

**COMPILATION OF APPROVED SPECIFICATIONS**

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

**REVISIONS  
SUPPLEMENTAL SPECIFICATIONS  
SPECIAL PROVISIONS**

**SUPPLEMENT NO. 17**

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Revise **Part 100; General Requirements and Covenants**, pages 1-1 through 1-82 of the RI Standard Specifications for Road and Bridge Construction as follows.

## **PART 100**

### **GENERAL REQUIREMENTS AND COVENANTS**

- **Replace Subsection 102.13 in its entirety with the following.**

**102.13 MATERIAL GUARANTY.** The successful bidder may be required to furnish a complete statement of the origin, composition, and manufacture of any or all materials to be used in the construction of the work, together with samples to be tested for conformance with Contract provisions.

**a. Domestic Steel and Iron Products.** The bidder is advised of the “Buy America” requirements that apply to domestic steel and iron products as set forth in **Subsection 106.01(a)** of these Specifications.

- **Replace Subsection 104.15 in its entirety with the following.**

**104.15 ENVIRONMENTAL PROTECTION.** The Contractor shall comply with any and all Federal, State and Local laws, rules, regulations, permits, approvals and Contract Provisions controlling pollution and protection of the environment, such that the Contractor does not pollute Freshwater and or Coastal Wetlands, (including but not limited to surface water features such as rivers, streams, lakes, ponds, reservoirs, tidal waters, etc.) and all other regulated natural resource areas, (including but not limited to, waters of the state and or federal jurisdiction, wellhead protections areas, groundwater recharge/discharge areas, critical habitats, natural heritage areas, forestland, cultural/historic resources etc.) with sediment, fuels, oils, bitumens, chemicals, solid and or liquid waste or other harmful or hazardous or foreign materials, and the atmosphere with particulate and gaseous matter.

The Contractor shall read, become familiar with and aggressively and expeditiously adhere to environmental permits and approvals, contract provisions, Standard Specifications controlling pollution and protection of the environment. The contractor shall ensure that all employees, and all employees of each sub-contractor, avoid pollution of the environment. The contractor shall be responsible to ensure that all employees, and all employees of each sub-contractor, aggressively and expeditiously comply with any and all Federal, State and Local laws, rules, regulations, permits, approvals and Contract Provisions controlling pollution and protection of the environment.

When work areas or pits in or adjacent to any drainage system components, flowing body of water, surface water, tidal water or State or Federally regulated waters, such work areas shall be separated from the main water body by a dike or barrier to keep sediment and or pollutants from exiting the work area.

Water from aggregate washing or other operations containing sediment and or other pollutants shall be treated by filtration, settling basins or other means sufficient to reduce the sediment /pollutant content to levels which do not exceed that of the receiving waters/areas, and or levels allowed by specific permit, law and/or regulation.

Other requirements relating to temporary and permanent erosion and pollution controls are set forth in **SECTIONS 206** through **212** and **SECTION 214** respectively, of these specifications, and shall be in full effect.

The Contractor, at his own expense, shall be responsible for any fines and penalties resulting from non-compliance and or enforcement actions administered by Federal, State or Local Regulatory Authorities or by the Engineer for non-compliance with any and all Federal, State and Local laws, rules, regulations, permits, approvals and Contract Provisions controlling pollution and protection of the environment. The requirements set forth in **SECTION 107, LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC**, of these specifications, shall be in full effect.

Delay claims and compensation due to non-compliance of this specification, Federal, State or Local laws, Regulations and or Contract Provisions, will not be allowed. All time and/or delays resulting from non-compliance, including corrective work, will be considered non-excusable delays.

Failure to comply with this subsection and or contract provisions permits and approvals, if in the opinion of the Engineer, will result in a failure to comply charge, as set forth within Contract Special Provision Codes and will be deducted from monies due the contractor. The Engineer will determine if multiple violations of the contract permits and approvals exist and that the charge be deducted per violation. This charge shall be separate from any penalties, fines or corrective actions resulting from regulatory agency enforcement actions. This charge will be deducted along with any penalties, fines or corrective actions resulting from regulatory agency enforcement actions.

**a. Plant and Pest Control Requirements.** The United States Department of Agriculture has advised that soil and soil-moving equipment operating in regulated areas of certain counties will be subject to plant and pest quarantine regulations. In general, these regulations provide for cleaning soil from equipment before it is moved from regulated areas. Complete information may be secured from appropriate divisions of the Rhode Island Department of Environmental Management and the United States Department of Agriculture.

Contractors shall comply with these regulations where applicable to the State of Rhode Island.

