

COMPILATION OF APPROVED SPECIFICATIONS

**RHODE ISLAND DEPARTMENT OF TRANSPORTATION
STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION**

**REVISIONS
SUPPLEMENTAL SPECIFICATIONS
SPECIAL PROVISIONS**

SUPPLEMENT NO. 20

JUNE 2019

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Remove **Subsection 109.06, Payment for Work**, pages AC-13 through AC-16 of the September 2018 Compilation of Approved Specifications and replace it with the following.

109.06

PAYMENT FOR WORK

109.06 PAYMENT FOR WORK.

a. General. The Department will make payment for Work before the Project is accepted and final payment is made. These payments for Work will be processed via progress payments. To receive a payment for Work, the Contractor shall prepare an invoice in accordance with **Subsection 109.06(c)**. The Department may suspend progress payments if the Contractor does not comply with the terms of the Contract or the Engineer's instructions or written directives. The Department will notify the Contractor whenever progress payments will be suspended. Processing of progress payments for work prior to the Department's acceptance and final payment of the Work does not constitute the Department's acceptance of the Work, and does not relieve the Contractor of responsibility for the Work, which includes but is not limited to:

1. Protecting, repairing, correcting, maintaining, or renewing the Work where necessary to meet Contract requirements before acceptance.
2. Replacing or repairing all defective work or materials used in the construction of the Work, and repairing all damage to other work or materials whose damage is attributable to such defective work or materials.
3. All defects or damage that the Engineer may discover on or before the Engineer's acceptance and final payment of the Work. The Engineer is the sole judge of these defects or damage.

b. Frequency. The Department will make progress payments bi-weekly (every two weeks) in accordance with established Department procedures. Progress payments will be subject to a 5 percent retainage.

c. Invoice for Payment for Work. The Contractor shall submit an invoice for payment bi-weekly (every two weeks), and, as requested by the Engineer, a weekly progress report for review detailing the items included in the invoice. The Contractor shall utilize and complete invoice forms supplied by the Department, including a certification for payment, in accordance with the instructions contained thereon.

d. Invoice for Partial Payment for Materials, Supplies, and Equipment. The Engineer may allow invoicing as provided above and permit partial payments for those materials, supplies, and equipment delivered to an approved location but not yet incorporated into the Work. Payment for materials, supplies and equipment furnished at an approved site but not yet incorporated into the Work will not exceed the lesser of the following amounts:

1. 100 percent of the cost incurred by the Contractor, or
2. 80 percent of the value calculated by multiplying the quantity of the item delivered by the unit price for the corresponding item in the Bid Schedule.

For verification of costs, the Contractor shall provide the Engineer with an original paid supplier's invoice for the furnished materials, supplies or equipment within thirty (30) days after receiving the partial payment. Otherwise, the amount of the partial payment will be deducted from subsequent invoices.

The Engineer will not approve any payment for perishable plant materials until such plant materials are planted as specified in the Contract.

e. Engineer's Review of Contractor's Request for Payment for Work and Request for Partial Payment for Materials, Supplies, and Equipment. Upon receipt of the Contractor's invoice, the Engineer will review the invoice and may approve or reject payment or portions thereof. The Engineer will notify the Contractor in writing of any modifications and/or rejection of the invoice. Modifications and reasons for the change will be made to the Excel spreadsheet in the columns provided. In the case of a rejection, the Engineer will request that the invoice be resubmitted.

f. Subcontractor Payments and Release of Retainage. The Contractor shall notify RIDOT within 7 days upon the Contractor's assessment that the subcontractor's work is complete and ready for inspection for partial acceptance by RIDOT.

The Contractor shall make progress payments to the subcontractor incrementally as the Contractor is paid progress payments by RIDOT, with each progress payment made no more than 30 days from when so paid by RIDOT. The Work of a subcontractor will be inspected by RIDOT within 14 days of the date of Contractor's notification for partial acceptance. Within 30 days of partial acceptance of the completed subcontract work, the Department will pay the Contractor for all work covered by the acceptance including the relevant portion of retainage due the subcontractor. Within 30 days of receipt of such payment, the Contractor shall pay the subcontractor for all accepted subcontract work including all retainage owed. The Contractor must obtain RIDOT's prior written consent for good cause delays in or postponement of payment to the subcontractor.

g. Final Release of Contractor Retainage. Retainage due the Contractor will be released when all documentation requirements and items on the Punch List have been addressed to the satisfaction of the Engineer.

Procedures for Section 109.06 - Payment for Work

The Contractor shall prepare an invoice to apply for a payment for work completed. This invoice shall utilize the Request for Payment templates supplied by the Department, including the following attachments:

A. Detailed Invoice - The detailed invoice shall be submitted in both hard copy and Excel® and include the following information:

1. The date of the invoice.
2. The Project Name and State and Federal-Aid Project Numbers.
3. The Contract Item number(s) and name(s) for which the Contractor is seeking payment, as they appear in the Contract Proposal.
4. The date(s) each Contract Item was performed.
5. Name of Contractor/Subcontractor(s) that performed the work.
6. The location(s) where the Work associated with each Contract Item was performed, cross referenced to the location(s) shown in the Distribution of Quantities.
7. Invoiced Item Quantities: The quantity of each Contract Item performed by date and by location since the previous invoice.

For Lump Sum Items, the Contractor shall provide the percentage of work completed since the previous invoice. Prior to the start of work, the Contractor shall submit a Lump Sum Item Breakdown for the Engineer's review, acceptance and allocation of payments for the item, in accordance with **Section 109.07** of the Standard Specifications.

All calculations shall conform to the Method of Measurement and Basis of Payment portions of the appropriate Item Code(s). Documentation shall include, but is not limited to, backup calculations, measurements, sketches, and related supporting information.

8. Cumulative Item Quantities: A cumulative total of the quantities performed for each Contract Item, including the current request.
9. Bid Prices: The Contract Price for each Contract Item, including Unit Bid Items and Lump Sum Bid Items as applicable, shall be listed for each item being invoiced.
10. Extended Prices: Calculate the extended price of each item being invoiced in this request.

For Unit Bid Items, this is to be calculated by multiplying each item quantity completed during the invoice period by its Contract Unit Bid Price (i.e., Extended Price \$ = Qty. Invoiced x Unit Bid Price).

For Lump Sum Items, this is to be calculated by multiplying each item by the percentage of work completed during the invoice period by its Lump Sum Bid Price (i.e., Extended Price \$ = %Complete-this-invoice-period x Lump Sum Bid Price).

11. Total Invoice Price: Sum all extended prices calculated in step 10 and report this amount as the total amount being invoiced under the request.

- B. Certificates of Compliance** - A list of the Certificate(s) of Compliance attached or that have been submitted to the Department, including date(s) submitted, for the work that is listed on the invoice in accordance with **Section 106.04, Certification of Compliance**.
- C. Certified Payrolls** - A list of the certified payrolls attached or that have been submitted to the Department, including date(s) submitted, for the work that is listed on the invoice. List all outstanding payrolls yet to be submitted by week ending date and Contractor\Subcontractor(s).
- D. Subcontractor Payments** - A list of all payments (including all retainage payments) made to date to subcontractors for amounts previously billed and paid by the State for the related project.
- E. Extra Work**- A list of approved and/or potential extra work subject to approval, including dates(s) when the work was identified and/or approved, and a description and associated cost(s) of the work, including information pertaining to when and by whom the work was performed.
- F. EEO Certification** - A statement that all EEO documentation has been submitted as required by the Contract.
- G. As-Built Data** - A set of as-built data in hard copy or electronic form of the work billed on the invoice, including plans, sketches, diagrams and all other information necessary for resulting in a complete and accurate set of as-built data representing the work completed. A final set of as-built plans is also required in accordance with **Section 934.03.3 (h), Field Control and Construction Layout**. □

General - Outstanding or missing documentation for Items A through G above will be a basis for rejection and/or modification of the Request for Payment.

