser or inkjet facsimile machine with a dedicated telephone line. The machine shall be capable of sending and printing a maximum paper size of 8 1/2 x 14 inches, have a minimum 20 page memory storage, a minimum 20-sheet document feeder, a minimum 50-sheet paper capacity, transmit at least 6 pages per minute and have an autodial/redial with a minimum of 50 phone number memory. The machine shall be capable of storing and printing outgoing message confirmation information and printing the sender’s name, fax number and page number on incoming faxes.
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H. Photocopyer. Heavy duty, electric, dry-process photocopying machine. The machine shall be capable of duplex copying paper sizes of 8 1/2 x 11 inches, 8 1/2 x 14 inches and 11 x 17 inches, and have separate trays for each paper size. It shall have a document feeder, collator and the capability to reduce/enlarge copies between each paper size. One (1) case (5,000 sheets, 20 lb, white) of each paper size shall be provided as initial stock.

I. Paper Shredder. Automatic start, heavy duty cross-cut paper shredder. The shredder shall be able to receive 8 1/2 inch wide paper and shred a minimum of 15 sheets simultaneously along with CDs and staples.

J. Pencil Sharpener. Manual or electric pencil sharpener, minimum 1 per room.

K. Exterior Bulletin Board. An installed 4 foot x 8 foot weatherproof bulletin board in front of or adjacent to the Engineer’s Field Office. The bulletin board may be attached to an outside wall of the office. The location selected must be handicapped accessible and clearly visible.

L. Interior Bulletin Board. An installed, wall-mounted 4 foot x 6 foot bulletin board made of cork or similar material in a large room, and one 2 foot x 4 foot wall mounted bulletin board installed per room.

M. Dry Erase Board. Installed, wall-mounted 2 foot x 4 foot dry erase boards, minimum one per room.

N. Storage Locker. Metal or wood storage locker with shelves, a tumbler lock and 2 keys for the storage of survey, GPS and testing equipment. The total locker space footprint provided shall be a minimum of 9 square feet with a minimum height of 6 feet.

O. Fire Resistant Cabinet. Fire resistant, legal size filing cabinet with locks and 2 keys each, meeting the requirements of ANSI/UL Standard 72 for Insulated Filing Devices, Class 350-1 hour. Each office shall be provided with two 2-drawer cabinets, and the required number of additional 4-drawer cabinets as specified in Table 637-2.

P. Bookcase. Self-standing, 3-shelf metal or wood bookcase, approximately 4 feet high, 4 feet wide and 1 foot deep. The minimum required number of bookcases to be provided is specified in Table 637-2.

Q. Wastebasket. Minimum 7 gallon wastebasket, minimum one per desk.

R. Refrigerator. Electric, top-freezer type providing a minimum storage space of 15 cubic feet for Engineer’s Field Office Types 1 and 2, and a minimum storage space of 21 cubic feet for Types 3, 4 and 5.

S. Kitchenette. To include a minimum 1 cubic foot, 1,300 watt microwave oven, a sink with hot and cold running water with minimum dimensions of 15 inch x 15 inch x 6 inch deep, usable counter space with minimum dimensions of 5 feet long x 2 feet deep and cabinet space with minimum...
dimensions of 5 feet long x 1 1/2 feet deep x 2 1/2 feet high. If the water in the sink is not potable, it shall be clearly marked as such.

**T. Stove.** Electric, propane or bottle gas stove with a minimum of two burners adequate for rapid drying of soil samples, including fuel or electrical supply. A stove is required when a separate Field Laboratory is not included.

**U. First Aid Kit.** A Type III kit in accordance with ANSI Z308.1 Minimum Requirements for Workplace First Aid Kits. The minimum number of first aid kits to be provided is specified in Table 637-2.

**V. Thermometer.** A minimum-maximum thermometer displaying in degrees Fahrenheit and mounted with an external probe to give the temperature both indoors and outdoors.

**W. Coat Rack.** A metal or wood coat rack or closet capable of holding at least 4 coats. The minimum required number of coat racks to be provided is specified in Table 637-2. A single coat rack may be provided as long as it holds the minimum number of coats as per Table 637-2.

**X. Office Desk and Chair.** Fully assembled freestanding office desks and chairs. Each desk shall have a 5 feet long by 2 1/2 feet wide work surface and a height of 30 inches, at least 2 lockable drawers and include an adjustable shelf approximately 1 foot wide and no less than 2 1/2 feet long. Each desk shall also be provided with an adjustable chair with arms, 5 legs with casters and be adjustable from approximately 16 inches to 24 inches in height. Each desk shall have a dedicated electrical outlet receptacle. The required number of office desks and chairs to be provided is specified in Table 637-2.

**Y. Office/Conference Table.** Commercial-grade rectangular table with weather/spill resistant top a minimum of 8 feet long by 2 1/2 feet wide by 30 inches high. The minimum required number of office/conference tables to be provided is specified in Table 637-2.

**Z. Folding Chair.** Commercial-grade, folding steel chair with approximate overall dimensions of 30 inches high by 19 inches wide by 21 inches deep. The minimum required number of folding chairs to be provided is specified in Table 637-2.

**AA. Drafting Table.** Adjustable height, tilting top drafting table with brackets and legs and approximate dimensions of 6 feet long by 3 feet wide by 3 feet high. The minimum required number of drafting tables to be provided is specified in Table 637-2.

<table>
<thead>
<tr>
<th>TABLE 637-2  ENGINEER’S FIELD OFFICE FURNISHING REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Furnishing Description</strong></td>
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<tr>
<td>----------------------------</td>
</tr>
<tr>
<td>Restrooms</td>
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<tr>
<td>Parking spaces</td>
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<td>Telephone voice lines</td>
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<td>Telephone line for facsimile</td>
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<table>
<thead>
<tr>
<th>Item</th>
<th>Quantities</th>
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</thead>
<tbody>
<tr>
<td>Fire resistant cabinets (4-drawer)</td>
<td>2 3 4 6 8</td>
</tr>
<tr>
<td>Bookcases</td>
<td>5 7 10 12 16</td>
</tr>
<tr>
<td>First aid kits</td>
<td>1 1 1 2 2</td>
</tr>
<tr>
<td>Coat racks</td>
<td>1 2 3 4 5</td>
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<tr>
<td>Office desks and chairs</td>
<td>4 8 12 18 22</td>
</tr>
<tr>
<td>Office/conference tables</td>
<td>2 2 3 4 5</td>
</tr>
<tr>
<td>Folding chairs</td>
<td>4 6 8 10 15</td>
</tr>
<tr>
<td>Drafting tables</td>
<td>1 1 2 3 3</td>
</tr>
<tr>
<td>Drafting stools</td>
<td>2 2 4 6 6</td>
</tr>
<tr>
<td>Vertical plan filing racks</td>
<td>1 1 2 3 8</td>
</tr>
<tr>
<td>Roll file units</td>
<td>1 1 1 2 4</td>
</tr>
</tbody>
</table>

**BB. Drafting Stools.** Adjustable height stool with backrest. The minimum required number of drafting stools to be provided is specified in Table 637-2.

**CC. Vertical Plan Filing Rack.** Constructed of metal, capable of hanging up to 12 sets of plan drawings up to 3 feet x 4 feet in size, 12 hanging clamps included. The minimum required number of vertical plan filing racks to be provided is specified in Table 637-2.

**DD. Roll File Unit.** Twelve (12) compartments, each measuring approximately 6 inches x 6 inches. The minimum required number of roll file units to be provided is specified in Table 637-2.

637-2.02 Field Laboratory. The Field Laboratory shall be a secured, weatherproof room, building or mobile structure not less than 100 square foot floor area in size. The floor covering shall be linoleum, tile or other serviceable finish. A local exhaust system shall be provided. An ambient air temperature of $70^\circ F \pm 10^\circ F$ shall be maintained. The Contractor may furnish equivalent facilities in an existing building, provided that the building is located to provide convenient service. The Contractor shall supply the Engineer with a copy of the Certificate of Occupancy for the existing building.

The Field Laboratory shall be in accordance with the requirements of the New York State Uniform Fire Prevention and Building Code, 19 NYCRR, and any applicable local codes.

The electrical system shall be able to continuously operate all equipment and be provided with adequate receptacles. Where an electric hotplate or stove is provided, service shall be increased over 20 amperes by an amount equal to the rating of the device provided.

The Field Laboratory shall be sufficiently anchored to prevent damage from vibration caused by the laboratory equipment. Fire extinguishers and smoke and carbon monoxide detectors shall be provided and installed.

**A. Potable Water.** From an existing system or from an external 55 gallon (minimum) gravity-feed storage tank connected to the sink faucet and refilled as necessary.

**B. Sink.** A sink at least 36 inches long by 24 inches wide by 18 inches deep, equipped with water faucet and drain line.

**C. Counter.** A work counter next to sink at least 24 inches long by 24 inches wide.
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D. Cabinet. A storage cabinet or locker at east 2 feet square by 6 feet high, equipped with at least 4 shelves, a lock and 2 keys.

E. Table. A heavy duty work table not less than 8 feet long by 2 1/2 feet wide by 3 feet high.

F. Pedestal. A heavy wooden block for soil compaction tests, nominally 10 inches square by 12 inches high.

G. Stove. As specified in §637-2.01U.

H. Office Desk and Chair. As specified in §637-2.01Y.

637-2.03 Concrete Cylinder Curing Box. The concrete cylinder curing box shall be constructed of non corroding materials. A moisture proof seal shall be provided between the lid and body of the box. Provision for automatic control of water temperature to \(72^\circ F \pm 5^\circ F\) shall be made when the box is located in an uncontrolled environment. A bimetallic thermometer shall be inserted with its sensing element in the storage water. The thermometer shall be capable of being read from the outside without opening the box. The thermometer shall have minimum gradations of \(1^\circ F\) and shall be protected from damage. Electric utility connections shall be made in a lockable switch box securely attached to the outside of the curing box.

A rustproof wire or metal rack shall be set above the bottom of the box to support cylinders in an upright position. The rack and all temperature control elements shall be positioned to allow free circulation of water around the cylinders. A combination hose connection and drain shall be provided at the lower front edge of the box so that it may be drained or water may be circulated. A drain shall also be provided on the box in such a position that when open will drain water to within 1 inch over the top of the cylinders. All areas of the box shall be easily drained and accessible for cleaning.

The concrete cylinder curing box shall be capable of maintaining the required water temperature through an ambient air temperature range of \(-10^\circ F\) to \(+100^\circ F\). The box shall be capable of holding a minimum of nineteen (19) 6 inch x 12 inch cylinders. When filled with water, the box shall not leak enough so that the cylinders are exposed.

637-2.04 Digital Camcorder. The digital camcorder shall meet the requirements below. All necessary hardware, cables, operating manuals, and other pertinent media for all the components shall be provided, including connecting the camera to the office computer system. The camera must be able to download the video to a computer without any proprietary software having to be installed on the computer. The equipment shall be no more than one (1) year old. To verify the age of the equipment, the Contractor shall provide the Engineer with a dated copy of the receipt(s) for the purchase of the equipment. Once equipment has been provided, it does not require replacement, as long as it is serviceable.

- Records video in .avi and/or .mpg format
- Autofocus operation
- 2 1/2 inch LCD screen and optical viewfinder
- Equipped with Electronic Image Stabilization
- Low-light recording capable
- Time/date stamp on recording
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- AC adapter and all cables and connections necessary for computer interface
- Two rechargeable batteries (Lithium-Ion or NiMH) and charging unit
- Recording media to store 180 minutes of video footage
- Soft storage/carry case with shoulder strap

637-2.05 Rain Gauge. The wireless rain gauge system shall meet the requirements below. All necessary mounting materials and hardware, operating manuals and other pertinent media for the components shall be provided.
- Wireless remote transmission from outdoor weatherproof rainfall sensor to indoor display unit
- Self-emptying tipping bucket
- Display daily rainfall information and at least 9 day historical rainfall records
- Two sets of rechargeable batteries for each component and charging unit
- No computer software shall be necessary for rain gauge operation or rainfall data storage/viewing

637-2.06 Inspection Vehicle. The vehicles(s) provided shall not be over 4 years old or have over 35,000 miles on the odometer as of the delivery date. The supplied vehicle(s) shall be of such durability to carry occupants and equipment over rough terrain and contain sufficient weather protection for both the occupants and equipment. The vehicle(s) shall have sufficient cargo capacity to carry the equipment necessary for the work. The vehicle(s) shall be properly registered, maintained (including repairs, tires, lubrication, fuel, washing, etc.), and be provided with an owner’s policy of liability insurance in conformance with §107-06B. Insurance Requirements. The vehicle(s) shall be equipped with or meet the following minimum specifications:
- Manufacturer’s Standard 4 or 6 cylinder engine
- Automatic transmission
- Manufacturer’s Standard 4 wheel drive or all-wheel drive
- Power steering
- Air conditioning
- Manufacturer’s base level interior option
- Left, right and center mirrors
- Roof mount flashing yellow light
- All Standard Manufacturer equipment and accessories including spare tire, jack, owner’s manual, etc. shall be included with the vehicle(s), along with vehicle registration and insurance cards

637-2.07 Inspection Boat. The boat provided shall comply with the following minimum requirements:
- All required capacity, maximum horsepower, and identification plates shall be affixed in the manner required by Coast Guard regulations.
- The motor’s horsepower shall meet the rated requirements of the boat and be equipped with a forward, neutral, and reverse. The power train shall be equipped with an interlock so that the engine may not be started in gear. U.S. Coast Guard-approved fuel tanks shall be provided.
- All equipment required by Coast Guard regulations shall be provided for the boat. The equipment shall include, but not be limited to, the following:
  - Class B-1 fire extinguisher
  - Life jackets for all persons aboard
  - One anchor, Danforth-type or Navy stockless, suitable for the specified boat
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- Bailing device
- Power operated whistle or horn
- Visual distress signals
- Means for accessing work sites not accessible from land from the water (piers, floating equipment, etc.)
- Registration, licenses, and other legal requirements for boat operation shall be obtained by the Contractor and kept current by the Contractor for the length of time the boat is in operation.
- Dockage facilities shall be maintained by the Contractor and shall be constructed (if necessary) so that easy access to the boat is provided at all times under all tidal conditions.
- The Contractor shall maintain the boat in good, clean condition at all times as required. Fuel tanks shall be maintained full at all times.

A. Inspection Boat – Type A
- Boat lengths up to and including 18 feet
- The boat will be operated by an appropriately trained and certified member of the inspection staff.

B. Inspection Boat – Type B
- Boat lengths in excess of 18 feet
- An appropriately trained, certified and licensed operator shall be provided.

637-2.08 Office Technology Supplies. Materials as specified in the bid documents or by the Engineer.

637-2.09 Construction Testing Supplies – Consumables. Consumable testing materials as specified by the Engineer.

637-2.10 Partnering Workshop. None specified.

637-3 CONSTRUCTION DETAILS. The equipment, with the exception of the office technology supplies, shall be maintained by, and remain the property of, the Contractor.

637-3.01 Engineer’s Field Office. The Contractor shall be responsible, until use and occupancy is relinquished by the State, for any and all damage, direct or indirect, of whatever nature, occurring to the property of the State and property of the inspection staff which is kept in the Engineer's Field Office. The Engineer will provide the Contractor with a detailed list of items kept in the office, with corresponding dollar values, and will provide the Contractor with updates when something on the list changes. Non-State-owned property shall only be those items used in the performance of contract-related work activities. Such property shall be replaced within 30 days of the reported damages and would include any loss caused by, but not limited to, fire, theft, vandalism or malicious mischief. The Contractor shall not be responsible for items kept in the Engineer's Field Office that are not on this list.

The Contractor shall install the Engineer’s Field Office sign at a location approved by the Engineer. If the Engineer’s Field Office is not located within or adjacent to the contract limits, two (2) additional signs shall be displayed conspicuously within the contract limits in locations directed by the Engineer.

The Engineer’s Field Office shall be fully equipped and made available for use and occupancy by the inspection staff prior to the start of any contract work, and shall be made available after contract final acceptance as directed in writing by the Regional Construction Engineer.
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All furniture and equipment shall be fully assembled, operational, clean and serviceable. The Engineer’s Field Office shall be cleaned weekly or more often if required, and the timing of the cleaning operations shall be coordinated with the Engineer. The Contractor shall remove and dispose of all rubbish generated in the office and shall keep the office free from pests. The Contractor shall remove snow from all areas subject to vehicular circulation and parking.

After completion, all portable buildings or trailers, fencing, surfacing and utilities shall be removed from the location and the areas cleaned, loamed and restored as required.

637-3.02 Field Laboratory. The Contractor shall be responsible for any and all damage, direct or indirect, of whatever nature, occurring to the property of the State which is kept in the Field Laboratory. The Engineer will provide the Contractor with a detailed list of items kept in the laboratory, with corresponding dollar values, and will provide the Contractor with updates when something on the list changes. Non-State-owned property shall only be those items used in the performance of contract-related work activities. Such property shall be replaced within 30 days of the reported damages and would include any loss caused by, but not limited to, fire, theft, vandalism or malicious mischief. The Contractor shall not be responsible for items kept in the Field Laboratory that are not on this list.

The Field Laboratory shall be fully equipped and made available for use and occupancy by the inspection staff prior to the start of any contract work. Such use and occupancy shall be made available after contract final acceptance as directed in writing by the Regional Construction Engineer.

All furniture and equipment shall be fully assembled, operational, clean and serviceable. The Field Laboratory shall be cleaned weekly or more often if required, and the timing of the cleaning operations shall be coordinated with the Engineer. The Contractor shall remove and dispose of all rubbish generated in the laboratory and shall keep the laboratory free from pests.

After completion, all portable buildings or trailers, fencing, surfacing and utilities shall be removed from the location, the areas cleaned, loamed and restored as required.

637-3.03 Concrete Cylinder Curing Box. Prior to the placement of any structural concrete, the Contractor shall furnish the Engineer a concrete cylinder curing box and 2 locks with 2 keys for each lock. The locks shall fit each securing latch of the curing box. This concrete cylinder curing box shall remain exclusively available to the Engineer at a location approved by the Engineer. The Contractor shall provide and maintain all necessary utility connections to operate the curing box.

637-3.04 Digital Camcorder. The Contractor shall provide and maintain a digital camcorder system for the exclusive use of Department personnel and their authorized representatives. The digital camcorder shall be fully operational prior to the start of any contract work and the Contractor shall supply qualified instruction to the inspection staff regarding proper equipment operation. The Contractor shall provide replacement, due to breakdown, damage, loss, or theft within 24 hours of notification. The State may retain ownership of any data storage media, data storage containers and consumables.

637-3.05 Rain Gauge. The Contractor shall provide, install and maintain the wireless rain gauge system in accordance with the manufacturer’s instructions in a location approved by the Engineer. The Contractor shall make the system fully operational in a timely manner, at a minimum, prior to any soil disturbance at the site. The Contractor shall provide replacement due to breakdown, damage, loss, or theft within 24 hours of notification.

637-3.06 Inspection Vehicle. Prior to the start of any contract work, the Contractor shall make the
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inspection vehicle(s) available for inspection by the Engineer. The Contractor shall make arrangements for delivery to the site on the date specified by the Engineer. The vehicle(s) will be driven by the Engineer and other personnel authorized by the Engineer possessing a valid driver’s license.

The Contractor shall provide fuel, oil, proper maintenance, tires, and replacement parts as required to keep the vehicle(s) in safe operating condition, and undertake all repairs, including repairs arising from the vandalism, accidents or other damages. The Contractor shall either establish an account at a local gas station or provide the inspection staff with the monetary means to fuel the vehicles. If any vehicle requires maintenance or repairs which cannot be completed on the same day, a comparable replacement vehicle shall be provided while the vehicle is out of service. If the vehicle is lost or stolen, the Contractor shall replace the vehicle within 5 work days with a comparable vehicle.

637-3.07 Inspection Boat. The Contractor shall furnish the boat (and operator for Type B Inspection Boats) within 5 work days after written notification by the Engineer, and the boat (and operator for Type B Inspection Boats) shall, thereafter, be available at all times to the Engineer and other personnel authorized by the Engineer.

637-3.08 Office Technology Supplies. The Contractor shall provide office technology-related supplies for the exclusive use of Department personnel and their authorized representatives. The supplies shall be provided within 2 work days of the Engineer’s request, unless the Engineer agrees to a longer delivery time. The Department shall retain ownership of the technology-related materials and supplies.

637-3.09 Construction Testing Supplies - Consumables. The Contractor shall provide consumable testing materials for the exclusive use of Department personnel and their authorized representatives. The supplies shall be provided within 5 work days of the Engineer’s request, unless the Engineer agrees to a longer delivery time. The Department shall retain ownership of the consumable testing materials, both materials used and those materials unused for which the Contractor has been paid, at the completion of the contract.

637-3.10 Partnering Workshop. The Contractor and the Regional Construction Engineer will jointly select a facilitator and a location for the workshop. A list of potential facilitators is available from the Department. The facilitator shall present a one to two day Partnering Workshop for this contract between the time of award and the start of work. For long duration, multi year projects, a subsequent follow-up workshop may be convened, with the agreement of the Contractor and the Regional Construction Engineer, at an appropriate point during the progression of the work. The associated costs for this subsequent workshop will be reimbursed under this item.

637-4 METHOD OF MEASUREMENT

637-4.01 Engineer’s Field Office. The Engineer’s Field Office will be measured for payment as the number of months satisfactorily provided, measured to the nearest 0.25 months.

637-4.02 Field Laboratory. The Field Laboratory will be measured for payment as the number of units satisfactorily provided.

637-4.03 Concrete Cylinder Curing Box. The concrete cylinder curing boxes will be measured for payment as the number of units furnished and installed.
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637-4.04 Digital Camcorder. The digital camcorder will be measured for payment on a fixed price Dollars-Cents pay unit basis.

637-4.05 Rain Gauge. The rain gauge will be measured for payment as the number of units furnished and installed.

637-4.06 Inspection Vehicle. The inspection vehicle(s) will be measured for payment on a monthly basis, measured to the nearest 0.25 months.

637-4.07 Inspection Boat. The inspection boat will be measured for payment on a monthly basis, measured to the nearest 0.25 months.

637-4.08 Office Technology Supplies. Office technology supplies will be measured for payment on a fixed price Dollars-Cents pay unit basis.

637-4.09 Construction Testing Supplies – Consumables. Construction testing supplies will be measured for payment on a fixed price Dollars-Cents pay unit basis.

637-4.10 Partnering Workshop. The Partnering Workshop will be measured for payment on a Dollars-Cents pay unit basis.

637-5 BASIS OF PAYMENT. For the items to be paid on a Dollars-Cents pay unit basis, the total cost shown in the itemized proposal will be considered the price bid even though payment will be made only for actual equipment and materials supplied. The unit price amount is not to be altered in any manner by the bidder. Should the bidder alter the amount shown, the altered figure will be disregarded, and the original price will be used to determine the total amount bid for the contract.

637-5.01 Engineer’s Field Office. The unit price bid per month for the Engineer’s Field Office shall include the cost of all labor, materials and equipment necessary to complete the work including property rental, utility charges and incidental expenses. Payment will be made for each month of availability for occupancy by the Engineer and inspection field staff.

   No payment will be made under Engineer's Field Office for each calendar day during which there are deficiencies in compliance with these requirements. The first calendar day shall commence 24 hours after notice to the Contractor of such a deficiency. This nonpayment shall be deducted from the next contract payment. The amount of such calendar day nonpayment will be determined by dividing the unit price bid per month by 30.