• **Add the following new Subsection 105.22.**

**105.22 REQUEST FOR INFORMATION (RFI).** An RFI is a document submitted by the Contractor requesting clarification of a portion of the Contract Documents or a field condition. All such requests shall include a detailed written statement indicating the specific Drawings or Specifications to be clarified and the clarification requested. In addition, the Contractor shall:

1. Clearly state the item to be clarified, provide background information as appropriate, and explain why a response is needed.
2. Identify Drawings by Drawing number and location on the sheet.
3. Identify Specifications by Section number, page and paragraph.
4. Provide description of the field condition requiring clarification.
5. Present Contractor's interpretation or understanding of the requirement.
6. Include possible solution by text and/or drawings.

Improper RFIs are defined as:

1. RFIs that are not complete.
2. RFIs that request information that is clearly shown on the Contract Documents.
3. RFIs that do not comply with the definition of an RFI as indicated above.

Improper RFIs will be returned unanswered.

Delays caused by improper RFIs are the sole responsibility of the Contractor. The Contractor is not entitled to additional time or monetary compensation as a result of such delays.

**a. RFI Submission.** RFIs are to be entered by the Contractor into the Department's web-based Project Management Portal system (PMP). The Contractor shall ensure all attachments are fully legible after download. Each page of attachments to RFIs shall bear the RFI number.

RFIs shall be originated by the Contractor. RFIs from subcontractors or material suppliers shall be submitted through, reviewed by, commented on, numbered, logged, and signed by the Contractor prior to submission to the Department.

The Contractor shall carefully study the Contract Documents to determine that the requested information is not available therein. RFIs which request information available in the Contract Documents will be deemed improper, as defined above.

RFIs shall be identified and submitted by the Contractor in a timely fashion in order to not cause delay to the Project. Any delays due to the untimely submission of RFIs will be the responsibility of the Contractor.

RFIs shall not be used for the following purposes:

1. To request approval of submittals.
2. To request approval of substitutions.
3. To request different methods of performing work than those drawn and specified.
4. To request changes to the Contract Documents.
5. To request additional cost or credit.
6. As routine written communications between the Department and the Contractor.
7. To reply to notices issued by the Department.
8. To clarify subcontract bid questions.
9. For any other purpose not listed in this Specification.

**b. RFI Response.** RFIs do not automatically justify a cost increase in the work or a change in the Project Schedule. Answered RFIs shall not be construed as approval to perform extra work.

Responses from the Department will not change any requirement of the Contract Documents. If the Contractor believes that a response to an RFI will cause a change to the requirements of the Contract Documents, the Contractor shall immediately give written notice to the Engineer stating that the Contractor considers the response to require a Change Order. Failure to give such written notice immediately shall waive the Contractor's right to seek additional time or compensation.

The Contractor shall allow the Engineer 30 days review and response time for RFIs.

- **Replace Subsection 106.01 in its entirety with the following.**

**106.01 SOURCE OF SUPPLY AND QUALITY REQUIREMENTS.** Materials used on the work shall meet all quality requirements of the Contract and the “Master Schedule for the Preparation of a Project Schedule for Sampling, Testing, and Certification of Materials. In order to expedite the inspection and testing of materials, the Contractor shall notify the Engineer of the proposed sources of materials prior to delivery. At the option of the Engineer, materials may be approved at the source of supply before delivery is started. If, after trial, it is found that sources of supply which have been approved do not produce a reasonably uniform product, or if the product from any source proves unacceptable at any time, the Contractor shall furnish materials from other sources. All materials shall be new unless otherwise specified in the Contract.

No material which, after approval, has become unfit for use shall be employed in the work.

The Department reserves the right to retest all materials which have been previously tested and accepted at the source of supply and delivered to the site. However, prior to incorporation into the work the Department may reject all such materials which, when retested, do not meet the requirements of these Specifications, or those established for the specific project.

**a. Buy America Requirements for Domestic Steel and Iron Products.** In accordance with the U.S. Code of Federal Regulations Title 23, only such permanently incorporated steel materials as have been manufactured in the United States will be used on all projects.

Bidders are advised that the Contract will be awarded to the bidder who submits the lowest total bid based on furnishing domestic steel materials.

**1. Certification of Steel.** All manufacturing processes of the steel material in a project (i.e., smelting, and any subsequent process which alters the steel material’s physical form or shape or changes its chemical composition) must occur within the United States to be considered of domestic origin. This includes processes such as rolling, extruding, machining, bending, grinding, drilling and the application of coatings, including iron.

**2. Minimal Use of Foreign Steel.** Section 635.410(b)(4) of Title 23 CFR permits a minimal amount of foreign steel to be incorporated into a Federal-aid project. This amount is defined as one-tenth of one percent (0.1 percent) of the total contract cost or \$2,500, whichever is greater. The cost of the foreign steel is defined as its value delivered to the project. The Contractor shall submit copies of paid invoices for the foreign steel and iron products.