Remove **Section 408**, pages 4-38 through 4-42 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace it with the following.

SECTION 408

CLEANING AND SEALING CRACKS IN BITUMINOUS CONCRETE PAVEMENT

408.01 DESCRIPTION. This work shall consist of performing all operations and furnishing all materials, labor and equipment necessary in connection with the cleaning and sealing of cracks and open joints in bituminous concrete pavements at the locations indicated on the plans and as directed by the Engineer, all in accordance with these Specifications. For purposes of this specification, the terms “crack” and “open joint” are used synonymously.

All cracks shall be designated as follows:

- Cracks 1/16-Inches to 2-Inches in Width;
- Cracks greater than 2-Inches in Width;
- Alligator Cracks, which are cracks in any area where the density and/or severity of cracking forms a chicken wire or alligator pattern.

408.02 MATERIALS.

408.02.1 Sealant. The sealant shall be either one of the following and shall be subject to approval by the Engineer prior to the start of work.

- a. Joint and crack sealant, hot applied, conforming to ASTM D6690 Type II.
- b. Fiber reinforced modified asphalt compound consisting of:

1. Modified Asphalt Binder. This shall consist of a blend of modified PGAB and crumb rubber chemically bonded to produce a modified binder.

Modified PGAB shall conform to AASHTO M 320 and R 29 and shall meet the requirements of PG 64E-28. The non-recoverable creep compliance versus percent recovery of the binder shall be plotted and must fall above the curve in Figure X1.1 in Appendix X1 of AASHTO M 332. The elastic recovery at 10°C (AASHTO T 301) shall not be less than 70%.

The modified PGAB shall not contain any particles of rubber or elastomeric material when tested in accordance with AASHTO T 44. The modified binder shall at a minimum consist of 7% crumb rubber from tires. The supplier of the modified PGAB shall certify the composition and PG grade of the material.

2. Asphalt Cement. The high temperature grade (AASHTO MP320) of the neat asphalt cement shall not exceed PG 58-XX.

3. Crumb Rubber. The modified asphalt binder shall have a crumb rubber content of not less than 5% by weight of neat asphalt cement. The maximum size of the crumb rubber shall be 80 mesh.

4. Chemical Bonding Agent. The chemical bonding agent shall be heat stable and compatible with asphalt and rubber.

5. Fibers. Polyester, fully drawn.

Length	10 mm (max)	Diameter	0.0008 in \pm 0.0001 in.
Denier	15 dpf (max)	Specific Gravity	1.32 to 1.40
Tenacity	4 gpd (min)	Melt Temperature	480°F minimum
Crimp	none	Ignition Temperature	1000°F minimum
Color	natural	Tensile Strength	75,000 psi \pm 5,000 psi
		Elongation	33% \pm 9%

Fiber Reinforced Modified Asphalt Compound Properties:

Fiber concentration	6-8% by weight of modified asphalt binder; uniform dispersion of fibers
Elongation	8% at 0°F (max)
Tensile Strength	450 psi at 0°F (min)

Blending of the fibers with the modified asphalt binder shall be in accordance with the recommendations of the manufacturer of the fibers.

408.02.2 Filler. Filler shall consist of Class 4.75 HMA or High Performance Bituminous Cold Patch. The crack filler shall be compatible with the crack sealer and be pre-approved by the Engineer.

408.02.3 Blotter Material. Blotter Material shall be 3060 granulated coal slag abrasive (Black Beauty).

408.03 CONSTRUCTION METHODS.

408.03.1 Equipment. Equipment shall be subject to the approval of the Engineer and maintained in a satisfactory working condition at all times.

a. Air Compressor. Air compressors shall be portable and capable of furnishing not less than 100 cubic feet of air per minute at not less than 120 pounds per square inch pressure at the nozzle. The compressor shall be equipped with traps that will maintain the compressed air free of oil and water.

b. Hot Air Lance. A hot air lance for cleaning, drying, rejuvenating and heating sidewalls of cracks shall provide clean, oil-free compressed air at a volume of 100 cubic feet per minute, a pressure of 120 pounds per square inch and a temperature of 2000°F. The lance shall be designed such that the flame does not come in contact with the pavement.

c. Hand Tools. Hand tools such as brooms, shovels, metal bars with chisel shaped ends, tamping equipment and other miscellaneous tools which may be used to accomplish this work.

d. Melting Kettle. The unit used to melt the sealant shall be a double boiler, indirect fired type with a heating capacity of 550°F. The space between the inner and outer shells shall be filled with suitable heat transfer oil or substitute having a flash point of not less than 530°F. The kettle shall be equipped with a satisfactory means of agitating the crack sealer at all times. This may be accomplished by continuous stirring with mechanically operated paddles and/or by a continuous circulating gear pump attached to the heating unit. The kettle must be equipped with thermostatic control calibrated between 200°F and 550°F

with a $\pm 5^{\circ}\text{F}$ accuracy and a temperature measuring device located such that the Engineer may safely check the temperature of the sealant material.

e. Wand Applicator. The wand applicator shall be capable of applying the sealant to a minimum 2-inch wide overband. It shall be connected to the holding tank through a heated applicator hose that ensures operator safety and allows operator control of material flow. A device shall be mounted to bypass material into a holding tank should the applicator nozzle shut off.

408.03.2 Preparation of Surface. The crack sealing operation shall be performed only on pavement surfaces that have been thoroughly cleaned by the Contractor.

a. General. No crack sealing material shall be applied when the ambient temperature is below 40°F or above 90°F ; nor shall it be applied in wet weather, when the pavement is wet, or when frost, snow, or ice is present. If such conditions are present, drying of the cracked areas to be sealed with a hot compressed air lance may be performed with the approval of the Engineer. No sealant shall be applied to traffic loops, weigh-in-motion loops, or any other vehicular loop detectors in the roadway pavement. In the event roadway loops are damaged by the crack sealing application, the Contractor shall replace the loop detector system at its own expense.

b. Cleaning. All cracks to be sealed shall be thoroughly cleaned with a hot compressed air lance. Cleaning shall remove all moisture, dirt, foreign material and loose edges.

c. Debris Removal. All loose material and debris evacuated from the cracks shall be immediately removed from the pavement surface by means of mechanical sweepers or hand brooms.

408.03.3 Sealing of Cracks

a. Cracks Under 1/16-inches in width shall not be sealed.

b. Cracks 1/16-inches to 2 inches in Width.

1. Preparation of Sealer. Crack sealing material shall be heated and applied at the temperature specified by the manufacturer. The sealant shall have the consistency of a free-flowing liquid.

2. Heating of Cracks. The sealant shall be applied within three minutes of the cracks being heated with the hot air lance.

