

FOR INFORMATIONAL USE ONLY-DO NOT USE TO SUBMIT YOUR BID

Department of Public Works Nassau County, N.Y.

Bid Sheets for Contract: H66302-01G

Item No.	Engineers Estimate	Unit	Item Description			
1	1	LS	Clearing And Grubbing	For:		
1M/F	1	LS	Mobilization With Field Office	For:		
1S	2	EA	Job Information Sign	For:		
2	950	CY	Unclassified Excavation And Disposal/ Placement	For:		
5C	650	CY	Selected Fill	For:		
7	100	SY	Preparing Fine Grade	For:		
10A	4600	SF	Temporary Sheeting And Bracing	For:		
12S40-4	18	LF	Schedule 40 Pvc Drain Pipe - 4" Diameter	For:		
17A	215	CY	Class A Concrete For Structures - Retaining Wall	For:		
17AX	30	CY	Class A Concrete For Structures - Curb And Shoring Walls	For:		
17SS	2100	SF	Concrete Formliner	For:		

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Bid Sheets for Contract: H66302-01G

Item No.	Engineers Estimate	Unit	Item Description			
19	1	CY	Screened Gravel, Loose Measure	For:		
22C-2	45	TON	Base Course Asphalt Concrete, Type Dense Base	For:		
26	25	LF	Concrete Curb	For:		
27	3700	SF	Cement Concrete Sidewalk	For:		
29	30	SF	Driveway Restoration	For:		
33X	30000	LB	Epoxy Coated Bar Reinforcement	For:		
36D	20	TON	Asphalt Concrete, Type 1A (Top & Binder)	For:		
58RPC	500	LF	Saw Cutting Existing Roadway Pavement And Concrete	For:		
102	1	LS	Work Zone Traffic Control	For:		
102PVMS	400	DAY	Portable Variable Message Sign - Led Enhanced Disk Matrix	For:		
104PA-4	480	LF	Polyolefin Coated Chain Link Fencing 4' High	For:		

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Bid Sheets for Contract: H66302-01G

Item No.	Engineers Estimate	Unit	Item Description			
104XF	475	LF	Remove Existing Fence	For:		
117	20	LF	Temporary Fence	For:		
136	1	LS	Survey Stakeout	For:		
137	1500	LF	Remove Existing Traffic Markings	For:		
140	2000	LF	Temporary Pavement Delineation	For:		
158A	90	SF	Geotextile Cloth	For:		
199*	1	LS	Interim Payments	For: One hundred thousand dollars and zero cents	\$100,000.00	
360	10	EA	Pruning Existing Deciduous Trees	For:		
368	20	SY	Topsoil And Grass Seed	For:		
372E	1	EA	Tree Removal (36" - < 48" Caliper)	For:		
372F	1	EA	Tree Removal (48" & Up Caliper)	For:		

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Bid Sheets for Contract: H66302-01G

Item No.	Engineers Estimate	Unit	Item Description			
373E	1	EA	Stump Removal (36" - < 48" Diameter)	For:		
373F	1	EA	Stump Removal (48" & Up Diameter)	For:		
407.0102	10	GAL	Diluted Tack Coat	For:		
619.1712	600	LF	Temporary Positive Barrier - Category 2 (Pinning Permitted)	For:		
619.1719	16	EA	Warning Lights On Temporary Positive Barriers	For:		
662.60030008	1	EA	Altering Elevation Of Gas Valve Boxes	For:	Contingent	
685.07200110	750	LF	White Epoxy Reflectorized Pavement Stripes - 20 Mils (Wet Night Visibility Spheres)	For:		
685.07200610	1500	LF	Yellow Epoxy Reflectorized Pavement Stripes - 20 Mils (Wet Night Visibility Spheres)	For:		

*Force Bid

NASSAU COUNTY
GLEN COVE AVENUE RETAINING WALL REHABILITATION
CONTRACT NO. H66302-01G

GENERAL NOTES

All work included in this contract shall be in accordance with the following Nassau County Standard Specifications and Drawings, if they apply, or modified and amended in the Contract Specifications and Drawings.

- a) County of Nassau, Department of Public Works, 2009 Standard Specifications for Civil Engineering and Site Development Construction, or latest edition.
- b) County of Nassau, Department of Public Works, Traffic Engineering, Traffic Signal Specifications and Standard Drawings, November 1998 and Addenda, or latest edition.
- c) County of Nassau, Department of Public Works, Latest Standard Specifications and Details for the Construction of Sanitary Sewers 2003 or latest edition.
- d) New York State Department of Transportation Standard Specifications, September 1, 2025 or latest edition.
- e) FHWA 2009 Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), or latest edition.

1. Scope of Work:

The Glen Cove Avenue Retaining Wall Rehabilitation project consists of the removal of an existing stacked stone wall and replacement with a new reinforced concrete wall. The out-to-out length of the new wall is 473 feet, however, in a prior contract, an 80-foot section was already replaced, so the new installed wall length is 393 feet. Temporary sheeting will be required behind the new wall. A new ADA compliant sidewalk and chain link fence will be placed along the entire length including the wall section to remain. There are tapered high curbs at each end of the wall along with new sidewalks which meet existing curbs and sidewalks. There are 6 private properties behind the wall with fences and various small walls which will be maintained or modified and a new variable depth curbs/retaining walls added adjacent to these private walls. The project includes the removal of two large trees, trimming of other overhanging trees, and minor grade restoration at the south end. Utility poles and a fire hydrant will be relocated by their owners prior to construction.

All work shall be implemented and executed according to the plans and specifications.

2. NOTE: Compliance with Law.

Prohibition of Gifts. In accordance with County Executive Order 2-2018, the Contractor shall not offer, give, or agree to give anything of value to any County employee, agent, consultant, construction manager, or other person or firm representing the County (a "County Representative"), including members of a County Representative's immediate

family, in connection with the performance by such County Representative of duties involving transactions with the Contractor on behalf of the County, whether such duties are related to this Agreement or any other County contract or matter. As used herein, "anything of value" shall include, but not be limited to, meals, holiday gifts, holiday baskets, gift cards, tickets to golf outings, tickets to sporting events, currency of any kind, or any other gifts, gratuities, favorable opportunities or preferences. For purposes of this subsection, an immediate family member shall include a spouse, child, parent, or sibling. The Contractor shall include the provisions of this subsection in each subcontract entered into under this Agreement.

Disclosure of Conflicts of Interest. In accordance with County Executive Order 2-2018, the Contractor has disclosed as part of its response to the County's Business History Form, or other disclosure form(s), any and all instances where the Contractor employs any spouse, child, or parent of a County employee of the agency or department that contracted or procured the goods and/or services described under this Agreement. The Contractor shall have a continuing obligation, as circumstances arise, to update this disclosure throughout the term of this Agreement.

3. Work Hours

Special Condition: Unless otherwise specified in other sections of this Contract, the Contractor may not close an active travel lane during peak travel times. Any requests to close the lanes between 6:30 AM and 9:00 AM and/or between 4:00 PM and 6:30 PM must have written approval 72 working hours in advance. If approval is obtained and excessive congestion results, the approval will be withdrawn by verbal notice from a County Representative and no claim for additional compensation will be considered valid.

If the contractor does not adhere to the specified time limit for the contract, a \$ 5,000.00 per day penalty for each infraction shall be deducted from Item 102 - Work Zone Traffic Control. Nassau County DPW shall utilize the information contained on/in the Inspector Daily Work Reports to determine when an infraction has occurred.

Work is not permitted on all Nassau County holidays unless prior County Approval is obtained. This includes, but is not limited to Memorial Day, Independence Day, Labor Day, Columbus Day, Election Day, Veterans Day, from 12:00 on the Wednesday before Thanksgiving Day through the following Sunday, Christmas Eve, Christmas Day, New Year's Eve, New Year's Day, and various Jewish Holidays including, but not limited to Rosh Hashanah, Sukkot, Shemini Atzeret, Simchat Torah, Yom Kippur, Chanukah.

4. The Contractor will be responsible, at all times, for the safety of the general public, and for the protection of persons who may for any reason enter within the limits of his work.
5. The Contractor shall employ flagmen when deemed necessary by the Engineer and shall erect proper warning signs and necessary barricades to protect the general public and to warn them of changes caused by the progression of his contract. The contractor is responsible for work zone safety as per OSHA requirements.

6. Prior to the start of work, the Contractor shall notify the local police, fire department, school district, utilities and all municipalities within the proximity of the work order limits or if they may be impacted by the work in anyway, as to the conditions prevailing on the construction site.
7. The Contractor must, at all times, provide a safe and uninterrupted two-way traffic over the roads under construction, unless a detour plan is provided and approved by the County.
8. Unless otherwise approved by NCDPW, at least one of the loading dock ramps shall remain open during construction for building access.
9. Lighted Barricades, Flashing Warning Lights and Signs:
 - Must be serviced a minimum of twice each week.
 - Must be checked and maintained by the Contractor each day, including weekends and holidays.
 - Must be secured or weighted in such a manner as to prevent them from blowing over under windy conditions.
 - Must be in accordance with the latest Manual of Uniform Traffic Control Devices.
10. No direct payment shall be made for the above items of work, but the cost shall be included in the price bid for Item 102.
11. Conformance to the following notes with respect to the American with Disabilities Act Curb Ramps is required:
 - All curb ramps installed shall be in compliance with the ADA, PROWAG, NCDPW and NYSDOT standards.
 - Contractor shall verify the placement of all new ramp configurations prior to installation. Contractor must give 48 hours (2 business days) notification for NCDPW approval.
 - A NCDPW inspector must be present during the installation of any curb ramp.
 - It is recommended that a smart level tool (or equivalent) is used to check the slopes on all form work prior to the placement of concrete.
 - NCDPW Civil Engineering Design Unit must be notified in writing of all work done to curb ramps to update the transition plan inventory.

NOTE: The contractor will be required to maintain safe pathways for pedestrians during the entire time the contract is in effect, including all periods of work shutdown. This may involve mowing of grass, removal of snow and ice, and any other interruptions interfering with their safe travel through the construction zone. Failure of the contractor to insure safe pedestrian passage as determined by County staff, or from pedestrian complaints in the work zone will result in a fine of \$ 500.00 a day. This fine will be deducted from any funds owed the contractor.

12. The Contractor must submit to the Engineer a schedule of work order locations at which he will be working and a tentative schedule of dates that he intends to be at said locations. All work will be done during work hours as restricted under note 3. If the Contractor chooses to work beyond these work hours, the Contractor will be responsible for reimbursing the County for the additional cost, including benefits costs of any County employees and/or County representatives working for the

County that work these overtime hours.

Note: If work is done under a County declared emergency condition, this provision will not apply.

13. The Contractor will not be allowed to commence more than three (3) work orders at any one time. If the County issues a written declaration of an emergency a fourth work order may be started prior to one of the three in progress work orders being 100% complete. However, at no time will more than four Work Orders be in progress.
14. Payment for the work performed under each Work Order, shall be made upon the completion and acceptance by the County. However, final payment will not be made until all punch list work is completed to the satisfaction of the Engineer.
15. All weather and temperature requirements specified by the Manufacturers for materials used must be adhered to.
16. Where there are fire hydrants situated along a section of roadway where markers are to be installed, blue double faced markers shall be installed in line with the hydrant (as required).

17. Pavement Restoration

New asphalt shall be included under Item 36D, Asphalt Concrete, Type 1A (Top & Binder)

18. All work performed under this contract shall be in compliance with **Appendix EE**, "Equal Employment Opportunities for Minorities and Women". As part of the "Detailed MBE/WBE Utilization Plan" the contractor shall provide documentation that a good faith effort was made to meet the intended goals. Also, all work performed under this contract shall include an SDVOB goal of 6% or Good Faith Effort.

19. Procedure to Ensure Worker Safety

Work Zone safety was addressed in the contract documents. In addition, the County and contractor will discuss Work Zone safety issues at the pre-construction meeting. The contractor shall provide a safety plan (including subcontractors). The County Project Manager/Consultant R.E will ensure that the contractor has on site at all times at least one person skilled in safety and health procedures familiar with State and Federal safety and health regulations, whose responsibility it will be to monitor methods and procedures. NCDPW will review and approve prime contractor's Health & Safety plan as per NYSDOT Specification 107-05.

It is the Contractor's responsibility to only have on site for the particular contract those workers who successfully completed the OSHA 10-hour construction safety course, and to have each of the worker's certificates of completion with the project records, available for review by NCDPW.

The Health & Safety Plan must be approved by NCDPW prior to the start of contract work.

The Prime contractor will keep NCDPW informed as to their safety meeting schedule. Include with the schedule (whether it is monthly or weekly etc.) any meeting minutes, as well as sign-in sheets as part of the project file/records.

20. Maintenance of Traffic

- Maintenance and protection of traffic will be paid as described under Item 102. No work

shall commence until all appropriate traffic devices have been placed and functioning.

- If in the judgment of the Engineer, traffic is not properly and adequately maintained, no payment will be made to the contractor for Item 102, Maintenance and protection of traffic. The price bid shall include the cost of furnishing all labor, materials, tools and equipment necessary to satisfactorily complete the requirements to safely maintain traffic.

21. Utilities

- The Contractor is directed to notify all utilities well in advance of beginning work, to allow them to mark-out their facilities.
- The Contractor is directed to provide private utility mark out and notify all privately-owned utilities well in advance of beginning work, to allow them time to adjust their manholes and other castings, if applicable.
- The Contractor will see to it that utility valves and manholes are readily accessible at all times. The Contractor will not store materials over them and should it become necessary to cover the valves and manholes with soil, will devise a method for finding them quickly and assist the Utility Company to uncover them. Further, all utilities will be uncovered during non-working hours.
- Prior to the award of contract, the Contractor will be required to submit a list, certified by National Grid, of his key personnel who have taken the National Grid Safety Course along with a statement that sufficiently trained personnel will be available on the job site at all times.
- Mechanical excavation will not be permitted within two feet (2') on either side of any utility or house service so marked by the utility company. Hand digging will be required to expose the utility pipe. All provisions of 16 NYCRR Part 753 shall apply.
- Prior to backfilling, a National Grid representative will inspect all gas facilities and any damaged pipe will be repaired by the utility company. The Contractor's attention is called to existing PSE&G overhead lines. The Contractor is warned to keep all equipment and personnel a minimum of ten feet (10') from any conductor. The Contractor shall fully cooperate with PSE&G and comply with its requirements for safe operations.
- The Contractor's attention is called to the fact that there are utilities, both publicly and privately owned, that are within the contract area. The owners of privately-owned utilities may be relocating parts of their existing plants to conform to the new lines and grades of this project. The Contractor shall cooperate with the various agencies carrying out the work, which must be coordinated with the work of this contract.
- Existing structures, utilities and facilities, either shown or not shown on the plans, above or below the ground, may not have been located accurately. The Contractor shall determine the locations and elevations of pertinent structures, utilities and facilities, before new installations are started so that there will be no interference with the progression of the work. Any conflict between existing structures, utilities and facilities and the new items of work shall be ascertained by the Contractor prior to commencing

any work under the respective items and called to the attention of the Engineer. It is the responsibility of the contractor to protect and maintain utilities or utility structures while working "in proximity". No additional payment will be made for this purpose.

- Grades and locations of new installations may be changed by the Engineer, if possible, to prevent conflict with existing installations. Therefore, the Contractor shall locate all existing installations accurately, both as to line and grade before new items of work are started.
- If the above procedure is not followed by the Contractor and new work has to be removed and replaced, or there is a delay, all the cost will be borne by the Contractor and the County will only pay for the amount of the items in place complete at the completion of the work.
- The Contractor shall exercise extreme care in the performance of any operation, in the vicinity of the existing or relocated cable pipelines. No such operations shall take place without proper personnel of PSE&G on hand. All excavation in the immediate vicinity of these lines shall be done by hand, with such application as to ensure that the pipe shall not be punctured or the coating disrupted. In the event that any length of cable pipeline is exposed, it shall be supported and protected to the satisfaction of PSE&G inspection personnel. No blind sheeting shall be driven in the proximity of the existing electric cable pipes before first exposing these cable pipes by hand.
- The Contractor should inspect the utility companies' plans to ascertain the location of the underground work and locations of crossings of sewer and drainage work. The Contractor shall coordinate his work with the work being done by the utility companies. It is anticipated that job meetings will be held at various times to aid in coordination of the work.

22. Protection of Facilities - The Contractor shall protect all new work done under this contract from possible injury for the duration of the Contract. He shall be responsible for the repair or replacement, to the satisfaction of the Engineer, of any material, structure, or property on or adjacent to the site and damaged by him or his employees through the construction and demolition operations up to the time of acceptance by the County.

23. Drainage Installations - The Contractor shall plan his work and progress, so that at all times either the new or the existing drainage facilities will function to carry off liquids so that no damage or inconvenience will result.