- **Replace Subsection 106.06 in its entirety with the following.**

**106.06 STORAGE OF MATERIALS.** Materials shall be stored to ensure the preservation of their quality and fitness for the work according to the requirements of the Contract, including but not limited to the manufacturer’s recommendations. Stored materials, even though approved before storage, may again be inspected prior to their use in the work. Stored materials shall be located to facilitate their prompt inspection.

**a. Location of Stored Materials and Equipment.**

**1. Roads without Curbing and Sidewalks.** Materials and/or equipment shall not be stored within existing and/or newly constructed travel lanes, designated parking areas, paved shoulders or adjacent areas other than as noted below. Materials and equipment may be stored within specified areas provided prior written approval has been granted by the Engineer. Materials stored in these locations must be removed within fourteen (14) calendar days. Equipment storage shall be on a day by day basis and must be removed during the subsequent days' construction operations. Extended storage of equipment will not be allowed. Storage areas must exceed the following distances from the travel lane:

<b>Posted Speed</b>	<b>Clear Distance from Edge of Travel Lane</b>
35 mph or less	12 feet
40-45 mph	16 feet
50 mph	20 feet
55 mph or greater	35 feet

Storage of equipment and/or materials not utilized in the daily operations will not be allowed.

All portions of an area used for storage of construction material and/or equipment must be clearly delineated with appropriate traffic control devices, as directed by the Engineer. The cost of these traffic control devices shall be at the sole expense of the Contractor.

Storage sites shall be restored to their original condition at the sole expense of the Contractor, and as directed by the Engineer.

Any additional space required for storage shall be provided at the Contractor's expense. Private property shall not be used for storage purposes without written permission of the owner or lessee. Copies of such written permission, outlining any and all pertinent agreements between the property owner and the Contractor, shall be furnished to the Engineer by the Contractor.

The Contractor shall comply with all Federal, State and local statutes and/or ordinances in reference to the storage of materials, and shall be liable for all damages arising from the violation thereof.

**2. Roads with Curbing and Sidewalks.** Construction materials and/or equipment shall not be stored within existing or newly constructed travel lanes, paved shoulders, or designated parking lanes. No portion of the sidewalks may be used for storage of construction equipment and/or material.

- **Replace Subsection 108.08(b) with the following.**

**108.08 FAILURE TO COMPLETE ON TIME.**

**b. Final Completion.** For each day, including work days, Saturdays, Sundays, and Holidays, that any work shall remain uncompleted after the time established for completion of the work in **Subsection 105.17; Acceptance, Para. b, Final Acceptance**, the applicable Daily Charge specified below, will be deducted from any money due the Contractor, not as a penalty, but as liquidated damages. An adjustment

of the contract time for completion of the work granted under the provisions of **Subsection 108.07** hereto will be considered in the assessment of liquidated damages.

Permitting the Contractor to continue and finish the work, or any part of it, after the contract time or any extensions thereof, has passed will not waive the Department's rights under the Contract. Unless otherwise specified, liquidated damages will not accrue during the winter shutdown period, i.e., December 15<sup>th</sup> through the following April 15<sup>th</sup>.

Rates for liquidated damages will be established in accordance with the Schedule. When the contract time is either the calendar day or fixed calendar day basis, the schedule for calendar days shall be used. When the contract time is on a work day basis, the schedule for work days will be used.

**Schedule of Liquidated Damages**

<b>Original Contract Amount</b>		<b>Daily Charge</b>	
<b>From More Than</b>	<b>To and Including</b>	<b>Calendar Day or Fixed Date</b>	<b>Work Day</b>
\$ 0	25,000	\$200.00	\$300.00
25,000	50,000	350.00	500.00
50,000	100,000	450.00	600.00
100,000	500,000	900.00	1,200.00
500,000	1,000,000	1,200.00	1,700.00
1,000,000	2,000,000	1,500.00	2,050.00
2,000,000	6,000,000	1,950.00	2,700.00
6,000,000	10,000,000*	2,350.00	3,250.00

\*Projects over \$10,000,000 will have Liquidated Damages assigned in the Job Specific Specifications.

Remove Subsection **601.03.7(a) Testing of Concrete - Process Control of Concrete**, page 6-17 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace it with the following:

## SECTION 601

### PORTLAND CEMENT CONCRETE

**601.03.7 Quality Assurance (QA).** QA is defined as all those planned and systematic actions necessary to provide confidence that a material will satisfy given requirements for quality. QA includes Quality Control (QC), Acceptance and Independent Assurance (IA).

QC is the system used by the Contractor to monitor, assess and adjust production and placement processes to ensure that a material will meet the specified quality. QC is the responsibility of the Contractor.