3. Installation of Sealer. All cracks shall be sealed according to the manufacturer's recommendations at the time of sealant approval, the sealant shall be well bonded to the pavement, and as specified herein. The cracks shall be completely filled and banded with a 2-inch width of sealant centered directly over the crack. The thickness (i.e., projection above the pavement profile) of the middle portion of the sealant band shall be between 1/16 and 3/16 inches. The band shall be feathered so its edges are flush with the pavement. More than one application of sealant may be necessary where the sealant has sunk into the crack, leaving a crevice. A squeegee may be required to obtain the sealant profile. There shall be no defects, including any formation of voids or entrapped air. Blotter material shall be spread over the hot sealant to prevent lifting and tracking. Corrections of these deficiencies or other work unacceptable to the Engineer shall be at no additional cost to the state.

4. Filling of Cracks 2-inches or greater in width. All cracks of sufficient depth shall first be coated with sealant material on all contact surfaces, filled with Class 4.75 HMA or high-performance cold

patch, compacted by rolling and tamping, and sealed in accordance with the provisions of **Subsection 408.03.3, Para. b.3** above with two or more adjacent passes of the wand.

c. Alligator Cracks.

1. Preparation of Sealer. Preparation shall follow the procedures of **Subsection 408.03.3, Para. b.1** above.

2. Heating of Cracks. Only cracks on the perimeter or boundary of the alligator cracked area shall be sealed. Perimeter cracks shall be treated in accordance with the provisions of **Subsection 408.03.3, Para. b.2** above.

3. Installation of Sealer. The cracks on the perimeter or boundary of the alligator cracked area shall be completely filled and banded with a 2-inch width of sealant in accordance with the provisions of **Subsection 408.03.3, Para. b.3** above. There shall be no treatment of the alligator cracks within the boundary.

408.04 METHOD OF MEASUREMENT.

408.04.1 Cracks 1/16-Inches to 2-Inches in Width. "Cleaning and Sealing Cracks in Bituminous Concrete Pavement" will be measured by the number of linear feet of cracks actually sealed in accordance with the contract and/or as directed by the Engineer.

408.04.2 Cracks Greater than 2-Inches in Width. There will be no separate measurement for this item. Cracks greater than 2-inches in width will be measured by the number of linear feet of cracks actually sealed in accordance with the contract and/or as directed by the Engineer and included in the measurement under **Subsection 408.04.1** above.

408.04.3 Alligator Cracks. There will be no separate measurement for this item. Alligator Cracks will be measured by the number of linear feet of cracks actually sealed in accordance with the contract and/or as directed by the Engineer and included in the measurement under **Subsection 408.04.1** above.

408.05 BASIS OF PAYMENT.

408.05.1 Cracks 1/16-Inches to 2-Inches. The accepted quantity of "Cleaning and Sealing Cracks in Bituminous Concrete Pavement" will be paid for at the contract unit price per linear foot as listed in the Proposal. The price so-stated constitutes full and complete compensation for furnishing and applying all materials; labor, equipment, tools; cleaning of cracks and debris removal; maintenance and protection of traffic; and all incidentals necessary to complete the work in accordance with the contract and to the satisfaction of the Engineer.

408.05.2 Cracks Greater than 2-Inches in Width. There will be no separate payment for this item. Cracks greater than 2-inches in width will be paid for at the contract unit price per linear foot under the provisions of **Subsection 408.05.1** above.

408.05.3 Alligator Cracks. There will be no separate payment for this item. Alligator Cracks will be paid for at the contract unit price per linear foot as listed in the Proposal under the provisions of **Subsection 408.05.1** above.

Remove **Section 813, Waterproofing and Dampproofing**, pages 8-87 to 8-91 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace it with the following.

SECTION 813

WATERPROOFING AND DAMPPROOFING

813.01 DESCRIPTION. This work consists of providing waterproofing and dampproofing systems on concrete bridge decks and other surfaces at the locations indicated on the Plans and where directed by the Engineer, all in accordance with these Specifications.

813.01.1 Systems.

a. Dampproofing shall consist of a system formulated to apply to surfaces to minimize the intrusion of moisture in areas that will not bear traffic.

b. Waterproofing shall consist of the application of heat-applied pre-fabricated membrane or a cold spray-applied liquid membrane, all as set forth below.

813.01.2 Bituminous Dampproofing. Dampproofing consists of the application of a RIDOT approved dampproofing system to concrete surfaces in strict compliance with the manufacturer's recommendations.

813.01.3 Heat-applied Pre-Fabricated Membrane. This type of waterproofing consists of applying a heat-applied bituminous polymer-modified reinforced membrane of RIDOT approved manufacture to concrete surfaces in strict compliance with the manufacturer's recommendations.

813.01.4 Cold Spray-Applied Liquid Membrane. This type of waterproofing system consists of applying a spray applied plural component resin based elastomeric membrane of RIDOT approved manufacturer to concrete surfaces in strict compliance with the manufacturer's recommendations.

813.02 MATERIALS.

813.02.1 General. Materials for waterproofing and dampproofing systems shall be delivered in original, tightly sealed containers and unopened packages, as appropriate for the type of material, clearly labeled with manufacturer's name, brand name and number, and batch number of the material where appropriate. Prior to delivery, the Contractor shall submit to the Engineer a notarized Certificate of Compliance provided by the manufacturer attesting that the material conforms to the product requirements as approved by the Department. The primer shall be as recommended by the system manufacturer.

813.02.2 Dampproofing. The dampproofing system shall conform to **M.12.02**.

813.02.3 Heat-applied Pre-Fabricated Membrane. The primer and membrane materials of this system shall conform to the respective requirements of **Subsection M.12.01.1** of these Specifications.

813.02.4 Cold Spray-applied Liquid Membrane. The primer and membrane materials of this system shall conform to the respective requirements of **Subsection M.12.01.2** of these Specifications.

813.03 CONSTRUCTION METHODS.

813.03.1 Surface Preparation for All Types. Prior to the start of the application of the product, new concrete or repair materials shall have cured in accordance with the Standard Specifications or the manufacturer's recommendations, whichever is more stringent. If required, degreasing shall be performed with detergent washing in accordance with ASTM D4258 (Standard Practice for Surface Cleaning Concrete for Coating). Concrete surfaces shall be abrasively cleaned in accordance with ASTM D4259 (Standard Practice for Abrading Concrete) and all spalls and depressions repaired with concrete patch materials per the manufacturer's recommendations and to the satisfaction of the Engineer. Voids and blowholes on vertical surfaces shall be repaired in the same manner. All steel surfaces shall be prepared to a near white metal finish per SSPC-10 and overcoated with the manufacturer's specified primer within 4 hours, per the manufacturer's recommendations. All surfaces to receive the material shall be free of any substance that could adversely affect adhesion.

The Contractor shall be responsible for the protection and repair of equipment and adjacent areas from overspray or other contamination that may be caused by application of the waterproofing or dampproofing.

813.03.2 Dampproofing.

a. Limitations. The dampproofing shall be applied in accordance with the manufacturer's recommendations and as specified in the Contract Documents.

b. Application. Dampproofing shall be applied to concrete surfaces in strict compliance with the manufacturer's recommendations as approved by the Engineer. The bituminous material shall completely cover the surface with a continuous film to the thickness recommended by the manufacturer. When any breaks or thin spots show in the dampproofed surface after drying, they shall be retouched to provide a uniform impervious coating per the manufacturer's recommended procedure. The interval between successive applications shall be as recommended by the manufacturer. The completed dampproofing shall be protected by the Contractor from damage by subsequent construction operations using methods and materials approved in advance by the Engineer.

c. If it is determined by the Engineer that the work is not being performed satisfactorily or deficient work is not being properly corrected in conformance with these specifications, the Contractor will be required to furnish the services of a competent technical field representative of the approved manufacturer at no additional cost to the State. The representative shall instruct the Contractor on installation and inspection procedures in the presence of the Engineer. The representative shall inspect the condition of the prepared and treated surfaces and verify that all surfaces meet the requirements for application of the material. The application shall not proceed until the representative has confirmed that the surface is ready to receive the material.