24. Clean-Up

- Prior to final acceptance of the work under this Contract, the Contractor shall clean the pipe, manholes and catch basins where construction was undertaken, of accumulated dirt, sand or other materials which have washed into them. No direct payment shall be made for the aforementioned work; but shall be included in the prices bid for the various items of the Contract.
- The Contractor will be required to restore to original condition all areas, outside the work limits, that are disturbed by him during the life of this contract.
- No separate payment will be made for any of this clean-up and restoration work, but

the cost thereof shall be included in the unit prices bid for various items.

25. Subletting

The attention of all bidders is directed to the provisions of Article 20, Sublet or Assign, relative to the percentage of work that may be assigned or sublet, which provisions will be enforced by the County in the manner it deems advisable.

26. Job Site Safety

Precaution shall be exercised by the Contractor at all times for the protection of all personnel. The safety provisions of applicable laws shall be observed, but job site safety is the sole responsibility of the Contractor and his subcontractors and cannot be assumed by the County or its agents.

27. Rubbish and Debris

The Contractor shall legally dispose of all unsuitable material, rubbish and debris at some separate location, not in the vicinity of the site.

28. Concrete Breaking

The Contractor is cautioned that the use of a ball operated from a crane or other equipment will not be permitted under any circumstances for the breaking up of any concrete or other demolition work. Any machine or method used must meet the approval of the Engineer.

29. Sales Tax Exemptions

Nassau County is exempt from the payment of New York State Sales Tax and Compensating Use Taxes under Section 1116 of Article 28 of the Tax Law of the State of New York and is exempt from the payment of Nassau County Sales and Uses taxes under Section 7, Ordinance 404-C- 1968, enacted pursuant to Section 1210 of Article 29 of the Tax Law of the State of New York.

However, it is not to be construed by bidders as relieving them from any obligation to pay sales tax on applicable items pursuant to the terms of the present sales tax laws.

30. Cold Patch

Payment for cold patch material used in this contract is included in the cost of the Item 102, no additional payment shall be paid for this material.

31. Requirements of Other Municipal Departments

The Contractor shall give all necessary notices, obtain all permits and pay all fees in connection with the work under this contract. He shall comply with all laws, ordinances, rules and regulations of Nassau County and Municipal Departments having jurisdiction over work of this character.

These shall take precedence over any requirements of these Specifications where and if a conflict occurs. This, however, shall not be interpreted as permitting the use of materials and equipment inferior to those specified.

32. Private Facilities in Public Rights-of-Way (ROW)

- The Contractor shall be aware that sprinkler heads, private lamp and sign posts, signs, electric signs, electric lines, water service, oil inlets, oil lines, horticultural planting, landscaping, etc. were owned privately, but exist in the public ROW. The Contractor may be required to remove these appurtenances as ordered by the Engineer.
- Payment for this work will be included in the price bid for various items in the Contract.

33. Special OSHA Notes

- Safety Provisions in the Specifications are primarily to protect County Property and the public against unsafe acts of the Contractor. The Occupational Safety and Health Act of 1970 (OSHA) requires that "Each Employer" (1) shall furnish to each of his employee's employment and a place of employment which are free from recognized hazards that are causing or likely to cause death or serious physical harm to his employees; (2) shall comply with the occupational safety and health standards promulgated under this Act."

The regulations in the act may be more stringent than are required by the Plans and/or Specifications. The Contractor however must conform to the OSHA Regulations and such conformance shall not be reason to demand additional payment or claim extra work.

- Sheeting shall conform strictly to the Requirements of the OSHA Regulations for Construction Subpart P, Excavation, Trenching and Shoring:

1926.650	General protection requirements;
1926.651	Specific excavation requirements;
1926.652	Specific trenching requirements;
1926.653	Definitions applicable to this subpart.

34. The Contractor shall notify the Nassau County Police Department, local Fire Department and Metropolitan Suburban Bus Authority in writing as to the conditions prevailing on the construction site and detours in use. Duplicate copies of such notices shall be filed with the Engineer.

35. The Contractor shall obtain the necessary permit from the water district to allow rollers to be filled with water from fire hydrants. Intakes shall be fitted with either an "Airgap" or "Double Check Valve Assembly" to prevent water from the roller from entering the public water system.

36. The Contractor shall be required to hand out notices to the local homeowners and businesses affected by the asphalt milling and asphalt paving operations, twenty-four (24) hours prior to starting work. A sample letter is attached at the end of these General notes.

The Contractor shall notify the local police department, fire department/district, school district, utilities and all municipalities within the proximity of the work limits or if they may be impacted by the work in any way, prior to the start of the work, as to the conditions prevailing on the construction site.

37. **Schedule:** The Contractor shall provide a detailed written schedule of operations for when work will be started and completed for work within the Contract one week after the Notice to Proceed is issued. Typical information to be provided includes, but is not limited to:

- Work Zone Traffic Control
- Temporary Support of Excavation
- Concrete Removal
- Concrete Wall Work
- Concrete Curb and Sidewalk Work
- Chain Link Fence Installation
- Restoration
- Punch list.

No claims will be processed until the County has this updated information on a bi-weekly basis until the project has been completed.

38. Test Cylinders - The Contractor will provide a place for concrete test cylinders close enough to the work so that the cylinders share the same curing conditions. The Contractor will protect these cylinders for the three days they will be left on the job site.
39. The contractor when submitting shop drawings for approval must specify the work order number and location that said shop drawings will be used.
40. Erosion and Sediment Control: The contractor shall assume responsibility for the temporary control of soil and water pollution that could potentially result from construction activities and shall be in accordance with Federal, State and Local regulations, as well as the Contract specifications and directions of the County representatives. In essence all necessary precautions shall be taken to prevent contamination of waters and surrounding areas by slit, sediments, fuels, solvents, lubricants, epoxy coating, wet concrete, concrete leachate, washings from concrete equipment or any other pollutant associated with drilling and constructions procedures. Specific reference is made to the New York State Department of Environmental Conservations' "Guidelines for Urban Erosion and Sediment Control", along with any subsequent updates. Associated costs for erosion and sediment control, inspection and maintenance of the same as mentioned above, including any permits required, shall be included in the unit prices for individual items.
41. When ordered, all concrete supplied for Items 17A, 17AX, 26, and 27 will include an admixture such as will assure compressive strength cores of 2500 PSI in 48 hours. The admixture will be added to the concrete at a rate recommended by the supplier. The cost of the admixture will be included under Items 17A, 17AX, 26, and 27.
42. The contractor shall have a full time Supervisor, fluent in English on the project at all times.
43. No permanent asphalt top course will be allowed to be placed after December 1st (unless approved by the Commissioner and as long as other conditions are met per specification).
44. All layout of traffic pavement markings must be completed immediately after paving and prior to opening the newly paved surface to traffic. The cost of all layout of traffic pavement markings shall be included in the various items of the Contract.

45. The contractor must contact the Resident Engineer or Harold Lutz of the Nassau County Traffic Engineering by calling (516) 571-9453, within 48 to 72 hours prior to final pavement marking placement. On all roadways resurfaced under this contract, epoxy reflectorized pavement markings shall be placed within 3 business days of final paving. A \$1,000.00 per day penalty will be deducted from the various asphalt items after 3 business days until the epoxy is placed.
46. The contractor must notify the Resident Engineer and Jeff Lindgren of the Nassau County Traffic Management Section prior to any lane closures by calling (516) 571-6998, by email jlindgren@nassaucountyny.gov, or TrafficHelp@nassaucountyny.gov; two (2) of the three (3) forms of contact must be used to ensure contact has been made.

The contractor must submit any lane closure to Nassau County Traffic Management website: <https://apps.nassaucountyny.gov/trafficmanagement/closureform.php>

47. The contractor is to notify all privately owned utilities at least 5 business days before starting work to permit the utility time to adjust their facilities.
48. Survey Stakeout - Survey work shall be paid for under Survey Stakeout (Item 136) only when done with prior written approval of the project manager. When the work is completed in less than an 8 hour shift the payment will be prorated for the actual time required. Survey work done to determine the contractors' payment will not be paid for under this item.
49. At all times during the life of this contract, the Contractor shall maintain safe vehicular traffic and access to adjacent private properties located throughout the entire length of the contract.
50. All concrete required for this Contract shall be air entrained. Except as otherwise specified, all cement used on this project shall be Type 2A (air entraining) or Type 2 with an approved air entraining agent added to the mix to produce air entranced concrete. Air entraining admixtures shall conform to the requirements of Volume One, Part Two, Section B, material M21, Admixtures of the 2009 Nassau County Standard Specifications.
51. The Contractor will provide a place for concrete test cylinders in proximity to the work so that the cylinders share the same curing conditions as the newly placed concrete. The Contractor will protect these cylinders for the three days they will be left on the job site.
52. The Contractor is responsible to coordinate efforts with NC Permit Dept. and Utilities to resolve pending 239F applications within construction site. Any restoration performed must conform to NCDPW Standard Specifications. NCDPW Permits Department contact information: (516) 571-6840 / 6841.
53. The Contractor is required to coordinate his work with Public Agencies and Private Utility companies to avoid conflicts and to arrange for castings and appurtenances which are to be adjusted by others in advance of performing any final pavement overlay work. The contractor is required to obtain approval for limits of proposed pavement milling and overlay work, sidewalk ramp type and layout of proposed pavement markings from a County representative prior to performing any proposed work.

54. Supplies

- As per Item 1M/F – Mobilization with Field Office: All the provisions of the Item 1M/F shall apply with the following modifications: Contractor shall provide one (1) cell phone under this item, so that County's Engineer may maintain contact with inspection forces. It must be a smart phone (type to be approved by the Engineer) with a minimum 256 GB storage capacity along with a mobile charger and a hard-protective cover. No work may begin until the phone is provided, and service is activated. The smart phone service shall be maintained for the duration of the contract. The phone shall be replaced at no additional cost to the County if damaged or lost, otherwise cease the operation.

55. Specifications

The following items have work that is included in the price bid for the item that may not be stated explicitly or implicitly in the original specification. This list is not meant to be all-encompassing. Any work that is shown in the Plans or implied in order to complete the required work shall be assumed to be included in the price bid for items in this contract.

- Item 2 - Removal of concrete retaining wall.
- Item 10A - Augering, H-pile installation, and flowable fill.
- Item 17A - Waterstops.
- Item 104PA -4 - Placing posts at 6' o.c.

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NASSAU COUNTY
GLEN COVE AVENUE RETAINING WALL REHABILITATION
CONTRACT NO. H66302-01G

TECHNICAL SPECIFICATIONS

<u>ITEM NO.</u>	<u>SPECIAL SPECIFICATION</u>	<u>UNIT</u>
17AX	CLASS A CONCRETE FOR STRUCTURES	CY
17SS	CONCRETE FORMLINER	SF
33X	EPOXY COATED BAR REINFORCEMENT	LB
407.0102	DILUTED TACK COAT	GAL
619.1712	TEMPORARY POSITIVE BARRIER - CATEGORY 2 (PINNING PERMITTED)	LF
619.1719	WARNING LIGHTS ON TEMPORARY POSITIVE BARRIERS	EA
662.60030008	ALTERING ELEVATION OF GAS VALVE BOXES	EA
685.07200110	WHITE EPOXY REFLECTORIZED PAVEMENT STRIPES - 20 MILS (WET NIGHT VISIBILITY SPHERES)	LF
685.07200610	YELLOW EPOXY REFLECTORIZED PAVEMENT STRIPES - 20 MILS (WET NIGHT VISIBILITY SPHERES)	LF

ITEM 17AX – CLASS A CONCRETE FOR STRUCTURES

1. DESCRIPTION OF WORK

The work under this item shall conform to the applicable requirements of **Item 17A – Class A Concrete for Structures** of the Nassau County Standard Specifications, except as modified by the plans and/or by the specifications, as stated herein.

This specification shall apply only to concrete being paid under this item, which includes, but is not limited to concrete curbs, concrete shoring walls, etc.

ITEM 17SS - CONCRETE FORMLINER

1. DESCRIPTION OF WORK

Under this item the Contractor shall furnish all labor, materials, and equipment required to install and remove the concrete formliner when pouring the concrete for the retaining wall.

2. MATERIALS

All concrete surfaces designated in the engineering plans or specifications as needing this formliner shall be formed using Fitzgerald Formliners Pattern No. 16986 Georgetown Ashlar, as manufactured by Fitzgerald Formliners, 1500 E. Chestnut Avenue, Santa Ana, CA 92701, phone 714-547-6710, or approved equal.

3. CONSTRUCTION DETAILS

Contractor shall carefully prepare, install, remove, and finish in accordance with the current release of manufacturer's application guideline for the particular type of formliner used.

Contractor shall submit shop drawings with plan, elevation, and details showing overall pattern, joint locations, form tie location, end locations, and any other special conditions, including, but not limited to, how it will tie into the concrete wall already constructed with the same pattern.

4. METHOD OF MEASUREMENT

The quantity to be paid under this item will be the number of square feet of concrete surface successfully installed using the formliner, including the 6" required below grade.

5. BASIS OF PAYMENT

The price bid per square foot shall include the cost of furnishing all labor, material and equipment necessary to complete this work as shown on the plans or called out in this specification.

ITEM 33X – EPOXY COATED BAR REINFORCEMENT

1. DESCRIPTION OF WORK

The work under this item shall conform to the applicable requirements of **Item 33 – Bar Reinforcement** of the Nassau County Standard Specifications, except as modified by the plans and/or by the specifications, as stated herein.

2. MATERIALS

- A. Reinforcement – This shall meet the requirements of ASTM A615 Grade 60.
- B. Epoxy Coating Material – The epoxy coating material shall be an organic, powdered epoxy resin that is applied by the electrostatic method. The epoxy coating materials shall be approved by the County.
- C. Patching Material – Patching or repair materials shall be supplied by the epoxy coating manufacturer. The patching material shall be compatible with the epoxy coating, inert in concrete, and shall be suitable for use in making field repairs.
- D. Coating Application

1) Surface Preparation

The surface of bars to be coated shall be blast cleaned in accordance with the Steel Structures Painting Council – Surface Preparation Specifications No. 10 (SSPC-SP10), Near White Blast Cleaning. After blasting, the cleaned surface of the bar shall be defined by SSPC-Vis1, Pictorial Standards ASa 2-1/2, BSa 2-1/2, or CSa 2-1/2, as applicable.

2) Coating Application

The powdered epoxy resin coating shall be electro-statically applied in accordance with the recommendations of the coating manufacturer. The epoxy coating may be applied before or after fabrication of the reinforcing bars.

3) Coating Thickness

The epoxy coating shall be applied as a smooth, uniform coat. After curing, the coating thickness shall be 7 plus/minus 2 mils. Coating thickness shall be controlled by taking measurements on a representative number of bars from each production lot. Coating thickness measurements shall be conducted by the method outlined in ASTM G12.

4) Continuity of Coating

The coating shall be checked visually after cure for continuity. It shall be free from holes, voids, contamination, cracks and damaged areas.

The coating shall not have more than two holidays (pinholes not visible to the naked eye) in any linear foot of the coated bar. A holiday detector shall be used, in accordance with manufacturer's instructions, to check the coating for holidays.

5) Coating Cure

The coating applicator shall check each production lot to determine that the entire production lot of coated bars is in a fully-cured condition.

6) Flexibility of Coating

The flexibility of the coating shall be evaluated on a representative number of bars selected from each production lot. The coated bar shall be bent 120 degrees (after rebound) around a 6-inch diameter mandrel. The bend shall be done at a uniform rate and may take up to one minute to complete. The test specimens shall be at the thermal equilibrium between 20 and 30 degrees C (68-85 degrees F) at the time of testing.

No cracking of the coating shall be visible to the naked eye on the outside radius of the bent bar.

7) Plant Inspection

The County reserves the right to have its authorized representative to observe the preparation, coating and testing of the reinforcement bars.

The representative shall have free access to the plant and any work done when access has been denied shall be automatically rejected.

3. CONSTRUCTION DETAILS

A. Shop Repair of Coated Bars

Epoxy coated reinforcement bars which do not meet the requirements for Coating Thickness, Continuity of Coating, Coating Cure or Flexibility of Coating shall not be repaired.

Reinforcement bars with these defects shall be replaced or alternately, stripped of epoxy coating, re-cleaned and recoated in accordance with the requirements of this specification.

Coating breaks due to fabrication and handling shall be repaired with patching material if the defective area is greater than the cross-sectional area of the reinforcement bar. Defects which are smaller than the cross-sectional area need not be repaired.

The repair of coating breaks shall be limited to bars on which the total of the defective coating bar does not exceed 5 percent of the surface area of the reinforcement bar. Bars with greater than 5 percent damage shall be replaced or

alternately, stripped of epoxy coating, re-cleaned and recoated in accordance with this specification.

B. Handling

All systems for coated bars shall have padded contact areas for the bars, wherever possible. All building bands shall be padded and all bundles shall be lifted with a strong back, multiple supports or a platform bridge so as to prevent bar to bar abrasion from sags in the bar bundle. The bars or bundles shall not be dropped or dragged.