Acceptance is the system used by the Engineer to measure the degree of compliance of the Portland Cement Concrete with the Contract requirements. Acceptance is the responsibility of the Engineer and will be in accordance with the Rhode Island Department of Transportation Project Schedule for Sampling, Testing and Certification of Materials (PMTB) and these Specifications.

IA is an unbiased and independent system used to assess all sampling, testing and inspection procedures used for QA. IA is conducted by the Engineer in accordance with the Rhode Island Department of Transportation Master Schedule for the Preparation of a Project Schedule for Sampling, Testing and Certification of Materials (MST) and these Specifications.

#### **a. Concrete Manufacturing Plant Quality Control (QC).**

**1. General.** The Concrete Producer shall establish, implement and maintain a QC program to control all equipment, materials and processes during concrete production. The Concrete Producer's QC program shall include, but is not limited to, sampling, testing, inspection, monitoring, documentation and corrective action procedures during the handling, blending and mixing operations. A written Quality Control Plan (QCP) shall be developed which details the Concrete Producers QC program and that meets the requirements of these specifications. Concrete shall not be produced for the State without an approved QCP and a QC technician present at the plant for production. QC is not required for optionally tested items listed in the latest edition of the RIDOT Master Schedule of Testing. Failure to comply with the provisions of this Section or the contract special provisions will result in the shutdown of the Concrete Producer's production operation for RIDOT work and rejection by the Engineer of the concrete produced until the Concrete Producer's operations are in compliance with these requirements.

**2. Personnel.** QC personnel shall not perform concrete production operations when the total quantity of concrete produced for RIDOT on a calendar day exceeds 50 CY. At a minimum, the QC staff shall include the following personnel:

**(a) QCP Administrator.** The Concrete Producer shall employ a QCP Administrator with five years minimum of Materials QC experience and meeting one or more of the following criteria:

(1) Professional Engineer licensed in the State of Rhode Island;

(2) Certification by the National Institute for Certification of Engineering Technologies (NICET) at Level III or above for concrete;

(3) Certification by the North East Transportation Training and Certification Program (NETTCP) as a QA Technologist.

Prestress Concrete facilities shall employ a QCP Administrator with five years minimum of prestress concrete production QC experience and meeting one or more of the following criteria:

(1) Precast/Prestress Concrete Institute (PCI) Level III Certification for prestressed concrete production (PCI Level II for non prestressed precast);

(2) Certification by the National Institute for Certification of Engineering Technologies (NICET) at Level III or above for concrete;

(3) Certification by the North East Transportation Training and Certification Program (NETTCP) as a QA Technologist.

The QCP Administrator shall have full authority to direct any and all actions necessary for the successful implementation of the QCP, including administering, implementing, monitoring and adjusting processes as necessary to ensure compliance with the Contract Documents.

**(b) QC Technicians.** The Concrete Producer shall employ QC Technician(s) who test concrete specimens and concrete materials. QC Technicians shall possess current certification as American Concrete Institute (ACI) Concrete Laboratory Testing Technician Level I or NETTCP Concrete Technician.

Precast/Prestressed Concrete facilities shall additionally employ QC technician(s) who sample and test concrete at the point of placement. QC technicians shall possess current certification as ACI Concrete Field Testing Technician Grade I or NETTCP Concrete Technician.

QC technicians shall report directly to the QCP Administrator and shall be responsible for performing required QC activities and preparation of associated QC documentation.

**3. QC Testing Facilities and Equipment.** The Concrete Producer shall maintain a separate QC Laboratory and associated sampling, testing and measuring equipment necessary to perform the required QC activities. Sampling, testing and measuring devices shall be in accordance with specified standards and shall be properly calibrated and verified. The Concrete Producer shall maintain records of the calibration and maintenance of all sampling, testing and measuring equipment.

Back-up equipment shall be used if a device is found to be defective. Defective equipment shall be clearly tagged and/or removed from the site until repaired and the calibration is verified. If non-standard or alternative sampling methods, testing procedures, or equipment are proposed to be used, they shall be detailed in the QCP and approved by the Engineer prior to use.

**4. QC Activities.** QC activities shall include monitoring, inspection, sampling and testing. The Concrete Producer's QC activities shall cover all aspects that affect the quality of the concrete, including but not limited to:

(a) Component Materials

(1) Fine and Coarse Aggregates

(2) Portland Cement

(3) Mineral and Chemical Admixtures

- (4) Water
- (b) Production and Delivery Equipment
- (c) Mixing and Transportation
- (d) Formwork (Precast/Prestress plants only)
- (e) Prestressing Steel, Reinforcement, Inserts (Precast/Prestress plants only)
- (f) Tensioning Prestressing Steel (Precast/Prestress plants only)
- (g) Plastic and Hardened Concrete Properties (Precast/Prestress plants only)
- (h) Placement and Consolidation (Precast/Prestress plants only)
- (i) Finishing and Curing (Precast/Prestress plants only)
- (j) Finished Product (Precast/Prestress plants only)

The minimum QC activities and frequencies required are listed in **TABLES 3** and **4** below.