813.03.3 Heat-applied Pre-Fabricated Membrane.

a. Application. The Contractor's team of applicators shall be qualified and/or certified by the manufacturer of the membrane to install the product. The Contractor shall provide documentation from the manufacturer of the prefabricated waterproofing sheet membrane that the applicators have been qualified and/or certified to install the membrane system.

b. Primer. The manufacturer's recommended primer shall be applied by spray, brush or rollers in accordance with the manufacturer's recommendations. Coverage rates shall be per the manufacturer's

recommendations. The primer shall be applied only to areas that are to be covered with membrane within the following 24 hours. Any areas not covered within 24 hours must be re-primed at no additional cost to the State.

c. Membrane. The prefabricated waterproofing sheet membrane shall only be applied when the primed substrate surface is clean and dry. The membrane shall not be applied over a water-based bituminous primer until the emulsion breaks completely. The membrane shall be applied only when the surface and ambient temperatures are within the ranges specified in the manufacturer's recommendations. The membrane shall be rolled out in the area to be applied to ensure correct placement. Installation of the membrane shall be per the manufacturer's recommendations. Application of the prefabricated waterproofing sheet membrane is to be by a "heat-bonded" method approved by the manufacturer. Care must be taken to avoid overheating the membrane material. A heat source sufficient to melt the lower layer of the membrane shall be used. Sufficient heat is evident when the modified bitumen polymer compound liquefies and just appears beside the roll and/or on front of the roll. Overlapping of the membrane edges shall be per the manufacturer's recommendations. Membrane installation shall begin at the outside perimeter of the pavement adjacent to the curb and then progress to the high point of the pavement on the bridge. The height onto the vertical curb shall be at least 2 inches but no more than 3-inches.

d. Inspection and Repair. After completion of installation, the Contractor's installer shall check for the following: air bubbles on the membrane top layer, any unattached membrane and/or any unattached lapped seams and any tears or holes. All air bubbles shall be cut. Air bubble cuts and/or unattached membrane shall be heat-bonded again. All damaged areas (including holes) shall be repaired with new material per the manufacturer's recommendations and to the satisfaction of the Engineer. All primer stains or bitumen on curbs, sidewalks or surfaces that are not to be covered by membrane shall be cleaned to the satisfaction of the Engineer.

e. If it is determined by the Engineer that the work is not being performed satisfactorily or deficient work is not being properly corrected in conformance with these specifications, the Contractor will be required to furnish the services of a competent technical field representative of the approved manufacturer at no additional cost to the State. The representative shall instruct the Contractor on installation and inspection procedures in the presence of the Engineer. The representative shall inspect the condition of the prepared and treated surfaces and verify that all surfaces meet the requirements for application of the material. The application shall not proceed until the representative has confirmed that the surface is ready to receive the material.

f. Placement of Wearing Surface. The wearing surface shall be placed as soon as possible after application of the membrane. The temperature of the overlay when placed on the membrane must meet the manufacturer's requirements in order to achieve a proper bond between the overlay and the membrane. If no temperature guidance is provided by the manufacturer, the overlay temperature shall be a minimum of 320°F.

813.03.4 Cold Spray-Applied Liquid Membrane.

a. Application. The Contractor's team of applicators shall be trained and certified by the manufacturer of the membrane to install the product. The Contractor shall provide documentation from the manufacturer of the cold spray-applied liquid membrane that the applicators have been certified to install the membrane system. Application shall only proceed while air and substrate temperature are within the temperature range recommended by the manufacturer, providing the substrate is above the dew point. Outside this temperature range, the manufacturer shall be consulted; work shall not proceed without

written documentation from the manufacturer approving the modified acceptable substrate temperature. All components of the system shall be measured and mixed strictly in accordance with the manufacturer's recommendations. Mixing shall be done with either an air driven high-speed paddle or an explosion proof mixer. A field representative of the approved manufacturer shall be present at the work site prior to any use of materials. The representative shall review, with the Contractor and the Engineer, the installation and inspection procedures and inspect the condition of any surfaces to receive the membrane. All concrete surfaces in contact with the membrane shall be clean and dry, before the application of any part of this system. The representative shall confirm to the Engineer that the surface condition is suitable to receive the membrane system.

1. Primer. The manufacturer's recommended primer shall be applied by spray, roller or brush in accordance with the manufacturer's recommendations on all steel and concrete surfaces intended to receive the membrane. This primer shall be cured per the manufacturer's recommendations before application of the waterproofing membrane.

2. Membrane. The waterproofing membrane shall be spray applied with suitable equipment, approved by the manufacturer. The applicator shall perform film thickness tests in accordance with SSPC-PA2 Measurement of Dry Coating Thickness, using 1/8-inch thick (minimum) steel coupons sprayed during the deck application so as to accurately represent the application procedure. The membrane shall cure between coats, as needed, and before application of the tack coat, per the manufacturer's recommendation.

Apply aggregate broadcast into membrane per the manufacturer's recommendations.

3. Quality Control Testing. Quality control testing is the responsibility of the Contractor. Random tests for adequate tensile bond strength of the cured membrane to the substrate shall be conducted by the applicator on site per ASTM D4541 at a minimum frequency of three randomly-placed tests per 5,000 square feet. Areas less than 5000 square feet shall receive a minimum of three randomly-placed tests. Should the tensile bond strengths be lower than 100 psi on concrete (unless failure occurs within the concrete) or 290 psi on steel, the Engineer may request further surface preparation and/or repairs in accordance with applicable specifications. Damage as a result of the adhesion testing shall be repaired by the applicator and shall be considered incidental to the application of the membrane. Testing for the thickness of each membrane layer shall be per the manufacturer's recommended method.

4. Tack Coat. A tack coat, approved by the membrane manufacturer, shall be applied directly to the waterproofing membrane prior to paving, in accordance with the manufacturer's recommendations.

b. Repairs.

1. Patching. If an area is left untreated or the membrane becomes damaged, a patch repair shall be carried out to restore the integrity of the system. Patching shall be per the manufacturer's recommendations and to the satisfaction of the Engineer.

2. Overlapping. Where the membrane is to be joined to existing cured material and at day joints, the new application shall overlap the existing one by at least 4 inches. Preparation shall be per the manufacturer's recommendations.

c. Protection. During all stages of application and until the membrane is overlaid, the Contractor shall protect the membrane from damage.

d. Final Inspection. The Engineer, the Contractor and the applicator shall jointly inspect the deck area(s) in which the completed system has been installed, prior to placing the asphalt overlay. Any portion of the work that doesn't conform to the specifications and meet the satisfaction of the Engineer shall be corrected at this time.

813.04 METHOD OF MEASUREMENT. "Dampproofing," "Heat-applied Pre-Fabricated Membrane" and "Cold Spray-applied Liquid Membrane," will be measured by the number of square yards of the neat area of the system actually placed in accordance with the Plans and these Specifications and as directed by the Engineer.