406.XXCF Asphalt Pavement Course with Fibers**Ton**

XX= Mixture Pavement Course	C= Compaction Series	F=Friction Type
01 – Truing & Leveling	5 – 50 Series Compaction	1 – Type 1
06 – 6.3 Top	6 – 60 Series Compaction	2 – Type 2
09 – 9.5 Top	7 – 70 Series Compaction	3 – Type 3
12 – 12.5 Top or Binder	8 – 80 Series Compaction	9 – Type 9
19 – 19 Binder		
25 – 25 Binder		
37 – 37.5 Base		

SECTION 407 - TACK COAT

407-1 DESCRIPTION. This work shall consist of preparing and treating an existing Portland cement concrete surface or asphalt pavement surface with tack coat in accordance with the Contract documents and as directed by the Engineer.

407-2 MATERIALS. The tack coat shall meet the applicable requirements of §702. Use of alternative tack coat material requires prior approval by the Director, Materials Bureau.

407-3 CONSTRUCTION DETAILS.

407-3.01 Equipment. A distributor shall be used for applying tack coat. The distributor shall be capable of applying the tack coat uniformly on variable widths of surface up to 15 feet.

The distributor equipment shall include a quantity measuring system and a thermometer for measuring temperature of tank contents. Prior to being used on a project, this equipment shall be calibrated in accordance with ASTM D 2995 *Standard Practice for Estimating Application Rate of Bituminous Distributors* or an equivalent calibration procedure acceptable to the Engineer. The Engineer will witness the equipment calibration or require the Contractor to provide documentation certifying the calibration.

Distributors shall be equipped with circulation spray bars which shall be adjustable both laterally and vertically. An attached bristle broom that drags on the pavement behind the spray bars may be attached to the distributor. If the broom is used, it shall be adjustable laterally and vertically so that the full width of the applied tack coat is bristled uniformly into the pavement surface.

A bituminous material sampling valve shall be attached to the distributor. The distributor tank shall be equipped with an agitator that is capable of ensuring the tack coat remains homogeneous.

Tack coat stored in the distributor tank shall be heated and maintained at a temperature between 85°F and 160°F.

Hand operated spray units will be permitted only in areas where the use of a distributor is impractical.

The Engineer will determine the final acceptance of all equipment used for applying the tack coat.

407-3.02 Application of Tack Coat. The tack coat contained in the distributor tank shall be homogeneous.

The tack coat shall be applied to a prepared clean pavement. Material shall be applied uniformly across the width of the designated area.

The tack coat shall not be applied on a wet pavement surface or when the pavement surface temperature is below 40°F.

The application rate shall be as determined in Table 407-1 *Tack Coat Application Rates*. These are recommended application rates for tack coat on various surface types and may be modified by the Engineer.

TABLE 407-1 – TACK COAT APPLICATION RATES		
Surface Type	Application Rate (gal/yd²)	
	Diluted Tack Coat	Straight Tack Coat
New Asphalt Pavement	0.05 - 0.06	0.03 - 0.04
Milled Surfaces and Existing Asphalt Pavement	0.08 - 0.10	0.05 - 0.06
Portland Cement Concrete	0.08 - 0.10	0.05 - 0.06
Vertical Surfaces (curbs, drainage structures, and appurtenances)	0.09 - 0.11	0.06 - 0.07

407-3.03 Sampling. The Engineer will request samples from the Contractor at the frequency listed in Materials Method 702-2 *Asphalt Emulsion - Quality Assurance*. The Engineer will witness the Contractor sampling the material. The sample will represent all material from the same certified lot, placed that day.

407-4 METHOD OF MEASUREMENT. The quantity to be measured for payment will be in gallons of tack coat measured at 60°F to the nearest gallon. The following formula will be used to calculate material quantity at 60°F:

$$\text{Volume @ 60°F} = \text{Volume}_D \times [1 - (\Delta T \times 0.00025)]$$

$$\Delta T = \text{Delivered Temperature (°F)} - 60$$

$$\text{Volume}_D = \text{Quantity at Delivered Temperature (gallons)}$$

407-5 BASIS OF PAYMENT. The unit price bid per gallon for tack coat shall include the cost of all labor, materials, and equipment necessary to satisfactorily complete the work.

The Regional Materials Engineer will evaluate material represented by failing samples. If the Engineer elects to leave the material in place, the Contractor shall receive a pay reduction of 75% of the tack bid price, for the pavement section represented by the failing sample.

Payment will be made under:

Item No.	Item	Pay Unit
407.0102	Diluted Tack Coat	Gallon
407.0103	Straight Tack Coat	Gallon

SECTIONS 408 AND 409 (VACANT)

SECTION 410 – CHIP SEAL

(Last Revised September, 2016)

410-1 DESCRIPTION. This work shall consist of the construction of a single course chip seal for pavements and/or shoulders in accordance with the contract documents.

410-2 MATERIALS

410-2.01 Bituminous Materials. The bituminous material shall meet the applicable requirements of

614.09

Tree Root Pruning

Feet

SECTION 615 - LANDSCAPE APPURTENANCES

615-1 DESCRIPTION. The work in this section shall include all work required for furnishing, placing, and/or special construction of landscape appurtenances.

615-2 MATERIALS. As specified in the special specifications.

615-3 CONSTRUCTION DETAILS. As specified in the special specifications.

615-4 METHOD OF MEASUREMENT. As specified in the special specifications.

615-5 BASIS OF PAYMENT. As specified in the special specifications.

SECTION 616 - SOIL BIOENGINEERING

616-1 DESCRIPTION. This section shall include work required for soil bioengineering

616-2 MATERIALS. As specified in the special specifications.

616-3 CONSTRUCTION DETAILS. As specified in the special specifications.

616-4 METHOD OF MEASUREMENT. As specified in the special specifications.

616-5 BASIS OF PAYMENT. As specified in the special specifications.

SECTION 617 - INVASIVE SPECIES MANAGEMENT

617-1 DESCRIPTION. This work shall consist of the control, eradication and management of invasive species.

617-2 MATERIALS. As specified in the special specifications.

617-3 CONSTRUCTION DETAILS. As specified in the special specifications.

617-4 METHOD OF MEASUREMENT. As specified in the special specifications.

617-5 BASIS OF PAYMENT. As specified in the special specifications.

SECTION 618 (VACANT)**SECTION 619 - WORK ZONE TRAFFIC CONTROL**

(Last Revised May, 2023)

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 work. 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 Figures 619-1A and 619-1B *Component Parts of a Typical Highway Work Zone* for definitions of terms.

Work shall be categorized based on the following work durations:

A. Long Term Operation. Long term is stationary work that occupies a location for more than 3 consecutive days. It includes nighttime work.

B. Intermediate Term Operation. Intermediate term is stationary work that occupies a location for more than 1 daylight period up to 3 consecutive days. It includes nighttime work lasting more than 1 hour.

C. Short Term Operation. Short term is stationary daytime work that occupies a location for more than 1 hour during a single daylight period.

D. Short Duration Operation. Short duration is work that occupies a location for up to 1 hour. It can be performed during the daytime or at night in accordance with §619-3.19 Nighttime Operations.

E. Mobile Operation. Mobile is work that moves intermittently or continuously where the work at any specific location completes within 15 minutes. It is used for vehicle based operations and does not involve workers on foot. It can be performed during the daytime or at night in accordance with §619-3.19 Nighttime Operations.

F. Special Operation. Special Operations are work operations that do not fit under one of the five categories mentioned in §619-1.01A through §619-1.01E. Special operations include:

1. Stop and Go Operations. Work that completes within five minutes and allows workers on foot.

2. Other Operations. Including but not limited to Mowing Operations, Mulching and Herbicide Operations, Pavement Marking Operations, Temporary Road/Intersection Closures, etc.

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 vehicular, bicycle, and ADA compliant pedestrian public access to intersecting roads, residences, business establishments, adjacent property, bus stops and transportation facilities.

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. Protective Vehicles. Work shall consist of furnishing protective vehicles to guide traffic and to protect workers in stationary or moving temporary traffic control zones as shown in the contract documents or as directed by the Engineer. Protective Vehicles shall be provided in accordance with the requirements of Table 011-01 Protective Vehicle Requirements on Standard Sheet 619-011. The specific § 619 Standard Sheets illustrate the minimum number and positioning of Protective Vehicle(s) required. Protective Vehicle(s) in addition to those that are required may be utilized in situations where special hazards (ex. work area at the base of grade on a two lane two way road, etc.) exist. When a protective vehicle(s) is used between the work vehicle (crew) or hazard and the traffic in a stationary operation it is referred to as a barrier vehicle(s) and when used in a moving operation it is referred to as a shadow vehicle(s). When a protective vehicle is used in advance of a moving or stationary operation to display sign messages it is referred to as an advance warning vehicle.

Protective Vehicles (PVs) exposed to traffic with preconstruction speed limit ≥ 45 mph require Truck / Trailer Mounted Impact Attenuators (TMIA's) as part of any mobile, short-duration, or short-term operation.

Protective Vehicles (PVs) exposed to traffic with preconstruction speed limit ≤ 40 mph require Truck / Trailer Mounted Impact Attenuators (TMIA's) in accordance with the requirements of Table 011-01 of Standard Sheet 619-011

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 work zones not protected by stationary lane or shoulder closures, as shown in the contract documents, or as directed by the Engineer.

3. Advance Warning Vehicles. Work shall consist of furnishing advance warning vehicles to guide traffic and/or to protect workers, 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, interim pavement markings, and temporary 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 and applying temporary pavement markings as shown in the contract documents or as directed by the Engineer. The work for removable pavement tape, removable wet-night reflective tape, temporary overlay markers and removable raised pavement markers shall include removal. 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, and maintaining, 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) and Truck Mounted Variable Message Signs (TMVMS).

A. Portable Variable Message Signs (PVMS). Work shall consist of furnishing, installing, operating, maintaining, relocating, and removing PVMS 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 and in accordance with the Special Note Requirements for Portable Variable Message Signs (PVMS). 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.

PVMS 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.

B. Truck Mounted Variable Message Signs (TMVMS). Work shall consist of furnishing, installing, operating, maintaining, and relocating TMVMS as shown in the contract documents or as directed by the Engineer. TMVMS with a pay unit of each shall be provided for the duration of the contract at the general locations specified in the contract documents. TMVMS with a pay unit of weeks shall be provided at general locations and durations in accordance with the Special Note Requirements for Truck Mounted Variable Message Signs and the contract documents. TMVMS are intended to supplement other traffic control devices by displaying symbolic or word messages. They may only be used alone to replace conventional traffic control devices in mobile and short duration work zones or situations of limited duration.

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 Positive Barrier. Work shall consist of furnishing, installing, moving, maintaining, and removing approved temporary positive barrier (concrete or steel), including barrier warning lights and transitions to and from guide rail 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, programming, 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. Portable Traffic Signals (PTS) shall not be placed or operated on a State highway without the permission of the Regional Traffic Engineer (RTE) or their designee. On a construction contract, approval is required for each location or relocation of a PTS, even when one location is near another. If the PTS is relocated, a new approval is required regardless of how short of a move is made along the highway. It is recommended that moving and short duration traffic control operations be controlled by flagging operations when possible. Contractors shall abide by all “Standard” and “Guidance” statements in the MUTCD and the New York State Supplement. However, “Guidance” statements may be waived at the discretion of the Department.

619-1.19 Nighttime Operations. Work shall consist of developing a Nighttime Operations and Lighting Plan; furnishing, installing, operating, maintaining, moving, and removing lighting equipment for nighttime construction operations; constructing devices and adapting equipment to be compatible with lighting equipment; and furnishing nighttime safety apparel and devices as shown in the contract documents or as directed by the Engineer. Balloon lights, or equivalent lighting, shall be used on nighttime moving operations and are defined as a light source inside a translucent material that produces a low-glare, 360-degree, diffuse light.

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, maintaining, inspecting, relocating, and removing temporary structures, their approaches and any required appurtenances at the location(s) shown in the contract documents.

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.

619-1.22 A. Pavement Patching (Force Account). This item is to be used to pay for pavement patching installed when the Contract Documents prohibit top course paving.

619-1.22 B. Pavement Patching (Tonnage). This item is to be used to pay for pavement patching installed on the contract at all times except when the Contract Documents prohibit top course paving.

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.

619-1.24 Portable Temporary Rumble Strips. Work shall consist of furnishing, installing, maintaining, and removing Portable Temporary Rumble Strip (PTRS) Arrays in accordance with the contract documents and as directed by the Engineer.

619-1.25 Automated Flagging Assistance Devices (AFAD). Work shall consist of furnishing, installing, maintaining, and removing Automated Flagging Assistance Devices (AFAD) in accordance with the contract documents and as directed by the Engineer.

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

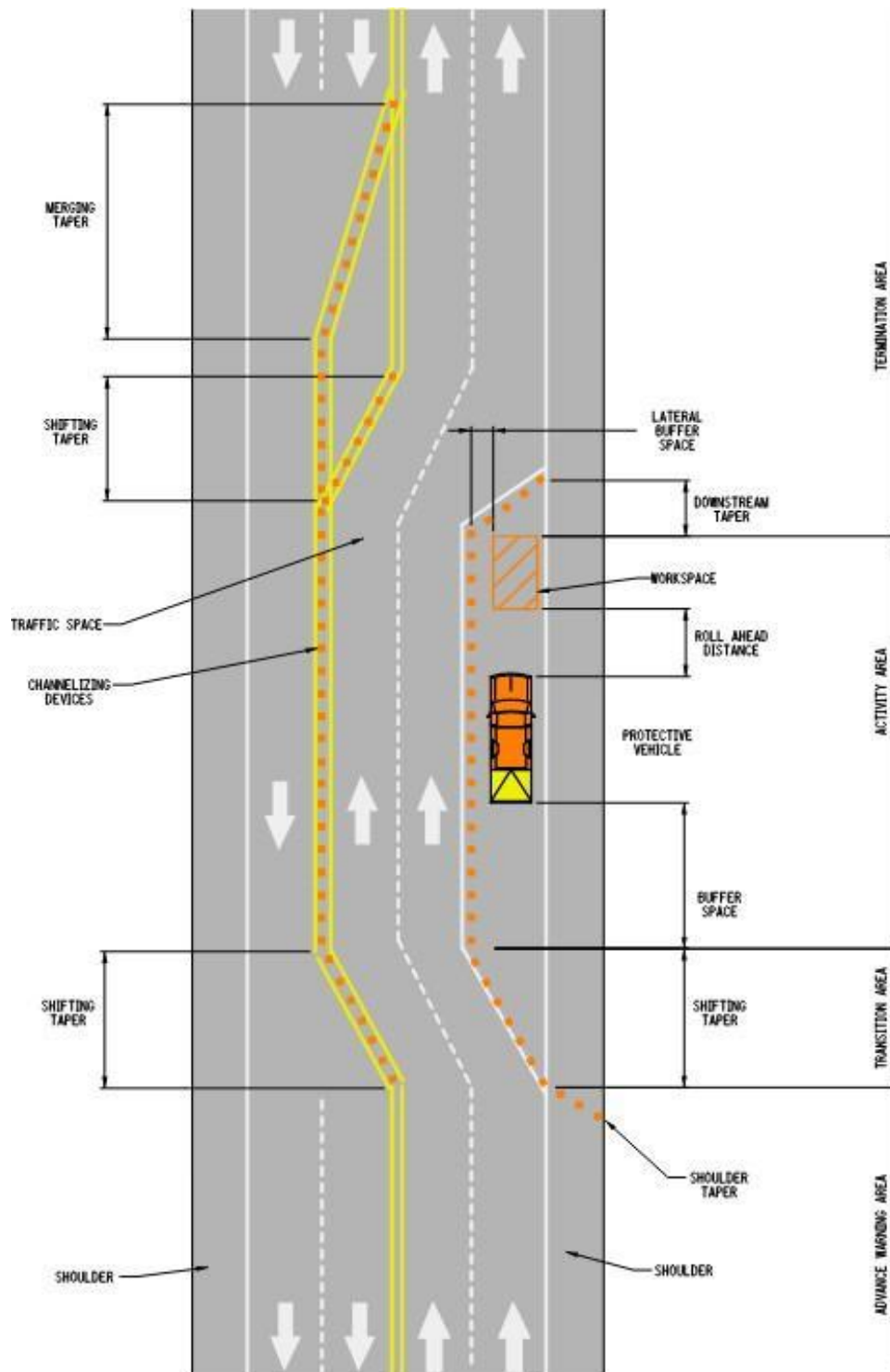
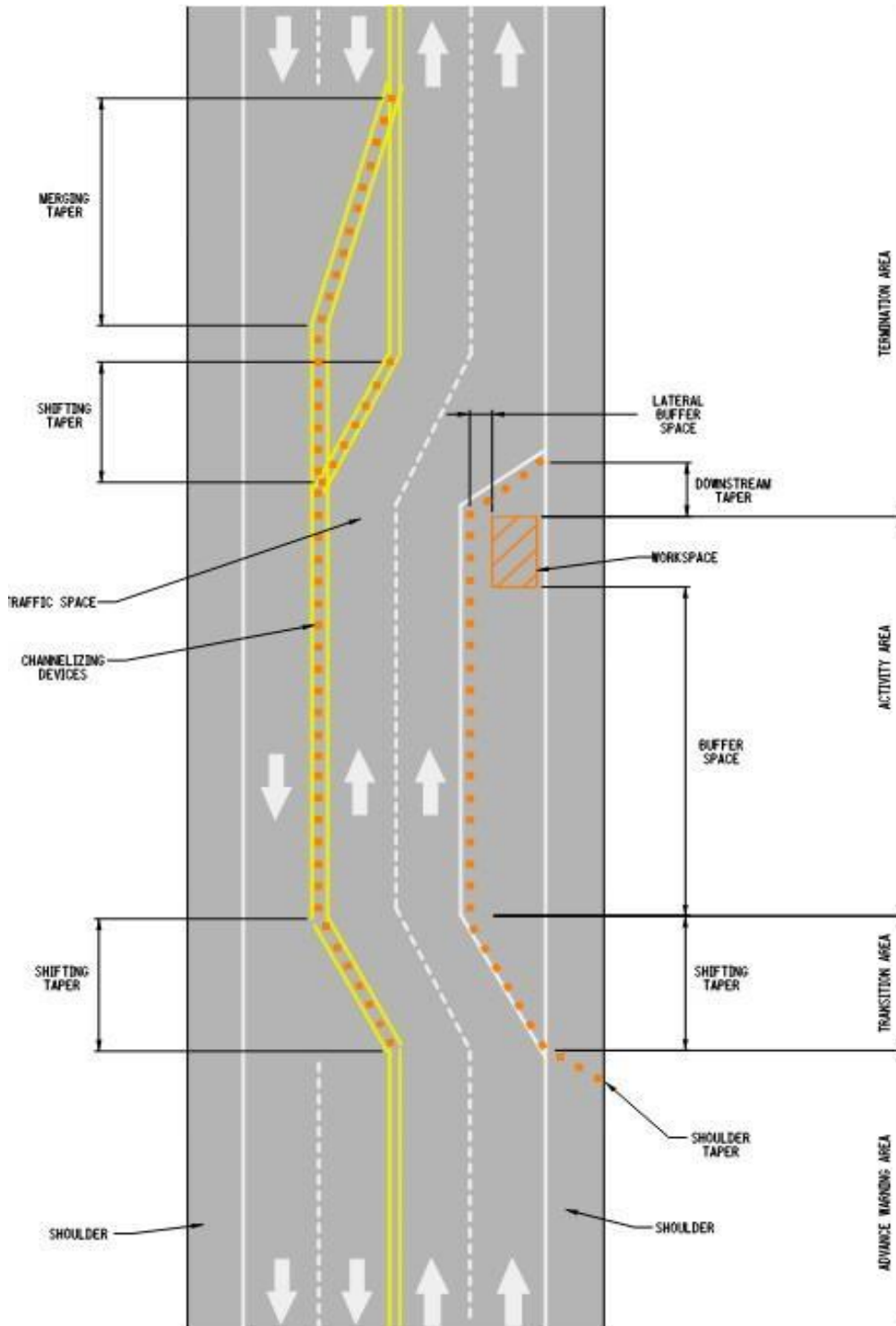