**TABLE 3**

MINIMUM PRODUCTION EQUIPMENT QC REQUIREMENTS		
Equipment	Control Requirement	Minimum Frequency
1. Plant Central Mixer Blades	Visual Inspection	Annually
2. Plant Scales and Meters	Calibrate	Every 90 days
3. Plant Admixture Dispensers	Calibrate	Every 90 days
4. Mixer Trucks	NRMCA Certification	Annually
5. Truck Water Meters	Calibrate	Annually
6. Tensioning Gauges	Calibrate	Precast/Prestressed Concrete – Every 180 days
7. Hydraulic Jacks	Calibrate	Precast/Prestressed Concrete – Every 180 days

**TABLE 4**

MINIMUM MATERIALS QC REQUIREMENTS		
Item	Control Requirement	Minimum Frequency
1. Fine and Coarse Aggregates	Gradation Moisture Content	<b>Ready Mix Concrete</b> – Daily/prior to start of production and randomly every 150 cubic yards of concrete.
	Visual Inspection of stockpiles and bins for segregation and contamination	<b>Precast/Prestressed Concrete</b> – Daily/prior to start of production and randomly every 50 cubic yards of concrete.
2. Portland Cement	Mill Test Report – Verify conformance to specifications	Each delivery
3. Mineral Admixtures	Mill Test Report – Verify conformance to specifications	Each delivery
4. Chemical Admixtures	Certificate of Compliance – Verify conformance to specifications	Each delivery
5. Concrete Batching	Verify Mix Proportions and Batch Weights  Compute maximum allowable retempering water and maximum discharge time	Each batch
6. Plastic Concrete	Air Content Yield (Unit Weight) Slump/Spread Concrete Temperature Air Temperature	<b>Precast/Prestressed Concrete</b> – First two loads then randomly every 50 CY for each concrete class delivered and placed on a calendar day from a single supplier.
	*Compressive Strength Specimens	<b>Precast/Prestressed Concrete</b> – One set for 1 – 50 CY inclusive and one set for each additional 50 CY or fraction thereof and as necessary for formwork removal, stress transfer, and shipping (Include concrete temperature, air content and slump test results).

\*The Concrete Producer shall determine the quantity of cylinders necessary for process control of construction operations.

**5. Concrete Producers Quality Control Plan (QCP).** The Concrete Producer shall submit a detailed written QCP to the Engineer for approval annually, at least sixty days prior to the first concrete placement. The QCP shall detail the Concrete Producer's plans, policies, procedures and organization deemed necessary to measure and control materials, equipment and concrete production processes.

The QCP shall be maintained to reflect the current status of the operations; proposed changes to the QCP must be submitted to the Engineer in writing. Changes must be approved by the Engineer before implementation.

At a minimum, the QCP shall Detail the following:

(a) Scope of QC Plan – Reference all applicable specifications, including the latest revision of the Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction along with all the applicable compilations and supplements.

(b) QC Organization – Include a QC organizational chart identifying all personnel responsible for implementing the QCP and how they integrate and communicate within the Concrete Supplier's management structure and with the Engineer. Include a list of QC personnel and their names, qualifications, responsibilities, levels of authority, certifications, telephone contact number(s) and e-mail addresses.

(c) QC Testing Facilities and Equipment – Include the location and qualifications of QC testing facilities, and a listing of all QC testing equipment with the frequency of calibration and verification.

(d) Materials Control – Include the source(s) for all materials used in the production of Portland Cement Concrete and receiving, storage and handling practices. For fine and coarse aggregates describe stockpile management practices, including stockpile identification, separation, segregation mitigation and loading.

(e) Concrete Production – Provide a description of the concrete plant and concrete batching operation, including but not limited to:

- (1) plant location and layout;
- (2) production equipment;
- (3) method and sequence of batching;
- (4) mixing capacity and minimum mixing time;
- (5) method of monitoring ingredients and recording batches;
- (6) methods of delivery.

(f) QC Activities – Describe QC activities deemed necessary to control all aspects of concrete production. Include the locations, methods, frequency and personnel responsible for conducting QC sampling, testing and inspection. Identify lot/sublot sizes, sample identification system and sample

storage/retention procedures. The minimum required QC activities are listed in **TABLES 3** and **4** of this specification.

(g) Pre-Placement (Precast/Prestressed Plants only) – Include source, storage and handling procedures for steel reinforcement, prestressing strand, hardware and inserts. Describe procedures and equipment for tensioning and detensioning of prestressing steel strands.