813.05 BASIS OF PAYMENT. The accepted quantities of "Dampproofing," "Heat-applied Pre-Fabricated Membrane," and "Cold Spray-applied Liquid Membrane," will be paid for at their respective contract unit prices per square yard as listed in the Proposal. The prices so-stated constitute full and complete compensation for all labor, materials, equipment, and all incidentals required to finish the work, complete and accepted by the Engineer.

Add the following new **Section 843, Galvanized Structural Steel** to the RI Standard Specifications for Road and Bridge Construction.

SECTION 843

GALVANIZED STRUCTURAL STEEL

843.01 DESCRIPTION. This work consists of thoroughly cleaning, preparing surfaces, and applying a hot-dip galvanized coating to the surfaces of new structural steel and its components at the locations indicated on the Plans or as directed by the Engineer, all in accordance with these Specifications.

843.02 MATERIALS. Materials shall conform to the applicable requirements of **Subsection M.05.06**.

843.02.1 SUBMITTALS

The Contractor shall submit a shop drawing with all documentation as specified herein including but not limited to working drawings, QC plan, test data, supporting details and method of application to the Engineer for approval.

The manufacturer/ supplier shall provide the following necessary information:

Analysis of Galvanizing: Submit an assay of the galvanize bath constituents and state how often the bath is tested.

Warranty: Provide galvanizer's standard warranty that the galvanized substrate shall be free from 10 percent or more visible red rust for 20 years.

Certificate of Compliance for Items Coated by Galvanizer: Submit notarized Certificate of Compliance for galvanize, signed by the galvanizer and indicating compliance with the requirements of these specifications. Scope of services provided, itemized description of items processed, and their quantities shall also be included.

Item Identification by Galvanizer: The galvanizer shall mark all lots of material with a clearly visible tag indicating the name of the galvanizer, the type and weight of the coating, and the applicable ASTM standards.

Quality Control (QC): Testing and Certification: The Manufacturer shall certify that every batch or lot of material conforms to this specification and shall submit test results for every batch or lot of materials. Galvanizers using the wet kettle process shall show how their QC program addresses the potential for flux inclusion.

Provide a QC plan for the coating process. This should include but not be limited to:

- Qualifications and responsibilities of the QC manager.

- Qualification and training for workers. This would include frequency of checks on quality of work.
- How environmental conditions for various stages of the process are monitored and maintained.
- Any pretreatment of the steel prior to the galvanize and how these processes are monitored and maintained.
- How the zinc dipping and prep bath(s) are monitored and maintained.
- How the adhesion of the coating systems is verified and at what frequency. Testing shall be in accordance with ASTM D4541.
- How the dry film thickness (DFT) of the galvanize thickness is to be measured for verification of values in accordance with the specification.
- Documentation of any equipment used for QC operations, along with calibration records as applicable.
- Methods to protect all items to be galvanized from damage during storage and shipping.
- Method to mask areas not to receive galvanizing, such as the top of bridge beams and around edges to be welded.
- Format of QC documentation records and how they are maintained.

Each of these items should reference the relevant standards. Provide documentation of all testing. Any destructive testing shall be the Contractor's responsibility at no additional cost to the State. Work shall not commence until the QC plan is approved by the Engineer.

843.03 CONSTRUCTION METHODS.

843.03.1 Surface Preparation for Hot Dip Galvanize.

a. Preparation of Steel Prior to Galvanize. Preparation shall be in accordance with ASTM A385

843.03.2 Hot Dip Galvanize

a. Masking of Areas Not to be Galvanized. Areas to be masked shall be as shown on the plans. When masking the tops of bridge beams, the outer perimeter of the top surface of each beam shall not be masked for a distance of one inch from the edge. For areas to be welded, the masked area shall provide an ungalvanized surface at least one inch beyond the anticipated heat affected zone.

b. Application of Galvanize. Application and minimum thickness shall be in accordance with AASHTO M111 or AASHTO M232, as applicable.

c. Galvanize Thickness. The galvanize thickness shall be measured using the methods described in the latest edition of the Steel Structures Painting Council Paint Application Specification No. 2 - Measurement of Dry Paint Thickness with Magnetic Gauges (SSPC - PA2).

d. Appearance and Condition of Galvanize. Items with defects or damage to the final condition of the galvanize that expose the steel substrate or with thicknesses below the applicable

AASHTO standard shall be stripped completely of the zinc using the standard preparation methods and re-galvanized.

e. Field Touchup: It shall be verified that all surfaces to be touched up in the field are thoroughly cleaned of dirt, grease, oil, chalk, bird droppings, lubricants, and other surface interference material. Hand tools, power tools, or blast cleaning shall be used as necessary to remove rust and for spot repair of localized damage to the galvanizing and coating system. Touchup or painting shall not occur until the Engineer has accepted the surface cleaning and dry surface condition.

All field repair to the galvanize of exposed steel shall be made by a field application of a zinc rich paint (minimum 92% zinc) in strict accordance with the repair material supplier's recommendations, these Specifications, and shall be approved by the Engineer. Pieces with damage exceeding 2% of the steel substrate shall be stripped of all galvanize and other coatings using the standard preparation methods and re-galvanized.

843.03.3 Subsequent Coatings. Any top coating over the galvanize required by the Contract shall be compatible with the galvanize and be applied in accordance with the appropriate RIDOT Standard Specifications. Hot dip galvanize shall be prepared in accordance with ASTM D7803 Sections 5.1.1.

843.03.4 Approval Requirements.

a. Qualification/Certifications. The Contractor is responsible for providing proper training of each worker and any certifications to ensure that the final product meets the specifications.

b. Quality Control (Process Control). In addition to the general process control requirements of the Contract, the following specific process control items shall be required.

Technical supervision will be required for all applications. Daily logs taken of air and surface temperature, dew point and relative humidity shall be maintained for at least five years after project completion and provided to the Engineer upon request.

c. Safety and Health. Employees required to enter confined spaces where the work may be conducted shall be instructed as to the nature of the hazards involved, the necessary precautions to be taken, and in the use of protective and emergency equipment required. All pertinent OSHA regulations shall apply.

843.04 METHOD OF MEASUREMENT. "Galvanized Structural Steel" will not be measured for payment.

843.05 BASIS OF PAYMENT. "Galvanized Structural Steel" will not be paid separately and will be considered incidental to the cost of items being galvanized.

Remove **Section 936, Mobilization and Demobilization**, pages 9-78 to 9-79 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace it with the following.

SECTION 936

MOBILIZATION AND DEMOBILIZATION

936.01 DESCRIPTION.

936.01.1 Mobilization consists of those efforts necessary for the movement of the Contractor's personnel and equipment to the project site, the establishment of all the Contractor's field offices, buildings and other facilities required for the performance of the Contract, and all other incurred costs for work or operations required to be performed prior to the actual commencement of work on the Proposal items in the Contract.

936.01.2 Demobilization consists of removal of all materials, equipment, temporary structures and all other facilities of a temporary nature from the project site at the conclusion of the project, and restoration of the project site, including those areas used for storage of equipment, materials or the placement of temporary facilities.