FIGURE 619-1B COMPONENT PARTS OF A TYPICAL HIGHWAY WORK ZONE WITHOUT PROTECTIVE VEHICLE



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 and Anchoring Material	701-05
Precast Concrete Barrier	704-05
Epoxy Polysulfide Grout	721-03
Traffic Signal Heads	724-04
Removable Raised Pavement Markers	727-02
Epoxy Paint	727-03
Permanent Pavement Tape	727-04
Glass Beads for Pavement Markings	727-05
Removable Pavement Tape	727-06
Removable Wet-Night Reflective Tape	727-07
Permanent Wet-Night Reflective Tape	727-08
Traffic Paint	727-09
Drums	729-01
Cones	729-02
Temporary Tubular Markers	729-03
Vertical Panels	729-04
Stop/Slow Paddles	729-05
Type III Construction Barricades	729-08
Temporary Sign Supports	729-09
Temporary Impact Attenuators - Redirective	729-10
Temporary Impact Attenuators - Gating	729-11
Truck-Mounted and Trailer Mounted Impact Attenuators	729-12
Temporary Sand Barrels	729-13
Vehicle Arresting Systems	729-14
Arrow Panels	729-15
Portable Variable-Message Signs	729-16
Temporary Glare Screens	729-17
Warning Lights	729-18
Automated Flagging Assistance Devices	729-19
Portable Traffic Signals	729-20
Temporary Overlay Markers	729-21
Truck Mounted Variable Message Signs	729-22
Aluminum Sign Panels	730-01
Temporary Plywood Sign Panels	730-02
Temporary Rigid Lightweight Sign Panels	730-03
Retro-Reflective Sign Sheeting	730-05
Temporary Wooden Sign Posts	730-19
Stiffeners, Overhead Brackets and Miscellaneous Hardware	730-22
Fiberglass Reinforced Plastic Sign Panels	730-23
Type A Sign Supports	730-24
Type B Sign Posts	730-25

Note: Signs and panels supplied before March 1, 2023, may be fabricated with NYSDOT approved ASTM D4956 Type III/IV and/or IX retro-reflective sign sheeting based on the sign type.

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 asphalt is suitable for all pavement surfaces to be repaired. Material other than plant-mixed 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 and trailers with a GVWR greater than 10,000 lbs shall display retro-reflective markings in compliance with Code of Federal Regulations 49 CFR 393.11- Lamps and Reflective Devices. The markings 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 similarly compliant markings on the front and rear (100 square inches per end minimum), as practicable.

G. Protective Vehicles. Protective vehicles are divided into 2 categories based on the Gross Vehicle Weight (GVW): Protective Vehicle Light (PVL) shall have a minimum GVW of 9,500 lbs. or greater, and; Protective Vehicle Heavy (PVH) shall have a minimum GVW of 22,000 lbs. or greater. 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 pursuant to Federal Motor Carrier Safety Administration (FMCSA) Cargo Securement Rules, such that: 1. the ballast will not separate from the vehicle upon impact, and 2. the ballast weight will not exceed the manufacturer's GVW.

Protective vehicles when used as barrier or shadow vehicles always require either a Type B or Type C arrow panel. Protective vehicles when used as advanced warning vehicles may require an arrow panel as shown on the 619 Standard Sheets. A Truck / Trailer mounted Variable Message Sign (TMVMS) meeting the size, legibility and illumination requirements of Type B or Type C Arrow Panels displaying approved messages per NYSDOT VMS GUIDELINES is acceptable. TMVMS may be used, if available, to supplement required work zone traffic control devices.

The requirements for use of a protective vehicle depend on the type of closure, work duration, preconstruction posted speed limit, and exposure conditions. Protective vehicles with or without Truck/Trailer Mounted Impact Attenuator (TMIA) shall be used in accordance with the requirements shown on Table 011-01 Protective Vehicle Requirements as shown on Standard Sheet 619-011.

1. TMIA's manufactured after December 31, 2019 shall be Manual for Assessing Safety Hardware (MASH) compliant.

2. Any TMIA's manufactured after December 31, 2019, must have been successfully tested to the 2015 edition of MASH and shall be used as follows:

- a. Where the preconstruction posted speed limit is ≤ 45 mph protective vehicles shall be equipped with a MASH Test Level-2 or MASH Test Level-3 truck mounted or trailer mounted impact attenuator.
- b. Where the preconstruction posted speed limit is > 45 mph protective vehicles shall be equipped with a MASH Test Level-3 truck mounted or trailer mounted impact attenuator.

3. Any National Cooperative Highway Research Program (NCHRP)-350 compliant TMIA's manufactured on or before December 31, 2019, and successfully tested to NCHRP Report 350 or the 2009 edition of MASH, may continue to be used throughout their normal service lives as follows:

- a. Where the preconstruction posted speed, limit is ≤ 45 mph, protective vehicles shall be equipped with a NCHRP 350 Test Level-2 or NCHRP 350 Test Level-3 truck mounted or trailer mounted impact attenuator.
- b. Where the preconstruction posted speed, limit is > 45 mph, protective vehicles shall be equipped with a NCHRP 350 Test Level-3 truck mounted or trailer mounted impact attenuator.

4. Damaged TMIA's shall be evaluated in accordance with the manufacturer's specifications and instructions and, if deemed repairable, may be repaired, and returned to service.

5. Truck / Trailer Mounted Impact Attenuators shall not be mounted / installed on vehicles with a Gross Vehicle Weight (GVW) less than what is minimally required by the manufacturer of the TMIA.

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 retro-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. All construction sign faces on rigid panels shall conform to §730-05 Retro-Reflective Sign Sheeting NYSDOT Class A sheeting. Characters including letters, numerals, route shields, symbols, logos, and borders shall conform to §645-2.02 Sign Panels - E. Sheeting Sign Characters.

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

2. Mounting Temporary Signs. Temporary sign supports, except those located beyond the deflection distances of guide rail or temporary barrier as given in Table 619-5 Guide Rail & Concrete Barrier Standard Deflection Distances or otherwise protected against impact by errant vehicles, shall meet the following requirements for portable or fixed supports. If rigid diagonal bracing is used, the high end of the bracing shall face away from approaching traffic. All wood supports shall be painted white.

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

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

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

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

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

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

L. Flagging and Traffic Control. Hand signaling devices used to control traffic shall meet the requirements of the MUTCD. The standard signaling device shall be STOP/SLOW signal paddles in accordance with §729-05 Stop/Slow Paddles. Red signal flags shall be a minimum of 24 inches x 24 inches. Automated Flagging Assistance Devices shall be in accordance with §729-19 Automated Flagging Assistance Devices. Portable traffic signals shall be in accordance with §729-20 Portable Traffic Signals.

M. Maintain Existing Mailboxes. (None Specified)

N. Contract Site Patrol. (None Specified)**619-2.03 Basic Work Zone Traffic Control** (Daily Operations). (None Specified)

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

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

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

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

619-2.08 Temporary Rumble Strips.

A. Raised Asphalt Rumble Strips. Raised asphalt rumble strips shall be formed from 6.3 or 9.5 asphalt pavement. 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 $\pm$ 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 1/4 inch and 1/2 inch.

D. Saw-Cut Rumble Strips. Saw-cut rumble strips shall have a width of 4 inches $\pm$ 1/2 inch measured in the direction of traffic. The depressions shall have a rectangular cross section with a depth of 3/8 inches $\pm$ 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 $\pm$ 1/8 inch.

F. Removing Temporary Rumble Strips. Rumble strip depressions shall be filled in with a 6.3 or a 9.5 asphalt pavement meeting the requirements of Section 404, Asphalt Pavements.

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

619-2.10 Portable Variable-Message Signs (PVMS) & Truck Mounted Variable Message Signs (TMVMS). Portable Variable-Message Signs shall be in accordance with §729-16 *Portable Variable-Message Signs (PVMS)*. Truck Mounted Variable Message Signs (TMVMS) shall be in accordance with §729-22 *Truck Mounted Variable Message Signs*. When a TMVMS is used as an arrow board, it shall comply with 729-15 *Arrow Panels*.

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 Positive Barrier. Temporary positive barrier segments shall be precast concrete units in accordance with the Standard Sheets or steel or concrete barrier meeting the approved Materials Details of the products on the Department's Approved List. All temporary positive 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 positive 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 barrier shall be in accordance with §729-18 *Warning Lights*. Where warning lights are not required, temporary barrier segments shall be delineated using reflective panels covered with §730-05 Retro-Reflective Sign Sheeting NYSDOT Class A 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. Where transitions between Temporary Positive Barrier and box beam are required, the box beam shall be in accordance with the requirements of §710-21 Box Beam Guide Railing and Median Barrier. Where required, the Transition End Pieces shall be precast concrete units in accordance with the Standard Sheets and shall be produced in accordance with the requirements of §704-05 Precast Concrete Barrier with a legible permanent marking.

Where transitions between Temporary Concrete Barrier and Corrugated Beam are required, the corrugated beam shall be in accordance with the requirements of §710-20 *Corrugated Beam Guide Railing and Median Barrier*

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

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

619-2.15 Temporary Sand Barrel Arrays. Temporary sand barrels shall meet the requirements of §729-13 *Temporary Sand Barrels*. Sand fill shall meet the material requirements of §703-06 *Cushion Sand* or §733-15 *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*. Concrete used for bases shall be Performance Engineered Mixture

(PEM) Portland Cement Concrete that meets the appropriate mix design requirements specified in Table 2 of Materials Procedure (MP) 501-2 *Mix Design and Approval Procedure for Performance Engineered Mixtures – Structural Concrete*.

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 §680 *Traffic Signals*. Materials which will be permanently incorporated into the work shall be in accordance with §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 §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 *Vehicular and Pedestrian 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 and approaches, substitutions or alterations may be permitted if approved by Deputy Chief Engineer (Structures) (DCES).

When specific materials are not shown in the contract documents, the Contractor shall assume all liability and responsibility for certifying that all materials required to complete the work conform to the AASHTO Standard Specifications for Highway Bridges or NYSDOT Load and Resistance Factor Design (LRFD) Bridge Design Specifications or NYSDOT Standard Specification, Construction and Materials, unless otherwise approved by the DCES.

If the Contractor proposes to fabricate/construct the temporary structure with used materials, the Contractor shall include with his submittal for the temporary structure, documentation that all primary member material meets the physical properties required by the design. In the absence of record plans, or other valid material certification for the used materials, physical testing shall be performed. The type of physical testing and the results of the testing shall be documented and submitted with the design computations. Excluded from the documentation and testing of physical properties provision are proprietary structures.

Used material shall not be furnished for fracture-critical members. Mill certifications shall be provided for all fracture critical material. Excluded from these fracture-critical provisions are pedestrian and pre-engineered (fabricated) proprietary structures.

619-2.22 Pavement Patching.

619-2.22 A. Pavement Patching (Force Account). Asphalt mixture from an approved asphalt plant shall be used. When asphalt mixture from an asphalt plant is not available (i.e., asphalt plants are closed), a bituminous cold-patch material shall be used.

619-2.22 B. Pavement Patching (Tonnage). Asphalt mixture from an approved asphalt plant shall be used.

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

619-2.24. Portable Temporary Rumble Strips (PTRS). PTRS material shall consist of thermoset cast urethane, engineered polymers, or rubber materials and shall be manufactured for use at temperatures from 0 to 180°F. PTRSs shall be able to withstand vehicles up to 80,000 pounds with minimal dislocation or lateral movement. PTRSs shall be less than one inch in height and consist of a single segment or multiple interlocking sections. Each PTRS shall be capable of being installed without adhesives or bolts. The face of PTRS shall have a non-slip textured surface. PTRS shall be black in color.

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, pedestrians, and bicyclists from moving traffic. If the work zone affects the movement of pedestrians, pedestrian access and walkways shall be provided. If the work zone affects an accessible and detectable pedestrian facility, the accessibility and detectability shall be maintained along the alternate pedestrian route. 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			
Height of Bump (in)	Anticipated Exposure Time (Calendar Days)	Posted Speed ≤ 45 mph	Posted Speed > 45 mph
1 to 6	≤ 7	6:1	10:1
	> 7	15:1	30:1

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

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

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

A ROAD CLOSED (R11-2) sign on a temporary sign support and Type III construction

barricades with warning lights shall be used whenever an entire roadway or ramp is closed to traffic

Where pedestrian facilities exist, or where pedestrian traffic is reasonably anticipated, the Contractor shall maintain pedestrian access on at least one side of the highway or street at all times, in accordance with the contract documents and the MUTCD. Where an existing pedestrian facility is disrupted, closed, or relocated, the temporary facility shall include accessibility features consistent with the features in the existing pedestrian facility. Pedestrian access may be provided using existing pedestrian facilities, temporary sidewalks or walkways, or alternate paths. Where a sidewalk is closed, it shall be marked with a Type 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, instorage 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. Protective Vehicles.

1. Barrier Vehicles (Stationary Operation). 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. Barrier vehicles with or without Truck/Trailer Mounted Impact Attenuator (TMIA) shall be used in accordance with the requirements shown on Table 011-01 Protective Vehicle Requirements as shown on standard

sheet 619-011. The §619 Standard Sheets illustrate the minimum quantity and positioning of Barrier Vehicles required.

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 display the four-corner flashing caution mode.

a. More Than One Hour Operation. Barrier vehicles used in a stationary operation that occupies a location for more than one hour **should be unoccupied**. The unoccupied vehicle shall be positioned parallel to traffic, parking brake set, placed in 2nd gear (Manual transmissions /engine off) or Park / Neutral (Automatic transmissions) and have the front wheels aligned with the lane striping and lane to maintain lane discipline and to stay in lane if struck.

b. One Hour or Less Operation. Barrier vehicles used in a stationary operation that occupies a location for one hour or less **shall be occupied**. For an occupied vehicle, the operator shall remain in the vehicle with the safety belt and headrest properly adjusted, parking brake set whenever possible, keep the wheels aligned with the lane striping and lane to maintain lane discipline and to stay in lane if struck.

c. Use of Protective Vehicle Light (PVL) as a Barrier Vehicle. The use of a Protective Vehicle Light (PVL) as a Barrier Vehicle(s) is limited to Non-freeway roadways where the posted speed limit is ≤ 40 mph.

d. Use of Protective Vehicle Heavy (PVH) as a Barrier Vehicle. The use of a Protective Vehicle Heavy (PVH) as a Barrier Vehicle(s) is appropriate on all roadway types. A Protective Vehicle Heavy (PVH) shall be used on roadways with a posted speed limit ≥ 45 mph.