   If the cited deficiencies exceed 72 hours or is permitted to recur, liquidated damages will be assessed at 20% of the rate shown in Table 108-1 Schedule of Liquidated Damages of §108-03 Failure to Complete Work on Time for each subsequent calendar day or part thereof that the cited deficiency resulting in nonpayment is not corrected.

   Monthly payments may be terminated prior to contract final acceptance by written notification by the Regional Construction Engineer that such office will no longer be required on the contract. Payment for each month's occupancy of the Engineer’s Field Office after the date of contract final acceptance will be made as part of the final contract payment. Failure of the Contractor to supply documentation required to complete the final estimate may result in nonpayment during this delaying period.

   During periods of contract extension of time where Engineering Charges are assessed, no payment
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will be made for occupancy and services, except that payment for each month's occupancy after the date of final acceptance will be made as part of the final estimate.

637-5.02 Field Laboratory. The unit price bid for each Field Laboratory shall include the cost of furnishing all labor, materials and equipment necessary to complete the work including property rental, utility charges and incidental expenses.

Payment will be made for each Field Laboratory when it has been placed on the work site and is fully operational.

637-5.03 Concrete Cylinder Curing Box. The unit price bid for each concrete cylinder curing box shall include the cost of all labor, materials and equipment necessary to complete the work including property rental, relocation, repair or replacement, painting, cleaning, maintenance, and utility charges.

637-5.04 Digital Camcorder. The digital camcorder is a “draw down” item. As materials are supplied, the receipts for the materials shall be submitted to the Engineer. The Contractor will be reimbursed for receipted costs of materials plus 5% for profit and overhead (“materials” includes all labor, materials and equipment, including services to furnish, maintain, and remove all of the components of the digital camcorder system).

If new equipment is not provided, the Engineer will determine a reasonable cost for the equipment. The Contractor shall provide a copy of the original receipt for the equipment to assist the Engineer in assessing the current value of the equipment. Used equipment less than one (1) year old shall be assessed at no more than 50% of the original receipted cost. Equipment over one (1) year old shall not be considered for approval.

637-5.05 Rain Gauge. The unit price bid for each rain gauge shall include the cost of furnishing all labor, materials and equipment necessary to complete the work including installing and maintaining all components of the wireless rain gauge system.

Payment will be made for the rain gauge when it has been installed and is fully operational.

637-5.06 Inspection Vehicle. The unit price bid per month shall include all costs in connection with furnishing properly registered vehicles, maintaining the vehicles (including repairs, tires, lubrication, fuel, washing, etc.), and providing an owner’s policy of liability insurance for the vehicles in conformance with §107-06B. A deduction of 1/30 of a month will be made for each 24-hour period, or portion thereof, during which the vehicle is unavailable to the Engineer, or personnel authorized by the Engineer, regardless of the reason for the vehicle's unavailability. When directed in writing by the Engineer, payment for each month of use after the date of acceptance will be made as part of the final estimate. Payment will begin the first month the vehicle is furnished and made available for use. Monthly payments may be terminated on a specified date prior to acceptance of the Contract by written notification by the Engineer that the vehicle will no longer be required.

637-5.07 Inspection Boat. The unit price bid per month shall include the cost of furnishing all labor, fuel, maintenance, repairs, registration permits, the operator (for Type B Inspection Boats), and other necessary incidentals for operation of the boat. A deduction of 1/30 of a month will be made for each 24-hour period, or portion thereof, during which the boat is unavailable to the Engineer, or personnel authorized by the Engineer, regardless of the reason for the boat's unavailability. When directed in writing by the Engineer, payment for each month of boat use after the date of acceptance will be made as
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part of the final estimate. Payment will begin the first month the boat is furnished and made available for use. Monthly payments may be terminated on a specified date prior to acceptance of the Contract by written notification by the Engineer that the boat will no longer be required.

637-5.08 Office Technology Supplies. Office technology supplies is a “draw down” item. As the materials are supplied, the receipts shall be submitted to the Engineer. The Contractor will be reimbursed for receipted costs of materials plus 5% for profit and overhead ("materials” includes all labor, materials and equipment, including services and service contracts provided).

637-5.09 Construction Testing Supplies – Consumables. Construction testing supplies is a “draw-down” item. As the materials are supplied, the receipts shall be submitted to the Engineer. The Contractor will be reimbursed for receipted costs of materials plus 5% for profit and overhead ("materials” includes all labor, materials and equipment, including delivery charges from vendor sources).

637-5.10 Partnering Workshop. The Department will reimburse the Contractor for 50% of the costs for the facilitator and the facility upon submission of original receipts. Receipted costs eligible for 50% reimbursement include the fee for the facilitator and the costs for the facilitator’s travel and expenses; associated workshop costs such as charges for the rental of the meeting room, required audio/visual equipment and any handouts, notes or workshop materials. The costs for travel, lodging, meals and salaries of workshop attendees, other than those of the facilitator, will not be eligible for reimbursement under this item.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>637.01</td>
<td>Field Laboratory</td>
<td>Each</td>
</tr>
<tr>
<td>637.03</td>
<td>Concrete Cylinder Curing Box</td>
<td>Each</td>
</tr>
<tr>
<td>637.11</td>
<td>Engineer’s Field Office – Type 1</td>
<td>Month</td>
</tr>
<tr>
<td>637.12</td>
<td>Engineer’s Field Office – Type 2</td>
<td>Month</td>
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<tr>
<td>637.13</td>
<td>Engineer’s Field Office – Type 3</td>
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<tr>
<td>637.14</td>
<td>Engineer’s Field Office – Type 4</td>
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</tr>
<tr>
<td>637.15</td>
<td>Engineer’s Field Office – Type 5</td>
<td>Month</td>
</tr>
<tr>
<td>637.25</td>
<td>Digital Camcorder</td>
<td>Dollars-Cents</td>
</tr>
<tr>
<td>637.26</td>
<td>Rain Gauge</td>
<td>Each</td>
</tr>
<tr>
<td>637.31</td>
<td>Inspection Vehicle</td>
<td>Month</td>
</tr>
<tr>
<td>637.32</td>
<td>Inspection Boat - Type A</td>
<td>Month</td>
</tr>
<tr>
<td>637.33</td>
<td>Inspection Boat - Type B</td>
<td>Month</td>
</tr>
<tr>
<td>637.34</td>
<td>Office Technology and Supplies</td>
<td>Dollars-Cents</td>
</tr>
<tr>
<td>637.35</td>
<td>Partnering Workshop</td>
<td>Dollars-Cents</td>
</tr>
<tr>
<td>637.36</td>
<td>Construction Testing supplies – Consumables</td>
<td>Dollars-Cents</td>
</tr>
</tbody>
</table>
Make the following changes to Section 637 of the Standard Specifications of 2008:

Page 622 to Page 639, Delete §637-1.07, §637-2.07, §637-3.07, §637-4.07 and §637-5.07 and Replace them with the following:

637-1.07 (Vacant).
637-2.07 (Vacant).
637-3.07 (Vacant).
637-4.07 (Vacant).
637-5.07 (Vacant).

Page 622 to Page 639, Delete §637-1.13, §637-2.13, §637-3.13, §637-4.13 and §637-5.13 and Replace them with the following:

637-1.13 (Vacant).
637-2.13 (Vacant).
637-3.13 (Vacant).
637-4.13 (Vacant).
637-5.13 (Vacant).

Delete the following from the contract pay items list:

637.10   CHAMP® Management System   Dollars-Cents
637.24   Digital Camera   Dollars-Cents
Make the following changes to the Standard Specifications of May 1, 2008

**Delete** §637-1.13 (Vacant) and **replace** with “637-1.13 Construction Testing Supplies - Consumables. This work shall consist of providing consumable testing supplies to be used by inspection staff.”

**Delete** §637-2.13 (Vacant) and **replace** with “637-2.13 Construction Testing Supplies – Consumables. Consumable testing materials as specified by the Engineer.”

**Delete** §637-3.13 (Vacant) and **replace** with “637-3.13 Construction Testing Supplies - Consumables. The Contractor shall provide consumable testing materials for the exclusive use of Department personnel and their authorized representatives. The supplies shall be provided within five (5) working days of the Engineer’s request, unless the Engineer agrees to a longer delivery time. The Department shall retain ownership of the consumable testing materials, both materials used and those materials unused for which the Contractor has been paid, at the completion of the contract.”

**Delete** §637-4.13 (Vacant) and **replace** with “637-4.13 Construction Testing Supplies – Consumables. Construction testing supplies will be measured for payment on a fixed price Dollars-Cents pay unit basis.”

**Delete** §637-5.13 (Vacant) and **replace** with “637-5.13 Construction Testing Supplies – Consumables. Construction testing supplies is a “draw-down” item. As the materials are supplied, the receipts shall be submitted to the Engineer. The Contractor will be reimbursed for receipted costs of materials plus 5% for profit and overhead (“materials” includes all labor, materials and equipment, including delivery charges from vendor sources).”

**Add** the following to the contract pay items list:

“637.36 Construction Testing supplies – Consumables Dollars-Cents”
POLE MOUNTED SIGN SUPPORT SYSTEM

Make the following changes to the Standard Specifications of May 1, 2008:

*delete 645-3.07 Pole-Mounted Sign Support Systems* in its entirety and *replace* with the following:

```
“645-3.07 Pole-Mounted Sign Support System. Pole-Mounted Sign Support System, as defined in 645-2.07, shall be firmly attached to the pole in accordance with the standard sheets and/or manufacturer's instructions.

   A. Panels without Z-bar stiffeners:
      Sign panels less than or equal to 18 inches wide, shall be attached to the pole with at least two bands. Sign panels less than or equal to 18 inches wide and longer than 30 inches, shall be attached to the pole with at least three bands.

   B. Panels and assemblies with Z-bar stiffeners:
      Sign panels greater than 18 inches wide and sign panel assemblies shall be banded to the pole at each horizontal Z-bar stiffener, as shown on the standard sheets.

Sign Panels mounted with this type of sign support shall not be greater than 48 inches wide, and shall not be greater than 60 inches in height. Sign panel assemblies mounted with this type of sign support shall not be greater than 48 inches wide.”
```
SECTION 647 - REMOVING, STORING, AND RELOCATING SIGNS, SIGN PANEL ASSEMBLIES, SIGN SUPPORTS, AND FOUNDATIONS

Make the following changes to Standard Specification Construction and Materials of May 1, 2008.

*Delete* Section 647 in its entirety and *replace* with the following:

SECTION 647 - REMOVING, STORING, AND RELOCATING SIGNS, SIGN PANEL ASSEMBLIES, SIGN SUPPORTS, AND FOUNDATIONS

647-1 DESCRIPTION. This work shall consist of removing and disposing, storing, and relocating individual sign panels, sign panel assemblies, sign supports, and sign support foundations.

647-1.01 Definition. Sign Panel Assembly – a group of contiguous sign panels attached by means of bars, on the same sign support(s).

647-2 MATERIALS. All new materials used shall comply with the requirements of §644, or 645 as applicable.

647-3 CONSTRUCTION DETAILS

647-3.01 General. Sign panels, sign panel assemblies, sign supports, and sign support foundations shall be removed, stored, or relocated in accordance with the contract documents, standard sheets, MUTCD and materials details. Sign locations in the contract documents are approximate.

647-3.02 Remove and Dispose Overhead Sign Structures. Removal of overhead sign structures shall be done in accordance with §644-3.06 A.

Lifting of overhead sign structures shall be done in accordance with §107-05P. Lifting. Lift Plans are required.

No lifting shall be permitted over traffic.

Designated sign structures and any attached pole-mounted sign panel assemblies or overhead signs requiring disposal, but not relocation or storage, shall become the property of the Contractor and shall be removed from the work site.

All concrete sign footings shall be removed to a minimum depth of 1 foot below existing ground and shall be restored to match the surrounding area to the satisfaction of the engineer.

Any work to relocate or remove and store existing sign panels from the overhead sign structure is performed under a separate item.

647-3.03 Relocate Overhead Sign Panel, Sign Panel Assembly. Overhead sign panels or sign panel assemblies shall be removed from the overhead sign structure by removing the bolts or other attachment device from the structure. Care shall be exercised in removing the sign, sign panel assembly to prevent damage to any part of the reflectorized sign face or characters and to the existing stringers or stiffeners. Any part damaged by the Contractor’s operations shall be replaced by the Contractor at no additional cost to the State. Signs, sign panel assemblies shall be reinstalled in accordance with §645-.3. All hardware, steel angles, and bearing pads needed to reattach the sign panel, sign panel assembly to the relocated sign shall be new. Existing stringers and stiffeners shall remain attached to the sign panel(s).

647-3.04 Remove and Store Overhead Sign Panel, Sign Panel Assembly. Overhead sign
panels or sign panel assemblies shall be removed from the existing overhead structure by removing the bolts or other attachment device from the support structure. Care shall be exercised in removing the sign, sign panel assembly to prevent damage to any part of the reflectorized sign face or characters and to the existing stringers, structure or stiffeners. Signs shall be transported to the storage location(s) identified in the contract documents. Any part damaged by the Contractor’s operations shall be replaced by the Contractor at no additional cost to the State.

647-3.05 Remove and Dispose Overhead Sign Panel, Sign Panel Assembly. Overhead sign panels or sign panel assemblies shall be removed from the site and shall become the property of the contractor. Care shall be exercised to prevent damage to the sign structure or sign supports.

647-3.06 Relocation of Ground-Mounted Sign Panel, Sign Panel Assembly. Ground-mounted sign panels, sign panel assemblies shall be detached from the support structure or posts by removing the bolts or other attachment device from the support structure or posts. Care shall be exercised in removing the sign, sign panel assembly to prevent damage to any part of the reflectorized sign face or characters and to the existing stringers or stiffeners. The existing stringers and stiffeners shall remain attached to the sign panel(s). Any part damaged by the Contractor’s operations shall be replaced by the Contractor at no additional cost to the State. Signs, sign panel assemblies shall be reinstalled in accordance with §645-3 on new posts and foundations. All hardware used to attach the sign panel(s), sign panel assembly to the post(s) shall be new.

647-3.07 Remove and Store Ground-Mounted Sign Panel, Sign Panel Assembly. Ground-mounted sign panels, sign panel assemblies shall be detached from the support structure or posts by removing the bolts or other attachment device from the support structure or posts. Care shall be exercised in removing the sign, sign panel assembly to prevent damage to any part of the reflectorized sign face or characters and to the existing stringers or stiffeners. Care shall also be exercised to avoid damage to any structures or supports that will not be removed. Signs shall be transported to the storage location(s) identified in the contract documents. Any part damaged by the Contractor’s operations shall be replaced by the Contractor at no additional cost to the State.

647-3.08 Remove and Dispose Ground-Mounted Sign Panel, Sign Panel Assembly. Existing ground-mounted sign panels, sign panel assemblies shall be detached from the posts by removing the bolts or other attachment device from the posts. Ground-mounted sign panels, sign panel assemblies shall be removed from the site and become the property of the contractor. Care shall be exercised to prevent damage to the sign structure or sign supports.

647-3.09 Remove and Dispose Ground-Mounted Sign Panel, Sign Panel Assembly, Type A Sign Supports and Foundations. Existing ground-mounted sign panels, sign panel assemblies and/or Type A sign supports shall be removed from the site and become the property of the contractor. Type A sign post foundations shall be completely removed. The disturbed area shall be restored to match the surrounding area to the satisfaction of the Engineer.

647-3.10 Remove and Dispose High-Capacity Type A and Type B Ground-Mounted Sign Supports and Foundations. Existing ground-mounted sign supports and/or foundations shall be removed from the site and become the property of the Contractor. High-Capacity Type A sign post
foundations shall be completely removed. Type B footings shall either be completely removed or shall be cut to a depth of at least 1 foot below existing ground. Backfilling and surfacing shall be performed to match the surrounding area to the satisfaction of the Engineer.

647-4 METHOD OF MEASUREMENT.

647-4.01 General. The size of sign panels, sign panel assemblies shall be measured as the product of overall width and height equaling a number of square feet and rounded to the nearest square foot.

   Overall width for sign panel assemblies shall be measured as the total width neglecting spaces between sign panels.

   Vertical spaces less than one foot between panels, or sign panel assemblies shall be included in the calculation of overall height. For vertical spaces one foot or more, the panel, sign panel assembly heights shall be measured separately. The total area shall be the sum of the individual areas measured.

   When ground-mounted sign panels, sign panel assemblies are mounted back to back, only the larger side shall be measured when the entire structure is to be removed. When one or both of two back to back panels are relocated or removed and stored, separate panel measurements shall be made.

647-4.02 Remove and Dispose Overhead Sign Structures. The work will be measured as the number of overhead sign structures completely removed and disposed, including any overhead sign panels that are also to be removed and disposed.

647-4.03 Relocate Overhead Sign Panel, Sign Panel Assembly. The work will be measured as the number of overhead sign panels, sign panel assemblies relocated.

647-4.04 Remove and Store Overhead Sign Panel, Sign Panel Assembly. The work will be measured as the number of overhead sign panels, sign panel assemblies removed and stored.

647-4.05 Remove and Dispose Overhead Sign Panel, Sign Panel Assembly. The work will be measured as the number of overhead sign panels, sign panel assemblies removed and disposed from structures or supports that will not be removed.

647-4.06 Relocation of Ground-Mounted Sign Panel, Sign Panel Assembly. The work will be measured as the number of ground-mounted sign panels, sign panel assemblies relocated.

647-4.07 Remove and Store Ground-Mounted Sign Panel, Sign Panel Assembly. The work will be measured as the number of ground-mounted sign panels, sign panel assemblies removed and stored.

647-4.08 Remove and Dispose Ground-Mounted Sign Panel, Sign Panel Assembly. The work will be measured as the number of ground-mounted sign panels, sign panel assemblies removed and disposed.

647-4.09 Remove and Dispose Ground-Mounted Sign Panel, Sign Panel Assembly, Type A Sign Supports and Foundations. The work will be measured as the number of ground-mounted sign panels, sign panel assemblies and foundations removed and disposed.
SECTION 647 - REMOVING, STORING, AND RELOCATING SIGNS, SIGN PANEL ASSEMBLIES, SIGN SUPPORTS, AND FOUNDATIONS

647-4.10 Remove and Dispose High-Capacity Type A and Type B Ground-Mounted Sign Supports and Foundations. The work will be measured as the number of ground-mounted sign supports and foundations removed and disposed.

647-5 BASIS OF PAYMENT. The unit price bid for removing, storing, and relocating signs shall be compensation in full for the furnishing of all labor, equipment and materials necessary to complete the work.

No additional payment will be made for the restoration of surfaces when foundations are removed.

Payment for new sign supports, and foundations will be made under separate pay items.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item Pay</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>647.20</td>
<td>Removal of Cantilever Overhead Sign Panel(s), Structure, and Foundations</td>
<td>Each</td>
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<tr>
<td>647.21</td>
<td>Removal of Single Span Overhead Sign Panel(s), Structure, and Foundations</td>
<td>Each</td>
</tr>
<tr>
<td>647.22</td>
<td>Removal of Multi-Span Overhead Sign Panel(s), Structure, and Foundations</td>
<td>Each</td>
</tr>
<tr>
<td>647.23</td>
<td>Relocate Overhead Sign Panel, Sign Panel Assembly</td>
<td>Each</td>
</tr>
<tr>
<td>647.24</td>
<td>Remove and Store Overhead Sign Panel, Sign Panel Assembly</td>
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<td>647.25</td>
<td>Remove and Dispose Overhead Sign Panel, Sign Panel Assembly</td>
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<td>647.31</td>
<td>Relocate Sign Panel, Sign Panel Assembly Size I (Under 30 Square Feet)</td>
<td>Each</td>
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<td>647.32</td>
<td>Relocate Sign Panel, Sign Panel Assembly Size II (30-100 Square Feet)</td>
<td>Each</td>
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<td>647.33</td>
<td>Relocate Sign Panel, Sign Panel Assembly Size III (Over 100 Square Feet)</td>
<td>Each</td>
</tr>
<tr>
<td>647.41</td>
<td>Remove and Store Sign Panel, Sign Panel Assembly Size I (Under 30 Square Feet)</td>
<td>Each</td>
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<td>647.42</td>
<td>Remove and Store Sign Panel, Sign Panel Assembly Size II (30-100 Square Feet)</td>
<td>Each</td>
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<td>647.43</td>
<td>Remove and Store Sign Panel, Sign Panel Assembly Size III (Over 100 Square Feet)</td>
<td>Each</td>
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<td>647.51</td>
<td>Remove and Dispose Sign Panel, Sign Panel Assembly Size I (Under 30 Square Feet)</td>
<td>Each</td>
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<td>647.52</td>
<td>Remove and Dispose Sign Panel, Sign Panel Assembly Size II (30-100 Square Feet)</td>
<td>Each</td>
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<td>647.53</td>
<td>Remove and Dispose Sign Panel, Sign Panel Assembly Size III (Over 100 Square Feet)</td>
<td>Each</td>
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<td>647.61</td>
<td>Remove and Dispose Signs, Ground Mounted Type A Sign Supports and Foundations - Size I (Under 30 Square Feet)</td>
<td>Each</td>
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<td>647.62</td>
<td>Remove and Dispose Signs, Ground Mounted Type A Sign Supports and Foundations - Size II (30-100 Square Feet)</td>
<td>Each</td>
</tr>
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<td>647.63</td>
<td>Remove and Dispose Signs, Ground Mounted Type A Sign Supports and Foundations - Size III (Over 100 Square Feet)</td>
<td>Each</td>
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<tr>
<td>647.64</td>
<td>Remove and Dispose High Capacity Type A Ground Mounted Sign Support and Foundation</td>
<td>Each</td>
</tr>
<tr>
<td>647.65</td>
<td>Remove and Dispose Type B Ground Mounted Sign Support and Foundation</td>
<td>Each</td>
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</tbody>
</table>
Traffic Signals – Light Emitting Diode (LED) modules

Make the following changes to the Standard Specifications of May 1, 2008:

Delete the following items from §680-5:

680.8101 Traffic Signal Section – 12 inch
680.8106 Traffic Signal Section - Polycarbonate, 12 inch
680.8103 Traffic Signal Section – 8 inch
680.8107 Traffic Signal Section - Polycarbonate, 8 inch
680.8104 Traffic Signal Section- Fiberoptic Dual Indication Arrow
680.810401 Traffic Signal Section- Polycarbonate Fiberoptic Dual Indication Arrow
680.8105 Traffic Signal Section- Strobing Signal Indication
680.810501 Traffic Signal Section- Polycarbonate Strobing Signal Indication
680.8131 Pedestrian Signal Section – 4 1/2 inch Letters
680.8132 Pedestrian Signal Section – 3 inch Letters
680.8133 Pedestrian Signal Section – Fiberoptic
Make the following changes to the Standard Specification of May 4, 2006 / May 1, 2008:

**Delete** Sections 689 thru 696 and **Replace** them with the following:

### SECTIONS 689 THRU 695 (VACANT)

#### SECTION 696  CONTRACTOR CHARGES

696-1 **DESCRIPTION.** This section will provide for the accounting of charges assessed against the Contractor in accordance with the contract documents.

696-2 **MATERIALS.** None specified.