936.02 MATERIALS. Not applicable.

936.03 CONSTRUCTION METHODS. Not applicable.

936.04 METHOD OF MEASUREMENT. This work will be measured for payments as follows:

a. First Payment. The first payment of 50 percent of the lump sum price for Mobilization and Demobilization, or 5 percent of the total contract amount minus the bid amount for Mobilization and Demobilization, whichever is the lesser, will be made on the first progress payment, following notice to proceed and the complete, approved set up of the project field office.

b. Second Payment. The second payment of 35 percent of the lump sum price for Mobilization and Demobilization, or 3.5 percent of the total contract amount minus the bid amount for Mobilization and Demobilization, whichever is the lesser, will be made when the progress payment estimate of the amount earned, not including that amount earned for Mobilization and Demobilization, is 5 percent of the total contract amount minus the bid amount for Mobilization and Demobilization.

c. Third Payment. The third payment of 15 percent of the lump sum price for Mobilization and Demobilization, or 1.5 percent of the total contract amount minus the bid amount for Mobilization and Demobilization, whichever is the lesser, will be made when the progress payment estimate of the amount earned, not including that amount earned for Mobilization and Demobilization, is 10 percent of the total contract amount minus the bid amount for Mobilization and Demobilization.

d. Final Payment. Upon completion of all the work on the project, including the completion of all Punch List items in accordance with **Subsection 105.17(b) Para. 4** of these Specifications, and Demobilization of the project site in accordance with **Subsection 936.01.2** above, payment of the remaining balance of the lump sum price for Mobilization and Demobilization will be paid.

936.05 BASIS OF PAYMENT. "Mobilization and Demobilization" will be paid for at the contract lump sum price as listed in the Proposal, in accordance with the provisions of **Subsection 936.04** above. The price so-stated constitutes full and complete compensation for all labor, materials, equipment and incidentals required to establish the Contractor's facilities at the site and, at the conclusion of the contract, for the complete removal thereof.

No lump sum breakdown will be required for this item of work.

Remove **Section T.11, Traffic Signal Standards and Posts**, pages T-21 through T-23 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace it with the following.

SECTION T.11

TRAFFIC SIGNAL MAST ARMS, POLES AND FOUNDATIONS

T.11.01 DESCRIPTION. This work consists of furnishing and installing Steel Mast Arms and Poles with Foundations and Steel Span Poles with Foundations at the locations indicated on the Plans or as directed by the Engineer, all in accordance with these Specifications.

T.11.02 MATERIALS.

T.11.02.1 Manufacture. Traffic signal mast arms, poles and span poles shall be steel conforming to **Section M.16** and shall be manufactured with materials as follows:

a. Structural steel tube shall conform to ASTM A595 GR A or ASTM 572 Gr 50 (minimum). Tubes may be cylindrical, hexagonal, octagonal, or elliptical, of constant section or tapered, and shall be capable of withstanding the applied load and serviceability deflection requirements without the necessity of a back guy.

b. Structural steel plates shall conform to **Subsection M.05.04.1b**, AASHTO M270 (ASTM A709) Grade 50 or ASTM 572 Grade 50 (minimum).

c. Structural Tubing shall conform to **Subsection M.05.04.3**, ASTM A500, Grade B or structural pipe **Subsection M.05.04.7** ASTM A53, Grade B.

d. Steel mast arm and span poles assemblies shall be galvanized in accordance with the requirements of AASHTO M111.

e. Arm and pole fasteners shall conform to **Subsection M.05.04.4b**. Bolts shall conform to ASTM F3125. Nuts shall conform to ASTM A563 GR DH. Hardware shall be hot-dipped galvanized in accordance with ASTM A153.

f. Anchor rods shall conform to ASTM F1554, Grade 55 (minimum). The leveling nuts shall conform to ASTM A563, Heavy Hex Grade A or ASTM A563, Heavy Hex Grade DH. The anchor bolts and the nuts shall be hot-dipped galvanized in accordance with ASTM A153. The internal threads of nuts shall be re-tapped after galvanizing to accommodate the increased diameter of the rods. Flat washers shall conform to ASTM F436.

g. Anchor bolt nut covers shall be compatible with the base connection and galvanized coatings.

Unless indicated otherwise on the Plans, traffic signal structures must comply with AASHTO LFRD Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals,"

(SLTS), latest edition, fatigue Category No. 2 requirements, including galloping, vortex shedding (if applicable), natural wind gusts, and truck induced gusts. The truck induced loading is based on 30 mph velocity.

The poles shall be raked back to allow for the anticipated dead load pole deflection as indicated in the shop drawings such that the final position of the poles under dead load is vertical. The shop drawings shall indicate the theoretical dead load deflection.

If the pole or mast arm is manufactured in two pieces, the sections shall be joined by a manufacturer-approved method.

Traffic signal mast arm structures shall be supplied by one of the RIDOT-accepted steel mast arm manufacturers, or the Contractor may furnish an alternate mast arm manufacturer's shop drawings and computations for review and approval. The alternate mast arm shall conform to RI Standard 19.2.0 standard or heavy maximum design configuration (equipment weights, surface areas, and location dimensions) for the arm length proposed on the Plans. The alternative mast arm shall include design computations and details for the foundation. To allow interchangeability with standard mast arm types/mast arm lengths, the alternate structure's connection to the foundation shall conform to RI Standard Detail 19.5.0A bolt projection above the top of the foundation and RI Standard Detail 19.5.0B, Step 2 anchor bolt circle, number of anchor bolts, diameter of anchor bolts, anchor bolt embedment. To be considered for inclusion on the list of RIDOT accepted steel mast arm shop drawings, the alternate manufacturer shall be required to submit standard shop drawings, at their own expense, for all structure loading scenarios depicted in RI Standard Detail 19.2.0.

Vibration mitigation devices will not be allowed.

T.11.02.2 Foundations.

a. Concrete: Shall be Class XX (3/4"), 4,000 psi at 28 days, and shall conform to the applicable requirements of **SECTION 601; PORTLAND CEMENT CONCRETE**.

b. Reinforcing Steel: Shall conform to ASTM Designation A615, Grade 60 and shall be galvanized per **SECTION 810**.

c. Ground rods, rigid metal conduits, fittings and drain pipes within the foundation shall be in accordance with **SECTION M.15**.

d. Crushed stone under structures shall meet the applicable requirements of **SECTION 203** and must meet the gradation requirements of Column II, Table I in **Subsection M.01.09**.

e. If slurry methods are used to maintain the open hole of the foundation, a polymer-based slurry shall be used. Bentonite slurry is prohibited.

T.11.02.3 Design. The Contractor shall design span pole structures and foundations, and when indicated on the plans, site-specific mast arm structure and foundation designs. Span Pole and site-specific mast arm submittals shall be designed and stamped by a Rhode Island Registered Professional Engineer. Span pole and site-specific mast arm designs shall be in accordance with the AASHTO LRFD Bridge Design Specifications (LRFD, latest edition) and the SLTS (latest edition) and shall be designed to withstand the specified forces including those produced by Strength and Service wind speeds of 130 miles per hour and Mean Recurrence Interval of 700 years. The design shall also include the following:

- a. The combined force interaction of SLTS Equation 5.12.1-1 in any mast arm, span pole or component due to each group load shall not exceed 1.0.
- b. Serviceability requirements for deflection and slope of vertical components shall comply with SLTS Section 10.4.2 except the limits shall consider dead load only.
- c. The traffic signal mast arms shall be bolted with a minimum of six anchor bolts at the foundation in accordance with the latest edition of the SLTS.
- d. Special icing requirements of SLTS 3.7 need not be included in mast arm designs.
- e. The vertical deflection of the free end of the arm due to the wind load effects of galloping and truck-induced gusts shall not exceed 8-inches.