Barrier vehicles shall be moved, if necessary, as the work progresses. The roll ahead distance (distance a vehicle is located in advance of the first workers or hazard) shall be based on Table 011-04 *Roll Ahead Distance for Protective Vehicles* as shown on Standard Sheet 619-011.

2. Shadow Vehicles (Moving Operation). For posted speed limits of ≥ 30 mph, the Contractor shall provide shadow vehicles to guide traffic and protect workers conducting moving work operations except where the travel lane is closed to traffic by traffic barriers or by channelizing devices in accordance with the contract documents or as directed by the Engineer. Shadow vehicles with or without Truck/Trailer Mounted Impact Attenuator (TMIA) shall be used in accordance with the requirements shown on Table 011-01 Protective Vehicle Requirements as shown on standard sheet 619-011. The §619 Standard Sheets illustrate the minimum quantity and positioning of Shadow Vehicles required.

When located in an open travel lane of a multi-lane 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 display the four-corner flashing caution mode.

Shadow vehicles shall be occupied for the entire duration of the work. For an occupied vehicle, the operator shall remain in the vehicle with the safety belt and headrest properly adjusted and keep the wheels aligned with the lane striping. The parking brake shall be applied wherever possible.

The shadow vehicle shall be moved as necessary to keep pace with the work operations. The roll ahead distance (distance the vehicle is in advance of the first workers or hazard) shall be

based on Table 011-04 *Roll Ahead Distance for Protective Vehicles* as shown on Standard Sheet 619-011.

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 .

a. Use of Protective Vehicle Light (PVL) as a Shadow Vehicle. The use of a Protective Vehicle Light (PVL) as a Shadow Vehicle is limited to Non-freeway roadways where the posted speed limit is ≤ 40 mph unless otherwise authorized by the engineer. A Protective Vehicle Light (PVL) shall be equipped with an appropriately rated Truck / Trailer Mounted Impact Attenuator pursuant to Table 011-01: Protective Vehicle Requirements of Standard Sheet 619-011.

b. Use of Protective Vehicle Heavy (PVH) as a Shadow Vehicle. The use of a Protective Vehicle Heavy (PVH) as a Shadow Vehicle is appropriate on all roadway types. A Protective Vehicle Heavy (PVH) shall be used on roadways with a posted speed limit ≥ 45 mph.

3. Advance Warning Vehicles (Moving or Stationary Operation). The purpose of the Advance Warning Vehicle is to display sign messages which advise motorists of what to expect ahead in Incident Management, Mobile and Short Duration operations. Advance Warning Vehicles with or without Truck/Trailer Mounted Impact Attenuator (TMIA) shall be used in accordance with the requirements shown on Table 011-01 Protective Vehicle Requirements as shown on standard sheet 619-011. The §619 Standard Sheets illustrate the minimum quantity and positioning of Advance Warning Vehicles required. If the vehicle encroaches the travel lane and reduces the traffic space below 10 feet on Non-freeway roads or 11 feet on Freeways it shall be equipped with a TMIA accordingly.

a. More Than One Hour Operation. Advance Warning Vehicles used in a stationary operation that occupies a location for more than one hour **should be unoccupied**. Unoccupied vehicle shall be positioned parallel to traffic, parking brake set, placed in 2nd gear (Manual transmissions /engine off) or Park / Neutral (Automatic transmissions) and have the front wheels aligned with the lane striping and lane to maintain lane discipline and to stay in lane if struck.

b. One Hour or Less Operation. Advance Warning Vehicles used in a stationary operation that occupies a location for one hour or less **shall be occupied**. For an occupied vehicle, the operator shall remain in the vehicle with the safety belt and headrest properly adjusted, parking brake set whenever possible, keep the wheels aligned with the lane striping and lane to maintain lane discipline and to stay in lane if struck.

c. Use of Protective Vehicle Light (PVL) as an Advance Warning Vehicle. The use of a Protective Vehicle Light (PVL) as an Advance Warning Vehicle is limited to Non-Freeway roadways where the posted speed limit is ≤ 40 mph. A Protective Vehicle Light (PVL) equipped with an appropriately rated Truck / Trailer Mounted Impact Attenuator may be used as an Advance Warning Vehicle on other roadway types where it is necessary for the Advance Warning Vehicle to remain completely on the shoulder.

d. Use of Protective Vehicle Heavy (PVH) as an Advance Warning Vehicle. The use of a Protective Vehicle Heavy (PVH) as an Advance Warning Vehicle is appropriate on all

roadway types. A Protective Vehicle Heavy (PVH) shall be used on roadways with a posted speed limit ≥ 45 mph.

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 619-5 *Guide Rail and Temporary Positive 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 unrelated to work zone traffic control operations will be 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 for long term operations. For intermediate term operations, the NYR9-11 or NYR9-12 sign is recommended in advance of a work zone not having a reduced regulatory speed. 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 regardless of the work duration.

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 (NYR9-12) 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 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 $\frac{1}{2}$ 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. If the regulatory speed is maintained throughout the work activity area, an END ROAD WORK (G20-2) sign shall be placed a minimum of 80' and a maximum of 400' past the end of the downstream taper.

For short, intermediate, and long term operations, and 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. Each BE PREPARED TO STOP sign shall be mounted on a temporary sign support. 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.

When used for a short or intermediate term operation, the BE PREPARED TO STOP (W3-4) sign shall be placed halfway between the first two advance warning signs. A PVMS may be used to supplement but not replace the required sign.

For long term operations, the BE PREPARED TO STOP signs shall be posted approximately $\frac{1}{2}$ 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.

XX miles is the total expected length of work to be completed within a work day. A supplement distance plaque W7-3a NEXT XX MILES shall be used with the first advance warning sign when the distance between the advance warning signs and the work area becomes greater than 2 miles as a result of the following situations:

- a. Multiple work locations are anticipated within XX miles from the first advance warning sign.

- b. Work area is expected to be relocated during the duration of the work within XX miles from the first advance warning sign.

The supplement W7-3a sign shall indicate the maximum anticipated distance between the first advance warning sign and the farthest work location.

When multiple work locations exist within XX miles from the first advance warning sign, a G20-1 sign shall be placed every two miles indicating the distance to the farthest work location.

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 619-2A *Channelizing Device Application for Short-Term Stationary Work Zones* and Table 619-2B *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 or oversized vertical panels 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, or oversized vertical panels 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, or oversized vertical panels. The Contractor may also use standard cones and vertical panels for short term work zones (during daylight 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, or oversized vertical panels 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, or oversized vertical panels 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, 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, 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 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 619-2A CHANNELIZING DEVICE APPLICATION FOR SHORT-TERM STATIONARY WORK ZONES											
Work Zone Provisions		Maximum Device Spacing (center to center)	MUTCD compliant Channelizing Device								
			Drums	Standard Cones	Tall Cones	Extra Tall Cones	Temporary Tubular	Interim Tubular Markers	Vertical Panels	Oversized Vertical Panels	Type III Barricades
Short-Term Stationary Work Zones involve daytime work that occupies a location for more than one hour and up to a single daylight period											
Shoulder/Merging/Shifting Tapers	< 40 mph	20 ft.	X	X	X	X			X	X	
	≥ 40 mph	40 ft.	X	X	X	X			X	X	
One-Lane Taper for Alternating Two-Way Traffic		20 ft.	X	X	X	X			X	X	
Longitudinal Lane or Shoulder Closure w/Workers		40 ft.	X	X	X	X			X	X	
Longitudinal Lane or Shoulder Closure w/No Workers		80 ft.	X	X	X	X			X	X	
Freeway / Expressway Gores		20 ft.	X	X	X	X			X	X	O
Marking for Transverse Bumps ¹		N/A	X ²			X ²			X ²		
Transverse Device within Closed Traffic Lane and/or		800 ft	X	X	X	X			X	X	O
Roadway edge exposed with no Edgeline or Permanent Delineators		200 ft.	X		X	X			X	X	O
Roadway Intersection or Commercial Driveway Radii		6 ft.	X	X	X	X	X				
Residential Driveway Radii		6 ft	X	X	X	X	X				
Removal of existing guide rail	Shoulder width ≥ 4 ft.	80 ft.	X		X	X	X		X	X	O
	Shoulder width < 4 ft.	40 ft.									
Pavement Drop offs > 2 in. and < 24 in.		See Table 619-3									
Drop off ≥ 24 in. within 10 ft. of active travel way; Posted speed ≤ 45 mph; Drop off Length ≤ 100 ft.; Not to last longer than 1 work shift		20 ft.	X			X				X	
Closed Roads		N/A									X
Closed Sidewalks		N/A									X

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 619-2B CHANNELIZING DEVICE APPLICATION FOR INTERMEDIATE-TERM AND LONG-TERM STATIONARY WORK ZONES											
Work Zone Provisions			Maximum Device Spacing (center to center)	MUTCD compliant Channelizing Device							
				Drums	Standard Cones	Tall Cones	Extra Tall Cones	Temporary Tubular	Interim Tubular Markers	Vertical Panels	Oversized Vertical Panels
Intermediate-term and Long-Term Stationary Work Zones involve work that occupies a location for more than 1 daylight period or nighttime work that occupies a location for more than 1 hour											
Shoulder/Merging/Shifting Tapers	<40 mph	20 ft.	X							X	
	≥ 40 mph	40 ft.	X							X	
One-Lane Taper for Alternating Two-Way Traffic		20 ft.	X							X	
Longitudinal Lane or Shoulder Closure w/Workers		40 ft.	X		X	X				X	
Longitudinal Lane or Shoulder Closure w/No Workers		80 ft.	X		X	X				X	
Freeway / Expressway Gores		20 ft.	X		X	X				X	O
Marking for Transverse Bumps ¹		N/A	X ²			X ²				X ²	
Transverse Device within Closed Traffic Lane and/or		800	X		X	X			X	X	O
Roadway edge exposed with no Edgeline or Permanent Delineators		200 ft.	X		X	X			X	X	O
Roadway Intersection or Commercial Driveway Radii		6 ft.	X			X					
Residential Driveway Radii		6 ft.	X			X					
Removal of existing guide rail	shoulder width ≥ 4	80 ft.	X		X	X	X		X	X	O
	shoulder width < 4	40 ft.									
Pavement Drop offs > 2 in. and < 24 in.		See Table 619-3									
Drop off ≥ 24 in. within 10 ft. of active travel way; Posted speed ≤45 mph; Drop off Length ≤ 100 ft.; Not to last longer than 1 work shift		20 ft.	X			X				X	
Two-Lane Two-Way Operations on expressways and freeways at	along curves	20 ft.	X							X	O
	along tangents	40 ft.									
Two-Lane Two-Way Operations on expressways and freeways between Crossovers		40 ft.	X		X	X		X	X	X	
Closed Roads		N/A									X
Closed Sidewalks		N/A									X

NOTES: X = Allowed Blank = Not Allowed O = Optional at Contractor's expense¹ - 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 619-3 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 619-3 PAVEMENT EDGE DROP-OFF PROTECTION						
Drop-Off Height	Edge Line Pavement Markings	Drum Spacing (feet)	Vertical Panel Spacing (feet)	Tubular Marker Spacing (feet)	Tall Cone Spacing (feet)	Signs
DROP-OFF AT OR WITHIN SHOULDER AREA						
Within 4 ft. from Travel Lane						
2 – 6 in.	Yes	100	100	N/A	N/A	Shoulder Drop-off
	No	40	40	N/A	N/A	No Shoulder
6 - 24 in.	Yes	40	40	N/A	N/A	Shoulder Drop-off
	No	20	20	N/A	N/A	No Shoulder
More than 4 ft. from Travel Lane						
2 – 6 in.	Yes	200	200	100	100	Shoulder Drop-off
	No	100	100	40	40	No Shoulder

6 - 24 in.	Yes	40	40	N/A	N/A	Shoulder Drop-off
	No	40	40	N/A	N/A	No Shoulder
DROP-OFF OUTSIDE OF SHOULDER EDGE						
Shoulder width ≤ 4 ft.						
2 – 6 in.	Yes	100	100	N/A	N/A	Shoulder Drop-off
	No	100	100	N/A	N/A	No Shoulder
6 - 24 in.	Yes	40	40	N/A	N/A	Shoulder Drop-off
	No	40	40	N/A	N/A	No Shoulder
Shoulder width > 4 ft.						
2 – 6 in.	Yes	200	200	100	100	Shoulder Drop-off
	No	100	100	40	40	No Shoulder
6 - 24 in.	Yes	100	100	40	40	Shoulder Drop-off
	No	40	40	N/A	N/A	No Shoulder

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 additional cones at all approaches to flaggers, in accordance with the Standard Sheet, in order to provide effective advanced warning to motorists. 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 Standard Sheet 619-309. 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 BE PREPARED TO STOP 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. Specified AFAD's may be replaced with human flaggers for a time period of no longer than 24 hours.

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. Mailboxes shall not block the Pedestrian Accessible Route such that the location does not comply with ADA requirements. Posts set in pavement shall be set in a 6" or 8" sleeve to facilitate replacement. Wood posts should not be set in concrete but in soil or compacted crushed stone.

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 (NY18-4) 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, interim pavement markings and temporary pavement markings, as 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 1/4 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 30 calendar days.

Within 30 calendar days after placement, the Contractor shall either (1) install the succeeding pavement course or (2) install the remaining temporary 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 at no additional cost to the State.

Temporary pavement marking stripes shall be a minimum of 4 inches in width. Temporary pavement markings shall be applied to a clean, dry pavement in accordance with the manufacturer's recommendations. 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 LINE (W8-12) signs and DO NOT PASS (R4-1) signs at no additional cost to the State. A NO CENTER LINE 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. Work shall consist of furnishing, applying, and maintaining interim pavement markings as shown in the contract documents or as directed by the Engineer. The work for removable tape, removable wet-night reflective tape, temporary overlay markers and removable raised

pavement markers shall include removal. 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.

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-strip 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 no usable 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 curbed 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 $\pm$ 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 asphalt mixture. 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) and Truck Mounted Variable Message Signs (TMVMS). The Contractor shall provide, operate, and maintain PVMS & TMVMS as indicated in the contract documents until the progress of work no longer requires their use. The Contractor shall relocate or reorient PVMS with a pay unit of each, if necessary, up to 4 times per year as conditions dictate, at no additional cost to the State. The Contractor shall provide, operate, and maintain PVMS with a pay unit of weeks at the general locations and duration stated in the contract documents and in accordance with the Special Note Requirements for Portable Variable Message Signs (PVMS). There shall be no extra payment due for each relocation or reorientation of TMVMS. On the PVMS & TMVMS, 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. NYSDOT's Variable Message Sign Guidelines shall be reviewed to ensure compliance with Chapter 5 - Messages.

If the contract requires a NTCIP compliant PVMS, the Contractor shall provide the Engineer with the model, manufacture date and manufacturer of the NTCIP compliant PVMS the Contractor plans to use from the Approved List. After delivery to the work site, the Contractor shall allow the Regional Transportation Management Center (TMC) to conduct operations and communications tests on one or more samples supplied by the Contractor. The testing will determine if the proposed PVMS meets the TMC's operational requirements by demonstrating remote communications to and from the TMC using NTCIP compliant operating software. TMVMS do not require NTCIP compliant communications. The message to be displayed shall be as required by the contract documents or as directed by the Engineer.

PVMS specified with cellular communications shall be equipped with control software compatible with the current computer operating system used in the Engineer's Field Office. PVMS with Cellular Communications Option shall have cellular telephone service provided by the Contractor. The Contractor shall supply the Engineer with two copies of operating instructions for the PVMS and the control software. 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. Electronic copies of software instructions are acceptable.

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 and TMVMS locations and update as they are relocated and removed.

The PVMS shall be protected from unauthorized use. All cabinet doors shall be secured and/or padlocked, and default manufacturer's passwords shall be changed. Additional security measures shall be implemented as needed.

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 Positive Barrier. Temporary Positive Barriers are categorized by their standard MASH TL-3 (pickup truck) deflection and their deflection reduction measures (pinning and or box-beam-stiffening). The barriers that satisfy a given deflection category are shown on the Department's Approved List for Temporary Positive Barriers. The system chosen and the segment length used must be capable of meeting the curvatures indicated in the Plans.

The Engineer will inspect temporary barrier segments upon delivery. Any barrier segment having damage and/or defects in the segment and/or joint connections will be rejected if the performance of the barrier may be affected.

Temporary positive barrier segments shall be fastened together 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. The connections shall conform to the approved details for the particular barrier.

Tapered end sections shall not be used in traversable medians, gores, or other areas where impacts on a tapered end section could allow vehicles to penetrate 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 positive 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.