(h) Concrete Placement (Precast/Prestressed Plants only) – Describe methods, equipment and materials for placement, consolidation, finishing and curing of concrete. Include sequencing of work and maximum discharge times. Include procedures for determination of concrete strength for formwork removal and application of load.

(i) Post Production (Precast/Prestressed Plants only) – Describe procedures for post-production inspection, including product condition assessment, measurement of product geometry and camber (as applicable). Include procedures for handling and storage of finished products.

(j) Documentation – Describe documentation and reporting procedures for all QC activities. Include samples of all QC forms, reports and control charts.

(k) Non-Conformance and Corrective Action – Establish and maintain an effective and positive system for controlling non-conforming material and products as indicated by inspection and test results. Investigate the cause of any non-conformance to prevent recurrence, and take prompt corrective action to correct conditions that have resulted, or could result, in the incorporation of non-conforming materials and products into the Work. All non-conforming materials and products shall be positively identified to prevent use, shipment, and intermingling with conforming materials and products. Segregated holding areas shall be provided by the Concrete Producer, subject to the approval by the Engineer. Include criteria for identifying non-conforming materials and products, and procedures for isolation, disposition and documentation. Include procedures and personnel responsible for directing corrective action, including suspension of work, disposal and reclaiming or reworking of non-conforming materials and products. Detail how the results of QC inspections and tests will be used to determine corrective actions, define rules to gauge when a process is out of control and associated corrective action to be taken. At a minimum, establish corrective action procedures for each control requirement listed in **TABLES 3** and **4**.

**6. Records and Documentation.** The Concrete Producer shall maintain complete records of all QC tests and inspections. The QC records shall contain all test and inspection reports, forms and checklists, equipment calibrations, component material certificates of compliance and mill test reports, and non-conformance and corrective action reports. The QC records shall indicate the nature and number of observations made, the number and type of deficiencies found, the quantities conforming and non-conforming, and the nature of corrective action taken, as appropriate. The QC records shall be available to the Engineer at all times, and shall be retained for the life of the contract. The Concrete Producer's documentation procedures will be subject to approval by the Engineer prior to the start of the work, and to compliance checks by the Engineer during the progress of the work.

(a) Forms and Reports – All QC inspection and test results shall be documented on NETTCP forms and reports, or equivalent as approved by the Engineer. Additionally, a non-conformance and corrective action report shall be generated for each instance where test or inspection results indicate a non-conformance. The report shall indicate the nature of the non-conformance and corrective actions taken to resolve it. Forms and reports shall be kept complete, shall be on computer-acceptable medium and shall be submitted to the Engineer as the work progresses (or weekly, at a minimum).

(b) Control Charts. All conforming and non-conforming test results shall be documented on control charts, shall be kept complete, and shall be available to the Engineer at all times during production. Test data for Portland Cement concrete shall be shown on control charts, including but not limited to critical gradation(s) (i.e. passing no. 4, no. 100, no. 200 sieve); and additionally air content, unit weight and 28-day compressive for precast/prestressed concrete. Control charts shall indicate lots and sub-lots, target values, control limits, all in chronological order with legend. The Concrete Producer may use other types of control charts as deemed appropriate and as approved by the Engineer. Testing and charting shall be completed within 24 hours after sampling.

(c) Certification. At the conclusion of the project, the Concrete Producer shall certify in writing to the Engineer that all Portland Cement Concrete and Precast/Prestressed products have been produced, inspected and tested in accordance with, and meet the requirements of, the contract specifications.

Remove **Section 707; Adjust Drainage and Utility Structures**, pages 7-16 and 7-17 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace it with the following.

## **SECTION 707**

### **ADJUST DRAINAGE AND UTILITY STRUCTURES**

**707.01 DESCRIPTION.** This work consists of adjusting drainage structures, telephone, electrical, and sanitary manholes to those new grades and details indicated on the Plans or as directed by the Engineer, all in accordance with these Specifications.

**707.02 MATERIALS.** Materials shall conform to the applicable paragraphs of **Subsection 702.02.1; Masonry Unit Construction**, of these Specifications.

#### **707.03 CONSTRUCTION METHODS.**

**707.03.1 General.** In addition to the applicable paragraphs of **Subsection 702.03.1** of these Specifications, the following special requirements shall also apply.

When structures are to be adjusted in paved areas, cutting and matching pavement will be required. Cutting and matching pavement shall be performed in accordance with **SECTION 932** of these Specifications. When paved areas are open to traffic, the exposed vertical faces of adjusted structures shall be painted with iridescent orange reflective paint if less than or equal to 1-3/4 inches. An asphalt ramp shall be provided in cases where the exposed vertical face exceeds 1-3/4 inches.

Castings shall be carefully removed and stored and the walls of the structure adjusted to the proper line and grade by the removal or addition of bricks and mortar. Walls shall be plastered with 1/2-inch cement mortar where required.