Street signs shall be in accordance with **SECTION T.15**.

Structure components and their connections shall be designed to resist the worst-case fatigue loading, upon evaluation of all applicable cases acting separately.

Foundation designs shall be in accordance with the requirements of the latest edition and interim Specifications of the SLTS. Foundations shall be sized to resist overturning according to Brom's Design Method with a safety factor that includes an overload factor of 2.0 and understrength factor of 0.7.

T.11.02.4 Submittals. Shop drawing submissions shall be in accordance with **Section 105.02** in addition to the following requirements.

T.11.02.4.1 Foundations.

For all standard and site-specific foundations where survey is not provided, the Contractor shall obtain survey elevations of the ground surface at the foundation. The Contractor shall submit to the Engineer for approval an elevation view of the foundation showing:

- The proposed foundation with elevations at the top and bottom of the proposed foundation
- The existing ground elevations at the high and low side of the proposed foundation

The Contractor shall furnish the approved foundation elevations to the reinforcing bar detailer. These elevations shall be included with the foundation reinforcing shop drawings submission.

The Contractor shall submit a foundation constructability plan which includes the following:

- Access to the area including the following, when applicable:
 - Removal of guard rails and/or concrete barriers.
 - Utility locations and drainage installations that could obstruct construction.
 - Clearing and grubbing.
- Maintenance and Protection of Traffic plans (if the Contractor chooses to utilize a traffic control setup that is not included in the plan set).
- Drilling operation, including all calculations and specifications associated with the

Contractor's proposed drilling procedure and tools and machinery used.

The Contractor shall submit shop drawings for the reinforcement, including the following:

- A note indicating that no welding of reinforcement will be allowed.
- Supplemental cages or ties that will be used to lift the reinforcing cage and prevent distortion. Reinforcing cages shall be tied adequately for handling, but may need internal ties or cages, which shall be detailed for approval. The support bars or cage, if intended to remain in the finished foundation, shall be arranged so as not to interfere with concrete placement or proposed anchorage.

The design of anchor bolts shall result in a ductile steel failure prior to any sudden brittle failure of the concrete.

When the clearance between the bottom of the leveling nuts and the top of the concrete is equal to or greater than one bolt diameter, bending stresses in the anchor bolts shall be considered in the design.

The Contractor shall submit shop drawings for the anchor rods and plates including the following:

- Material designations.
- Length and diameter of anchor rods.
- Number of anchor rods.
- Thickness and dimensions of anchor plate.
- Anchor rod hole diameters and locations, including bolt circle diameter and edge distance.
- Angular orientation of the anchor rods around the bolt circle.
- Galvanizing requirements.

The Contractor shall be responsible for the design of temporary earth retaining and dewatering systems, where required, and shop drawings shall be stamped by a Professional Engineer registered in the State of Rhode Island and shall be submitted to the Engineer for review and approval.

Standard and site-specific design and construction methods shall be appropriate to result in undisturbed soils above and below the water table.

T.11.02.4.2 Standard Mast Arm Signal Structures.

The Contractor shall provide a for record mast arm submittal that includes the following items as specified in the contract documents:

- a. Standard mast arm loading type
- b. Selected RIDOT-accepted steel mast arm shop drawings
- c. Copy of the boring log
- d. Soil conditions used to select the standard foundation.

T.11.02.4.3 Site-Specific Mast Arm and Span Pole Signal Structures.

- a. Shop Drawings shall include plans and calculations for the traffic signal structures.

b. Plans shall include complete details of each traffic signal structure, including but not limited to elevation views, cross sections and details necessary for the complete fabrication and erection of each structure.

c. Plans shall include a materials list specifying size, material type, finish, location and quantity for each element of each structure.

d. Calculations shall be provided for each of the different traffic signal structures, including foundation design, and shall clearly specify all loads, load combinations, design capacities, allowable capacities, assumptions, and design references.

e. For site-specific traffic signal supports, the following notes shall be included on all plans and/or shop drawings in reference to anchor bolts:

Pre-tensioning of all anchor nuts is required and shall be accomplished by tightening to 1/6th turn beyond the snug-tight position for 1-1/2-inch diameter anchor bolts or greater, and 1/3rd turn beyond the snug-tight position for anchor bolt diameters less than or equal to 1-1/2-inch diameter in accordance with SLTS Table C15.6.3-1.

The maximum clearance between the bottom of the leveling nuts and the top of the concrete is critical and all anchor bolts shall not exceed the amount specified on the drawing.

Where overhead utilities are present, the shop drawings shall include sketches that show the mast arm structure will accommodate required clearances from overhead utilities as well as the roadway vertical clearance. The shop drawing sketches shall include the approximate horizontal and vertical locations of the overhead wires with clearances dimensioned from the overhead wire to the mast arm tube and shaft, with all features drawn to scale, and clearances dimensioned from the mast arm tube to the roadway surface at the proposed curb line, crown line and outer end of the mast arm.

No work shall be performed until approved shop drawings have been returned to the Contractor.

T.11.03 CONSTRUCTION METHODS. Traffic Signal mast arms and poles, traffic signal span poles and foundations shall be installed as indicated on the Plans and shall conform to the following requirements:

T11.03.1 Steel Poles.

a. Workmanship and finish shall be equal to the best general practice of modern metal fabrication shops.

b. Traffic Signal Poles shall be installed in accordance with the National Electric Safety Code (NESC).

Prior to the start of fabrication of the mast arm signal structure, the Contractor shall, in the field, verify location of the foundations and establish and verify all elevations, dimensions and longitudinal grades. The signal structure must be assembled after galvanizing and prior to shipment to assure fit up. It may be disassembled for shipping.

To prevent warping of the tubular members, base plates, connection plates and splice plates during welding of the plates, precautions such as the use of steel strongbacks bolted to the plates shall be utilized. Fabricated members which are warped and do not fit properly during the trial fit up will be rejected.

The mast arm structure connections and splices shall be trial fitted and bolted in the fabricator's shop after cambering and galvanizing. The fabricated members will be rejected by the Engineer if the mating surfaces of the plates have a gap greater than 1/4-inch at any location prior to the bolting or if the interface of the plates is not in full contact at each bolt location after bolting. Bolts used for the trial shop fit-up shall not be reused in the final field assembly.

The horizontal member on the mast arm structure shall be checked for proper residual camber prior to it being galvanized. The horizontal member with the splice shall be bolted together with temporary bolts for checking camber. With the horizontal member supported at its ends, the residual camber shall be measured at mid-span and the member shall be rejected if the camber does not fall within the following limits:

Minimum Residual Camber	Span/1000
Maximum Residual Camber	Span/500

All connections using high strength bolts shall conform to the applicable requirements of **SECTION 824**.

Prior to assembly, the top and bottom surfaces of the base plates shall be planed, or else the plate shall be heat straightened. The poles shall be faced at the bottom end.

T11.03.2 Foundations. The dimensions and reinforcing steel shall be in accordance with the requirements of the Plans.

All structural excavation and temporary earth retaining systems shall be in accordance with **SECTION 203** and **SECTION 805**.

The Contractor shall remove and legally dispose of all material excavated for the foundations.

The Contractor shall ensure that foundation construction is capable of being constructed in locations shown on the Plans without modifying the existing paved roadways and sidewalks beyond the limits indicated. Any existing items not identified on the Plans to be modified that are disturbed during construction shall be brought to the attention of the Engineer prior to commencement of the work. Otherwise, the items disturbed or damaged shall be repaired or replaced to the satisfaction of the Engineer at no additional cost to the State.