696-3 **CONSTRUCTION DETAILS.** The Department may assess the Contractor charges for Engineering Charges and/or Liquidated Damages against monies due the Contractor in accordance with §108-03 *Failure to Complete Work On Time*, or may make other charges in accordance with the contract. These charges will be assessed using the contract pay items in this section.

696-4 **METHOD OF MEASUREMENT.** These contract pay items will not be shown in the itemized proposal. Contractor charges will be measured on a Dollars-Cents basis.

696-5 **BASIS OF PAYMENT.** Should the Contractor be assessed charges, the amounts will be accounted for using the contract pay items in this section. Assessed charges will be deducted from a contract payment processed after the determination that charges will be made, or, if the Contractor is not due monies sufficient to recover the assessed charges, the State may utilize other methods of recovery.

*Payment will be made under:*

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
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</thead>
<tbody>
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<td>Dollars Cents</td>
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<tr>
<td>696.02</td>
<td>Liquidated Damages</td>
<td>Dollars Cents</td>
</tr>
<tr>
<td>696.03</td>
<td>Contractor Charges – Other</td>
<td>Dollars Cents</td>
</tr>
</tbody>
</table>
PRICE ADJUSTMENTS

Make the following changes to the Standard Specifications dated May 1, 2008.
Page 749 Delete Section 698 Price Adjustments and Replace it with the following:

SECTION 698 PRICE ADJUSTMENTS

698-1 DESCRIPTION. This section will provide for additional compensation to the Contractor for increases, or repayment by the Contractor for decreases, in the price of asphalt, fuel, or steel/iron products.

698-1.01 Asphalt Price Adjustment. This item will enable the Department to make price adjustments to account for changes in asphalt prices. Price adjustments will be made for eligible work listed in the contract proposal.

698-1.02 Fuel Price Adjustment. This item will enable the Department to make price adjustments to account for changes in fuel prices. Price adjustments will be made for eligible work listed in the contract proposal.

698-1.03 Steel/Iron Price Adjustment. This item will enable the Department to make price adjustments to account for changes in steel/iron product prices for materials eligible and identified by the Contractor which will be permanently incorporated into the work.

698-2 MATERIALS. None specified.

698-3 CONSTRUCTION DETAILS. No adjustment will be provided for any new or additional work paid for by force account. Additional quantities of existing contract pay items at original bid prices will be considered eligible work. Additional work added by agreed price will be considered eligible work. Work performed by the Contractor at its own expense will not be eligible for price adjustment.

The monthly average asphalt prices, monthly average fuel prices, steel cost basis and steel index values will be posted in the Engineering Bulletin entitled Fuel, Asphalt and Steel Price Adjustments.

If eligible items are installed after the contract completion date, when an extension of time without the assessment of engineering charges and/or liquidated damages is approved, the monthly average posted price or monthly steel index value will be used to compute price adjustments.

If eligible items are installed after the contract completion date, when an extension of time was approved with the assessment of engineering charges and/or liquidated damages, the monthly average posted price or monthly steel index value in effect on the last contract completion date without the assessment of engineering charges and/or liquidated damages, or the value for the month of installation/purchase, whichever is less, will be used to compute price adjustments.

698-3.01 Asphalt Price Adjustment. The asphalt price adjustment will be based solely on the price changes for asphalt as determined by the formulas below. No adjustment will be made if the monthly average posted price is within $15.00 of the asphalt index price. No consideration will be given to the situation where an individual supplier's price exceeds the monthly average posted price.

A. Prices. The asphalt index price and the monthly average posted price are defined as follows:

1. Asphalt Index Price. The asphalt index price is a price per ton of Performance Graded Binder (PGB) used solely as a basis from which to compute asphalt price adjustments. The
PRICE ADJUSTMENTS

asphalt index price for original contract bid price items and additional work at the original contract bid price will be the monthly average posted price for the month of the bid letting. The asphalt index price for additional work at agreed price will be the monthly average posted price for the month the agreed price was submitted to the Engineer.

2. Monthly Average Posted Price. The average terminal price for unmodified PG 64-22 binder, without anti-stripping agent, determined by the Department, based on prices of approved primary sources of PGB.

B. Quantity. The quantity of asphalt in tons considered for adjustment will be determined by multiplying the quantity of eligible work completed by the conversion factors listed in the Special Note entitled Asphalt Price Adjustment.

C. Adjustment. Asphalt price adjustment will be based on the following formulas:

1. When price increases: Price Adjustment = (Quantity of Asphalt) x (Monthly Average Posted Price - PGB Index Price - $15.00)

2. When price decreases: Price Adjustment = (Quantity of Asphalt) x (Monthly Average Posted Price - PGB Index Price + $15.00)

698-3.02 Fuel Price Adjustment. The fuel price adjustment will be based solely on the price changes for fuel as determined by the formulas below. No adjustment will be made if the monthly average posted price is within $0.10 per gallon of the fuel index price. No consideration will be given to the situation where an individual supplier's price exceeds the monthly average posted price.

A. Prices. The fuel index price and the monthly average posted price are defined as follows:

1. Fuel Index Price. A price per gallon of fuel used solely as a basis from which to compute fuel price adjustments. The fuel index price for original contract bid price items and additional work at the original contract bid price will be the monthly average posted price for the month of the bid letting. The fuel index price for additional work at agreed price will be the monthly average posted price for the month the agreed price was submitted to the Engineer.

2. Monthly Average Posted Price. An average refinery or terminal price based on prices for ultra low sulfur diesel (ULSD) and gasoline.

B. Quantity. The quantity of fuel in gallons considered for adjustment will be determined by multiplying the quantity of eligible work completed by the fuel usage factor listed in the Special Note entitled Fuel Price Adjustment.

C. Adjustment. Fuel price adjustment will be based on the following formulas:

1. When price increases: Price Adjustment = (Quantity of Fuel) x (Monthly Average Posted Price - Fuel Index Price - $0.10)

2. When price decreases: Price Adjustment = (Quantity of Fuel) x (Monthly Average Posted Price - Fuel Index Price + $0.10)
PRICE ADJUSTMENTS

Price - Fuel Index Price + $0.10

698-3.03 Steel/Iron Price Adjustment. Within 30 calendar days after award, the Contractor shall provide the Engineer with a list of materials to which the Contractor opts to apply the steel price adjustment, identifying the materials by groups of similar material content within a core (3 digit) contract pay item (e.g. 564 Structural Steel or 603.05xxxx Corrugated Steel Pipe). For each material listed, the Contractor shall also identify the parties whose relationship establishes the invoice date. If the two parties are known, they shall be identified by name. If the two parties are not known, they shall be identified by role (Contractor, Subcontractor, Material Supplier, Fabricator, Manufacturer, Mill, etc.). Different parties may be identified for individual or groups of contract pay items for the purposes of establishing an invoice date. If the Contractor does not provide a list of materials to which to apply the steel price adjustment, no steel price adjustment will be made.

If the percentage change for a given month does not exceed 5% plus or minus, from the benchmark steel index, no adjustments will be made for materials invoiced that month. For lump sum or each items that are assembled from numerous components, such as overhead sign structures, the percentage change will be determined for the assembled contract pay item using the month that the largest value of materials were invoiced. For unit price items such as guiderail that are assembled from numerous components, the percentage change will be determined for a given quantity of the contract pay item using the month that the largest value of component materials for that quantity of the contract pay item were invoiced.

The weight of the steel and/or iron shall exclude minor appurtenances individually weighing less than 5 lbs (i.e., nuts, bolts, washers, etc.). Precast or prestressed concrete items shall have total reinforcing steel weight listed on the approved shop drawings. The following sources shall be used, in declining order of precedence, to determine the weight of steel/iron: Department established weights of steel/iron by contract pay item per pay unit; approved shop drawings; verified shipping documents; contract documents; Standard Sheets; industry standards (i.e., AISC Manual of Steel Construction, AWWA Standards, etc.); and manufacturer’s data.

A. Indexes and Prices. Adjustments are based on the Producer Price Index (PPI) for Semifinished Steel Mill Products (WPU 101702). PPI values are published by the US Department of Labor, Bureau of Labor Statistics (BLS). Recent PPI values are posted on the Office of Construction website at www.dot.ny.gov. A complete listing of PPI values can be found on the BLS website at http://data.bls.gov/PDQ/outside.jsp?survey=wp. The Cost Basis, Benchmark Steel Index, Monthly Steel Index, and the Percentage Change are defined as follows:

1. Cost Basis (CB). An average price of steel products in dollars per ton used solely as a cost basis from which to compute steel/iron price adjustments. The cost basis for original contract bid price items and additional work at the original contract bid price will be the cost basis listed for the month of the bid letting. The cost basis for additional work at agreed price will be the value of the cost basis for the month the agreed price was submitted to the Engineer.

2. Benchmark Steel Index (BI). The benchmark steel index for original contract bid price items and additional work at the original contract bid price will be the value of the preliminary PPI for the month of the bid letting. The benchmark steel index for additional work at agreed price will be the value of the preliminary PPI for the month the agreed price was submitted to the Engineer.
PRICE ADJUSTMENTS

3. Monthly Steel Index (MI). Value of the preliminary PPI for the month the material is invoiced. If a preliminary PPI is not posted for a given month, the value will be the average of the preceding and following months that are posted.

4. Percent Change. The percent change in any given month will be determined as follows:

\[
\text{Percentage Change} = \left( \frac{\text{MI} - \text{BI}}{\text{BI}} \right) \times 100
\]

B. Quantity. The quantity of steel and/or iron for adjustment for each core (3-digit) contract pay item number (e.g., 564 – Structural Steel) will be measured to the nearest 0.1 Tons.

1. Percent Change Greater Than +5%. If the Percentage Change is greater than +5% from the benchmark steel index, Price Adjustments will be made for materials invoiced that month. The Contractor shall provide the Engineer a detailed list of the weight of eligible materials within 60 calendar days after installation, including: the contract pay item, the weight of steel/iron, the month(s) of invoice, the source used to determine the weight, and if requested by the Engineer, copies of invoices to verify the month of invoice.

2. Percent Change -5% to +5%. If the Percentage Change is between -5% and +5%, inclusive, from the benchmark steel index, no adjustments will be made for materials invoiced that month.

3. Percent Change Lower Than -5%. If the Percentage Change is lower than -5% from the benchmark steel index, a Price Adjustment will be charged to the Contractor for materials invoiced that month. The Contractor shall provide the Engineer a detailed list of the weight of eligible materials within 60 calendar days after installation, including: the contract pay item, the weight of steel/iron, the month(s) of invoice, the source used to determine the weight, and copies of invoices to verify the month of invoice.

C. Adjustment. Steel/Iron price adjustment will be made for the materials which the Contractor opted to apply the steel price adjustment, based on the following formulas:

1. When price increases:

\[
\text{Price Adjustment} = \left[ \left( \frac{\text{MI} - \text{BI}}{\text{BI}} \right) - 0.05 \right] (\text{CB} \text{ Qty})
\]

2. When price decreases:

\[
\text{Price Adjustment} = - \left[ \left( \frac{\text{MI} - \text{BI}}{\text{BI}} \right) + 0.05 \right] (\text{CB} \text{ Qty})
\]

698-4 METHOD OF MEASUREMENT. 698-4.01 Asphalt Price Adjustment. Asphalt price adjustments will be measured on a Dollar Cents basis.

698-4.02 Fuel Price Adjustment. Fuel price adjustments will be measured on a Dollar Cents basis.
PRICE ADJUSTMENTS

698-4.03 Steel/Iron Price Adjustment. Steel/Iron price adjustments will be measured on a Dollar Cents basis.

698-5 BASIS OF PAYMENT. The unit price shown in the itemized proposal will be considered the unit price bid, although actual payment will be calculated based on changes in posted material prices. Should the amount shown be altered, the altered figures will be disregarded and the original price will be used to determine the total contract bid amount.

If price adjustments are based on estimated material quantities, and a revision to the estimated material quantity is made in a subsequent or final estimate, an appropriate addition or deduction will be made to the price adjustment previously calculated. The addition or deduction will be based on the adjustment factors initially used to calculate the price adjustment. If the installation dates of the revised material quantity cannot be determined, the addition or deduction will be based on the adjustment factors in effect during the last month in which any portion of the material quantity was installed.

698-5.01 Asphalt Price Adjustment. The asphalt price adjustment will be based on the monthly average posted price in effect at the time the work is completed, calculated using the price adjustment formula described above.

698-5.02 Fuel Price Adjustment. The fuel price adjustment will be based on the monthly average posted price in effect at the time the work is completed, calculated using the price adjustment formula described above.

698-5.03 Steel/Iron Price Adjustment. The steel/iron price adjustment will be based on the monthly steel index in effect at the time of invoice between the two parties previously identified by the Contractor, calculated using the price adjustment formula described above.

Payment will be made under:

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>698.04</td>
<td>Asphalt Price Adjustment</td>
<td>Dollars Cents</td>
</tr>
<tr>
<td>698.05</td>
<td>Fuel Price Adjustment</td>
<td>Dollars Cents</td>
</tr>
<tr>
<td>698.06</td>
<td>Steel/Iron Price Adjustment</td>
<td>Dollars Cents</td>
</tr>
</tbody>
</table>
SECTION 701 – HYDRAULIC CEMENTS

Make the following changes to the Standard Specifications of May 1, 2008:

Page 758 Under '701-04 CONCRETE REPAIR MATERIAL, delete the section in its entirety, and replace it with the following:

701-04 CONCRETE REPAIR MATERIAL

SCOPE. The material covered in this specification is generally used for shallow repairs of portland cement concrete, including repair of precast concrete products, such as pipe, cribbing, manholes, etc…

GENERAL. The use of this material is limited to repair areas smaller than 5 ft² and not deeper than 2 in. This material is meant to be applied and finished with a trowel in a horizontal position. The Department will test the material in accordance with Test Method NY 701-13P,C following the manufacturer’s proportioning and mixing instructions printed on the package. Material meeting the requirements of this specification will be placed on the Approved List. For field use, follow the manufacturers mixing and curing recommendations.

MATERIAL REQUIREMENTS. The material shall be a prepackaged dry component: to which water or emulsified compound is added, used for concrete repair, containing no metallic expansion aides, to which no aggregate may be added, meeting the requirements of Table 701-04. When being used for aesthetic purposes the material’s color shall be within the Munsell Neutral Scale range stated in Table 701-04.

<table>
<thead>
<tr>
<th>TABLE 701-04 CONCRETE REPAIR MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEST REQUIREMENT</td>
</tr>
<tr>
<td>-----------------------------------------</td>
</tr>
<tr>
<td>Initial Set (minutes)</td>
</tr>
<tr>
<td>Expansion (%)</td>
</tr>
<tr>
<td>Contraction (%)</td>
</tr>
<tr>
<td>1 Day Compressive Strength (psi)</td>
</tr>
<tr>
<td>7 Day Compressive Strength (psi)</td>
</tr>
<tr>
<td>28 Day Compressive Strength (psi)</td>
</tr>
<tr>
<td>1 Day Bond Strength (psi)</td>
</tr>
<tr>
<td>Freeze/Thaw Loss % (25 cycles)</td>
</tr>
<tr>
<td>Total Chloride Content (% by weight)</td>
</tr>
<tr>
<td>Total Sulfate Content (% by weight)</td>
</tr>
<tr>
<td>Color, Munsell Neutral Scale</td>
</tr>
</tbody>
</table>
SECTION 701 – HYDRAULIC CEMENTS

BASIS OF APPROVAL. Application for material approval shall be submitted to the Materials Bureau by the manufacturer. The application shall be accompanied by a labeled 50 lb production sample of the product; however the Materials Bureau will approve other packaging quantities on a case-by-case basis. The Department will test the material according to Test Method NY 701-13P,C following the manufacturer's proportioning and mixing instructions printed on the package. Upon approval, the product brand name, manufacturing location and shelf life will be placed on the Approved List. The Department must receive a letter from the manufacturer annually certifying that no changes have been made in the formulation, manufacturing process, or manufacturing location. In the event that a letter is not received, the product may be removed from the Approved List. Furthermore, the material may be removed from the Approved List at any time if the Department is not notified in writing of any material changes as stated above. The Department reserves the right to sample and test the material at any time.

BASIS OF ACCEPTANCE. Products will be accepted on the basis of the brand name and manufacturing location appearing on the Approved List. Such products will then be accepted on the basis of the brand name and manufacturing location printed on the sealed, non reusable container along with the month and year (i.e. 05/2011) of when the material was manufactured. The manufacturer is required to print the shelf life on the container if it is less than 12 months. The expiration date of acceptance for this material shall be one calendar year from the date of manufacture or as stated in the Approved List, whichever is less.

Page 758 Under '701-05 CONCRETE GROUTING MATERIAL, delete the section in its entirety, and replace it with the following:

701-05 CONCRETE GROUTING AND ANCHORING MATERIAL

SCOPE. This specification covers the requirements for grouting material used to grout anchor bolts, dowels and other items in portland cement concrete. This material can also be used for forming mortar pads under bridge rail supports.

GENERAL. This material should not be used in layers thicker than 2 in. The Department will test the material according to Test Method NY 701-11P,C following the manufacturer's proportioning and mixing instructions printed on the package. Material meeting the requirements of this specification will be placed on the Approved List. For field use, follow the manufacturers mixing and curing recommendations.

MATERIAL REQUIREMENTS. The material shall be a prepackaged, dry component: to which water or emulsified compound is added, used for concrete repair, containing no metallic expansion aides, to which no aggregate may be added, meeting the requirements of Table 701-05.

| TABLE 701-05 CONCRETE GROUTING AND ANCHORING MATERIAL |
|-----------------------------------------------|----------------|----------|
| TEST REQUIREMENT                              | Min.         | Max.     |
| Initial Set (minutes)                         | 30           | -        |
| Expansion (%)                                 | -            | 0.4      |
SECTION 701 – HYDRAULIC CEMENTS

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contraction (%)</td>
<td>0.0</td>
</tr>
<tr>
<td>1 Day Compressive Strength (psi)</td>
<td>3000</td>
</tr>
<tr>
<td>7 Day Compressive Strength (psi)</td>
<td>6000</td>
</tr>
<tr>
<td>Pullout Strength (lbs)</td>
<td>10000</td>
</tr>
<tr>
<td>Freeze-Thaw Loss % (25 cycles)</td>
<td>1.0</td>
</tr>
<tr>
<td>Total Chloride Content (% by weight)</td>
<td>0.05</td>
</tr>
<tr>
<td>Total Sulfate Content (% by weight)</td>
<td>5.0</td>
</tr>
</tbody>
</table>

**BASIS OF APPROVAL.** Application for material approval shall be submitted to the Materials Bureau by the manufacturer. The application shall be accompanied by a labeled 50 lb production sample of the product; however the Materials Bureau will approve other packaging quantities on a case-by-case basis. The Department will test the material according to Test Method NY 701-11P,C following the manufacturer's proportioning and mixing instructions printed on the package. Upon approval, the product brand name, manufacturing location and shelf life will be placed on the Approved List. The Department must receive a letter from the manufacturer annually certifying that no changes have been made in the formulation, manufacturing process, or manufacturing location. In the event that a letter is not received, the product may be removed from the Approved List. Furthermore, the material may be removed from the Approved List at any time if the Department is not notified in writing of any material changes as stated above. The Department reserves the right to sample and test the material at any time.

**BASIS OF ACCEPTANCE.** Products will be accepted on the basis of the brand name and manufacturing location appearing on the Approved List. Such products will then be accepted on the basis of the brand name and manufacturing location printed on the sealed, non reusable container along with the month and year (i.e. 05/2011) of when the material was manufactured. The manufacturer is required to print the shelf life on the container if it is less than 12 months. The expiration date of acceptance for this material shall be one calendar year from the date of manufacture or as stated in the Approved List, whichever is less.

Page 759 Under '701-06 CEMENT BASED GROUT MATERIALS FOR SHEAR KEYS, delete the section in its entirety, and replace it with the following:

**701-06 SHEAR KEY GROUT**

**SCOPE.** This specification covers the requirements for grout to be placed in shear keys between precast concrete structural units.

**GENERAL.** The material must be flowable to fill the shear key with no voids. The Department will test the material in accordance with Test Method NY 701-12P,C following the manufacturer's proportioning and mixing instructions printed on the package. Material meeting the requirements of this specification will be placed on the Approved List. The Approved List titled: Shear Key Grout will state the precise water-grout ratio by weight. This ratio shall not be altered. For field use, follow the manufacturers mixing and curing recommendations.
MATERIAL REQUIREMENTS. The material shall be a prepackaged dry component: to which water or emulsified compound is added, used for concrete repair, containing no metallic expansion aides, to which no aggregate may be added. The material must meet the shear key pourability test as per Test Method NY 701-12P,C and the requirements of Table 701-06.

### TABLE 701-06
**SHEAR KEY GROUT**

<table>
<thead>
<tr>
<th>TEST REQUIREMENT</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Set (minutes)</td>
<td>120</td>
<td>-</td>
</tr>
<tr>
<td>Expansion (%)</td>
<td>0.02</td>
<td>1.0</td>
</tr>
<tr>
<td>Contraction (%)</td>
<td>-</td>
<td>0.0</td>
</tr>
<tr>
<td>7 Day Compressive Strength (psi)</td>
<td>6000</td>
<td>-</td>
</tr>
<tr>
<td>Freeze-Thaw Loss % (25 cycles)</td>
<td>-</td>
<td>1.0</td>
</tr>
<tr>
<td>Total Chloride Content (% by weight)</td>
<td>-</td>
<td>0.05</td>
</tr>
<tr>
<td>Total Sulfate Content (% by weight)</td>
<td>-</td>
<td>5.0</td>
</tr>
</tbody>
</table>

**BASIS OF APPROVAL.** Application for material approval shall be submitted to the Materials Bureau by the manufacturer. The application shall be accompanied by a labeled 50 lb production sample of the product; however the Materials Bureau will approve other packaging quantities on a case-by-case basis. The Department will test the material according to Test Method NY 701-12P,C following the manufacturer’s proportioning and mixing instructions printed on the package. Upon approval, the product brand name, manufacturing location and shelf life will be placed on the Approved List. The Department must receive a letter from the manufacturer annually certifying that no changes have been made in the formulation, manufacturing process, or manufacturing location. In the event that a letter is not received, the product may be removed from the Approved List. Furthermore, the material may be removed from the Approved List at any time if the Department is not notified in writing of any material changes as stated above. The Department reserves the right to sample and test the material at any time.

**BASIS OF ACCEPTANCE.** Products will be accepted on the basis of the brand name and manufacturing location appearing on the Approved List. Such products will then be accepted on the basis of the brand name and manufacturing location printed on the sealed, non reusable container along with the month and year (i.e. 05/2011) of when the material was manufactured. The manufacturer is required to print the shelf life on the container if it is less than 12 months. The expiration date of acceptance for this material shall be one calendar year from the date of manufacture or as stated in the Approved List, whichever is less.

Page 761 Under '701-08 VERTICAL AND OVERHEAD PATCHING MATERIAL, delete the section in its entirety, and replace it with the following:
SECTION 701 – HYDRAULIC CEMENTS

701-08 VERTICAL AND OVERHEAD REPAIR MATERIAL

SCOPE. This specification covers the requirements for Vertical and Overhead Repair Material for placement in structural concrete repairs.