Castings shall be reset to the proper line and grade in a bed of mortar. Prior to the placement of the final bituminous concrete course and following the secondary bituminous concrete course binder, an area of 1 foot outside the top of the frame shall be removed to a depth of 9 inches below the surface course. This area shall then be compacted and replaced with a Class A(AE) concrete collar to the level of the secondary bituminous course.

The Contractor shall maintain access to all catch basins and utility manholes at all times.

**707.03.2 Narragansett Bay Commission Structures.** In addition to the requirements of **Subsection 707.03.1**, the Contractor must obtain a Sewer Facility Permit from the Narragansett Bay Commission prior to removing any frame, cover or grate from any manhole or catch basin and prior to modifying and/or exposing any manhole, catch basin or service connection within the boundaries of the Narragansett Bay Water Quality Management District. The Contractor must strictly adhere to all conditions set forth in the Bay Commission's permit.

**707.04 METHOD OF MEASUREMENT.** "Adjust Catch Basins," "Adjust Manholes," "Adjust Telephone Manholes," "Adjust Electrical Manholes," "Adjust Sanitary Manholes," and "Adjust Narragansett Bay Commission Sanitary Manholes" will be measured by the number of each type structure actually installed in accordance with the Plans and/or as directed by the Engineer.

**707.05 BASIS OF PAYMENT.** The accepted quantities of "Adjust Catch Basins," "Adjust Manholes," "Adjust Telephone Manholes," "Adjust Electrical Manholes," "Adjust Sanitary Manholes," and "Adjust Narragansett Bay Commission Sanitary Manholes" will be paid for at the respective contract unit prices per each such structure 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 both the Engineer and the representative of the particular utility company involved.

In the case of "Adjust Narragansett Bay Commission Sanitary Manholes," the contract unit price shall also include the application fee for the Sewer Facility Permit.

Remove **Section 713; Adjust Curb Stop, Water Gate and Gas Gate Boxes**, page 7-25 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace it with the following.

## **SECTION 713**

### **ADJUST CURB STOP, WATER GATE, AND GAS GATE BOXES**

**713.01 DESCRIPTION.** This work consists of adjusting existing utility gate boxes and curb stops to new grades indicated on the Plans or as directed by the Engineer, all in accordance with these Specifications.

**713.02 MATERIALS.** Materials required for the adjustment of boxes shall conform to the applicable paragraphs of **Subsection 712.02**, of these Specifications.

**713.03 CONSTRUCTION METHODS.** Utility gate boxes and curb stops shall be carefully loosened from the surrounding material and adjusted to the designated new grades. In this regard, the use of gate box adapters will be allowed. The Contractor shall then carefully place approved granular material around the gate boxes and curb stops and hand tamp this material until it is well compacted. When paved areas are open to traffic, the exposed vertical faces of exposed utility structures shall be painted with iridescent reflective orange paint if less than or equal to 1-3/4 inches. An asphalt ramp shall be provided in cases where the exposed vertical face exceeds 1-3/4 inches.

The Contractor shall maintain access to the curb stops and utility gate boxes at all times.

When an existing gate box or curb stop is determined by the Engineer to be unadjustable, a new gate box or curb stop shall be furnished and installed in accordance with the applicable provisions of **SECTION 712; WATER AND GAS GATE BOXES**, of these Specifications.

**713.04 METHOD OF MEASUREMENT.** "Adjust Curb Stop Boxes," "Adjust Water Gate Boxes," and "Adjust Gas Gate Boxes" will be measured by the number of such units actually adjusted in accordance with the Plans and/or as directed by the Engineer.

**713.05 BASIS OF PAYMENT.** The accepted quantities of "Adjust Curb Stop Boxes," "Adjust Water Gate Boxes," and "Adjust Gas Gate Boxes" will be paid for at their respective contract unit prices per each such unit as listed in the Proposal. Each and every adjustment authorized by the Engineer will be paid for. 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 both the Engineer and the representative of the particular utility company involved.

Remove **Section 813; Waterproofing and Dampproofing**, pages 8-88 through 8-93 of the RI Standard Specifications for Road and Bridge Construction and pages AC11-10 through AC11-14 of the May 2011 Compilation of Approved Specifications 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. Waterproofing** shall consist of the application of heat-applied pre-fabricated membrane or a cold spray-applied liquid membrane, all as set forth below.

**b. Dampproofing** shall be formulated to apply to surfaces to minimize the intrusion of moisture in areas that will not bear traffic..

**813.01.2 Dampproofing.** This type of dampproofing consists of the application of a RIDOT approved dampproofing material 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 or unopened packages, 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 and all associated materials shall conform to **M.12.01.1**.