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 619-4 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 temporary barrier where indicated, and of the deflection Category indicated in the contract documents. Where pinning is indicated for the given barrier, the pinning shall be in conformance with the pinning requirements indicated in the Approved List. Where pins extend above the top surface of the barrier anchor recess, they shall be covered with plastic or rubber.

TABLE 619-4 FLARE RATES FOR TEMPORARY POSITIVE BARRIER					
POSTED PRECONSTRUCTION SPEED LIMIT (mph)	30	40	50	55	65
TEMPORARY POSITIVE BARRIER	8:1	11:1	14:1	16:1	20:1
BOX BEAM OR HEAVY POST CORRUGATED BEAM	7:1	9:1	11:1	12:1	15:1

TABLE 619-5 GUIDE RAIL AND NYSDOT TEMPORARY CONCRETE BARRIER STANDARD** DEFLECTION DISTANCES		
BARRIER TYPE	POST SPACING (ft)	DEFLECTION DISTANCE (ft)
CABLE GUIDE RAIL	16	11.0*
	12	9.5*
	8	8.0*
	4	7.0*
CORRUGATED W-BEAM (WEAK POST) GUIDE RAIL	12.5	8.0
	6.25	6.0
	4.16	5.0
CORRUGATED W-BEAM (HEAVY POST BLOCKED OUT)	6.25	4.0
	3.12	2.0
BOX BEAM GUIDE RAIL	6.0	5.0
	3.0	4.0

CORRUGATED W-BEAM (WEAK POST) MEDIAN BARRIER	12.5	7.0
	6.25	5.0
CORRUGATED W-BEAM (HEAVY POST) MEDIAN BARRIER	6.25	2.0
BOX BEAM MEDIAN BARRIER	6.0	3.0
NYSDOT TEMPORARY CONCRETE BARRIER	Unpinned	3.25**
	Box-Beam-Stiffened	2.2**
	Pinned	0.8**

* Note: NCHRP 350 Standard Deflection caused by a 4,400-lb test vehicle traveling 62 mph impacting the barrier at a 25° angle

**Note: Standard Deflections are those assumed to occur with a Standard TL-3 Impact. MASH Standard Impact is produced by a 5,000-lb test pickup traveling 62 mph impacting the barrier at a 25° angle.

The 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.

At any transition between pinned and unpinned portions of a temporary positive barrier run, to provide a gradual change in fixity, one piece of barrier shall be partially pinned using 2 pins on the construction side of the barrier. The partially pinned piece shall be included in the measurement of pinned barrier.

Pins shall have the following minimum embedment lengths:

- Bridge Decks and Cement Concrete Pavement 5 in.
- Flexible Pavement 18 in.
- Unpaved Areas 30 in.

After removal of the barrier, pin holes created in the surface shall be filled, unless that area will be further disturbed. Holes in flexible pavement shall be filled with warm or cold mix top course asphalt material rodded in 3" lifts. 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*~~. Holes in unpaved area shall be filled with sand backfill.

A. Temporary Barrier Without Warning Lights. Where warning lights for temporary positive barrier are not required, the Contractor shall provide and maintain delineation on the temporary barrier in accordance with Section 619-2.12. The delineation shall be visible and free of dirt and snow, including during shutdown periods. The maximum spacing of delineation shall be 20 feet.

B. Temporary Barrier With Warning Lights. Where warning lights are specified, Type C warning lights shall be provided on temporary barrier. 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.

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.

C. Box Beam Guide Rail to Temporary Positive Barrier (Concrete) Transition. Where required, the Contractor shall install the Transition from Box Beam to Flared Temporary Concrete Barrier or the Transition from Box Beam to Unflared Temporary Concrete Barrier in accordance with the details shown on the Standard Sheets. With the approval of the Engineer, the Contractor may choose to switch options, at no additional cost to the State.

Where the Contractor elects or is required to bolt the box beam to the face of the Temporary Concrete Barrier, the pieces of box beam thus bolted shall be removed and become the Contractor's property when the Temporary Concrete Barrier is removed. After removal of the Temporary Concrete Barrier, any rail and posts removed to facilitate placement of the Temporary Concrete Barrier transition shall be promptly replaced with new posts and new or acceptable reset box beam guide rail.

When an unflared Box to Temporary Concrete Barrier transition is removed, the heavy posts, blockouts, rub rail, and Transition End Piece and associated hardware shall become the property of the Contractor and shall be removed from the project before its completion.

D. Temporary Positive Barrier (Concrete) to Box Beam Guide Rail Transition. Where required, the Contractor shall install "Temporary Concrete Barrier Face to Box Beam Transition" or "Temporary Concrete Barrier Back to Box Beam Transition" in accordance with the details shown on the Standard Sheets. When the box beam is mounted to the traffic-side face, a tapered box beam end piece shall be used. When the box beam is behind the Temporary Concrete Barrier, the Contractor shall bolt to the Temporary Concrete Barrier or shall provide an overlap of box beam extending upstream past four segments of the downstream end of the Temporary Concrete Barrier.

When box beam is required to be bolted to the Temporary Concrete Barrier, or the Contractor elects to do so, the necessary positions for the bolts shall be located on the Temporary Concrete Barrier and drilled in the field. The pieces of box beam thus bolted shall be removed and become the Contractor's property when the Temporary Concrete Barrier is removed. After removal of the Temporary Concrete Barrier, any rail and posts removed to facilitate placement of the Temporary Concrete Barrier transition shall be promptly replaced with new posts and new or acceptable reset box beam guide rail.

E. Corrugated Beam Guide Rail to Temporary Positive Barrier (Concrete) Transition. Where required, the Contractor shall install the W-Beam to Flared TCB Transition (Leading End) in accordance with the details shown on the Standard Sheets.

After removal of the Temporary Concrete Barrier, any rail and posts removed to facilitate placement of the Temporary Concrete Barrier transition shall be promptly replaced with new posts, new or acceptable reset corrugated guide rail, new hardware, and new blockouts, backup plates, or other hardware required to meet current standards. Any terminal rail pieces, posts, or other guide rail components not required for the restored guide rail shall become the property of the Contractor and shall be removed from the project before its completion.

F. Temporary Positive Barrier (Concrete) to Corrugated Beam Guide Rail Transition. Where required, the Contractor shall install "Temporary Concrete Barrier Face to Corrugate Beam Transition" or "Temporary Concrete Barrier Back to Corrugated Beam Transition" in accordance with the details shown on the Standard Sheets. When the corrugated beam is mounted to the traffic-side face, a W-beam end piece shall be used. When the corrugated beam is behind the Temporary Concrete Barrier, the Contractor shall bolt to the Temporary Concrete Barrier as shown on the

Standard Sheets or shall provide an overlap of corrugated beam extending upstream past four segments of the downstream end of the Temporary Concrete Barrier.

When corrugated beam is required to be bolted to the Temporary Concrete Barrier, or the Contractor elects to do so, the necessary positions for the bolts shall be located on the Temporary Concrete Barrier and drilled in the field. The terminal rail pieces or W-Beam End Pieces thus bolted shall be removed and become the Contractor's property when the Temporary Concrete Barrier is removed. After removal of the Temporary Concrete Barrier, any rail and posts removed to facilitate placement of the Temporary Concrete Barrier transition shall be promptly replaced with new posts and new or acceptable reset corrugated beam guide rail

619-3.13 Temporary Glare Screen. Temporary glare screen shall meet the material requirements of §729-17 and be installed in accordance with the manufacturer's instructions or as otherwise specified by the Engineer. All components of the glare screen shall be maintained in a safe and functional condition. Damaged components shall be promptly repaired or replaced.

If blades are utilized, the blades shall be spaced and angled to provide approximately a 22° headlight cutoff angle.

If steel fabric is utilized, the fabric must be taut and the vertical posts shall be evenly spaced unless otherwise specified. 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.

The screen shall be reflectorized at a uniform maximum spacing of 40 feet, unless the radius is less than 500 feet in which case the uniform maximum spacing is 20 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 retro-reflective sheeting. Retro-reflective sheeting shall follow requirements of §730-05 Retro-Reflective Sign Sheeting - NYSDOT Class A and be firmly bonded to the screens using only adhesives. 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. The method used to clean the reflectorization shall not damage screen components, reflectorization, or barrier and shall not be 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. Where temporary glare screen is mounted on top of permanent concrete barriers and subsequently removed, bolt holes or other damage to the barrier 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. A nighttime operations meeting shall be held prior to the start of any nighttime operations.

For static and moving operations, the Contractor shall implement a lighting plan and provide illumination throughout the work areas.

For moving operations, the Contractor shall mount lighting to construction equipment that consists of balloon lights, or equivalent lighting that illuminates the work area with low glare for oncoming traffic and enhances visibility of the equipment from all directions. The Contractor should maintain traffic in a single lane during nighttime moving operations on freeways.

All workers involved in nighttime operations shall wear protective helmets and nighttime apparel in accordance with §107-05A. High Visibility Apparel at all times. All signs, Stop/Slow paddles, and red flags used to warn/alert/control traffic shall be retroreflective. Flaggers shall use a flashlight with red glow cone/ red LED baton for flagging in non-illuminated flagger stations during nighttime operations.

Where the Contractor implements a mobile lighting plan, PPE shall meet ANSI Class 3. The Contractor shall equip workers on foot with a personal active safety system which enhances the visibility of the worker from all directions, such as a powered hardhat light ring or an illuminated safety vest. ANSI Class E gaiters or pants are required to meet ANSI Class 3 if ANSI Class 2 vests are used. The Contractor shall provide the Department with the same personal active safety systems and ANSI Class 3 garments for Department inspectors and pertinent field office staff. When workers on foot are passing between illuminated work areas, the Contractor shall provide personal headlamps or flashlights producing a minimum of 5 foot-candles at the ground to navigate their path if hardhat light rings do not provide this function and illumination. Vehicles operating on the pavement of a closed roadway or travel lane shall display rotating amber beacons or flashing LED 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 DOT 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 applicable items:

1. 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.
2. The general layout of equipment involved in the moving operation, including typical or variable spacing.
3. Schematic of the equipment-mounted balloon lights and supplemental lights.
4. Listing of the anticipated workforce to be located within the work zone.

5. Internal traffic control plan to coordinate the flow of deliveries, moving equipment, workers, and vehicles at the worksite to minimize or eliminate vehicles and employees from crossing paths, and how this plan will be communicated to all individuals involved.
6. Specific illuminated areas for cleanout, specific areas for trucks entering and exiting the work area, and how this plan will be communicated to the workers and truck drivers prior to arrival on site.
7. Means to illuminate areas to perform tasks not in the immediate vicinity of the major work.
8. Means to ensure visibility of personnel and equipment involved with the set-up and removal of work zone traffic control devices.
9. Description of light towers to be used and electrical power source.
10. Specific technical details on all lighting equipment, including brand names, model numbers, power rating and photometric data.
11. Details of any hoods, louvers, shields or other means to be used to control glare.
12. Attachment and mounting details for lights to be attached to equipment.
13. 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. The Contractor shall have backup lighting equipment available onsite. In the event that any required lighting equipment is no longer operational or available to perform the work, the Contractor shall remove the work zone associated with the operation until the lighting equipment is restored.

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 for stationary operations and shall provide Level I illumination throughout the workspace. 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. Balloon Lighting and Additional Lighting on Paving, Milling, and Finishing Machines. If needed to supplement portable and/or trailer-mounted light towers, lighting 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. Primary lighting for nighttime moving operations should consist of balloon lighting, or equivalent low glare lighting visible from all directions. Additional lighting of an appropriate type shall be required, where obstructions exist, to perform the work safely and adequately. 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.

The Contractor shall equip the following equipment in conjunction with nighttime moving operations with balloon lights, or equivalent low glare lighting visible from all directions, to sufficiently illuminate the work area, enhance visibility of the equipment from all directions, and to carry out the work safely and accurately: all rollers, pavers, milling machines, material transfer vehicles, crack and seal equipment, and other miscellaneous equipment utilized for the moving operation that could be a hazard if not illuminated. There shall be a minimum of one balloon light mounted to each piece of equipment. Pavers and large milling machines should be equipped with a minimum of two balloon lights. Mechanical sweepers shall have forward-facing lights and tack trucks shall have rearward-facing lights, consisting of balloon lights, or equivalent low glare lighting visible from all directions, supplemented with flood lights as required. Balloon lighting, or equivalent, equipment shall be sufficiently ballasted and durable to withstand the anticipated weather conditions and vibrations from the host equipment.

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 suitable 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, or utilities, 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. Balloon lights or equivalent lighting, and 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. Illumination for moving operations. Equipment-mounted balloon lights, or equivalent low glare lighting visible from all directions, shall provide illumination to a minimum of 5 foot-candles measured at the work surface for 20 feet from the equipment on sides where workers generally work. Balloon lights or equivalent lighting shall be located to optimally illuminate the work area and enhance equipment visibility, mounted at a minimum height of 10 feet above the ground, and temporarily relocated as necessary to not interfere with overhead obstructions. Other types of equipment-mounted light sources shall be used as supplemental illumination around the equipment, where necessary, to carry out the work safely and adequately. The hopper, auger, and screed areas of pavers shall be uniformly illuminated. The operator's controls on all machines shall be illuminated. Tack shall be illuminated as it is applied.

In areas throughout the entire zone of mobile operations without existing roadway lighting, light towers shall be located at maximum intervals of 500 feet. The Contractor shall provide illumination to a minimum of 5 foot-candles at locations where miscellaneous or incidental tasks, such as saw cutting, are performed. The illumination shall be accomplished via floodlights or balloon lights (or equivalent) mounted to a truck, cart, or terrain vehicle, tow behind trailer lights, lights on light stands, or other suitable means. No tasks shall be performed without adequate illumination.

The Contractor shall furnish adequate illumination for Department construction inspection and quality assurance. The illumination shall be accomplished via floodlights or balloon lights (or equivalent) mounted to a truck, cart, or terrain vehicle, tow behind trailer lights, lights on light stands, or other suitable means. The Contractor shall furnish and maintain illumination equipment. The Contractor shall provide a minimum of 10 foot-candles in locations where the Department's representatives will perform tasks such as core drilling, density testing, and concrete testing.

b. Level I (5 foot-candles) for static operations. Level I illumination shall be provided for all areas of general construction operations to include all work operations by Contractor's 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 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 sufficient lights mounted on the roller.

c. Level II (10 foot-candles) for static operations. 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. Illumination shall be set-up to avoid adverse backlighting, a condition which presents the object intended to be illuminated as a shadow due to a bright light from behind.

d. Level III (20 foot-candles) for static operations. 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:

a. Tower-mounted luminaires shall be aimed either generally parallel or perpendicular to the roadway.

b. 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°.

c. No luminaires shall be permitted that provide a luminous intensity greater than 20,000 candelas at an angle of 72° above the vertical.

d. 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, relocate, and remove temporary structures and their approaches at the location(s) shown in and in accordance with the contract documents. The Contractor shall install temporary structures and their approaches, including any required earth support structures and any necessary appurtenances, in a manner and sequence that interference with and inconvenience to the traveling public and abutting properties is kept to a minimum. The Contractor shall be responsible for the workmanship, upkeep, and safety of all temporary structures and approaches.

When specific details are not included in the contract documents, or when the Contractor receives approval to deviate from the contract documents, the Contractor shall design all elements of the temporary structure and approaches including the railing system, on the structure and its approaches.

The design of temporary structures and their approaches shall be in conformance with the NYSDOT Load and Resistance Factor Design (LRFD) Bridge Design Specifications, the only design live load shall be HL-93, in addition to any anticipated construction or pedestrian loading. Alternatively, the design shall be in conformance with the NYSDOT Standard Specifications for Highway Bridges, the minimum design live load shall be AASHTO HS 20. All structures and approaches that are expected to be in service for more than 5 years, shall be designed as a permanent structure in accordance with the NYSDOT Load and Resistance Factor Design (LRFD) Bridge Design Specifications.

The bridge rail shall be designed for loads commensurate with those specified for TL-2 unless a higher level is shown in the project plans. The Contractor shall also be responsible for designing, furnishing, and installing the transition from bridge rail to highway rail for the temporary structure.

All design computations and associated working drawings shall bear the stamp and signature of a Professional Engineer and shall be submitted to the Engineer who will forward to the DCES for review. Design for non-highway temporary bridges shall be in accordance with AASHTO specifications for the design codes, loading, railing/barrier, ADA requirements and vertical clearance it is intended to serve or as specified in the project plans.

All fabrication and construction of a temporary structure shall conform to the AASHTO Standard Specifications for Highway Bridges, Division II or the AASHTO LRFD Bridge Construction Specifications, except as modified herein. Fabrication shall be performed by a fabricator that is certified by AISC for the type of work being performed. For fracture-critical member (FCM) work, the fabricator shall also have an FCM endorsement through AISC. The Contractor shall notify the DCES of the fabrication schedule at least 21 calendar days prior to commencement of any non-pre-engineered proprietary shop fabrication.

All welding required for the fabrication of temporary steel structures shall be performed in accordance with the provisions of the NYS Steel Construction Manual.

The Contractor is responsible for furnishing and installing any stone fill slope protection in accordance with Section 620 used to guard against erosion and/or scour of the end slopes and all temporary substructures. The type of the fill slope protection shall be as shown in the contract plans and paid under Item 619.05nn.