Crushed stone under structures must be placed and compacted on a prepared surface to a 12-inch minimum thickness. The surface of the crushed stone layer must be placed in such a manner that generally level bed is produced.

The Contractor is responsible for properly locating the foundation and shall notify the Engineer two weeks before beginning to drill the foundation.

Foundation construction may require rock excavation, drilling rock or using drilled shafts through whatever materials are encountered to reach the depths indicated on the Plans and Specifications. The Contractor shall submit a sequence plan outlining drilling, casing, slurry, reinforcement and concrete placement procedures for the Engineer to review.

Construction of drilled shafts shall be in accordance with AASHTO LRFD Bridge Construction Specifications, latest edition, Section 5 and with U.S.D.O.T. Publication FHWA-NHI-10-016, "Drilled Shafts: Construction Procedures and Design Methods" and latest revisions to these publications.

The top of foundation maximum allowable horizontal variation from the required location shall be 1 inch.

The concrete shaft shall not be out of plumb by more than 1% of the total length.

Should the depth of drilled shaft extend below the depth shown on the shop drawings, a minimum of one half of the longitudinal bars required in the upper portion of the shaft shall be extended the additional length by adding longitudinal reinforcing bars at the bottom of the cage. Tie or spiral bars shall be continued for the extra depth and the stiffener bars shall be extended to the final depth. All longitudinal and transverse bars shall be lap spliced or spliced with mechanical splices. Welding to the reinforcing steel will not be permitted.

Approved feet (bottom supports) shall be provided to ensure that the bottom of the reinforcing cage is maintained the proper distance above the base.

The use of hooked anchor bolts is not permitted.

Anchor bolts shall be set using template to ensure proper spacing, bolt projection and rotation to allow for mast arm and hand hole orientation per the shop drawings. The center of bolt pattern template shall coincide within ½ inch of the center of concrete foundation. Each anchor rod shall be fitted with base plate and leveling nuts and double nuts at the anchor plate.

Rigid metal conduit, drain pipe, shall be placed and secured in proper position in the formed portion of the top of foundation. The number of conduits in the foundation shall be as shown on the Plans. Electrical conduits of the size specified on the plans shall extend 2 feet out from the side of the formed portion of the foundation. All conduit ends terminating below grade shall be capped with a malleable iron cap. All above grade conduit ends shall be terminated with an insulated bonding bushing (phenolic type). Conduits shall extend up from the top of foundation to the height shown on the Plans. Conduit caps shall be installed before the concrete is placed and shall remain in place until the cable is installed. A template shall be used to hold the required, ground rod sleeve and conduits in their correct positions.

Concrete shall be placed in the forms in accordance with the applicable provisions of **SECTION 808; CAST-IN-PLACE STRUCTURE CONCRETE MASONRY.**

The drilled shaft concrete shall be placed as soon as possible after the placement of reinforcing steel. The bottom of the shaft shall be monitored for accumulation sediments; quantities of sediment greater than 1 inch shall be removed prior to placement of concrete.

Casings, if used in drilling operations, shall be removed from the hole. The casing may be removed as concrete is placed provided a 5-foot head of concrete is maintained, or the casing may be

removed after the concrete has been poured, provided that the concrete has not been set. Separation of the concrete by hammering or otherwise vibrating the casing during withdrawal operations shall be prohibited.

Concrete shall be placed in accordance with **Subsection 808.03.5** and concrete shall not hit the reinforcing, supporting cage or the side walls of the shaft before it reaches the base. Concrete placement down the center of the shaft shall be directed by use of a hopper and drop chute.

Concrete shall be placed in wet installations by gravity tremie method in accordance with **Subsection 808.03.5 para. f** or by concrete pump tremie method in accordance with **Subsection 808.03.6**. Concrete deposited in water shall conform to the applicable requirements of **Subsection 601.01.1**; Concrete placement shall be continuous from the bottom of drilled shaft to the top of the foundation.

Curing of the concrete shall be performed in accordance with **SECTION 601; PORTLAND CEMENT CONCRETE**.

The portions of the foundations that will remain exposed to view shall be finished to the satisfaction of the Engineer and in conformance with the pertinent requirements of **Subsection 808.03.11; Concrete Finishes**.

The Contractor shall install the signal pole after the concrete has reached 28-day compressive strength as confirmed by test cylinders. Concrete cylinders shall be cast, cured and tested in accordance with **SECTION 601**.

Where a foundation is placed within or adjacent to a concrete sidewalk, the entire section of sidewalk between joints shall be replaced, unless otherwise directed by the Engineer.

The use of grout under base plates is not permitted.

The signal structure supports shall have a ground lug internal to the pole. Each signal pole shall be grounded with a 3/4"x 8' (minimum) ground rod and #6 AWG solid bare ground wire. The ground wire shall be cadweld to the ground rod and travel through the support foundation via a flexible conduit (size as required) to the internal ground lug. A ground wire connected externally to the signal structure support will not be allowed. The signal structure shall be electrically bonded to all metallic conduits between the support structure and the ground mounted control box.

If earth adjacent to the foundation is disturbed or removed beyond the neat lines of the shaft foundation, it shall be replaced with concrete fill at no additional cost to the State. The top of foundation shall be set in accordance with the requirements of the Plans. After curing, the forms shall be removed and backfilled with suitable material and compacted in 12-inch layers.

The top leveling nuts and the leveling template shall be removed prior to placing the base plate and pole assembly upon the foundation.

All connections using high strength bolts shall conform to the applicable requirements of **SECTION 824**.

All damaged galvanized areas shall be repaired with two coats of zinc paint conforming to the requirements of the Federal Specification TT-P-641-b(2).

Dielectric material shall be placed between dissimilar metals to prevent corrosion by electrolysis

Areas around existing drainage swales shall be restored to the grades that existed prior to the excavation of foundations.

The Contractor shall provide topsoil and seeding at all disturbed grassed areas in accordance with **Subsection T.01.03.6.**

T.11.04 METHOD OF MEASUREMENT. "Steel Mast Arms and Poles and Foundations" and "Steel Span Poles and Foundations," will be measured by the number of units of each such type actually installed in accordance with the Plans or as directed by the Engineer.

T.11.05 BASIS OF PAYMENT. The accepted quantity of "Steel Mast Arms and Poles and Foundations" and "Steel Span Poles and Foundations," will be paid for at their respective contract unit prices per each such type as listed in the Proposal. The prices so-stated constitute full and complete compensation for all design, materials, labor, tools, equipment and all incidentals required to finish the work, complete in place and accepted by the Engineer.

Remove **Subsection M.02.01, Hydraulic Cement**, pages M-6 and M-7 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace it with the following.

SECTION M.02

PORTLAND CEMENT CONCRETE

M.02.01 HYDRAULIC CEMENT

M.02.01.1 Portland Cement. Portland cement shall conform both to the chemical and physical requirements of AASHTO M85 and be listed on the Department's Approved Materials List.

M.02.01.2 Blended Hydraulic Cements. Blended hydraulic cements shall both conform to the chemical and physical requirements of AASHTO M240 and be listed on the Department's Approved Materials List.

M.02.01.3 Masonry Cement. Masonry cement shall both conform to ASTM C91 and be listed on the Department's Approved Materials List.