GENERAL. The use of this material is limited to repair areas smaller than 4 ft² and not deeper than 2 in, and is meant to be applied and finished with a trowel. The Materials Bureau will consider other application techniques on a case by case basis. The Department will test the material in accordance with Test Method NY 701-17P,C following the manufacturer's proportioning and mixing instructions printed on the package. Material meeting the requirements of this specification will be placed on the Approved List. For field use, follow the manufacturers mixing and curing recommendations.

MATERIAL REQUIREMENTS. The material shall be a prepackaged dry component: to which water or emulsified compound is added, used for concrete repair, containing no metallic expansion aides, to which no aggregate may be added. The material shall be able to be placed in layers of at least 1 inch on overhead applications without the use of formwork or anchoring devices. When being used for aesthetic purposes the material’s color shall be within the Munsell Neutral Scale range stated in Table 701-08.

<p>| TABLE 701-08 |
| VERTICAL AND OVERHEAD REPAIR MATERIAL |</p>
<table>
<thead>
<tr>
<th>TEST REQUIREMENT</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Set (minutes)</td>
<td>15</td>
<td>-</td>
</tr>
<tr>
<td>Expansion (%)</td>
<td>-</td>
<td>0.4</td>
</tr>
<tr>
<td>Contraction (%)</td>
<td>-</td>
<td>0.0</td>
</tr>
<tr>
<td>7 Day Compressive Strength (psi)</td>
<td>4000</td>
<td>-</td>
</tr>
<tr>
<td>28 Day Compressive Strength (psi)</td>
<td>5000</td>
<td>-</td>
</tr>
<tr>
<td>1 Day Bond Strength (psi)</td>
<td>200</td>
<td>-</td>
</tr>
<tr>
<td>Freeze-Thaw Loss % (25 cycles)</td>
<td>-</td>
<td>1.0</td>
</tr>
<tr>
<td>Total Chloride Content (% by weight)</td>
<td>-</td>
<td>0.05</td>
</tr>
<tr>
<td>Total Sulfate Content (% by weight)</td>
<td>-</td>
<td>5.0</td>
</tr>
<tr>
<td>Color, Munsell Neutral Scale</td>
<td>4.0</td>
<td>8.5</td>
</tr>
</tbody>
</table>

BASIS OF APPROVAL. Application for material approval shall be submitted to the Materials Bureau by the manufacturer. The application shall be accompanied by a labeled 50 lb production sample of the product; however the Materials Bureau will approve other packaging quantities on a case-by-case basis. The Department will test the material according to Test Method NY 701-17P,C following the manufacturer's proportioning and mixing instructions printed on the package. Upon approval, the product brand name, manufacturing location and shelf life will be placed on the Approved List. The Department must receive a letter from the manufacturer annually certifying that no changes have been made in the
SECTION 701 – HYDRAULIC CEMENTS

formulation, manufacturing process, or manufacturing location. In the event that a letter is not received, the product may be removed from the Approved List. Furthermore, the material may be removed from the Approved List at any time if the Department is not notified in writing of any material changes as stated above. The Department reserves the right to sample and test the material at any time.

BASIS OF ACCEPTANCE. Products will be accepted on the basis of the brand name and manufacturing location appearing on the Approved List. Such products will then be accepted on the basis of the brand name and manufacturing location printed on the sealed, non reusable container along with the month and year (i.e. 05/2011) of when the material was manufactured. The manufacturer is required to print the shelf life on the container if it is less than 12 months. The expiration date of acceptance for this material shall be one calendar year from the date of manufacture or as stated in the Approved List, whichever is less.

Page 762 Under '701-09 RAPID HARDENING CONCRETE REPAIR MATERIAL (Normal Weather), delete the section in its entirety, and replace it with the following:

701-09 CONCRETE REPAIR MATERIAL - RAPID HARDENING

SCOPE. This specification covers the requirements for material to repair portland cement concrete where rapid strength gain is required.

GENERAL. Its use is limited to areas no larger than 10 ft^2 or 5 ft^3 in volume for a single patch. This material is intended for partial or full depth repairs. This material may be extended with dried Department approved CA1 coarse aggregate. This product must provide the ability to accept traffic loads within 1 hour of placement. The Department will test the material neat except where noted in Table 701-09 to test neat and extended according to Test Method NY 701-21P,C following the manufacturer's proportioning and mixing instructions printed on the package. Material meeting the requirements of this specification when tested (Neat and Extended), will be placed on the Approved List.

MATERIAL REQUIREMENTS. This material shall be a prepackaged, multi-component powdered material, containing no metallic expansion aides, and must remain workable when a minimum of 60% extended by weight with Department approved CA1 coarse aggregate and meets the requirements of Table 701-09. When being used for aesthetic purposes the material’s color shall be within the Munsell Neutral Scale range stated in Table 701-09.

<table>
<thead>
<tr>
<th>TABLE 701-09 CONCRETE REPAIR MATERIAL - RAPID HARDENING</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEST REQUIREMENT</td>
</tr>
<tr>
<td>Initial Set (minutes)</td>
</tr>
<tr>
<td>Expansion (%)</td>
</tr>
<tr>
<td>Contraction (%)</td>
</tr>
<tr>
<td>1 Hour Compressive Strength (psi)</td>
</tr>
</tbody>
</table>

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L09/06/12
SECTION 701 – HYDRAULIC CEMENTS

<table>
<thead>
<tr>
<th>Test Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Hour Compressive Strength (psi)</td>
<td>3000 -</td>
</tr>
<tr>
<td>7 Day Compressive Strength (psi)</td>
<td>6000 -</td>
</tr>
<tr>
<td>1 Day Bond Strength (psi)</td>
<td>200 -</td>
</tr>
<tr>
<td>Freeze-Thaw Loss % (25 cycles)**</td>
<td>- 1.0</td>
</tr>
<tr>
<td>Total Chloride Content (% by weight)</td>
<td>- 0.05</td>
</tr>
<tr>
<td>Total Sulfate Content (% by weight)</td>
<td>- 5.0</td>
</tr>
<tr>
<td>Color, Munsell Neutral Scale</td>
<td>4.0 8.5</td>
</tr>
</tbody>
</table>

** Neat and Extended

BASIS OF APPROVAL. Application for material approval shall be submitted to the Materials Bureau by the manufacturer. The application shall be accompanied by a labeled 50 lb production sample of the product; however the Materials Bureau will approve other packaging quantities on a case-by-case basis. The Department will test the material according to Test Method NY 701-21P,C following the manufacturer’s proportioning and mixing instructions printed on the package. Upon approval, the product brand name, manufacturing location and shelf life will be placed on the Approved List. The Department must receive a letter from the manufacturer annually certifying that no changes have been made in the formulation, manufacturing process, or manufacturing location. In the event that a letter is not received, the product may be removed from the Approved List. Furthermore, the material may be removed from the Approved List at any time if the Department is not notified in writing of any material changes as stated above. The Department reserves the right to sample and test the material at any time.

BASIS OF ACCEPTANCE. Products will be accepted on the basis of the brand name and manufacturing location appearing on the Approved List. Such products will then be accepted on the basis of the brand name and manufacturing location printed on the sealed, non reusable container along with the month and year (i.e. 05/2011) of when the material was manufactured. The manufacturer is required to print the shelf life on the container if it is less than 12 months. The expiration date of acceptance for this material shall be one calendar year from the date of manufacture or as stated in the Approved List, whichever is less.
701-12 CONCRETE REPAIR MATERIAL – HIGH EARLY STRENGTH

Make the following changes to the Standard Specifications of May 1, 2008:

Page 763 Add the following:

§701-12 CONCRETE REPAIR MATERIAL - HIGH EARLY STRENGTH

SCOPE. This specification covers a high early strength repair material, consisting of a dry component made up of cementing medium and fine aggregate to which water or an emulsified compound is added. The resulting mixture is generally used in repair of portland cement concrete pavement.

GENERAL. This material is intended for partial or full depth repairs, has the ability to be extended with Department approved CA1 aggregate, and provide at least 30 minutes of working time. This product must provide the ability to accept traffic loads within 3 hours of placement. For field use, follow the manufacturer’s mixing and curing recommendations. Material meeting the requirements of this specification when tested (neat and extended), will be placed on the Approved List.

MATERIAL REQUIREMENTS. The material shall be a prepackaged, multi-component powdered material, used for concrete repair, containing no metallic expansion aides. The product must remain workable when extended with up to 60% by weight with coarse aggregate, and meet the requirements of Table 701-12. When being used for aesthetic purposes the material’s color shall be within the Munsell Neutral Scale range stated in Table 701-12.

<table>
<thead>
<tr>
<th>TABLE 701-12 CONCRETE REPAIR MATERIAL - HIGH EARLY STRENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEST REQUIREMENT</td>
</tr>
<tr>
<td>Initial Set (minutes)</td>
</tr>
<tr>
<td>Expansion (%)</td>
</tr>
<tr>
<td>Contraction (%)</td>
</tr>
<tr>
<td>3 Hour Compressive Strength (psi) **</td>
</tr>
<tr>
<td>7 Day Compressive Strength (psi) **</td>
</tr>
<tr>
<td>1 Day Bond Strength (psi)</td>
</tr>
<tr>
<td>Freeze-Thaw Loss % (25 cycles)</td>
</tr>
<tr>
<td>Total Chloride Content (% by weight)</td>
</tr>
<tr>
<td>Total Sulfate Content (% by weight)</td>
</tr>
<tr>
<td>Color, Munsell Neutral Scale</td>
</tr>
</tbody>
</table>

** Neat and Extended

BASIS OF APPROVAL. Application for material approval shall be submitted to the Materials Bureau by the manufacturer. The application shall be accompanied by a labeled 50 lb production sample of the product; however the Materials Bureau will approve other packaging quantities on a case-by-case basis.
701-12 CONCRETE REPAIR MATERIAL – HIGH EARLY STRENGTH

The Department will test the material according to Test Method NY 701-21P,C following the manufacturer’s proportioning and mixing instructions printed on the package. Upon approval, the product brand name, manufacturing location and shelf life will be placed on the Approved List. The Department must receive a letter from the manufacturer annually certifying that no changes have been made in the formulation, manufacturing process, or manufacturing location. In the event that a letter is not received, the product may be removed from the Approved List. Furthermore, the material may be removed from the Approved List at any time if the Department is not notified in writing of any material changes as stated above. The Department reserves the right to sample and test the material at any time.

BASIS OF ACCEPTANCE. Products will be accepted on the basis of the brand name and manufacturing location appearing on the Approved List. Such products will then be accepted on the basis of the brand name and manufacturing location printed on the sealed, non reusable container along with the month and year (i.e. 05/2011) of when the material was manufactured. The manufacturer is required to print the shelf life on the container if it is less than 12 months. The expiration date of acceptance for this material shall be one calendar year from the date of manufacture or as stated in the Approved List, whichever is less.

Page 338 Add the following to the list of materials of §555-2.01 General:

“Concrete Repair Material - High Early Strength 701-12”

Page 406 Add the following to the list of materials of §569-2.01 Fabrication:

“Concrete Repair Material - High Early Strength 701-12”

Page 407 Add the following text after §701-04 of §569-3.02 C. Repair:

“or §701-12.”

Page 483 Add the following to the list of materials of §602-2.01 General:

“Concrete Repair Material - High Early Strength 701-12”

Page 488 Add the following to the list of materials of §603-2.01 General:

“Concrete Repair Material - High Early Strength 701-12”

Page 488 Add the following text after §701-04 of §603-3.02 C. Bell and Spigot Type Pipe:

“or §701-12.”

Page 495 Add the following to the list of materials of §604-2.01 Drainage Structures and Manholes:

“Concrete Repair Material - High Early Strength 701-12”

Page 497 Delete the 3rd sentence under §604-3.10 B. Precast Interceptors: and Replace it with the following:

02870=2008: 701-12,555,569,602-604,606,609,704-03,706-02,-04

L01/10/13
“Six (6) ¼ inch thick Premoulded Resilient Joint Filler shall be placed in the joint between the units, and the lifting hole and dowels shall be grouted with material conforming to §701-04, §701-05 or §701-12.”

Page 513 Add the following text after §701-04 of §606-3.05 C 12 a. Minor Defect Repair:

“or §701-12.”

Page 536 Add the following to the list of materials of §609-2 Materials:

“Concrete Repair Material - High Early Strength 701-12”

Page 537 Add the following text after §701-04 Concrete Repair Material of §609-3.02 B. Hot Mix Asphalt (Flexible) Pavement:

“, §701-12 Concrete Repair Material - High Early Strength,”

Page 537 Delete the last sentence under §609-3.03 Stone Curb and Granite Curb - Bridge Type: and Replace it with the following:

“Mortar used for bedding and filling of joints shall conform to §705-21 Masonry Mortar, §701-04 Concrete Repair Material or §701-12 Concrete Repair Material - High Early Strength.”

Page 782 Add the following to the list of materials of §704-03 Precast Concrete - General Materials Requirements:

“Concrete Repair Material - High Early Strength 701-12”

Page 787 Add the following text after §701-04 of Repair B. Minor Defects:

“or §701-12.”

Page 816 Add the following to the list of materials of §706-02 Reinforced Concrete Pipe Classes II, III, IV, V - Materials Requirements - A. Materials:

“Concrete Repair Material - High Early Strength 701-12”

Page 818 Add the following text after §701-04 Concrete Repair Material of §706-02 Reinforced Concrete Pipe Classes II, III, IV, V - Repair - A. Machine Made Pipe:

“or §701-12 Concrete Repair Material - High Early Strength.”

Page 821 Add the following text after §701-05 Concrete Grouting Material of §706-04 Precast Drainage Units - Steps for Drainage Units:

“, or §701-12 Concrete Repair Material - High Early Strength.”
Make the following changes to the Standard Specifications of May 1, 2008:

Page 781, remove 704-02 in its entirety and replace it with the following:

“704-02 CONCRETE BRICK

SCOPE. This specification covers the material and quality requirements for concrete brick produced in accordance with the current Materials Procedure for Concrete Masonry QC/QA titled “Procedures for Achieving and Maintaining Concrete Masonry Units Approved List Status”. Item 704-02 can be used in brick masonry construction, altering drainage structures, leaching-basins and manholes (section 604).

MATERIAL REQUIREMENTS. Concrete brick shall conform to the requirements of ASTM C936, except as noted herein. Certain aggregates appear in the Approved List of Sources of Fine and Coarse Aggregates that have use limitations with high alkali Portland Cement. Materials used in the manufacture of concrete brick shall meet the requirements of the following subsections:

<table>
<thead>
<tr>
<th>Material</th>
<th>Subsection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portland Cement</td>
<td>701-01</td>
</tr>
<tr>
<td>Coarse Aggregate</td>
<td>703-02</td>
</tr>
<tr>
<td>Mortar Sand</td>
<td>703-03</td>
</tr>
<tr>
<td>Grout Sand</td>
<td>703-04</td>
</tr>
<tr>
<td>Concrete Sand</td>
<td>703-07</td>
</tr>
<tr>
<td>Fly Ash</td>
<td>711-10</td>
</tr>
<tr>
<td>Ground, Granulated Blast-Furnace Slag</td>
<td>711-12</td>
</tr>
<tr>
<td>Water</td>
<td>712-01</td>
</tr>
</tbody>
</table>

Fly ash or ground, granulated blast-furnace slag may be substituted up to a maximum of 20% by weight of the total amount of cement plus pozzolan in the mix. Pigments used for integral coloring shall meet the requirements of ASTM C979. Other materials may be used in the manufacture as approved by the Director, Materials Bureau. The nominal dimensions of the brick shall be 8 inches long, 4 inches wide, and 2\(\frac{3}{4}\) inches in height.

Physical Properties. Concrete brick shall meet the compressive strength and absorption requirements in ASTM C936. In addition, the maximum acceptable average freeze/thaw loss of five paver samples, subjected to 25 freeze/thaw cycles in a 10% NaCl solution, is 1.0%, with no individual sample exceeding 1.5%.

SAMPLING AND TESTING. When samples are requested by the Department, they will be randomly selected from production-run material. A total of 15 concrete bricks of the same size and style will be required. Five samples will be tested for compressive strength and five for absorption, in accordance with ASTM C140. Five samples will be tested for freeze/thaw durability in accordance with NYSDOT test methods.

BASIS OF ACCEPTANCE. Concrete brick will be accepted on the job site based on the following:

- The manufacturer's name must appear on the Department’s Approved List for the item being supplied.
- A manufacturer’s certification.
- An acceptable product evaluation made by the Engineer.”
Page 788, remove 704-04 in its entirety and replace with the following:

"704-04 CONCRETE BLOCK (SLOPE PAVING)

SCOPE. This specification covers the material details and quality requirements for concrete block for use in concrete block slope paving and produced in accordance with the current Materials Procedure for Concrete Masonry QC/QA titled “Procedures for Achieving and Maintaining Concrete Masonry Units Approved List Status”.

MATERIAL REQUIREMENTS. Certain aggregates appear in the Approved List of Sources of Fine and Coarse Aggregates that have use limitations with high alkali Portland Cement. Materials used in the manufacture of concrete block shall meet the requirements of the following subsections:

- Portland Cement
- Coarse Aggregate
- Mortar Sand
- Grout Sand
- Concrete Sand
- Fly Ash
- Ground, Granulated Blast-Furnace Slag
- Water

Fly ash or ground granulated blast furnace slag may be substituted for up to a maximum of 20% by weight of the total amount of cement plus pozzolan in the mix. Pigments used for integral coloring shall meet the requirements of ASTM C979. Other materials may be used in the manufacture as approved by the Director, Materials Bureau.

Physical Properties. The minimum acceptable average compressive strength of five-block samples is 6000 psi, with no individual block less than 5500 psi. The maximum acceptable average freeze/thaw loss of five-block samples, subjected to 42 freeze/thaw cycles in a 3% NaCl solution, shall not exceed 1.0%, with no individual sample exceeding 1.5%.

Block dimensions shall be as required in the contract documents. Dimensions shall not vary by more than ¼ inch from those specified. Blocks shall be sound and free from cracks or other defects that would interfere with their proper placement or performance.

SAMPLING AND TESTING. When samples are requested by the Department, they will be randomly selected from production-run material. A minimum of five samples, prepared by the manufacturer in accordance with ASTM C1262, will be required for freeze/thaw testing.

Samples will be tested for compressive strength in accordance with ASTM C140. Samples will be tested for freeze/thaw durability in accordance with ASTM C1262.

BASIS OF ACCEPTANCE. Concrete block will be accepted on the job site based on the following:

- The manufacturer’s name must appear on the Department’s Approved List for the item being supplied.
- A manufacturer’s certification.
- An acceptable product evaluation made by the Engineer."
Page 790, remove 704-07 in its entirety and replace with the following:

“704-07 SEGMENTAL RETAINING WALL BLOCKS

SCOPE. This specification covers the material details and quality requirements for segmental retaining wall blocks produced in accordance with the current Materials Procedure for Concrete Masonry QC/QA titled “Procedures for Achieving and Maintaining Concrete Masonry Units Approved List Status”.

MATERIAL REQUIREMENTS. Provide segmental retaining wall block meeting the style and color requirements in the contract documents. Certain aggregates appear in the Approved List of Sources of Fine and Coarse Aggregates that have use limitations with high alkali Portland cement. Use materials, meeting the following requirements, in the manufacture of segmental retaining wall blocks:

- Portland Cement 701-01
- Coarse Aggregate 703-02
- Mortar Sand 703-03
- Grout Sand 703-04
- Concrete Sand 703-07
- Fly Ash 711-10
- Ground, Granulated Blast-Furnace Slag 711-12
- Water 712-01

Fly ash or ground, granulated blast-furnace slag may be substituted for up to a maximum of 20% by weight of the total amount of cement plus pozzolan in the mix. Use integral coloring pigments, when required, meeting the requirements of ASTM C979. Other materials may be used in the manufacture as approved by the Director, Materials Bureau.

Physical Properties. The minimum acceptable average compressive strength of five-block samples is 6000 psi, with no individual block sample less than 5500 psi. The maximum acceptable average freeze/thaw loss of five-block samples, subjected to 42 freeze/thaw cycles in a 3% NaCl solution, is 1.0%, with no individual sample exceeding 1.5%.

The formed dimensions of concrete retaining wall block units will not differ more than ¼ inch from the nominal dimensions shown on the approved Materials Detail Drawing. Provide sound blocks, free from cracks or other defects that would interfere with the proper placing, performance, or appearance of the blocks.

Materials Details. At the time of application to the Approved List, submit Materials Details Drawings to the Director, Materials Bureau for approval. Prepare and submit drawings in accordance with Departmental procedural directives. Submit a unique drawing(s) for each block style under consideration.

Sampling and Testing. When samples are requested by the Department, they will be randomly selected from production-run material. A minimum of 5 samples, prepared by the manufacturer in accordance with ASTM C140, will be required for compression testing. A minimum of five samples, prepared by the manufacturer in accordance with ASTM C1262, will be required for freeze/thaw testing.

Samples will be tested for compressive strength in accordance with ASTM C140. Samples will be tested for freeze/thaw durability in accordance with ASTM C1262.

Basis of Acceptance. Segmental retaining wall blocks will be accepted on the job site based on
the following:

- The manufacturer's name and block style must appear on the Department’s Approved List for the item being supplied.
- A manufacturer’s certification.
- Conformance to the approved material detail drawing(s).
- An acceptable product evaluation made by the Engineer.”

Page 792, **remove** 704-10 in its entirety and **replace** with the following:

**“704-10 SPLIT-FACED CONCRETE BRICK**

**SCOPE.** This specification covers the material details and quality requirements for split faced concrete brick for use in facing structural walls and produced in accordance with the current Materials Procedure for Concrete Masonry QC/QA titled “Procedures for Achieving and Maintaining Concrete Masonry Units Approved List Status”.

**MATERIAL REQUIREMENTS.** Split-faced concrete brick shall conform to the requirements of ASTM C90, except as noted herein. The shape, size, and color of split-faced concrete brick shall be as shown in the contract documents. The splitting operation shall leave relatively sharp, straight and parallel edges. Certain aggregates appear in the Approved List of Sources of Fine and Coarse Aggregates that have use limitations with high alkali Portland Cement. Materials used in the manufacture of split-faced concrete brick shall meet the requirements of the following subsections:

- Portland Cement: 701-01
- Coarse Aggregate: 703-02
- Mortar Sand: 703-03
- Grout Sand: 703-04
- Concrete Sand: 703-07
- Fly Ash: 711-10
- Ground, Granulated Blast-Furnace Slag: 711-12
- Water: 712-01

Fly ash or ground, granulated blast-furnace slag may be substituted for up to a maximum of 20% by weight of the total amount of cement plus pozzolan in the mix. Pigments used for integral coloring shall meet the requirements of ASTM C979. Other materials may be used in the manufacture as approved by the Director, Materials Bureau.

**SAMPLING AND TESTING.** When samples are requested by the Department, they will be randomly selected from production-run material. A minimum of 10 full-size, split-faced bricks of the same size and style will be required. Five samples will be tested for compressive strength and five for absorption, in accordance with ASTM C140.

The manufacturer shall be responsible for having brick tested for linear drying shrinkage in accordance with ASTM C90. A copy of the test report shall be included with the samples submitted to the Department for compression and absorption testing.

**BASIS OF ACCEPTANCE.** Split-faced concrete brick will be accepted on the job site based on the following:

- The manufacturer's name must appear on the Department’s Approved List for the item being
supplied.

- A manufacturer’s certification.
- An acceptable product evaluation made by the Engineer.”