If the bridge connects sidewalk at each end of the bridge, payment for all approach sidewalk and earthwork necessary to connect the temporary structure with the existing sidewalk system shall be as shown in the contract plans and paid under Item 619.05nn.

A. Submittals. Prior to beginning construction of any temporary structure designed by the Contractor, the Contractor shall submit detailed plans and calculations to the Engineer who will forward to the DCES for review and approval in accordance with §585-3.03 Working Drawings. The review by the DCES, does not and shall not relieve the Contractor of the responsibility for the adequacy and design of the temporary structures and approaches.

All design computations and associated working drawings shall bear the stamp and

signature of the Professional Engineer. Load ratings shall be computed using the Load Factor Design (LFD) or Allowable Stress Design (ASD) methodology. The Inventory and Operation load ratings shall be based on an AASHTO HS-20 live loading. Additionally, if the structure was designed using the NYSDOT LRFD Bridge Design Specifications, the load ratings shall also be computed by the Load and Resistance Factor Rating (LRFR) method. LRFR ratings shall be provided 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 AASHTO's Manual for Bridge Evaluation.

Prior to opening the temporary structures to highway traffic, the Contractor shall submit the Request for Bridge Identification Number and General Bridge Inventory Report forms. Upon removal of the temporary bridge, the Contractor shall submit a Bridge Deletion Report. Inventory forms and guidance including Request for Bridge Identification Number, General Bridge Inventory Report, Closed Bridge Report, and Bridge Deletion Report are located at <https://www.dot.ny.gov/divisions/engineering/structures/manuals/bridge-inventory-manual>.

B. Inspection. 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 experienced in bridge construction, at least once a month. Any issues affecting the safety, strength, or serviceability of the bridge must be immediately rectified by the Contractor.

Upon request, the Contractor shall provide NYSDOT Inspection staff access to temporary structures open to highway traffic to perform mandated inspections pursuant to NYS Uniform Code of Bridge Inspection (UCBI), the Federal Code of Regulations National Bridge Inspection Standards (NBIS), and the Bridge Inspection Manual including, but not limited to:

- Initial Inspection – performed within 60 days of structure opening to public highway traffic.
- Routine Inspection – Subsequent inspections shall be allowed in conformance with UCBI, NBIS and the Bridge Inspection Manual requirements.

The Contractor is the responsible party, as specified in the Bridge Inspection Manual (Inspection Flagging Procedure), for responding to all Safety and Structural Flags issued during the inspection

619-3.22 Pavement Patching. The Contractor shall furnish and install materials suitable to provide temporary pavement patching 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 the Contractor's operations. During periods of active work on the contract, the Contractor shall complete patching on a daily basis, as needed. The Contractor shall install pavement patching at locations identified by the Engineer within 24 hours of notification.

The Contractor shall perform pavement patching to provide a relatively smooth, uniform driving surface suitable for safe travel at the posted speed limit. Pavement patching 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 and patching material shall be thoroughly compacted with a tamper or roller to the satisfaction of the Engineer.

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. The replacement mailbox shall be of a similar or larger size than the original. Where the mailbox will be placed over a guide rail and/or other

location where the postal patron will have easiest access to the rear of the mailbox, the replacement mailbox shall be one having a door on each end.

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. 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:

$$\frac{\text{Width of Striping (in)} \times \text{Number of Feet}}{4 \text{ (in)}}$$

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 "X" 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:

$$\frac{\text{Width of Striping (in)} \times \text{Number of Feet}}{4 \text{ (in)}}$$

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:

$$\frac{\text{Width of Striping (in)} \times \text{Number of Feet}}{4 \text{ (in)}}$$

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 "X" 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) and Truck Mounted Variable Message Signs (TMVMS). The quantity of PVMS or TMVMS with a pay unit of each to be measured for payment will be the number of signs provided. The quantity of PVMS or TMVMS 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 Positive Barrier. . The quantity to be measured for payment of temporary positive barrier will be in feet to the nearest foot along the centerline of temporary positive barrier installed.

The quantity to be measured for payment of Box Beam to Flared Temporary Concrete Barrier Transition will be the number of such transitions installed.

The quantity to be measured for payment of Box Beam to Unflared Temporary Concrete Barrier Transition will be the number of such transitions installed.

The quantity to be measured for payment of Temporary Concrete Barrier Face to Box Beam Transition will be the number of such transitions installed.

The quantity to be measured for payment of Temporary Concrete Barrier Back to Box Beam Transition will be the number of such transitions installed.

The quantity to be measured for payment of Corrugated Beam to Flared Temporary Concrete Barrier Transition will be the number of such transitions installed.

The quantity to be measured for payment of Temporary Concrete Barrier Face to Corrugated Beam Transition will be the number of such transitions installed.

The quantity to be measured for payment of Temporary Concrete Barrier Back to Corrugated Beam Transition will be the number of such transitions 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 an each location basis. A location shall be defined as a work zone site that can operate from

one traffic signal controller, whether it be an intersection or in lieu of work zone flagging. If PTSs are moved and operated at the same location on the same day, no additional payment will be made.

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 work performed under temporary structures and approaches will be measured for payment on a lump sum basis.

619-4.22 Pavement Patching.

619-4.22 A. Pavement Patching (Force Account). The work under Pavement Patching (Force Account) will be measured for payment on a Dollars-Cents basis.

619-4.22 B. Pavement Patching (Tonnage). The work under Pavement Patching (Tonnage) will be measured for payment in tons of asphalt placed. No quality units are associated with this item.

619-4.23 Mailboxes. The quantity to be measured for payment will be the number of mailboxes installed in accordance with the contract documents or as directed by the Engineer. Mailboxes installed for the Contractor's convenience or due to damage during the contract period will not be compensated for.

619-4.24 Portable Temporary Rumble Strips (PTRS). PTRS arrays will be measured by Device-Day. When measured by Device-Day the quantity will be the number of devices (PTRS arrays) used each calendar day which are satisfactorily furnished, installed, maintained, and operated at each work zone location. If PTRS arrays are utilized at more than one work zone location on the same day, the total number of PTRS array-days measured for payment will be the total number of PTRS arrays setup on that day.

For the purpose of this specification, one Device-Day is defined as one PTRS array, set up and in use in a calendar day exceeding one hour. Two Device-Days is one PTRS array over two days or two PTRS arrays used on one day. A PTRS array relocated within the same work zone on the same day or same shift will count as one PTRS array.

619-4.25 Automated Flagger Assistance Devices (AFAD). The quantity measured for payment will be the number of AFAD's used each day which are satisfactorily furnished, installed, maintained, and operated at each work zone location. If AFAD's are operated at more than one work zone location on the same day, the total number of AFAD-days measured for payment will be the total number of AFAD setup on that day, however no additional payment will be made for AFAD's relocated within the same work zone on the same day. Work shifts spanning over two consecutive calendar days will be considered to occur on the "same day". For the purpose of this specification, one AFAD-Day is defined as two AFAD's, set up and in use for a portion of a day exceeding one hour.

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 619-6 *Basic Work Zone Traffic Control Nonpayment*.

TABLE 619-6 BASIC WORK ZONE TRAFFIC CONTROL NON-PAYMENT		
Original Contract Amount		Nonpayment Amount
From More Than	To and Including	
\$ 0	\$ 500,000	\$ 200
\$ 500,000	\$ 2,000,000	\$ 400
\$ 2,000,000	\$ 5,000,000	\$ 500
\$ 5,000,000	\$ 10,000,000	\$ 750
\$ 10,000,000	\$ 20,000,000	\$ 1,000
\$ 20,000,000	-----	\$ 3,000

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 10 percent of the lump sum price when the initial construction sign installation is complete, as determined by the Engineer, and an additional 10 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 10 percent of the lump sum price when the initial construction sign installation is complete, as determined by the Engineer, and an additional 10 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 covering or 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 operations.

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 30 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. The work to remove traffic paint or epoxy paint will be paid for separately.

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) and Truck Mounted Variable Message Signs (TMVMS). The unit price bid for PVMS or TMVMS shall include the cost of all labor, materials, testing and equipment necessary to complete the work, including cellular telephone service initial start-up and monthly charges for the cellular communications option. The TMVMS does not require cellular communications service.

Progress payments for PVMS or TMVMS 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 Positive Barrier. The unit price bid for temporary positive 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 positive barrier. Temporary impact attenuators, if required, will be paid for separately. When temporary positive 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 for the relocation will be made for additional length of temporary concrete barrier.

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

The unit price bid for warning lights on temporary positive barrier with 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 warning lights on temporary positive barrier.

The unit price bid for Box Beam to Flared Temporary Concrete Barrier Transition shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work, including removal and replacement or resetting of existing rail; placement and removal of the temporary berm; seeding of the disturbed area; and replacement of rail with holes in its face. No separate payment will be made for box beam used to provide an overlap.

The unit price bid for Box Beam to Unflared Temporary Concrete Barrier Transition shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work, including removal and replacement or resetting of existing rail; furnishing of Transition End Pieces, rub rail heavy posts and blockouts; and replacement of rail with holes in its face.

The unit price bid for Temporary Concrete Barrier Face to Box Beam Transition shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work, including removal and replacement or resetting of existing rail and furnishing of box beam tapered end piece.

The unit price bid for Temporary Concrete Barrier Back to Box Beam Transition shall include the cost of furnishing all labor, materials, and equipment necessary to complete the work, including removal and replacement or resetting of existing rail and replacement of rail with holes in its face. No separate payment will be made for box beam used to provide an overlap.

The unit price bid for Corrugated Beam to Flared Temporary Concrete Barrier Transition shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work, including removal and replacement or resetting of existing rail; placement and removal of the temporary berm; seeding of the disturbed area; and furnishing and removal of terminal rail section. No separate payment will be made for corrugated beam used to provide an overlap.

The unit price bid for Temporary Concrete Barrier Face to Corrugated Beam Transition shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work, including removal and replacement or resetting of existing rail and furnishing and removal of W beam end piece.

The unit price bid for Temporary Concrete Barrier Back to Corrugated Beam Transition shall include the cost of furnishing all labor, materials, and equipment necessary to complete the work, including removal and replacement or resetting of existing rail and furnishing and removal of terminal rail section. No separate payment will be made for corrugated beam used to provide an overlap.

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 positive 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.

Progress payments will be made based on the unit price bid as follows: 90 percent when the attenuator is adequately installed and operational; the remaining 10 percent will be paid upon removal.

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.

Progress payments will be made based on the unit price bid as follows: 90 percent when the barrels are adequately installed and operational; the remaining 10 percent will be paid upon removal.

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, including the cost to adapt equipment and provide power to light sources.

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 lump sum 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, submittals, and inspection of the structure.

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.

619-5.22 A. Pavement Patching (Force Account). Payment shall include the cost of furnishing all labor, materials, and equipment necessary to patch pavement, including mobilization of work crews and work zone traffic control. Payment will be based on force account records submitted to the Engineer, in accordance with §109-05 *Extra Work and Time Related Compensation*.

619-5.22 B. Pavement Patching (Tonnage). The unit price bid shall include the cost of furnishing all labor, materials, and equipment necessary to patch pavement. No additional payment for mobilization or work zone traffic control will be paid under this item, even if no other work, at the time of the patching, is being performed on the contract.

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.

619-5.24 Portable Temporary Rumble Strips (PTRS). The price bid shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work. Pavement cleaning, if necessary, shall be included.

619-5.25 Automated Flagger Assistance Devices (AFAD). The unit price bid shall include the cost of all labor, materials, and equipment necessary to satisfactorily complete the work. The cost of advance warning signs shall be included in the unit bid price for Item 619.01 – Basic Work Zone Traffic Control.

Payment will be made under:

Item No.	Item	Pay Unit
619.01	Basic Work Zone Traffic Control	Lump Sum
619.0101	Basic Work Zone Traffic Control (Daily Operations)	Lump Sum
619.04	Type III Construction Barricades	Each
619.05nn	Temporary Structures and Approaches	Lump Sum
619.0701	Temporary Business Signs	Square Feet
619.0801xx	Remove Pavement Marking Stripes	Feet
619.0802xx	Remove Pavement Marking Letters or Symbols	Each
	xx = Material	
	01 = Traffic Paint,	
	02 = Epoxy Paint,	
	06 = Permanent Pavement Tape	
619.0803	Cover Existing Pavement Marking Stripes (Removable Tape)	Feet
619.0804	Cover Existing Pavement Marking Letters or Symbols (Removable Tape)	Each
619.09xx	Temporary Pavement Markings, Stripes	Feet
	xx = Material	
	01= Traffic Paint,	
	03= Removable Tape,	
	04= Removable Wet Reflective Tape	
619.1001xx	Interim Pavement Markings, Stripes	Feet
619.1002xx	Interim Pavement Markings, Symbols	Each
619.1003xx	Interim Pavement Markings, Letters	Each
	xx = Material	
	01= Traffic Paint,	
	02= Epoxy Paint,	
	03= Removable Tape,	
	04= Removable Wet Reflective Tape,	
	05= Traffic Paint Supplemented with Raised Markers	
619.1105XY	Portable Variable Message Sign (PVMS) Standard size – Full Matrix (LED)	Each
619.1106XY	Portable Variable Message Sign (PVMS) Standard size – Full Matrix (LED)	Week
619.1107XY	Portable Variable Message Sign (PVMS) Large size - Full Matrix (LED)	Each
619.1108XY	Portable Variable Message Sign (PVMS) Large size - Full Matrix (LED)	Week
619.1109XY	Portable Variable Message Sign (PVMS) Small size - Full Matrix (LED)	Each
619.1110XY	Portable Variable Message Sign (PVMS) Small size - Full Matrix (LED)	Week
619.1111XY	Portable Variable Message Sign (PVMS) Standard size – Line or character matrix (LED)	Each
619.1112XY	Portable Variable Message Sign (PVMS) Standard size – Line or character matrix (LED)	Week
XY = Options		

X= Equipment Options

Y= Cellular Communication Options

1 = No optional equipment specified 1 = No Cellular Communications required
 2= Radar 2 = Cellular Communications
 3= CCTV Camera 3 = Cellular Communication with NTCIP compliance
 4= Radar & CCTV Camera

619.1113	Truck Mounted Variable Message Signs (TMVMS)	Each
619.1114	Truck Mounted Variable Message Signs (TMVMS)	Week
619.12	Temporary Glare Screen	Feet
619.13XXnn	Temporary Traffic Signals	Each Location
XX= Type		
01 – Temporary Timber Pole System		
02 – Portable Traffic Signal System		
619.14	Automated Flagger Assistance Device (AFAD)	DVDY
619.1611	Maintain Traffic Signal Equipment (Requirement A) Intersection	Month
619.1612	Maintain Traffic Signal Equipment (Requirement B) Intersection	Month
619.1613	Maintain Traffic Signal Equipment (Requirement C) Intersection	Month
619.1614nn	Modify Existing Traffic Signal Equipment (Temporary)	Each Location
619.1711	Temporary Positive Barrier – Category 1 (Pinning Prohibited)	Feet
619.1712	Temporary Positive Barrier – Category 2 (Pinning Permitted)	Feet
619.1713	Temporary Positive Barrier – Category 3 (Pinning Prohibited)	Feet
619.1714	Temporary Positive Barrier – Category 4 (Pinning Permitted)	Feet
619.1715	Temporary Positive Barrier – Category 5 (Pinning Prohibited)	Feet
619.1716	Temporary Positive Barrier – Category 6 (Pinning Required)	Feet
619.1717	Temporary Positive Barrier – Category 7 (Pinning and Box-Beam-Stiffening Required)	Feet
619.1719	Warning Lights on Temporary Positive Barriers	Each
619.1720	Box Beam to Flared Temporary Concrete Barrier Transition	Each
619.1721	Box Beam to Unflared Temporary Concrete Barrier Transition	Each
619.1722	Temporary Concrete Barrier Face to Box Beam Transition	Each
619.1723	Temporary Concrete Barrier Back to Box Beam Transition	Each
619.1724	Corrugated Beam to Flared Temporary Concrete Barrier Transition	Each
619.1725	Temporary Concrete Barrier Face to Corrugated Beam Transition	Each
619.1726	Temporary Concrete Barrier Back to Corrugated Beam Transition	Each
619.1802	Temporary Impact Attenuator - Redirective (Test Level 2)	Each
619.1803	Temporary Impact Attenuator - Redirective (Test Level 3)	Each
619.1812	Temporary Impact Attenuator - Gating (Test Level 2)	Each
619.1813	Temporary Impact Attenuator - Gating (Test Level 3)	Each
619.20	Interim Tubular Markers	Each
619.21	Temporary Sand Barrel Module	Each
619.22	Temporary Rumble Strips	Feet
619.2202	Portable Temporary Rumble Strips	DVDY
619.23	Vehicle Arresting Barrier	Each
619.24	Nighttime Operations (Entire Project)	Lump Sum
619.24nn	Nighttime Operations	Lump Sum
619.25	Traffic Control Supervisor	Month
619.2601	Pavement Patching (Force Account)	
Dollars-Cents		
619.2602	Pavement Patching (Tonnage)	Tons
619.27	Mailboxes	Each

NOTE: nn denotes a serialized pay item.

DVDY denotes Devices per Day

SECTION 620 - BANK AND CHANNEL PROTECTION

(Last Revised May 1, 2019)

620-1 DESCRIPTION. This work shall consist of furnishing all labor, equipment, and materials to place a protective covering of erosion-resistant material in the locations indicated in the contract documents or as directed by the Engineer. The work shall be done in accordance with these specifications and in conformity with the lines, grades, thicknesses, and typical sections shown in the contract documents or established by the Engineer.

620-1.01 Vacant.

620-1.02 Stone Filling. Stone filling shall consist of a layer of well graded stone.

620-1.03 Dry Rip-Rap. Dry rip-rap shall consist of a fitted layer of shaped and graded stone.

620-1.04 Grouted Rip-Rap. Grouted rip-rap shall consist of a layer of stone, similar to dry rip-rap, with the spaces between the stones filled with cement grout.

620-1.05 Bedding Material. Bedding material shall consist of a layer of granular material placed to prevent underlying finer material from passing into and through the stone filling or rip-rap.

620-1.06 Concrete Block Slope Paving. Concrete block slope paving shall consist of concrete blocks placed on embankment slopes under structures as protection against erosion.

620-1.07 Gabions. Gabions shall consist of open wire mesh baskets, filled with stones.

620-2 MATERIALS

620-2.01 General. The requirements for bank and channel protection materials are described below. The procedure for acceptance or rejection of stone filling and rip-rap materials shall be in conformance with the procedures contained in the geotechnical control procedure "*Procedure for the Control of Stone Filling and Rip-Rap Items*".

620-2.02 Stone Filling. Provide material meeting the requirements of §733-21 *Stone Filling* for the type of stone filling specified in the contract documents.

620-2.03 Dry Rip-Rap. Provide material meeting the requirements of §733-22 *Rip-Rap*, except for §733-22D *Grout*.

620-2.04 Grouted Rip-Rap. Provide material meeting the requirements of §733-22 *Rip-Rap*.

620-2.05 Bedding Material. Bedding material shall meet the requirements of the following subsections of Section 700 *Materials and Manufacturing* for the type of bedding material specified in the contract documents:

A. Bedding Material Type 1. Provide material meeting the requirements of §733-23 *Bedding Material Type 1*.

B. Bedding Material Type 2. Provide material meeting the requirements of §733-23 *Bedding Material Type 2*.

ITEM 662.60030008 - ALTERING ELEVATION OF GAS VALVE BOXES

DESCRIPTION:

Under this item, the contractor shall alter the elevation of gas valve boxes to meet new grades as shown on the plans or as directed by the Engineer.

MATERIALS:

Concrete shall meet the requirements for concrete in Section 501 of the Standard Specifications. The Maintenance Repair/Misc. Items concrete in Table 2 of Materials Procedure MP 501-2 (Mix Design and Approval Procedure for Performance Engineered Mixtures – Structural Concrete) is acceptable.

CONSTRUCTION DETAILS:

Paved Areas:

Unless an alternate method is approved by the owner and directed by the Engineer, the following method shall be used:

The top section of the gas valve box shall be raised to meet the finished grade and supported on a concrete collar at least 6 inches in depth and at least 6 inches wider than the outer edges of the top section of the gas valve box casting. The existing pavement shall be cut and removed as needed in order to place the concrete collar. Cutting shall be done with tools or equipment acceptable to the Engineer and in such a manner as to avoid cracking the abutting portions of pavement. The concrete shall be allowed to cure for the required period before paving around the gas valve box.

Non-Paved Areas:

The method of raising the gas valve box shall be as approved by the owner and as directed by the Engineer.

METHOD OF MEASUREMENT:

The quantity to be paid for under this item will be the number of gas valve boxes altered.

BASIS OF PAYMENT:

The unit price bid per each shall include the cost of furnishing all labor, materials and equipment necessary to satisfactorily complete the work including any pavement cutting, excavation, backfill and pavement restoration. Any gas valve box castings or covers broken through carelessness on the part of the contractor shall be replaced at the contractor's expense.

ITEM 685.0715XX10 - EPOXY REFLECTORIZED PAVEMENT MARKINGS 15 MILS THICK
(WET NIGHT VISIBILITY SPHERES)
ITEM 685.0720XX10 - EPOXY REFLECTORIZED PAVEMENT MARKINGS 20 MILS THICK
(WET NIGHT VISIBILITY SPHERES)

DESCRIPTION:

Under this work the contractor shall furnish and apply epoxy reflectorized pavement markings in accordance with these specifications, the Contract Documents, the NYSMUTCD, or as ordered by the Engineer. Items for Special Markings include stop bars and crosswalks.

Yield line symbols are isosceles triangles with height equaling 1.5 times the base dimension:
A small yield line symbol shall have a base dimension of one foot.
A large yield line symbol shall have a base dimension of two feet.
Yield line symbols are to be installed with the Apex of the triangle oriented towards oncoming traffic.

The epoxy marking material shall be hot-applied by spray methods onto bituminous and portland cement concrete pavement surfaces at the thickness and width shown on the Contract Documents. Following a simultaneous application of Standard Glass Beads (Type 2) and Wet/Night Visibility Beads (Type 1), the cured epoxy marking shall be an adherent reflectorized stripe that will provide wet night retro-reflectivity.

MATERIALS REQUIREMENTS:

Epoxy Paint	727-03
Glass Beads for Pavement Markings	727-05

Reflective Glass Spheres

Retro-reflective beads shall be a double drop system of glass spheres consisting of Standard Beads (Type 2) and Wet/Night Visibility Beads (Type 1) as defined in §727-05 Glass Beads for Pavement Markings.

EPOXY APPLYING EQUIPMENT

In general, a mobile applicator shall be a truck mounted, self-contained pavement marking machine, specifically designed to apply epoxy resin materials and reflective glass spheres in continuous line patterns. The applying equipment shall be maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc. In addition, the truck mounted unit shall be provided with accessories to allow for the marking of cross hatching and other special patterns as directed by the Engineer.

At any time throughout the duration of the project, the Contractor shall provide free access to his epoxy applying equipment for inspection by the Engineer or his authorized representative.

The Engineer may approve the use of a portable applicator in lieu of mobile truck mounted accessories for use in applying special markings only, provided such equipment can demonstrate satisfactory application of reflectorized epoxy markings in accordance with these specifications.

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Mobile applying equipment shall be capable of installing up to 19 miles of epoxy reflectorized pavement markings in an eight hour day and shall include the following features:

1. Individual tanks for the storage of Part A and Part B of the epoxy resin.
2. Individual tanks for the storage of Standard (Type 2) and Wet/Night Visibility (Type 1) glass spheres. Each tank shall have a minimum capacity of 3000 lbs.
3. Heating equipment of sufficient capacity to maintain the individual epoxy resin components at the manufacturer's recommended temperature for spray application.
4. Individual dispensers for the simultaneous application of Standard (Type 2) and Wet/Night Visibility (Type 1) glass spheres. Each dispenser shall be capable of applying spheres at a minimum rate of 10 lbs/gal of epoxy resin composition.
5. Metering devices or pressure gauges on the proportioning pumps, positioned to be readily visible to the Engineer.
6. All necessary spray equipment, mixers, compressors, and other appurtenances for the placement of epoxy reflectorized pavement markings in a simultaneous sequence of operations as described in Construction Details, D. Application of Epoxy ReflectORIZED Pavement Markings.

CONSTRUCTION DETAILS

A. General

All pavement markings shall be placed as shown on the Contract Documents and in accordance with the New York State, Manual of Uniform Traffic Control Devices (MUTCD).

Before any pavement marking work is begun, a schedule of operations shall be submitted for the approval of the Engineer.

At least five (5) days prior to starting striping, the Contractor shall provide the Engineer with the epoxy manufacturer's written instructions for use. These instructions shall include, but not be limited to, material mixing ratios and application temperatures.

When pavement markings are applied under traffic, the Contractor shall provide all necessary flags, markers, signs, etc. in accordance with the MUTCD to maintain and protect traffic, and to protect marking operations and the markings until thoroughly set.

The application of pavement markings shall be done in the general direction of traffic. Striping against the direction of traffic flow shall not be allowed.

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The Contractor shall be responsible for removing, to the satisfaction of the Engineer, all tracking marks, spilled epoxy, and epoxy markings applied in unauthorized areas.

When necessary the Contractor shall establish marking line points at 30 foot intervals throughout the length of the pavement or as directed by the Engineer.

B. Atmospheric Conditions

Epoxy pavement markings shall only be applied during conditions of dry weather and on substantially dry pavement surfaces. At the time of installation the pavement surface temperature shall be a minimum of 50°F and the ambient temperature shall be a minimum of 50°F and rising. The Engineer shall be the sole determiner as to when atmospheric conditions and pavement surface conditions are such to produce satisfactory results.

C. Surface Preparation

The Contractor shall clean the pavement and existing durable markings to the satisfaction of the Engineer.

Surface cleaning and preparation work shall be performed only in the area of the epoxy markings application.

At the time of application all pavement surfaces and existing durable markings shall be free of oil, dirt, dust, grease and similar foreign materials. The cost of cleaning these contaminants shall be included in the bid price of this item.

In addition, concrete curing compounds on new portland cement concrete surfaces and existing painted pavement markings on both concrete and bituminous pavement surfaces shall be cleaned and paid for in accordance with §635 Cleaning and Preparation of Pavement Surfaces for Pavement Markings.

D. Application of Epoxy ReflectORIZED Pavement Markings

Epoxy reflectORIZED pavement markings shall be placed at the width, thickness, and pattern designated in the Contract Documents.

Marking operations shall not begin until applicable surface preparation work is completed and approved by the Engineer, and the atmospheric conditions are acceptable to the Engineer.

Pavement markings shall be applied by the following simultaneous operation:

1. The pavement surface is air-blasted to remove dirt and residues.
2. The epoxy resin, mixed and heated in accordance with the manufacturer's

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recommendations, is uniformly hot-sprayed onto the pavement surface at the minimum specified thickness.

3. Standard (Type 2) and Wet/Night Visibility (Type 1) reflective glass spheres are injected into or dropped onto the liquid epoxy marking. Standard beads (Type 2) shall be applied first immediately followed by the application of Wet/Night Visibility beads (Type 1). Each type shall be applied at a minimum rate of 10 lbs/gal of epoxy resin (minimum total application = 20 lbs/gal).

E. Defective Epoxy Pavement Markings

Epoxy reflectorized pavement markings, which after application and curing are determined by the Engineer to be defective and not in conformance with this specification, shall be repaired. Repair of defective markings shall be the responsibility of the Contractor and shall be performed to the satisfaction of the Engineer as follows:

1. Insufficient film thickness and line width; insufficient glass bead coverage or inadequate glass bead retention.

Repair Method. Prepare the surface of the defective epoxy marking by grinding or blast cleaning. No other cleaning methods will be allowed. Surface preparation shall be performed to the extent that a substantial amount of the reflective glass spheres are removed and a roughened epoxy marking surface remains.

Immediately after surface preparation remove loose particles and foreign debris by brooming or blasting with compressed air.

Repair shall be made by restriping over the cleaned surface in accordance with the requirements of this specification and at the full thickness indicated on the Contract Documents.

2. Uncured or discolored epoxy*; insufficient bond (to pavement surface or existing durable marking).

Repair Method. The defective epoxy marking shall be completely removed and cleaned to the underlying pavement surface in accordance with the requirements of Section 635 - Cleaning and Preparation of Pavement Surfaces, at the Contractor's expense.

The extent of removal shall be the defective area plus any adjacent epoxy pavement marking material extending three feet in any direction.

After surface preparation work is complete, repair shall be made by reapplying epoxy over the cleaned pavement surface in accordance with the requirements of this specification.

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*Uncured epoxy shall be defined as applied material that fails to cure (dry) in accordance with the requirements of §727-03 Epoxy Paint; or applied material that fails to cure (dry) within a reasonable time period under actual field conditions, as defined by the Engineer.

Discoloration shall be defined as localized areas or patches of brown, grayish or black colored epoxy marking material. These areas often occur in a cyclic pattern and often are not visible until several days or weeks after markings are applied.

Other defects not noted above, but determined by the Engineer to need repair, shall be repaired or replaced as directed by and to the satisfaction of the Engineer.

All work in conjunction with the repair or replacement of defective epoxy reflectorized pavement markings shall be performed by the Contractor at no additional cost to the State.

METHOD OF MEASUREMENT

Pavement striping (regular lines, cross hatching and special markings) will be measured in feet along the centerline of the pavement stripe and will be based on a 4 inch wide stripe. Measurement for striping with a width greater than the basic 4 inches, as shown on the plans or directed by the Engineer, will be made by the following method:

$$\frac{\text{Plan Width of Striping (inches) X Feet}}{4 \text{ inches}}$$

BASIS OF PAYMENT

The accepted quantities of markings will be paid for at the contract unit price, which shall include the cost of furnishing all labor, materials and equipment to satisfactorily complete the work. The cost for maintaining and protecting traffic during the marking operations shall be included in the price bid. The cost of removal of concrete curing compounds and existing pavement markings will be paid under separate items and are not included in this item.

No payment will be made for the repair or replacement of defective epoxy reflectorized pavement markings.

<u>PAY ITEM NO.</u>	<u>DESCRIPTION</u>	<u>PAY UNIT</u>
685.07150110	White Epoxy Reflectorized Pavement Stripes – 15 mils	Foot

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685.07150210	(Wet Night Visibility Spheres) White Epoxy ReflectORIZED Pavement Letters - 15 mils	Each
685.07150310	(Wet Night Visibility Spheres) White Epoxy ReflectORIZED Pavement Symbols – 15 mils	Each
685.07150410	(Wet Night Visibility Spheres) White Epoxy ReflectORIZED Cross Hatching -15 mils Thick	Foot
685.07150510	(Wet Night Visibility Spheres) White Epoxy ReflectORIZED Pavement Stripes (Special Markings) 15 mils Thick (Wet Night Visibility Spheres)	Foot
685.07150610	Yellow Epoxy ReflectORIZED Pavement Stripes – 15 mils (Wet Night Visibility Spheres)	Foot
685.07150710	Yellow Epoxy ReflectORIZED Pavement Stripes (Cross Hatching) 15 mils Thick (Wet Night Visibility Spheres)	Foot
685.07150810	White Epoxy ReflectORIZED Pavement Yield Line Symbols - Small - 15 mils (Wet Night Visibility Spheres)	Each
685.07150910	White Epoxy ReflectORIZED Pavement Yield Line Symbols - Large - 15 mils (Wet Night Visibility Spheres)	Each
685.07200110	White Epoxy ReflectORIZED Pavement Stripes – 20 mils (Wet Night Visibility Spheres)	Foot
685.07200210	White Epoxy ReflectORIZED Pavement Letters – 20 mils (Wet Night Visibility Spheres)	Each
685.07200310	White Epoxy ReflectORIZED Pavement Symbols – 20 mils (Wet Night Visibility Spheres)	Each
685.07200410	White Epoxy ReflectORIZED Pavement Stripes (Cross Hatching) 20 mils Thick (Wet Night Visibility Spheres)	Foot
685.07200510	White Epoxy ReflectORIZED Pavement Stripes (Special Markings) 20 mils Thick (Wet Night Visibility Spheres)	Foot

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685.07200610	Yellow Epoxy ReflectORIZED Pavement Stripes – 20 mils (Wet Night Visibility Spheres)	Foot
685.07200710	Yellow Epoxy ReflectORIZED Pavement Stripes (Cross Hatching) 20 mils Thick (Wet Night Visibility Spheres)	Foot
685.07200810	White Epoxy ReflectORIZED Pavement Yield Line Symbols - Small - 20 mils (Wet Night Visibility Spheres)	Each
685.07200910	White Epoxy ReflectORIZED Pavement Yield Line Symbols - Large - 20 mils (Wet Night Visibility Spheres)	Each

(On Construction firms letterhead)

Date Issued: _____

Dear Resident:

We are sorry to inconvenience you, but in order to proceed with construction for _____ we must close and/or limit your access to your driveway. As work progresses, you will be notified on a daily basis when and how your particular residence will be affected. We assure you that every effort will be made to minimize the impact to you relative to this construction.

Our current schedule calls for the project related work to be performed in your area during the week of _____. A copy of this letter with specific dates and time for this work will be delivered at least twenty-four (24) hours in advance in order that you will have sufficient opportunity to plan for accessibility to your vehicles.

If additional information is necessary, you may contact any of the representatives listed below.

Thank you for your patience.

Contractor	_____	Phone: _____
Inspector	_____	Phone: _____
Project Manager	_____	Phone: _____

(On Construction firms letterhead)

Date Issued: _____

CONSTRUCTION NOTIFICATION
24 HOUR NOTICE

Date & Type of Construction: _____

How will residence be affected: _____

Approximate time of
Construction: _____

Driveway access (will) (will not) be permitted.