Page 793, remove 704-12 in its entirety and replace with the following:

“704-12 CONCRETE BLOCK

SCOPE. This specification covers the material and quality requirements for concrete block for use in structural walls and produced in accordance with the current Materials Procedure for Concrete Masonry QC/QA titled “Procedures for Achieving and Maintaining Concrete Masonry Units Approved List Status”.

MATERIAL REQUIREMENTS. Concrete block shall conform to the requirements of ASTM C90 except as noted herein. The shape, size, and color of concrete block shall be as shown in the contract documents. Certain aggregates appear in the Approved List of Sources of Fine and Coarse Aggregates that have use limitations with high alkali Portland Cement. Materials used in the manufacture of concrete block shall meet the requirements of the following subsections:

<table>
<thead>
<tr>
<th>Material</th>
<th>Subsection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portland Cement</td>
<td>701-01</td>
</tr>
<tr>
<td>Coarse Aggregate</td>
<td>703-02</td>
</tr>
<tr>
<td>Mortar Sand</td>
<td>703-03</td>
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<td>Grout Sand</td>
<td>703-04</td>
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<td>711-12</td>
</tr>
<tr>
<td>Water</td>
<td>712-01</td>
</tr>
</tbody>
</table>

Fly ash or ground, granulated blast-furnace slag may be substituted for up to a maximum of 20% by weight of the total amount of cement plus pozzolan in the mix. Pigments used for integral coloring shall meet the requirements of ASTM C979. Other materials may be used in the manufacture as approved by the Director, Materials Bureau.

SAMPLING AND TESTING. When samples are requested by the Department, they will be randomly selected from production-run material. A minimum of 10 full-size concrete blocks of the same size and style will be required. Five samples will be tested for compressive strength and five for absorption, in accordance with ASTM C140.

The manufacturer shall be responsible for having block tested for linear drying shrinkage in accordance with ASTM C90. A copy of the test report shall be included with the samples submitted to the Department for compression and absorption testing.

BASIS OF ACCEPTANCE. Concrete block will be accepted on the job site based on the following:

- The manufacturer's name must appear on the Department’s Approved List for the item being supplied.
- A manufacturer’s certification.
- An acceptable product evaluation made by the Engineer.”

Page 794, remove 704-13 in its entirety and replace with the following:
"704-13 PRECAST CONCRETE DRIVEWAY AND SIDEWALK PAVERS

SCOPE. This specification covers the material details and quality requirements for precast concrete pavers used for driveway and sidewalk paving and produced in accordance with the current Materials Procedure for Concrete Masonry QC/QA titled “Procedures for Achieving and Maintaining Concrete Masonry Units Approved List Status”.

MATERIAL REQUIREMENTS. Precast concrete pavers shall meet the requirements of ASTM C936 except as noted herein. The shape, size, and color of precast concrete pavers shall be as shown in the Contract documents. Certain aggregates appear in the Approved List of Sources of Fine and Coarse Aggregates that have use limitations with high alkali Portland Cement. Materials used in the manufacture of precast concrete pavers shall meet the requirements of the following subsections:

- Portland Cement: 701-01
- Coarse Aggregate: 703-02
- Mortar Sand: 703-03
- Grout Sand: 703-04
- Concrete Sand: 703-07
- Fly Ash: 711-10
- Ground, Granulated Blast-Furnace Slag: 711-12
- Water: 712-01

Fly ash or ground, granulated blast-furnace slag may be substituted for up to a maximum of 20% by weight of the total amount of cement plus pozzolan in the mix. Pigments used for integral coloring shall meet the requirements of ASTM C979. Other materials may be used in the manufacture as approved by the Director, Materials Bureau.

Physical Properties. Precast concrete pavers shall meet the compressive strength and absorption requirements of ASTM C936. In addition, the maximum acceptable average freeze/thaw loss of five paver samples, subjected to 25 freeze/thaw cycles in a 10% NaCl solution, is 1.0%, with no individual sample exceeding 1.5%.

SAMPLING AND TESTING. When samples are requested by the Department, they will be randomly selected from production-run material. A total of 15 precast concrete pavers of the same size and style will be required. Five samples will be tested for compressive strength and five for absorption, in accordance with ASTM C140. Five samples will be tested for freeze/thaw durability in accordance with NYSDOT test methods.

BASIS OF ACCEPTANCE. Precast concrete driveway and sidewalk pavers will be accepted on the job site based on the following:

- The manufacturer's name must appear on the Department’s Approved List for the item being supplied.
- A manufacturer’s certification.
- An acceptable product evaluation made by the Engineer.”
“704-23 PRECAST CONCRETE STREET PAVERS

SCOPE. This specification covers the material and quality requirements for precast concrete pavers used for street paving and produced in accordance with the current Materials Procedure for Concrete Masonry QC/QA titled “Procedures for Achieving and Maintaining Concrete Masonry Units Approved List Status”.

MATERIAL REQUIREMENTS. Precast concrete pavers shall meet the requirements of ASTM C936 except as noted herein. The shape, size, and color of precast concrete pavers shall be as shown in the contract documents. Minimum thickness for precast concrete street pavers shall be 3 1/8 inches. Certain aggregates appear in the Approved List of Sources of Fine and Coarse Aggregates that have use limitations with high alkali Portland cement. Materials used in the manufacturing of precast concrete pavers shall meet the requirements of the following subsections:

- Portland Cement: 701-01
- Coarse Aggregate*: 703-02
- Mortar Sand*: 703-03
- Grout Sand*: 703-04
- Concrete Sand*: 703-07
- Fly Ash: 711-10
- Ground, Granulated Blast-Furnace Slag: 711-12
- Water: 712-01

*Aggregates. For precast concrete pavers or equivalent products placed in concrete highway wearing surfaces, use aggregate from a source or sources on the “Approved List of Sources of Fine and Coarse Aggregate.” All aggregate must be approved for use in concrete. Fine aggregate, natural or manufactured sand, must meet the requirements of §703-01, Fine Aggregate. Crushed stone, crushed gravel, or crushed slag from a coarse aggregate source must meet the requirements of §703-02, Coarse Aggregate.

Aggregate friction requirements: Sample and test aggregate for friction characteristics according to the procedures of Materials Method 28 “Friction Aggregate Control and Test Procedures”, PCC Sand. The Engineer will identify pavement areas, if any, represented by failing samples according to the procedures of Materials Method 28 “Friction Aggregate Control and Test Procedures.”

Aggregate must contain at least 25.0% acid-insoluble residue in the plus No. 30 size fraction and in the minus No. 30, plus No. 200 size fraction. If more than one source of aggregate is used, aggregate from each source must meet the acid-insoluble residue requirements.

Fly ash or ground, granulated blast-furnace slag may be substituted up to a maximum of 20% by weight of the total amount of cement plus pozzolan in the mix. Pigments used for integral coloring shall meet the requirements of ASTM C979. Other materials may be used in the manufacture as approved by the Director, Materials Bureau.

Physical Properties. Precast concrete pavers shall meet the compressive strength and absorption requirements of ASTM C936. In addition, the maximum acceptable average freeze/thaw loss of five paver samples, subjected to 25 freeze/thaw cycles in a 10% NaCl solution, is 1.0%, with no individual
SAMPLING AND TESTING. When samples are requested by the Department, they will be randomly selected from production-run material. A total of 15 precast concrete pavers of the same size and style will be required. Five samples will be tested for compressive strength and five for absorption, in accordance with ASTM C140. Five samples will be tested for freeze/thaw durability in accordance with NYSDOT test methods.

BASIS OF ACCEPTANCE. Precast Concrete Street pavers will be accepted on the job site based on the following:

- The manufacturer's name must appear on the Department’s Approved List for the item being supplied.
- A manufacturer’s certification.
- An acceptable product evaluation made by the Engineer.”
Make the following changes to the Standard Specifications dated May 1, 2008:

Page 799 Add the following:

704-24 - PRECAST CONCRETE PANELS

SCOPE. This specification covers the material and fabrication requirements for precast concrete panels.

MATERIAL REQUIREMENTS. The Material Requirements contained in §704-03 shall apply.

DRAWINGS. The Drawing requirements contained in §704-03 shall apply.

FABRICATION. The Fabrication requirements contained in §704-03 shall apply.

SAMPLING AND TESTING. The Sampling And Testing requirements contained in §704-03 shall apply.

MARKING. The Marking requirements contained in §704-03 shall apply.

FINAL PRODUCTION INSPECTION. The Final Production Inspection requirements contained in §704-03 shall apply.

SHIPPING. The Shipping requirements contained in §704-03 shall apply.

BASIS OF ACCEPTANCE. The Basis Of Acceptance requirements contained in §704-03 shall apply.
Make the following changes to Standard Specifications Construction and Materials of May 1, 2008.

Page 352, §556-2 MATERIALS: add the following to the list of materials:
Grouted Reinforcing Bar Splice Sleeves 709-15

Page 379, §563-2 MATERIALS: add the following before §563-3 CONSTRUCTION DETAILS:
563-2.07 Grouted Reinforcing Bar Splice Sleeves shall meet the requirements of §709-15 Grouted Reinforcing Bar Splice Sleeves.

Page 852, before SECTION 710- FENCE AND GUIDE RAIL, add the following:

709-15 GROUTED REINFORCING BAR SPLICE SLEEVES

SCOPE. This specification covers the material requirements for Grouted Splice Sleeves. The splice sleeve and the grout constitute a system, and both parts of the system will appear together on the Approved List.

MATERIAL REQUIREMENTS
Grouted splice sleeves may be made of plain steel, stainless steel, or steel with epoxy coating. Grouted splice sleeves made of plain steel shall not be used with epoxy coated reinforcement. Grouted splice sleeves will be tested for the following parameters using California Test 670. The total slip shall be a maximum of:

<table>
<thead>
<tr>
<th>Size</th>
<th>Slip Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>#3 to #6</td>
<td>0.010 in.</td>
</tr>
<tr>
<td>#7 to #9</td>
<td>0.015 in.</td>
</tr>
<tr>
<td>#10 to #11</td>
<td>0.020 in.</td>
</tr>
<tr>
<td>#14</td>
<td>0.025 in.</td>
</tr>
<tr>
<td>#18</td>
<td>0.030 in.</td>
</tr>
</tbody>
</table>

The tensile strength of the splice shall be at least 125% of the yield strength of the reinforcing bar as tested according to ASTM A370.

In addition, the manufacturer shall submit test data as set forth in AASHTO LRFD 5.5.3.4 for grout-filled sleeves. The results shall show that the fatigue resistance of the splice meets the set criteria. The sample preparation, testing methodology, and data analysis shall all be conducted by a certified and independent laboratory using the same methodology as that used in NCHRP 10-35.

The grout shall be as supplied by the manufacturer of the splice sleeve, and shall be the same grout that appears on the Approved List.

BASIS OF ACCEPTANCE. Grouted Reinforcing Bar Splice Sleeve systems will be accepted on the basis of the manufacturer’s name and location appearing on the Department’s Approved List and a material certification that states the product conforms to this specification or, at the discretion of the Department, based on sampling and testing in accordance with the procedural directives of the Materials Bureau. Buy America requirements apply.
§711-08 – ADMIXTURES- NON-CHLORIDE ACCELERATORS

Make the following changes to the Standard Specifications, dated May 1, 2008:

Page 872 under 711-08 ADMIXTURES, delete the paragraph SCOPE, and replace with the following:

“SCOPE. These specifications cover the material requirements for air-entraining, water-reducing and retarding, water-reducing (normal range and high range), and non-chloride accelerating admixtures used in the manufacture of Portland Cement concrete.”

Page 874, after paragraph E. Length Change, add the following:

“Non-Chloride Accelerating Admixtures. Non-chloride accelerating admixtures shall conform to the requirements outlined in ASTM C494 for Type C or Type E admixtures.”

Page 874, delete the paragraph SAMPLING AND TESTING, and replace with the following:

“SAMPLING AND TESTING. A one quart sample of admixture shall be submitted to the Materials Bureau by the manufacturer applying for approval, except that for Water-reducing (High Range) admixtures, two quarts will be required. The manufacturer shall submit information on the formulation of the product including the raw materials from which it is compounded, data from tests performed in accordance with these specifications and a description of the manufacturing process. Data from tests performed in accordance with ASTM C260 for air-entraining agents and ASTM C494 for water-reducing and retarding, water-reducing (normal range and high range), and non-chloride accelerating admixtures may be substituted.

The Department will test the submitted admixture sample according to written Department instructions. The test procedures are available from the Materials Bureau upon request.

The Department reserves the right to monitor the performance of any previously approved admixture. Samples of admixture may be taken from actual concrete operations and retested by the Materials Bureau.”

Page 875, delete the paragraph BASIS OF ACCEPTANCE, and replace with the following:

“BASIS OF APPROVAL. The approval of the admixture shall be based upon the submitted information and tests performed by the Materials Bureau. Upon approval by the Materials Bureau, the name of the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Admixtures will be accepted on the basis of the brand name appearing on the Approved List and the product containers plainly labeled with the brand name.

Any admixtures sampled from actual concrete operations and retested in the Materials Bureau shall give substantially the same results, at the same dosage rate, as the original tests. Any significant change will be cause for rejection of that material and may require a resubmission of the admixture by the manufacturer for a complete retest to determine specification compliance. The admixture may be withdrawn from the Approved List during the retest period.”
SOIL EROSION AND SEDIMENT CONTROL

Make the following changes to the Standard Specifications of May 1, 2008:

Page 901, delete Class IV Soil Stabilizers in its entirety and replace with the following:

**Class IV Soil Stabilizers.** Soil stabilizers are short-term duration, erosion control products. When used alone, they shall be used on slopes 1:2 or flatter. They shall not be used in channels or in areas of concentrated flow.

**Type A.** A soil binding system consisting of one of the following:
- Cementitious soil binder which is added to wood cellulose fiber mulch, a Bonded Fiber Matrix (BFM). Intended to form a thick, heavy-bodied crust or mat-like barrier that controls storm water and wind induced erosion. BFMs last up to six months and require a cure time up to 48 hours, without rain, to develop intimate soil contact.
- Soil stabilizing polymer which is added to wood cellulose fiber mulch, a Polymer Stabilized Fiber Matrix (PSFM). Intended to form a matrix that is designed to work directly with soil to maintain its stability by preserving existing soil structure, flocculating fine sediment being dislodged by storm water or wind, and to prevent splash erosion. PSFMs last up to six months and require a cure time up to 24 hours.

**Type B.** An anionic polyacrylamide (PAM) and calcium solution intended to reduce the erodibility of bare soils during construction activities or to enhance the performance of mulching on permanent slopes. Soil stabilizers, Type B, shall bond soil particles and shall effectively increase the soil particle size to 3/64 inch or larger. Soil stabilizers, Type B, shall reduce the movement of soil due to chemical bonding, thereby increasing the particle size rendering silt fence/sediment trapping devices more effective, and increase the water absorption of the soil.

**Type C.** A soil binder which may be made up of wood fibers, straw fibers, cotton fibers, interlocking fibers, polymers and hydro-colloid tackifiers, a Flexible Growth Medium (FGM) or Cotton Fiber Reinforcement Matrix (C-FRM). Intended to form a thick, heavy-bodied crust or mat-like barrier that controls storm water and wind induced erosion. FGMs/C-FRMs last up to a year and require no cure time to develop intimate soil contact.

Type A, B, and C soil stabilizers may be used alone or in combination with Class III, Types A and B Turf Reinforcement Materials where those products are used on slope applications.
PAVEMENT MARKING MATERIALS

Make the following changes to the Standard Specifications of May 1, 2008.
Page 1006, Delete Section 727 Pavement Marking Materials and Replace it with the following:

SECTION 727 - PAVEMENT MARKING MATERIALS

727-01 EXTRUDED THERMOPLASTIC

SCOPE. This specification covers the material requirements for thermoplastic that is extruded, in a molten state, onto a pavement surface. Following a surface application of reflective beads the resultant marking is a reflectorized stripe.

MATERIAL REQUIREMENTS. Unless otherwise noted, all samples are to be prepared and tested at an ambient temperature of 73°F ± 3°F.

General.
- Formulated for application at temperatures greater than 400°F.
- Show no significant breakdown or deterioration at 475°F.
- Pigment, beads and filler uniformly dispersed in the binder resin.
- Be free from all skins, dirt and foreign objects.
- Comply with the following requirements:

<table>
<thead>
<tr>
<th>TABLE 727-01-1 THERMOPLASTIC PROPERTIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Binder</td>
</tr>
<tr>
<td>Titanium Dioxide</td>
</tr>
<tr>
<td>Reflective Beads</td>
</tr>
<tr>
<td>Calcium Carbonate &amp; Inert Fillers</td>
</tr>
<tr>
<td>Yellow Pigments</td>
</tr>
</tbody>
</table>

* Amount and type of yellow pigment, calcium carbonate and inert fillers at the option of the manufacturer, providing the other composition requirements are met and the yellow pigment is lead chromate free.

Physical Properties.

A. Color. (ASTM D1535) When viewed under North Standard Daylight:
- White: Approximate visual color match to Munsell Book Notation N 9.5/0.
- Yellow: Approximate visual color match to Munsell Book Notation 10YR8/14.

B. Yellowness Index. (ASTM D1925 at 2°Observer angle and C Illuminate)
- White thermoplastic: 0.12 maximum

PAVEMENT MARKING MATERIALS

D. Specific Gravity. Between 1.8 and 2.2 as determined by a water displacement method at 77°F.

E. Field Drying Time. At 70°F, and thickness between 1/8 inch and 3/16 inch: Completely solid and showing no damaging effect from traffic after 10 minutes.

Thermoplastic Primer.
- Specifically designed to enhance the bond of thermoplastic pavement markings to HMA and/or PCC pavements.
- Be either a one-component or two-component, cold- or hot-applied material of the type recommended by the manufacturer.
- Conform to current Federal, State and Local air pollution regulations, including those for the control (emission) of volatile organic compounds (VOC) as established by the U.S. EPA, and the NYSDEC.

PACKAGING AND SHIPPING. Shipped to the job site in strong, substantial containers, clearly marked with the following and including:
- Manufacturer's Name
- Name of Product
- Material Specification Number
- Lot/Batch Number
- Manufacture Date
- Expiration Date
- Quantity
- Two-component primer containers clearly identified as "Part A" and "Part B"
- Primers accompanied with written instructions for use

BASIS OF APPROVAL. Application for approval shall be submitted to the Materials Bureau by the manufacturer, accompanied by samples of each color (white and yellow) of the product and applicable glass beads in accordance with §727-05 Glass Beads For Pavement Markings, independent lab test results in accordance to this specification or in conjunction with the National Transportation Product Evaluation Program (NTPEP), and a certification that the product conforms to this specification.

Upon approval by the Materials Bureau, the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Extruded Thermoplastic will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

727-02 REMOVABLE RAISED PAVEMENT MARKERS

SCOPE. This specification covers the material requirements for removable raised pavement markers for use as interim and temporary pavement markings.

MATERIAL REQUIREMENTS

General. Removable raised pavement markers shall be:
Designed as single units consisting of an acrylic plastic or another type of durable casing, containing one or two reflective faces.
PAVEMENT MARKING MATERIALS

Approximately square in shape.
Capable of providing daytime delineation.
Adhere to HMA or PCC surfaces using adhesives and/or methods recommended by the manufacturer.
Removable from HMA and PCC pavements, intact or in substantially large pieces, without the use of heat, solvents, grinding or blasting.
Free from dirt or any other contaminants.

Physical Properties.

A. Color. (ASTM D1535) When viewed under North Standard Daylight:
White: Approximate visual color match to Munsell Book Notation N 9.5/0
Yellow: Approximate visual color match to Munsell Book Notation 10YR8/14

B. Size.
2. Reflective Lens. Minimum area of the reflective lens: 0.38 square inches.

C. Reflectance. Initial average reflectance values, when measured with incident light parallel to the base of the marker, at an observation angle of 0.2°.

| TABLE 727-02-1 REFLECTIVE MARKER LENSES REFLECTANCE |
|---------------------------------|-----------|-----------|
| Color                          | White     | Yellow    |
| Entrance Angle                 | 0°        | 20°       | 0°        | 20°       |
| Specific Intensity (cd/ft²)     | 1.0       | 0.4       | 0.6       | 0.24      |

NOTES:
1. Observation Angle: The angle at the reflector between the observer's line of sight and the direction of light incident on the reflector.
2. Entrance Angle: The angle in the horizontal plane between the direction of incident light and the normal to the leading edge of reflective marker.
3. Specific Intensity: The luminous intensity (candels) of returned light at the chosen observation and entrance angles for each footcandle of illumination at the reflector on a plane perpendicular to the incident light.
4. Photometric Test Procedure: The reflective marker to be tested shall be located with the center of the reflective lens at a distance of 5 feet from a uniformly bright light source, having an effective diameter of 0.2 in. The return of light shall be measured using an annular ring photocell (3/8 inch I.D. x 1/2 inch O.D.). The photocell shall be shielded to eliminate stray light. The distance from the light source center to the photocell center shall be 0.21 inches. If a test distance of other than 5 feet is used, the source and receiver shall be modified in the same proportion as the test distance.

BASIS OF APPROVAL. Application for approval shall be submitted to the Materials Bureau by the manufacturer, accompanied by samples of each color (white and yellow) of the product, independent lab test results in accordance with this specification or in conjunction with the National Transportation Product Evaluation Program (NTPEP), and certification that the product conforms to this specification. Additional field tests will be carried out in accordance with Materials Bureau Directives.
PAVEMENT MARKING MATERIALS

Upon approval by the Materials Bureau, the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Removable Raised Pavement Markers for Interim Pavement Markings will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

Removable Raised Pavement Markers used for Temporary Pavement Markings will be accepted on the basis of the product appearing on the Approved List. Upon request, the Contractor shall provide a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

727-03 EPOXY PAINT

SCOPE. This specification covers the material requirements for epoxy pavement marking paint that is applied onto pavement, followed by a surface application of retroreflective beads for use as interim and permanent pavement markings.

MATERIAL REQUIREMENTS

General. Epoxy paint shall be:
Formulated for use as a pavement marking material and for hot-spray application at elevated temperatures.
Two-component (Part A and Part B), 100% solids type system formulated and designed to provide a simple volumetric mixing ratio (e.g., two volumes of Part A to one volume of Part B).
VOC compliant and lead chromate free.
Use organic yellow pigments, Color Index Pigment Yellow 65 (C.I. 11740) and/or 74 (C.I. 11741).
Have a consistent target value of epoxy in Part A, based on ASTM D1652. Tested on a pigment free basis and calculated as the weight per epoxy equivalent (WPE).
Have a consistent total amine value of Part B based on ASTM D2074, or an alternate test method for determining the amine value specified by the manufacturer subject to the approval of the Director, Materials Bureau.
Display no bleeding on the surface upon which the paint is applied.
Conform to current Federal, State and Local air pollution regulations, including those for the control (emission) of volatile organic compounds (VOC) as established by the U.S. EPA and the NYSDEC.

Physical Properties.

A. % Pigment - Part A. (ASTM D2371) Yellow: 23% minimum
White: 18% minimum
% TiO2 (100% Purity) (NYS Test Method 727-20C) White: 16.5% minimum

B. % Resin – Part A. (ASTM D2371) Yellow: 70% - 77%
White: 75% - 82%

C. Color. (ASTM D1535) When viewed under North Standard Daylight, at a 15 ± 1 mil wet film thickness with no glass beads applied:
White: Approximate visual color match to Munsell Book Notation N 9.5/0
PAVEMENT MARKING MATERIALS

Yellow: Approximate visual color match to Munsell Book Notation 10YR8/14 and within the following chromaticity coordinate limits when tested under ASTM E1347.

<table>
<thead>
<tr>
<th>Coordinate</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>0.485</td>
<td>0.526</td>
<td>0.504</td>
<td>0.468</td>
</tr>
<tr>
<td>y</td>
<td>0.426</td>
<td>0.472</td>
<td>0.481</td>
<td>0.450</td>
</tr>
</tbody>
</table>

D. Directional Reflectance. (ASTM E1347) White: 84% minimum Yellow: 54% minimum

E. Yellowness Index. (ASTM D1925 at 2° Observer angle and C Illuminate) White Epoxy Paint: 0.12 maximum

F. Drying Time – Laboratory. (ASTM D711) Dry to no-pick-up time in 3 minutes maximum at an application rate of 15 ± 1 mils wet-film thickness and glass-sphere application rate of 20 lb/gal.

G. Hardness. (ASTM D2240) Samples cured for 72 to 96 hours prior to testing. Shore D Hardness: 75 - 100.

H. Infrared Spectrophotometer Analysis. (ASTM D2621) The spectrum of each component will be analyzed and maintained as a base record. Any subsequent samples taken from a Department contract must be a reasonable match to the original formulation spectrum accepted by the Materials Bureau for the Approved List.

Placement Properties. The material shall be capable of being placed using standard epoxy pavement marking equipment and have a maximum field no track time of 30 minutes when installed at 77°F.

PACKAGING AND SHIPPING. Shipped to the job site in strong, substantial containers, clearly marked with the following information:

- Manufacturer's Name
- Name of Product
- Material Specification Number
- Lot/Batch Number
- Date of Manufacture
- Expiration Date
- The Statement (as appropriate):
  
  "Part A Contains Pigment and Epoxy Resin," or "Part B Contains Catalyst"

- Quantity

BASIS OF APPROVAL. Application for approval shall be submitted to the Materials Bureau by the manufacturer, accompanied by two 1/2 pint samples of each color (white and yellow) of Part A and one 1/2 pint of Part B for each color, independent lab test results in accordance with this specification or in conjunction with the National Transportation Product Evaluation Program (NTPEP), and certification that
PAVEMENT MARKING MATERIALS

the product conforms to this specification. Additional field tests will be carried out in accordance with Materials Bureau Directives. Upon approval by the Materials Bureau, the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Epoxy Paint for Permanent and/or Interim Pavement Markings will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

Epoxy Paint used for Temporary Pavement Markings will be accepted on the basis of the product appearing on the Approved List. Upon request, the Contractor shall provide a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

727-04 PERMANENT PAVEMENT TAPE

SCOPE. This specification covers the material requirements for preformed pavement marking tape that is applied to the pavement for use as permanent pavement markings.

GENERAL. Permanent pavement tape shall be:
Designed to provide immediate and continuous retroreflection.
Meet all the requirements of ASTM D4505.
Composed of a mixture of plastics or polymeric materials, resins, pigments, and reflective beads that are uniformly distributed throughout the thickness of the material.
Have a layer of reflective beads bonded to, or embedded in the top surface.
Pre-coated, on its bottom side, with a pressure-sensitive adhesive for adherence to HMA or PCC surfaces.
Of the specified dimension and shape with clean-cut, well-defined edges, of good appearance, and free of cracks or other defects.
Weather resistant and through normal traffic wear shall show no appreciable fading, lifting or shrinkage.
Capable of molding itself to the contours, breaks and faults of HMA or PCC surfaces.
Show no significant tearing, rollback, lifting or other signs of poor adhesion.
Free from dirt and any other contaminants.

MATERIAL REQUIREMENTS. Unless otherwise noted, all samples are to be prepared and tested at an ambient temperature of 73° ± 3°F.

A. Color. (ASTM D1535) When viewed under North Standard Daylight:
White: Approximate visual color match to Munsell Book Notation N 9.5/0
Yellow: Approximate visual color match to Munsell Book Notation 10YR8/14

B. Thickness. Preformed pavement marking tape shall be:
Uniform Cross Section: 60 mils minimum thickness.
Patterned (Variable Cross Section): 20 mils minimum thickness at the thinnest portions and 60 mils minimum thickness at the thickest portions.
The patterned top surface shall have approximately 50% of the surface area raised, and its design shall provide immediate and continuing retroreflection.

C. Tensile Strength. (ASTM D638) 40 psi minimum
Test specimens shall be Type II prepared by die cutting with Die C as specified in ASTM D412 Test
PAVEMENT MARKING MATERIALS

Method A. The testing machine shall operate at a speed of 0.2 inches per minute. For calculating the tensile strength of patterned type material, the thickness measurements shall be taken in the thinnest portions of the cross sectional area.

**D. Elongation.** (ASTM D638) When tested in accordance with the conditions as specified for Tensile Strength: 15% minimum elongation

**Primer.** Primer shall be recommended by the manufacturer of the permanent tape and be compatible with the marking and surface the marking is being applied to.

Specifically designed to enhance the bond of the permanent tape to HMA and/or PCC pavements. Conform to current Federal, State and Local air pollution regulations, including those for the control (emission) of volatile organic compounds (VOC) as established by the U.S. EPA and the NYSDEC.

**PACKAGING AND SHIPPING.** Shipped to the job site in strong, substantial containers, clearly marked with the following and including:

- Manufacturer's Name
- Name of Product
- Material Specification Number
- Lot/Batch Number
- Manufacture Date
- Quantity
- Primers accompanied with written instructions for use
- Expiration Date

**BASIS OF APPROVAL.** Application for approval shall be submitted to the Materials Bureau by the manufacturer, accompanied by samples of each color (white and yellow) of the product, independent lab test results in accordance with this specification or in conjunction with the National Transportation Product Evaluation Program (NTPEP), and certification that the product conforms to this specification. Additional laboratory analysis and field tests will be carried out in accordance with Materials Bureau Directives.

Upon approval by the Materials Bureau, the product will be placed on the Approved List.

**BASIS OF ACCEPTANCE.** Permanent Pavement Tape and primer will be accepted on the basis of the products appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

Permanent Pavement Tape and primer used for Temporary Pavement Markings will be accepted on the basis of the products appearing on the Approved List. Upon request, the Contractor shall provide a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

**727-05 GLASS BEADS FOR PAVEMENT MARKINGS**

**SCOPE.** This specification covers the material requirements for retroreflective beads applied on top of thermoplastic, epoxy or traffic paint for use as pavement markings.
PAVEMENT MARKING MATERIALS

MATERIAL REQUIREMENTS. Glass beads for pavement markings shall meet the requirements of AASHTO M247 and shall be:
- Composed of glass that is highly resistant to traffic wear and to the effects of weathering.
- Colorless, clean, transparent, free from milkiness or excessive air bubbles, and essentially free from surface scarring or scratching.
- Silica content (ASTM C169): 60% minimum.
- Refractive index: 1.50 when tested by the liquid immersion method at 77°F.
- Show no tendency to absorb moisture in storage and shall remain free of clusters and hard lumps.
- Flow freely from the dispensing equipment at any time when surface and atmospheric conditions are satisfactory for painting.

A. Sphericity. (ASTM D1155 Procedure A) Spherical in shape - 70% minimum, true spheres. Wet/Night Visibility Beads will be tested for roundness according to the procedural directives of the Materials Bureau.

B. Gradation. (ASTM D1214).

<table>
<thead>
<tr>
<th>TABLE 727-05-1</th>
<th>GLASS SPHERE GRADATION (Standard Bead)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Percent Passing by Weight</strong></td>
<td>Sieve Size</td>
</tr>
<tr>
<td><strong>Marking Type</strong></td>
<td>Epoxy</td>
</tr>
<tr>
<td></td>
<td>Traffic Paint</td>
</tr>
<tr>
<td></td>
<td>Thermoplastic</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 727-05-2</th>
<th>GLASS SPHERE GRADATION (Wet/Night Visibility Bead)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Percent Passing by Weight</strong></td>
<td>Sieve Size</td>
</tr>
<tr>
<td><strong>Marking Type</strong></td>
<td>Epoxy Wet/Night Reflective</td>
</tr>
</tbody>
</table>

C. Coating.

<table>
<thead>
<tr>
<th>TABLE 727-05-3</th>
<th>GLASS SPHERE COATINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Marking Type</strong></td>
<td>Coating Type</td>
</tr>
<tr>
<td>Epoxy Wet/Night Reflective</td>
<td>Silane Type adherence coating designed to interact with and adhere to epoxy pavement markings.</td>
</tr>
<tr>
<td>Epoxy (Standard Bead)</td>
<td>Moisture-resistant coating or a dual purpose type coating (moisture-resistant and adherence).</td>
</tr>
<tr>
<td>Traffic Paint</td>
<td></td>
</tr>
<tr>
<td>Thermoplastic (Drop on)</td>
<td></td>
</tr>
</tbody>
</table>
PAVEMENT MARKING MATERIALS

**D. Moisture Resistance.** AASHTO M 247 Section 5.3.2

**PACKAGING AND SHIPPING.** Shipped to the job site in waterproof plastic lined burlap or plastic lined paper bags with the following information clearly marked on the packages:

- Manufacturer's Name
- Name of Product
- Size/Type/Coating
- Material Specification Number
- Lot/Batch Number
- Manufacture Date
- Quantity/Weight of Material

**BASIS OF APPROVAL.** Application for approval shall be submitted to the Materials Bureau by the manufacturer, accompanied by one 50 lb bag sample of the product, independent lab test results in accordance with this specification and certification that the product conforms to this specification.

Upon approval by the Materials Bureau, the product will be placed on the Approved List.

**BASIS OF ACCEPTANCE.** Glass Beads for Pavement Markings will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

Glass Beads for Pavement Markings used for Temporary Pavement Markings will be accepted on the basis of the product appearing on the Approved List. Upon request, the Contractor shall provide a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

**727-06 REMOVABLE PAVEMENT TAPE**

**SCOPE.** This specification covers the material requirements for removable pavement marking tape and masking tape for use as interim and temporary pavement markings.

**MATERIAL REQUIREMENTS.**

**General.** Removable pavement tape shall be:

Composed of a mixture of plastics or polymeric materials, resins, pigments.

Have on its bottom side, a pre-applied, pressure-sensitive adhesive for adherence to HMA or PCC surfaces.

Of the specified dimension and shape with clean-cut, well defined-edges, of good appearance, and free of cracks or other defects.

Weather resistant and through normal traffic wear shall show no appreciable fading, lifting or shrinkage.

Capable of molding itself to the contours, breaks and faults of HMA or PCC surfaces.

Show no significant tearing, rollback, lifting or other signs of poor adhesion.

Removable from HMA and PCC pavements, intact or in substantially large pieces, without the use of heat, solvents, grinding or blasting, and leaving minimal permanent marks, scars or damage to the pavement surface after removal.

Be free from dirt and any other contaminants.
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Retroreflective Tape.
Designed to provide immediate and continuous retroreflection.
Composed of a mixture of plastics or polymeric materials, resins, pigments, and reflective beads that are uniformly distributed throughout the thickness of the material.
Have a layer of reflective beads bonded to, or embedded in the top surface.

Meet the following requirements:

**A. Color:** (ASTM D1535) When viewed under North Standard Daylight:
- White: Approximate visual color match to Munsell Book Notation N 9.5/0
- Yellow: Approximate visual color match to Munsell Book Notation 10YR 8/14 and be within the following chromaticity coordinate limits when tested under ASTM E1347.

| TABLE 727-06-1 CHROMATICITY COORDINATES |
|-----------------|---|---|---|---|
| Coordinate  | 1 | 2 | 3 | 4 |
| x           | 0.485 | 0.526 | 0.504 | 0.468 |
| y           | 0.426 | 0.472 | 0.481 | 0.450 |

**B. Reflectance:**

| TABLE 727-06-2 PREFORMED TAPE REFLECTANCE REQUIREMENTS |
|-----------------|---|---|
| Color           | White | Yellow |
| Observation Angle | 0.2° | 0.5° | 0.2° | 0.5° |
| Specific Luminance (mcd/ft²/fc) | 1770 | 1270 | 1310 | 810 |

Masking Tape. Masking tape shall be:
Specifically designed for use to temporarily cover existing pavement markings.
Consist of durable, nonreflective, pliant polymer tape on a reinforced, conformable backing, pre-coated with a pressure-sensitive adhesive.
Capable of adhering to existing pavement markings, asphalt pavement and Portland cement concrete pavement without the use of heat, solvents, additional adhesives or other means.
Be substantially similar in color to the pavement surface with a flat matte finish and textured, skid resistant surface.

**BASIS OF APPROVAL.** Application for approval shall be submitted to the Materials Bureau by the manufacturer, accompanied by samples of each color (white, yellow, black/grey) of the product, independent lab test results in accordance with this specification or in conjunction with the National Transportation Product Evaluation Program (NTPEP), and certification that the product conforms to this specification. Additional laboratory analysis and field tests will be carried out in accordance with Materials Bureau Directives.

Upon approval by the Materials Bureau, the product will be placed on the Approved List.

**BASIS OF ACCEPTANCE.** Removable Pavement Tape used for Interim Pavement Markings will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.
PAVEMENT MARKING MATERIALS

Removable Pavement Tape used for Temporary Pavement Markings will be accepted on the basis of the product appearing on the Approved List. Upon request, the Contractor shall provide a material certification that the product is the same as the one appearing material on the Approved List and that it conforms to this specification.

727-07 REMOVABLE WET-NIGHT REFLECTIVE TAPE

SCOPE. This specification covers the material requirements for removable wet-night reflective tape for use as interim and temporary pavement markings.

MATERIAL REQUIREMENTS.

General. Removable Wet-Night reflective tape shall be:
Designed to provide immediate and continuous retroreflection in day and night as well as dry and wet conditions.
Composed of a mixture of durable plastics or polymeric materials, resins, pigments, and reflective beads that are uniformly distributed throughout the thickness of the material.
Pre-coated, on its bottom side, with a pressure-sensitive adhesive.
Capable of adhering to existing pavement markings, asphalt pavement and Portland cement concrete pavement without the use of heat, solvents, additional adhesives or other means.
Of the specified dimension and shape with clean-cut, well-defined edges, of good appearance, and free of cracks or other defects.
Weather resistant and through normal traffic wear shall show no appreciable fading, lifting or shrinkage.
Capable of molding itself to the contours, breaks and faults of HMA or PCC surfaces.
Show no significant tearing, rollback, lifting or other signs of poor adhesion.
Removable from HMA and PCC pavements, intact or in substantially large pieces, without the use of heat, solvents, grinding or blasting, and leaving minimal permanent marks, scars or damage to the pavement surface after removal.
Have a layer of reflective beads bonded to, or embedded in the top surface.
Free from dirt and any other contaminants.

Meet the following requirements:

Physical Properties.

A. Color: (ASTM D1535) When viewed under North Standard Daylight:
White: Approximate visual color match to Munsell Book Notation N 9.5/0 and be within the following daytime chromaticity coordinates (dry) when tested under ASTM E1347.

| Coordinate | 1    | 2    | 3    | 4    |
|           |      |      |      |      |
| x         | 0.355 | 0.305 | 0.285 | 0.335 |
| y         | 0.355 | 0.305 | 0.325 | 0.375 |

Yellow: Approximate visual color match to Munsell Book Notation 10YR 8/14 and be within the following daytime chromaticity coordinates (dry) when tested under ASTM E1347.
TABLE 727-07-2 YELLOW CHROMATICITY COORDINATES

<table>
<thead>
<tr>
<th>Coordinate</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>0.560</td>
<td>0.460</td>
<td>0.420</td>
<td>0.490</td>
</tr>
<tr>
<td>y</td>
<td>0.440</td>
<td>0.400</td>
<td>0.440</td>
<td>0.510</td>
</tr>
</tbody>
</table>

B. Retroreflectivity. Wet: ASTM E2176 and ASTM E2177
Dry: ASTM E1710

TABLE 727-07-3 MINIMUM INITIAL RETROREFLECTIVITY

<table>
<thead>
<tr>
<th>Entrance Angle: 88.76°</th>
<th>Observation Angle: 1.05°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>White</td>
</tr>
<tr>
<td>Condition</td>
<td>Dry</td>
</tr>
<tr>
<td>Retroreflectivity [mcd/ft²/fc]</td>
<td>500</td>
</tr>
</tbody>
</table>

BASIS OF APPROVAL. Application for approval shall be submitted to the Materials Bureau by the manufacturer, accompanied by samples of each color (white and yellow) of the product, independent lab test results in accordance with this specification or in conjunction with the National Transportation Product Evaluation Program (NTPEP), and certification that the product conforms to this specification. Additional laboratory analysis and field tests will be carried out in accordance with Materials Bureau Directives.

Upon approval by the Materials Bureau, the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Removable Wet-Night Reflective Tape used for Interim Pavement Markings will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

Removable Wet-Night Reflective Tape used for Temporary Pavement Markings will be accepted on the basis of the product appearing on the Approved List. Upon request, the Contractor shall provide a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

727-08 PERMANENT WET-NIGHT REFLECTIVE TAPE

SCOPE. This specification covers the material requirements for permanent wet-night pavement marking tape for use as permanent pavement markings.

MATERIAL REQUIREMENTS. Unless otherwise noted, all samples are to be prepared and tested at an ambient temperature of 73° ± 3°F.

General. Permanent wet-night reflective tape shall be:
Designed to provide immediate and continuous retroreflection in day and night as well as dry and wet conditions.
Composed of a mixture of plastics or polymeric materials, resins, pigments, and reflective beads that are uniformly distributed throughout the thickness of the material.
PAVEMENT MARKING MATERIALS

Have a layer of reflective beads bonded to, or embedded in the top surface. Pre-coated, on its bottom side, with a pressure-sensitive adhesive for adherence to HMA or PCC surfaces. Of the specified dimension and shape with clean-cut, well-defined edges, of good appearance, and free of cracks or other defects. Weather resistant and through normal traffic wear shall show no appreciable fading, lifting or shrinkage. Capable of molding itself to the contours, breaks and faults of HMA or PCC surfaces. Show no significant tearing, rollback, lifting or other signs of poor adhesion. Free from dirt and any other contaminants.

Physical Properties.

**A. Color:** (ASTM D1535) When viewed under North Standard Daylight: White: Approximate visual color match to Munsell Book Notation N 9.5/0 and be within the following daytime chromaticity coordinates (dry) when tested under ASTM E1347.

<table>
<thead>
<tr>
<th>Coordinate</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>0.355</td>
<td>0.305</td>
<td>0.285</td>
<td>0.335</td>
</tr>
<tr>
<td>y</td>
<td>0.355</td>
<td>0.305</td>
<td>0.325</td>
<td>0.375</td>
</tr>
</tbody>
</table>

Yellow: Approximate visual color match to Munsell Book Notation 10YR 8/14 and be within the following daytime chromaticity coordinates (dry) when tested under ASTM E1347.

<table>
<thead>
<tr>
<th>Coordinate</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>0.560</td>
<td>0.460</td>
<td>0.420</td>
<td>0.490</td>
</tr>
<tr>
<td>y</td>
<td>0.440</td>
<td>0.400</td>
<td>0.440</td>
<td>0.510</td>
</tr>
</tbody>
</table>

**B. Retroreflectivity.** Wet: ASTM E2176 and ASTM E2177 Dry: ASTM E1710

<table>
<thead>
<tr>
<th>Entrance Angle: 88.76° Observation Angle: 1.05°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>White</td>
</tr>
<tr>
<td>Yellow</td>
</tr>
</tbody>
</table>

**C. Thickness.** Uniform Cross Section: 60 mils minimum thickness Patterned (Variable Cross Section): 20 mils minimum thickness at the thinnest portions and 60 mils minimum thickness at the thickest portions. The patterned top surface shall have approximately 50% of the surface area raised, and its design shall provide immediate and continuing retroreflection.

**D. Friction Resistance.** (ASTM E303) Friction resistance: 45 BPN minimum.
PAVEMENT MARKING MATERIALS

**E. Tensile Strength.** (ASTM D638) Tensile strength: 40 psi minimum
Test specimens shall be Type MII prepared by die cutting with Die C as specified in ASTM D412, Test Method A. The testing machine shall operate at a speed of 0.2 inches per minute. For calculating the tensile strength of patterned type material, the thickness measurements shall be taken in the thinnest portions of the cross sectional area.

**F. Elongation.** (ASTM D638) 15% minimum elongation when tested in accordance with the conditions as specified for Tensile Strength.

**Primer.** Primer shall be:
Be recommended by the manufacturer of the preformed pavement marking and be compatible with the marking and surface the marking is being applied to.
Specifically designed to enhance the bond of the preformed pavement markings to HMA and/or PCC pavements.
Conform to current Federal, State and Local air pollution regulations, including those for the control (emission) of volatile organic compounds (VOC) as established by the U.S. EPA and the NYSDEC.

**PACKAGING AND SHIPPING.** Shipped to the job site in strong, substantial containers, clearly marked with the following and including:
- Manufacturer's Name
- Name of Product
- Material Specification Number
- Lot/Batch Number
- Manufacture Date
- Quantity
- Primers accompanied with written instructions for use
- Expiration Date

**BASIS OF APPROVAL.** Application for approval shall be submitted to the Materials Bureau by the manufacturer, accompanied by samples of each color (white and yellow) of the product, independent lab test results in accordance with this specification or in conjunction with the National Transportation Product Evaluation Program (NTPEP), and certification that the product conforms to this specification. Additional laboratory analysis and field tests will be carried out in accordance with Materials Bureau Directives.
Upon approval by the Materials Bureau, the product will be placed on the Approved List.

**BASIS OF ACCEPTANCE.** Permanent Wet Night Reflective Tape and primer will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.
Permanent Wet-Night Reflective Tape and primer used for Temporary Pavement Markings will be accepted on the basis of the product appearing on the Approved List. Upon request, the Contractor shall provide a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

**727-09 TRAFFIC PAINT**
PAVEMENT MARKING MATERIALS

SCOPE. This specification covers the material requirements for waterborne and solventborne paints that are applied onto pavement, followed by a surface application of retroreflective beads for use as temporary, interim and permanent pavement markings.

MATERIAL REQUIREMENTS.

General. Traffic paint shall be:
Formulated for use as a pavement marking material.
Be VOC compliant and lead chromate free.
Yellow paints must use organic yellow pigments Color Index Pigment Yellow 65 (C.I. 11740) and/or 74 (C.I. 11741).
Display no bleeding on the surface upon which the paint is applied.
Conform to current Federal, State and Local air pollution regulations, including those for the control (emission) of volatile organic compounds (VOC) as established by the U.S. EPA, and the NYSDEC.

Physical Properties.
Traffic paint for permanent and Interim Pavement Markings shall conform to the requirements of paragraphs A through L below. Traffic paint for Temporary Pavement Markings shall conform to the following paragraphs: B. Color; C. Directional Reflectance; D. Yellowness Index; E. Drying Time; F. Viscosity; and G. Dry Opacity.

A. Composition.
% Pigment. (ASTM D3723) 58.0% – 62.0%
% Total Solids. (ASTM D3723) 76.0 % minimum
% Vehicle Non-Volatile. (ASTM D3723) 43.0 % minimum
The manufacturers certified organic yellow pigment content shall be used to determine the final laboratory test results for: total pigment (%), and for nonvolatile vehicle (%). The Department reserves the right to validate the manufacturers "certified" organic yellow pigment content through outside, independent laboratory testing.

B. Color. (ASTM D1535) When viewed under North Standard Daylight at a 15 ± 1 mils wet film thickness with no glass beads applied:
White: Approximate visual color match to Munsell Book Notation N 9.5/0.
Yellow: Approximate visual color match to Munsell Book Notation 10YR 8/14 and within the following chromaticity coordinate limits when tested under ASTM E1347.

<table>
<thead>
<tr>
<th>TABLE 727-09-1 CHROMATICITY COORDINATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinate</td>
</tr>
<tr>
<td>x</td>
</tr>
<tr>
<td>y</td>
</tr>
</tbody>
</table>

C. Directional Reflectance (ASTM E1347) White: 84% minimum
Yellow: 54% minimum

D. Yellowness Index. (ASTM D1925 at 2°Observer angle and C Illuminate)
PAVEMENT MARKING MATERIALS

White Traffic Paint: 0.12 maximum.

E. Viscosity. (ASTM D562 Procedures B) 75 – 95 Kreb Units at 77°F

F. Dry Opacity. (ASTM D2805) 0.95 minimum contrast ratio
Application at 3 1/2 inches wide, wet-film thickness of 5 mils to white and black contrast panels matching Lenta Form 5C or equivalent. Dry time of 1 hour minimum.

G. Abrasion Resistance. (ASTM D4060) Four plate samples for each lot will be prepared for testing on the Taber Abraser. The paint will be sprayed on steel plates, or applied by other suitable means so as to ensure a nominal 15 mil wet film thickness on each plate. Plates will be cured at standard laboratory temperature and humidity for 2 to 24 hours. The paint abrasion plates will be cleaned, dressed, and baked at 221°F for 18 hours. After baking, the plates will be allowed to cool in a desiccator for one hour and then weighed. The plates will be abraded for 1000 cycles on the Taber Abraser. The Taber Abraser will be operated with 1.10 lb weights and CS 10 wheels on the machine. After abrading, the samples will be cleaned with a soft brush, placed in a desiccator for one hour and weighed again. The average weight loss for the four plates shall not exceed 0.00176 oz.

H. Flexibility. (Federal Specification TT-P-1952B Section 4.5.4) No cracking or flaking visible. Determine flexibility in accordance with Method B of ASTM D522.

I. Freeze-Thaw Stability. (Federal Specification TT-P-1952b, Section 4.5.7) No coagulation or change in consistency (ASTM D562) greater than 15 Kreb Units.

J. Heat Stability. (Federal Specification TT-P-1952b, Section 4.5.8) Waterborne only. No coagulation, discoloration or change in consistency (ASTM D562) greater than 15 Kreb Units when tested in an oven at 120° ± 2°F.

K. Infrared Spectrophotometer Analysis.
Waterborne: (ASTM D3168)  Solventborne: (ASTM D2621)
The spectrum of the paint will be analyzed and maintained as a base record. Any subsequent samples taken from a Department contract must be a reasonable match to the original formulation spectrum accepted by the Materials Bureau for the Approved List.

Placement Properties.
The material shall be placed using standard traffic paint application equipment and have a maximum field no track time of 3 minutes when installed at 77°F.

PACKAGING AND SHIPPING. Shipped to the job site in strong, substantial containers. Individual containers plainly marked with the following information:

- Manufacturer's Name
- Name of Product
- Material Specification Number
- Lot/Batch Number
- Test Number
- Manufacture Date
PAVEMENT MARKING MATERIALS

- Expiration Date
- Quantity

BASIS OF APPROVAL. Application for approval shall be submitted to the Materials Bureau by the manufacturer, accompanied by eight 1 pint samples of each color (white and yellow) of the product, independent lab test results in accordance with this specification or in conjunction with the National Transportation Product Evaluation Program (NTPEP), and certification that the product conforms to this specification. Addition field tests will be carried out in accordance with Materials Bureau Directives.

Upon approval by the Materials Bureau, the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Traffic Paint for permanent and Interim Pavement Markings will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

Traffic Paint used for Temporary Pavement Markings need not appear on the Approved List. Upon request, the Contractor shall provide a material certification that the product conforms to this specification.
Make the following changes to the Standard Specifications dated May 1, 2008:

Page 1021 Delete §728-06 Sheet Gasket (Treated Both Sides) in its entirety and Replace it with the following:

728-06 SHEET GASKET (TREATED BOTH SIDES)

SCOPE. This specification covers the material requirements for sheet gasket, treated both sides with a parting agent to prevent adhesion to working surfaces. This material is used as a bond breaker and sliding surface in bridge construction.

MATERIAL REQUIREMENTS. The sheet gasket shall have a nominal 1/16 inch thickness and shall be treated on both sides with a parting agent. The material shall meet the following requirements:

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water absorption, %</td>
<td>Prepare 3 samples</td>
<td>25.0 Maximum</td>
</tr>
<tr>
<td></td>
<td>(2x2 inches, 1/16±1/32 inch thick). Record initial weight of the specimen. Immerse the samples in a distilled water tank for 24 hrs at room temperature. Take out the samples and dry it with a dry cloth, then record final weight. Use the difference in weight to calculate the water absorption %.</td>
<td></td>
</tr>
<tr>
<td>Coefficient of static friction</td>
<td>ASTM D1894</td>
<td>0.36 Maximum</td>
</tr>
<tr>
<td>Coefficient of kinetic friction</td>
<td>ASTM D1894</td>
<td>0.24 Maximum</td>
</tr>
<tr>
<td>Tensile strength, psi in the weakest direction</td>
<td>ASTM F152, Type 2</td>
<td>1200 Minimum</td>
</tr>
</tbody>
</table>

BASIS OF ACCEPTANCE. Sheet Gaskets will be accepted on the basis of the product appearing on the Department's Approved List.
Make the following changes to the Standard Specifications of May 1, 2008:

Page 1021, **Delete** Section 729 *Temporary Traffic Control Devices* and **Replace** it with the following:

**SECTION 729 – TEMPORARY TRAFFIC CONTROL DEVICES**

**729-01 DRUMS**

**SCOPE.** This specification covers the material, fabrication, and performance requirements for traffic drums. Drums are defined by FHWA as a Category I device.

**MATERIAL REQUIREMENTS.** Drums shall conform to the requirements of the MUTCD, shall be NCHRP 350 or MASH approved and shall be orange plastic, one-piece or two-piece construction, with a closed top. Drums shall be a minimum of 18 inches in diameter (visible from all directions), a minimum of 36 inches in height. Drums shall have a maximum weight of 75 lbs., including ballast. Two-piece drums shall consist of a base no more than 4 inches in height and an upper section. The base and upper section of two-piece drums shall be designed as a unit. One-piece drums shall include a base ring or elongation designed to hold ballast. The base and/or any nonflexible portion of the drum shall not extend more than 2 inches above the pavement surface.

Drums shall have 4 horizontal circumferential stripes of reflective sheeting a minimum of 4 inches wide, of alternating orange and white, starting with orange on the top. The top edge of the upper band shall be a maximum of 2 inches from the top edge of the drum. The space between stripes shall not exceed 2 inches.

Reflective sheeting shall conform to "730-05 Reflective Sheeting ASTM Type I (Class A), ASTM Type III (Class B), or higher. Reflective sheeting shall be firmly bonded to the drum with an adhesive; mechanical fasteners to bond reflective sheeting to the drum will not be allowed.

**BASIS OF ACCEPTANCE.** Upon request, the Contractor shall provide a material certification that the product conforms to this specification.

**729-02 CONES**

**SCOPE.** This specification covers the material, fabrication, and performance requirements for traffic cones. Cones are defined by FHWA as a Category I device.

**MATERIAL REQUIREMENTS.** Cones shall conform to the requirements of the MUTCD, shall be NCHRP 350 or MASH approved and shall be orange rubber or plastic. Cones shall have a maximum weight of 20 lbs, including ballast.

Standard cones shall be approximately 28 inches in height with a minimum conical bottom width of 10 inches. Standard cones shall have two horizontal circumferential stripes of white reflective sheeting, the upper a minimum of 6 inches wide, with the upper edge 3 to 4 inches from the top of the cone, and the lower a minimum of 4 inches wide with the upper edge approximately 2 inches below the upper stripe.

Tall cones shall be approximately 36 inches in height with a minimum conical bottom width of 10 inches. Tall cones shall have two horizontal circumferential stripes of white reflective sheeting, the upper a minimum of 6 inches wide, with the upper edge 3 to 4 inches from the top of the cone, and the lower a minimum of 4 inches wide with the upper edge approximately 2 inches below the upper stripe.

Extra tall cones shall be a minimum of 42 inches in height with a minimum conical bottom width of 7 inches. Extra tall cones shall have a minimum of four horizontal circumferential stripes of reflective sheeting from 4 to 6 inches wide, of alternating orange and white starting with orange on the top. The upper edge of the sheeting shall be 4 inches from the top of the cone. Nonreflective spaces between the stripes shall not exceed 3 inches wide.

Reflective sheeting shall conform to "730-05 Reflective Sheeting ASTM Type I (Class A), ASTM Type III (Class B) or higher. Reflective sheeting shall be firmly bonded to the cone with adhesive.

**BASIS OF ACCEPTANCE.** Upon request, the Contractor shall provide a material certification that the product conforms to this specification.
729-03 TEMPORARY TUBULAR MARKERS

**SCOPE.** This specification covers the material, fabrication, and performance requirements for tubular markers. Tubular markers are defined by FHWA as a Category I device.

**MATERIAL REQUIREMENTS.** Tubular markers shall conform to the requirements of the MUTCD, shall be NCHRP 350 or MASH approved and shall be orange, with a minimum height of 36 inches and a minimum outside diameter of 2 inches. Tubular markers shall be circular or elliptical in cross section. Tubular markers shall have a maximum weight of 12 lbs, not including a mounting base.

  The markers shall have two horizontal circumferential stripes of white reflective sheeting a minimum of 3 inches wide. The top edge of the upper band shall be a maximum of 2 inches from the top of the marker. The space between shall not exceed 6 inches.

  Reflective sheeting shall conform to '730-05 Reflective Sheeting ASTM Type I (Class A), ASTM Type III (Class B) or higher. The sheeting shall be bonded to the post with a precoated, pressure-sensitive adhesive or a tack-free, heat-activated adhesive. Mechanical fasteners to bond reflective sheeting to the post will not be allowed.

  For free-standing tubular markers, the base and/or any nonflexible portion of the marker shall not be more than 2 inches in height.

  For tubular markers fastened to pavement, the bonding system used to shall be a fast-setting chemical compound, mastic-type material, or mechanical fastener capable of fixing the tubular marker to either concrete or asphalt pavement. The bonding system shall not present a hazard to traffic if the tubular marker or base unit becomes unfixed from the pavement.

**BASIS OF ACCEPTANCE.** Upon request, the Contractor shall provide a material certification that the product conforms to this specification.

729-04 VERTICAL PANELS

**SCOPE.** This specification covers the material, fabrication, and performance requirements for vertical panels. Vertical panels are defined by FHWA as a Category II device.

**MATERIAL REQUIREMENTS.** Vertical panels shall conform to the requirements of the MUTCD, shall be NCHRP 350 or MASH approved and shall be constructed of plastic, aluminum, or other lightweight materials. Vertical panels shall be supported by a base capable of maintaining the panel in an upright position and in the proper position and orientation.

  Vertical panels shall have 4 to 6 inch wide diagonal stripes of alternating orange and white reflective sheeting, sloping downward at an angle of 45° toward the side on which traffic is to pass. Vertical panels which are 36 inches and larger shall have 6 inch wide diagonal stripes.

  Standard vertical panels shall be a minimum of 24 inches in height and a minimum of 8 inches in width. The top of the panel shall be mounted a maximum of 36 inches high. Support posts for standard vertical panels shall not be located on the traffic face of the panel.

  Oversized vertical panels shall be a minimum of 36 inches in height and have a minimum reflective area of 2.0 square feet.

  Reflective sheeting shall conform to '730-05 Reflective Sheeting ASTM Type I (Class A), ASTM Type III (Class B) or higher.

**BASIS OF ACCEPTANCE.** Upon request, the Contractor shall provide a material certification that the product conforms to this specification.

729-05 STOP/SLOW PADDLES

**SCOPE.** This specification covers the material requirements for stop/slow paddles.
MATERIAL REQUIREMENTS. Stop/slow paddles shall conform to the requirements of the MUTCD and shall be constructed of plastic, aluminum, or other lightweight materials. Stop/slow paddles shall be a minimum of 24 inches wide and shall be mounted on a support staff with a minimum height of 6 feet to the bottom of the panel. Reflective sheeting shall conform to 1 730-05 Reflective Sheeting ASTM Type IX (Class E).

BASIS OF ACCEPTANCE. Upon request, the Contractor shall provide a material certification that the product conforms to this specification.

729-06 TYPE I CONSTRUCTION BARRICADES

SCOPE. This specification covers the material, fabrication, and performance requirements for Type I construction barricades. Type I construction barricades are defined by FHWA as a Category II device.

MATERIAL REQUIREMENTS. Type I construction barricades shall conform to the requirements of the MUTCD and shall be NCHRP 350 or MASH approved. Type I construction barricades shall be constructed of an A-frame with a single rail panel 8 to 12 inches wide and a minimum of 24 inches long. Rails on barricades used on expressways and other high-speed roadways shall have an area of at least 2.0 square feet. The top of the upper panel shall be mounted at a minimum height of 36 inches. Barricade frames shall be designed to maintain the proper orientation and location of the device during windy conditions. Non-rigid ballast may be placed on the frame, close to the ground, to hold the barricade in position, and shall not obscure the view of the rail panels to approaching traffic.

Barricade rail panels shall have 4 inch wide reflective, alternating orange and white diagonal stripes sloping at an angle of $45^\circ$. Reflective sheeting shall conform to 1 730-05 Reflective Sheeting ASTM Type I (Class A), ASTM Type III (Class B), or higher.

BASIS OF ACCEPTANCE. Upon request, the Contractor shall provide a material certification that the product conforms to this specification.

729-07 TYPE II CONSTRUCTION BARRICADES

SCOPE. This specification covers the material, fabrication, and performance requirements for Type II construction barricades. Type II construction barricades are defined by FHWA as a Category II device.

MATERIAL REQUIREMENTS. Type II construction barricades shall conform to the requirements of the MUTCD and shall be NCHRP 350 or MASH approved. Type II construction barricades shall be constructed of a frame with two rail panels 8 to 12 inches wide and a minimum of 24 inches long. Rails on barricades used on expressways and other high-speed roadways shall have an area of at least 2.0 square feet. The top of the upper panel shall be mounted at a minimum height of 36 inches. Barricade frames shall be designed to maintain the proper orientation and location of the device during windy conditions. Non-rigid ballast may be placed on the frame, close to the ground, to hold the barricade in position, and shall not obscure the view of the rail panels to approaching traffic.

Barricade rail panels shall have 4 to 6 inch wide reflective, alternating orange and white diagonal stripes sloping at an angle of $45^\circ$. Barricade rail panels 36 inches and longer shall have 6 inch wide stripes. Reflective sheeting shall conform to 1 730-05 Reflective Sheeting ASTM Type I (Class A), ASTM Type III (Class B), or higher.

BASIS OF ACCEPTANCE. Upon request, the Contractor shall provide a material certification that the product conforms to this specification.

729-08 TYPE III CONSTRUCTION BARRICADES

SCOPE. This specification covers the material, fabrication, and performance requirements for Type III construction barricades. Type III construction barricades are defined by FHWA as a Category II device.

MATERIAL REQUIREMENTS. Type III construction barricades shall conform to the requirements of the MUTCD and shall be NCHRP 350 or MASH approved. Type III construction barricades shall be constructed of a frame with 2.
three rail panels 8 to 12 inches wide and a minimum of 48 inches long. The top of the upper panel shall be mounted at
a minimum height of 60 inches. Barricade frames shall be designed to maintain the proper orientation and location of
the device during windy conditions. Nonrigid ballast may be placed on the frame, close to the ground, to hold the
barricade in position, and shall not obscure the view of the rail panels to approaching traffic.

Barricade rail panels shall have 6 inch wide reflective alternating orange and white diagonal stripes sloping at an
angle of 45°. Reflective sheeting shall conform to '730-05 Reflective Sheeting ASTM Type I (Class A), ASTM Type
III (Class B) or higher.

Warning lights, when used, shall be securely mounted directly to the barricade frame, above the top rail, using a
bolt, nut, and washer of sufficient strength to ensure that the light does not detach if impacted by a vehicle, and no part
of the light or wiring shall cover the face of the rail. Batteries shall be placed at ground level, except that integral
batteries weighing a maximum of 7 lbs may be mounted on the barricade frame. Warning lights shall not be attached to
the barricade rail.

**Basis of Acceptance.** Upon request, the Contractor shall provide a material certification that the product
conforms to this specification.

### 729-09 Temporary Sign Supports

**Scope.** This specification covers the material, fabrication, and performance requirements for temporary sign
supports. Temporary sign supports are defined by FHWA as a Category II device.

**Material Requirements.** Temporary sign supports shall conform to the requirements of the MUTCD and
shall be constructed in accordance with the Standard Sheets or shall be commercially manufactured, temporary sign
supports that are NCHRP 350 or MASH approved.

**Basis of acceptance.** Upon request, the Contractor shall provide a material certification that the product
conforms to this specification.

### 729-10 Temporary Impact Attenuators - Redirective

**Scope.** This specification covers the material and performance requirements for temporary impact attenuators.
Temporary impact attenuators are defined by FHWA as a Category III device.

**Materials Requirements.** Temporary impact attenuators shall be NCHRP 350 or MASH approved as a
redirective, non-gating device. Temporary impact attenuators that use liquid or other materials as a filler or to provide
ballast will be evaluated for potential environmental impacts and/or seasonal limitations. Temporary impact attenuators
meeting the requirements of NCHRP 350 or MASH Test Level 2 are acceptable only as Test Level 2 devices. A
Temporary impact attenuator accepted as a Test Level 3 device is also acceptable as Test Level 2 device. Temporary
impact attenuators will be approved for use in shielding an object of a maximum width as specified in the Approved
List, and specific configurations may be approved for maximum speeds. Approach ends of Temporary impact
attenuators shall have impact attenuator markings in accordance with the MUTCD.

Concrete Grouting Material 701-05
Anchoring Materials - Chemically Curing 701-07

If a temporary foundation slab is required, concrete shall be Class A concrete conforming to Section 501 Portland
Cement Concrete - General; reinforcing steel shall conform to §709-01 Bar Reinforcement, Grade 420.

**Basis of Approval.** Manufacturers or material suppliers desiring to have Test Level 2 or Test Level 3
temporary impact attenuators approved shall prepare and submit copies of drawings, specifications, test reports, and
Federal acceptance letters to the Director of the Materials Bureau. The review process requires a minimum of 30
calendar days. Upon approval, the name of the manufacturer and the product will be placed on the Approved List.
BASIS OF ACCEPTANCE. Test Level 2 or Test Level 3 temporary impact attenuators will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

729-11 TEMPORARY IMPACT ATTENUATORS - GATING

SCOPE. This specification covers the material and performance requirements for temporary impact attenuators. Temporary impact attenuators are defined by FHWA as a Category III device.

MATERIALS REQUIREMENTS. Temporary impact attenuators shall be NCHRP 350 or MASH approved as a gating device. Temporary impact attenuators that use liquid or other materials as a filler or to provide ballast will be evaluated for potential environmental impacts and/or seasonal limitations. Temporary impact attenuators meeting the requirements of NCHRP 350 or MASH Test Level 2 are acceptable only as Test Level 2 devices. A Temporary impact attenuator accepted as a Test Level 3 device is also acceptable as Test Level 2 device. Temporary impact attenuators will be approved for use in shielding an object of a maximum width as specified in the Approved List, and specific configurations may be approved for maximum speeds. Approach ends of Temporary impact attenuators shall have impact attenuator markings in accordance with the MUTCD.

Concrete Grouting Material 701-05
Anchoring Materials - Chemically Curing 701-07

If a temporary foundation slab is required, concrete shall be Class A concrete conforming to Section 501 Portland Cement Concrete - General; reinforcing steel shall conform to §709-01 Bar Reinforcement, Grade 420.

BASIS OF APPROVAL. Manufacturers or material suppliers desiring to have Test Level 2 or Test Level 3 temporary impact attenuators approved shall prepare and submit copies of drawings, specifications, test reports, and Federal acceptance letters to the Director of the Materials Bureau. The review process requires a minimum of 30 calendar days. Upon approval, the name of the manufacturer and the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Test Level 2 or Test Level 3 temporary impact attenuators will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

729-12 TRUCK-MOUNTED AND TRAILER MOUNTED IMPACT ATTENUATORS

SCOPE. This specification covers the material and performance requirements for truck mounted impact attenuators or trailer mounted impact attenuators (TMIAs) mounted on the rear of work vehicles and barrier trailers. Impact attenuators are defined by FHWA as a Category III device.

MATERIALS REQUIREMENTS. TMIAs shall be NCHRP 350 or MASH approved. TMIAs meeting the requirements of NCHRP 350 or MASH Test Level 3 are also acceptable as a Test Level 2 device. TMIAs meeting the requirements of NCHRP 350 or MASH Test Level 2 are acceptable only as Test Level 2 devices. Approach ends of TMIAs shall have impact attenuator markings in accordance with the MUTCD.

BASIS OF APPROVAL. Manufacturers or material suppliers desiring to have products considered for inclusion on the Approved List shall prepare and submit copies of drawings, specifications, test reports, and Federal Acceptance Letters to the Director of the Materials Bureau. The review process requires a minimum of 30 calendar days. Upon approval, the name of the manufacturer and the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Test Level 2 or Test Level 3 TMIAs will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.
729-13 TEMPORARY SAND BARRELS

SCOPE. This specification covers the material and performance requirements for sand barrels. Sand barrels are defined by FHWA as a Category III device.

MATERIAL REQUIREMENTS. Sand barrels of each size module shall be NCHRP 350 or MASH approved. Sand barrels shall be yellow, durable, waterproof, ultraviolet-stable plastic. The first barrel in the array shall have impact attenuator markings in accordance with the MUTCD.

Sand barrels shall resist deformation from dynamic loadings due to vibration in the placement area and long-term stresses induced by thermal expansion/contraction and fill settlement. Sand barrels shall be free draining with respect to residual moisture in the fill sand. Lids shall divert precipitation and prevent moisture from entering the module. Lids shall be fastened or otherwise secured to provide a closed, reasonably vandal-resistant barrel.

The fill sand shall conform to the requirements of either '703-06 Cushion Sand' or '703-07 Concrete Sand'. Sodium chloride, as dry rock salt, equal to 3-5 % by weight of the sand, shall be thoroughly mixed into the sand. Sodium chloride shall meet the requirements of '712-03 Sodium Chloride'.

BASIS OF APPROVAL. Manufacturers or material suppliers desiring to have products considered for inclusion on the Approved List shall prepare and submit copies of drawings, specifications, test reports, and Federal Acceptance Letters to the Director of the Materials Bureau. The review process requires a minimum of 30 calendar days. Upon approval, the name of the manufacturer and the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Sand barrels will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

729-14 VEHICLE-ARRESTING SYSTEMS

SCOPE. This specification covers the material and performance requirements for vehicle-arresting systems. Vehicle-arresting systems are defined by FHWA as a Category III device.

MATERIAL REQUIREMENTS. Vehicle-arresting systems shall be NCHRP 350 or MASH approved.

BASIS OF APPROVAL. Manufacturers or material suppliers desiring to have products considered for inclusion on the Approved List shall prepare and submit copies of drawings, specifications, test reports, and Federal Acceptance Letters to the Director of the Materials Bureau. The review process requires a minimum of 30 calendar days.

BASIS OF ACCEPTANCE. Vehicle-arresting systems will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

729-15 ARROW PANELS

SCOPE. This specification covers the material and performance requirements for arrow panels. Arrow panels are defined by FHWA as a Category IV device.

MATERIAL REQUIREMENTS. Arrow panels shall be signs with a matrix of illuminated elements capable of either flashing or sequential arrow displays that meets the requirements of the MUTCD. Arrow panels shall be equipped with a sign control console, mounted in a lockable, weather-resistant compartment.

Arrow panels shall not bear any advertising message or any other message that is not related to traffic control. A nonreflective logo or name and telephone number of the contractor or supplier may be located on the back of the arrow panel or on the arrow panel trailer. The logo shall not exceed 0.1 m². The name and telephone number shall not exceed inches in height. The rear face of the arrow panel shall contain one or more clear lamp(s) to indicate that the arrow board is operating properly.
**Truck-Mounted Series B.** Arrow panels consist of a 60 x 30 inch rectangular panel mounted at a minimum of 5 feet above the roadway. The arrow display shall be legible at a minimum distance of 3/4 mile on a bright, sunny day or a clear night when the sight line is unobstructed.

**Trailer-Mounted or Truck-Mounted Series C.** Arrow panels consist of a 96 x 48 inch rectangular panel mounted at a minimum of 7 feet above the roadway for trailer mounted arrow panels and 5 feet above the roadway for truck mounted arrow panels. Arrow panels shall be powered by self-contained engine-driven generator systems, capable of energizing the arrow displays for 72 hours unattended and shall be capable of being powered by 110V AC supply; solar-powered, capable of energizing the arrow displays continuously for 21 days unattended; or powered by a truck. Arrow panel operation controls shall be mounted in a lockable enclosure. The arrow display shall be legible at a minimum distance of 1 mile on a bright, sunny day or a clear night when the sight line is unobstructed.

**TESTING.** Manufacturers or material suppliers desiring to have Truck-Mounted Series B arrow panels considered for inclusion on the Approved List shall submit a material certification that the arrow panel conforms to this specification and the requirements of the MUTCD, and provide an arrow panel to the Director, Materials Bureau in Albany for initial field testing. Field testing will include evaluation of arrow panel operation during various light conditions for brightness, legibility, and angularity. The review process requires a minimum of 30 calendar days.

Manufacturers or material suppliers desiring to have Trailer-Mounted or Truck-Mounted Series C arrow panels considered for inclusion on the Approved List shall submit test results from the AASHTO National Transportation Product Evaluation Program (NTPEP), a material certification that the arrow panel conforms to this specification and the requirements of the MUTCD, and provide an arrow panel to the Director of the Materials Bureau in Albany for initial field testing. Field testing will include evaluation of arrow panel operation during various light conditions for brightness, legibility, and angularity. The review process requires a minimum of 30 calendar days.

**BASIS OF APPROVAL.** Truck-Mounted Series B arrow panels meeting the requirements of this specification and having satisfactory initial field test results will be placed on the Approved List.

Trailer-Mounted or Truck-Mounted Series C arrow panels meeting the requirements of this specification and satisfactory initial field test results, as well as satisfactory NTPEP test results will be placed on the Approved List. Trailer-Mounted or Truck-Mounted Series C arrow panels for which NTPEP test results have not been submitted may be provisionally placed on the Approved List for a maximum of one year. After one year of provisional approval, the manufacturer may request an extension for one additional year based on a pending application filed with NTPEP for testing. No extensions of provisional approvals past two years will be granted. If satisfactory test results are not provided by the expiration date of the provisional approval, all units provided or in use shall be removed and replaced by the Contractor with approved units at no additional cost to the State. Arrow panels on the Approved List that have repeated poor evaluations will be removed from the Approved List.

**BASIS OF ACCEPTANCE.** Arrow panels will be accepted on the basis of the product appearing on the Approved List and a material certification that the product meets this specification and is the same as the one appearing on the Approved List.

**729-16 PORTABLE VARIABLE-MESSAGE SIGNS (PVMS)**

**SCOPE.** This specification covers the material and performance requirements for variable-message signs. Variable-message signs are defined by FHWA as a Category IV device.

**MATERIAL REQUIREMENTS.** Portable variable-message signs (PVMS) shall be tested by the National Transportation Product Evaluation Program (NTPEP) of the American Association of State and Highway Transportation Officials (AASHTO) demonstrating the arrow panel meets the requirements of this specification and the MUTCD. PVMS shall be trailer mounted and equipped for use on public highways in accordance with NYS Vehicle and Traffic Law. The unit shall operate primarily from a solar-powered electrical system and shall be capable of energizing the message display for a minimum of 21 days without auxiliary charge. The electrical system shall...
consist of batteries and a solar array panel and on-board auxiliary charging system to enable the batteries to be recharged via a 110V AC connection.

PVMS shall have a 3 line display with a minimum of 8 characters per line, and shall be capable of displaying 3 separate messages in a cyclical sequence. Characters shall be a minimum of 18 inches high.

PVMS shall be visible at a minimum distance of 1/2 mile during the day and at night. For highways with a posted pre-construction speed limit of 55 mph or greater, PVMS messages shall be legible from a minimum distance of 800 feet during the day, and 600 feet at night. For highways with a posted pre-construction speed limit of 50 mph or less, PVMS messages shall be legible from a minimum distance of 650 feet during the day. PVMS shall not bear any advertising message or any other message that is not related to traffic control. A nonretroreflective logo or name and telephone number of the contractor or supplier may be located on the back of the PVMS or on the PVMS trailer. The logo shall not exceed 1 square foot. The name and telephone number shall not exceed 2 inches in height.

PVMS shall be equipped with a sign control console, mounted in a lockable, weather-resistant compartment. The sign controller shall have programmable memory capable of storing messages pertinent to planned construction activities, including emergency messages. The controller shall be equipped with 14 day calendar programming capability, providing the ability to start and stop the display of a minimum of three (3) different messages on a repeating schedule without an operator present. The controller shall be capable of producing an accurate log of all messages and the times they were displayed. The controller shall have programmable messages, display rate, and display interval settings. The controller shall blank the sign if the output voltage drops below the manufacturer’s recommended output level.

PVMS shall be equipped with control software using a Microsoft Windows operating system. The Contractor shall supply the Engineer with two copies of operating instructions for the PVMS and the control software. Electronic copies of software instructions are acceptable.

**A. Light-Emitting Diode (LED) Type.** LED type PVMS shall have light-emitting diodes arranged in arrays and the arrays shall be arranged in a matrix for each character to be 7 pixels high by 5 pixels wide. The LED display shall have the ability to display characters at a minimum height of 18 inches. The controller shall provide a means of dimming the pixels.

**B. Hybrid Flip-Disk Type.** Hybrid, flip-disk type PVMS shall have pixels consisting of individual electromagnetic disks with at least two (2) high-output amber LEDs. The disk face shall be covered with yellow prismatic retroreflective sheeting or an approved equal. The PVMS shall operate using both flip-disk and light-emitting diode (LED) during nighttime and low-light periods. The hybrid flip disk type shall be arranged in a matrix of 7 disks high by 5 disks wide for each character.

**C. Cellular Communications Option.** PVMS with cellular communications shall be equipped with a cellular telephone with cellular service and a modem capable of remotely operating the control software. The phone numbers for PVMS on a contract shall be sequential whenever possible to facilitate remote control of multiple devices. The unit shall accept a land line telephone connection mode without rewiring or modification.

**D. Radar Option.** The PVMS with radar shall be equipped with a radar speed detection option, providing the system with the ability to determine the speed of an approaching vehicle and interrupt the programmed sequence with a special default message displaying the vehicle speed. The unit shall collect and store vehicle speed data for retrieval.

**E. NTCIP Communication Protocol Option.** PVMS units that will be operated by the Department, typically from a Transportation Management Center (TMC), shall be equipped with communications and control systems that are National Transportation Communications for ITS Protocol (NTCIP) compliant.

**TESTING.** Manufacturers or material suppliers desiring to have PVMS considered for inclusion on the Approved List shall submit test results from the AASHTO National Transportation Product Evaluation Program (NTPEP), a material certification that the PVMS conforms to this specification and the requirements of the MUTCD, and provide a PVMS to the Director, Materials Bureau in Albany for initial field testing. Field testing will include evaluation of PVMS.
operation during various light conditions for brightness, legibility, and angularity. The initial testing process requires a minimum of 30 calendar days.

**BASIS OF APPROVAL.** PVMS meeting the specification, having satisfactory NTPEP test results, and having satisfactory initial field test results will be placed on the Approved List.

PVMS meeting the specification, and having satisfactory initial field test results, that do not have NTPEP test results may be provisionally placed on the Approved List for a maximum of one year. After one year of provisional approval, the manufacturer may request an extension for one additional year based on a pending application filed with NTPEP for testing. No extensions of provisional approvals past two years will be granted. No extensions of provisional approvals will be granted. If satisfactory test results are not provided by the expiration date of the provisional approval, all units provided or in use shall be removed and replaced by the Contractor with approved units at no additional cost to the State. PVMS on the Approved List that have repeated poor evaluations will be removed from the Approved List.

**BASIS OF ACCEPTANCE.** PVMS will be accepted on the basis of the product appearing on the Approved List and a material certification that the product meets this specification and is the same as the one appearing on the Approved List.

**729-17 TEMPORARY GLARE SCREENS**

**SCOPE.** This specification covers the material and performance requirements for temporary glare screens. Glare screens are not defined separately by FHWA, but rather are considered a system component.

**MATERIAL REQUIREMENTS.** Temporary glare screens shall consist of an opaque screen on a horizontal base which is, in turn, mounted on a concrete barrier. The system shall be modular to allow flexible use and ease of maintenance.

The screen shall be constructed of durable, lightweight, flexible, weather-resistant and impact-resistant materials of a single, uniform dark color. The minimum height of the screen shall be approximately 24 inches. The screen shall be reflectorized at a uniform maximum spacing of 40 feet. If barrier delineation is blocked, the screen shall be reflectorized on both sides with a 3 inch wide by 6 inch high (minimum) piece of reflective sheeting, ASTM Type I (Class A), ASTM Type III (Class B), or higher. Yellow reflective sheeting shall be used facing traffic which is to pass to the right of the glare screen. White reflective sheeting shall be used facing traffic which is to pass to the left of the glare screen.

Individual temporary glare screen modules shall not span a joint between concrete barrier sections, and bases shall not overhang the face of the barrier. Temporary glare screens shall not have any horizontal rigid members that could potentially spear an impacting vehicle, or shall be NCHRP 350 or MASH approved if the system has horizontal rigid members.

The base shall have sufficient rigidity to facilitate ease of handling and proper screen support and position. The connection of the base to the vertical components shall prevent unintentional screen rotation or dislocation. The base shall be properly secured to prevent it from being dislodged upon impact.

**BASIS OF ACCEPTANCE.** Upon request, the Contractor shall provide a material certification that the product conforms to this specification.

**729-18 WARNING LIGHTS**

**SCOPE.** This specification covers the material and performance requirements for warning lights. Warning lights are not defined separately by FHWA, but rather are considered a system component.

**MATERIAL REQUIREMENTS.** Warning lights shall be mounted on signs or channelizing devices in a manner that, if hit by an errant vehicle, they will not be likely to penetrate the windshield. Warning lights shall be Type A (low-intensity flashing), Type B (high-intensity flashing), or Type C (steady-burning). Warning lights shall meet the requirements of the MUTCD Section 6F.83 and the ITE *Purchase Specification for Flashing and Steady Burn Warning Lights*. Warning lights shall have a minimum nominal diameter of 7 inches and shall emit yellow light.
TEMPORARY TRAFFIC CONTROL DEVICES

Flashing warning lights shall flash between 55 and 75 times per minute. Flashing warning lights required to operate 24 hours per day shall be Type B. Steady-burning warning lights shall operate from one-half hour after sunset to one-half hour before sunrise. Warning lights shall have a minimum mounting height of 30 inches to the bottom of the lens. Warning lights shall be powered by batteries, line power, or solar cells adequate to maintain the required luminance during all periods of required operation.

BASIS OF ACCEPTANCE. Upon request, the Contractor shall provide a material certification that the product conforms to this specification.

729-19 AUTOMATED FLAGGER ASSISTANCE DEVICES

SCOPE. This specification covers the material and performance requirements for automated flagger assistance devices (AFAD) designed to control road users through work zones to be remotely operated by a flagger. AFADs are defined by FHWA as a Category IV device.

MATERIAL REQUIREMENTS. AFADs shall meet the requirements of the MUTCD. Each AFAD shall consist of a remotely controlled self-contained trailer or movable cart consisting of STOP/SLOW signs or RED/YELLOW lenses.

Stop/Slow Sign AFAD shall consist of:
- A STOP/SLOW sign (R1-1/W20-8) having an octagonal shape of at least 36 x 36 inch with letters at least 12 inches high.
  - One red stop beacon, 12 inch diameter red Light Emitting Diode (LED), mounted above the STOP sign.
  - At least one amber beacon, 12 inch diameter amber Light Emitting Diode (LED) or Type B high-intensity flashing warning light mounted above, below or to the side(s) of the SLOW sign.
- A gate arm capable of extending up to 8.5 feet.
- WAIT ON STOP (R1-7) and GO ON SLOW (R1-8) signs mounted under the STOP/SLOW sign.
  - WAIT ON STOP sign shall be a 24 x 30 inches with black legend and black border on a white background with letters at least 2 inches high.
  - GO ON SLOW sign shall be a 24 x 30 inches with black legend and black border on a white background with letters at least 2 inches high.
- All sign sheeting shall conform to §730-05 Reflective Sheeting ASTM Type IX (Class E).

RED/Yellow Lens AFAD shall consist of:
- Circular red and circular yellow 12 inch diameter Light Emitting Diode (LED) displays.
- A gate arm capable to extend up to 8.5 feet.
- STOP HERE ON RED sign (R10-6) 24 x 30 inches.
- All sign sheeting shall conform to §730-05 Reflective Sheeting ASTM Type IX (Class E).

The AFADs shall be controlled by a single flagger with a remote control, which shall allow safe operation of two AFADs remotely, employ bi-directional communications to verify each command sent from the handheld was successfully received, be equipped with conflict monitoring to prevent displaying a SLOW message simultaneously in both directions, permit an override feature to allow a simultaneous slow display, and show the current status of each AFAD. The control console and power supply shall be housed in a locked compartment. Each trailer/cart shall be equipped with a remote control warning horn alerting workers of intruding vehicles.

Trailers/carts shall display a minimum of 2 inch wide band of reflective sheeting on all four sides of the trailer. Reflective sheeting shall conform to §730-05 Reflective Sheeting ASTM Type III (Class B), ASTM Type VII (Class C) or ASTM Type IX (Class E). 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 trailer. AFADs shall not bear an advertising message(s) or any other message that is not related to traffic control. A nonretroreflective logo or name and telephone number of the contractor or supplier not to exceed 1.0 square feet may be located on the trailer or cart. The name and telephone number shall not exceed 2 inches in height.
BASIS OF APPROVAL. Manufacturers or material suppliers desiring to have AFADs be considered for inclusion on the Approved List shall submit a material certification that the AFADs meet this specification and the requirements of the MUTCD, as well as provide one AFAD for initial field testing to the Director of the Materials Bureau in Albany for review. Initial field testing will include evaluating the AFADs for operation, sign visibility/legibility, retractable arm functionality/visibility and beacon/warning light brightness and angularity. The review process requires a minimum of 30 calendar days. AFADs having acceptable certifications and satisfactory initial field test results will be placed on the Approved List. AFADs that consistently have repeated poor evaluations will be removed from the approved list.

BASIS OF ACCEPTANCE. AFADs will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

729-20 PORTABLE TRAFFIC SIGNALS

SCOPE. This specification covers the material and performance requirements for portable traffic signals. Portable traffic signals are defined by FHWA as a Category IV device.

MATERIAL REQUIREMENTS. Portable traffic signals shall meet the requirements of the MUTCD. Portable traffic signals shall consist of two self-contained, trailer-mounted traffic signals, each with a vertical signal mast, horizontal mast arm and two - 3 section traffic signal heads. Each traffic signal head shall have 12 inch diameter circular red, yellow and green Light Emitting Diode (LED) modules.

The portable traffic signal system shall be able to function continuously and independent of utility power sources. The signal control console and power supply shall be housed in a locked compartment. The traffic signal controller shall be password protected, capable of providing traffic-actuated control with microwave detector sensors, have a built-in conflict monitor to prevent the display of conflicting indications, shall be hard-wired or radio-controlled to keep the signal indications synchronized, and have adequate phasing to serve expected traffic movements.

Trailers shall display a minimum of 2 inch wide band of reflective sheeting on all four sides of the trailer. Reflective sheeting shall conform to §730-05 Reflective Sheeting ASTM Type III (Class B), ASTM Type VII (Class D) or ASTM Type IX (Class E). 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 trailer. Portable traffic signals shall not bear an advertising message(s) or any other message that is not related to traffic control. A nonretroreflective logo or name and telephone number of the contractor or supplier may be located on the portable traffic signal trailer. The logo shall not exceed 1.0 square feet. The name and telephone number shall not exceed 2 inches in height.

BASIS OF APPROVAL. Manufacturers or material suppliers desiring to have Portable Traffic Signals considered for inclusion on the Approved List shall submit a material certification that the Portable Traffic Signal meets this specification and the requirements of the MUTCD, as well as one portable traffic signal for initial field testing to the Director of the Materials Bureau in Albany for review. Initial field testing will include evaluating the traffic signal system for phasing, clearances, detector operation and layout of the signal faces for brightness and angularity. The review process requires a minimum of 30 calendar days. Portable traffic signals having acceptable certifications and satisfactory initial field test results will be placed on the Approved List. Portable traffic signals on the Approved List that consistently have poor evaluations will be removed from the Approved List.

BASIS OF ACCEPTANCE. Portable traffic signals will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

729-21 TEMPORARY OVERLAY MARKERS

SCOPE. This specification covers the material and performance requirements for temporary overlay markers.
MATERIAL REQUIREMENTS. Temporary overlay markers are flexible polymer “L” shaped road reflectors with an adhesive on its base to adhere to the pavement surface. Temporary overlay markers are approximately 4 inches wide by 2 inches high with at least a 1 inch base. Yellow temporary overlay markers have a yellow reflective sheeting strip a minimum of 1/4 inch in height at the top of the vertical section on both sides. White temporary overlay markers have a white reflective strip a minimum of 1/4 inch in height at the top of the vertical section on one side only. Reflective sheeting shall conform to §730-05 Reflective Sheeting ASTM Type III (Class B), ASTM Type VII (Class D) or ASTM Type IX (Class E).

BASIS OF ACCEPTANCE. Upon request, the Contractor shall provide a material certification that the product conforms to this specification.
Make the following modification to EI 11-018:

Page 13

729-21 TEMPORARY OVERLAY MARKERS

Delete the MATERIAL REQUIREMENTS Section in its entirety and replace it with the following:

“MATERIAL REQUIREMENTS. Temporary overlay markers are flexible polymer “L” shaped road reflectors with an adhesive on its base to adhere to the pavement surface. Temporary overlay markers are approximately 4 inches wide by 2 inches high with at least a 1 inch base. Yellow temporary overlay markers have a yellow reflective sheeting strip a minimum of ¼ inch in height at the top of the vertical section on both sides. White temporary overlay markers have a white reflective strip a minimum of ¼ inch in height at the top of the vertical section on one side only. Reflective sheeting shall conform to §730-05 Reflective Sheeting ASTM Type III (Class B), ASTM Type V (Class C), ASTM Type VII (Class D) or ASTM Type IX (Class E).”

Make the following change to the Standard Specifications of May 1, 2008:

Page 1037 under 730-21 FLEXIBLE DELINEATOR POSTS, delete the MATERIAL REQUIREMENTS Section in its entirety and replace it with the following:

“MATERIALS REQUIREMENTS. Flexible delineator posts shall be supplied with reflective sheeting of a size and color as required by the contract documents. The color of the posts shall match the color of the reflective sheeting unless otherwise specified in the contract documents. Where double unit reflectors are specified, elongated reflective sheeting may be substituted as in accordance with the MUTCD. Reflective sheeting shall be fabricated of a material conforming to the requirements of §730-05 Reflective Sheeting, Class B, Class C, or Class E. Sheetings shall be applied in accordance with the sheeting manufacturer’s written instructions.”
REFLECTORIZED SHEETING SIGN CHARACTERS

Make the following changes to the Standard Specifications of May 1, 2008:

**Page 1036:**
*Delete* entirely Standard Spec 730-12 and *replace* with:

**“730-12 REFLECTORIZED SHEETING SIGN CHARACTERS (TYPE IV)”**

**SCOPE.** These specifications cover the material requirements for Type IV reflectorized sheeting sign characters.

**MATERIAL REQUIREMENTS.** Type IV characters shall consist of cutout reflective sheeting material meeting the requirements of §730-05 Reflective Sheeting, Materials Designation 730-05.02 (Class B).

Characters or borders shall be applied directly to clean, dust-free reflective sheeting background panels. Characters or borders shall be applied mechanically with equipment and in a manner specified by the sheeting manufacturer. Borders shall be cut neatly and butt-joined at corners and panel joints.

**TESTING.** The Department reserves the right to conduct tests on samples taken by a representative of the Department as follows: 2% or a minimum of five (5) characters (whichever is the greater) for each size character used; and 2% or a minimum of 2 ft of border (whichever is greater) for each width of border used.

When performed, tests will be conducted in accordance with §730-05 Reflective Sheeting.

**BASIS OF ACCEPTANCE.** Type IV characters will be accepted on the basis of a material certification that the product conforms to this specification.”

**Page 1036:**
*Delete* entirely Standard Spec 730-13 and *replace* with:

**“730-13 REFLECTORIZED SHEETING SIGN CHARACTERS (TYPE V)”**

**SCOPE.** These specifications cover the material requirements for Type V reflectorized sheeting sign characters.

**MATERIAL REQUIREMENTS.** Type V characters shall consist of a painted, screened, or reverse-screened application of paint, paste, or transparent color of a type and in a manner recommended by the manufacturer of the reflective material.

Reflective material used for reverse-screened signs shall meet the requirements of §730-05 Reflective Sheeting, Materials Designation 730-05.02 (Class B).

**TESTING.** The Department reserves the right to conduct tests on samples taken by a representative of the Department as follows: 2% or a minimum of five (5) characters (whichever is the greater) for each size character used; and 2% or a minimum of 2 ft of border (whichever is greater) for each width of border used.

When performed, tests will be conducted in accordance with §730-05 Reflective Sheeting.

**BASIS OF ACCEPTANCE.** Type V characters will be accepted on the basis of a material certification that the product conforms to this specification.”