**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.12.02.1** 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.12.02.2** 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 oil, grease, curing compounds, algae, moss, laitance, friable matter, bituminous products, previous waterproofing membranes and any other material 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.** When directed by the Engineer, the Contractor shall furnish the services of a competent technical field representative of the approved manufacturer to be present at the work site prior to any use of materials. 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 surfaces and verify that all surfaces to be treated meet the requirements for application of the material. The application shall not proceed until the representative and the Engineer accept the surface preparation.

**b. Limitations.** The dampproofing shall be applied in accordance with the manufacturer's recommendations.

**c. Application.** Concrete surfaces which are to be protected by dampproofing with an approved bituminous material for absorptive treatment shall be applied 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.

#### **813.03.3 Heat-applied Pre-fabricated 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 prefabricated waterproofing sheet membrane that the applicators have been certified to install the membrane system. 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.

**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. 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.** 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. 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. Acceptance Testing.** Acceptance testing is the responsibility of the Engineer. Sampling frequency for all tests will be as deemed necessary by the Engineer. Adhesion testing will be per ASTM D4541. Damage as a result of the adhesion testing shall be repaired by the applicator at no additional cost to the State. Film thickness testing will be by non-destructive methods where feasible. If destructive testing is required, damage as a result of the thickness testing shall be repaired by the applicator at no additional cost to the State.

**5. 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.

Remove **Section 817, Repairs to Structure Concrete Masonry**, pages 8-110 through 8-116 of the RI Standard Specifications for Road and Bridge Construction and pages AC-63 and AC-64 of the January 2011 Compilation of Approved Specifications in its entirety and replace it with the following:

## SECTION 817

### REPAIRS TO STRUCTURE CONCRETE MASONRY

**817.01 DESCRIPTION.** This work consists of making repairs to structure concrete masonry by removing and disposing deteriorated concrete; furnishing and installing steel reinforcement; preparing bonding surfaces of concrete; preparing and installing bonding agent; replacing the deteriorated concrete with a specified repair material; and finishing and curing to the lines and grades specified at the locations indicated on the Plans, all in accordance with these Specifications and/or as may be directed by the Engineer.

#### 817.02 MATERIALS.

**817.02.1 Pneumatically Applied Mortar (Shotcrete).** Materials for shotcrete shall conform to the applicable requirements of **SECTION 601, SECTION 602** and **SECTION M.02**, respectively, of these Specifications, except as modified herein.

Shotcrete shall be produced by either the wet mix process or the dry mix process and conform to the following requirements unless otherwise indicated on the Plans:

<b>Material or Property</b>	<b>Value</b>
Compressive Strength at 28 days, $f_c'$ (psi)	As indicated on plans
Maximum Water/Cementitious Ratio	0.45
Minimum Cement Factor (lbs./cy.)	500
Air Content (percent)	5-9
Slump (inches)	1 to 3

**a. Mixture Proportions.** The Contractor shall determine, recommend and submit a mix proportion for acceptance, 28 day compressive strength results, water-cement ratio and source of materials. The Contractor shall select mix proportions on the basis of compressive strength tests of specimens continuously moist cured until tested at 28 days or different test age if so specified in accordance with ASTM C1604. Shotcrete core specimens shall be sampled from shotcreted test panels not earlier than 3 days after shotcreting. Sampling and testing of shotcrete cores shall be in accordance with ASTM C1604. Combined aggregate gradation (fine and coarse) shall meet either gradation #1 or #2 of Table 1.1 of ACI 506R, Section 1.5 as indicated on the Plans.

Premixed and prepackaged concrete products specifically manufactured as a shotcrete product may be provided for the dry mix shotcrete process only as approved by the Engineer. The packages shall contain cement and aggregates conforming to the materials requirement of this Specification and the product must be listed on the Department's Approved Materials List.

**817.02.2 Patching Mortar.** Patching mortar shall conform to the requirements of ASTM C928; "Rapid Hardening or Very Rapid Hardening Mortar" as indicated on the Plans, and be listed on the Department's Approved Materials List. The mortar shall be a non-shrink type and chloride free. Repair mortars not previously approved must be submitted for approval to the Engineer 45 days before intended use. All materials shall be used in accordance with manufacturer's recommendations.

**817.02.3 Reinforcement.** All reinforcement shall be galvanized and conform with the requirements of **Section M.05**.

**817.02.4 Bonding Agent.** A bonding agent shall be used when mortar repairs are specified or indicated on the Plans. The bonding agent shall be as specified and/or as indicated on the Plans, and be listed on the Department's Approved Materials List. Bonding agents not previously approved must be submitted for approval to the Engineer 45 days before intended use. All materials shall be used in accordance with manufacturer's recommendations.

**817.02.5 Form and Cast-in-Place Concrete.** Concrete shall be as indicated on the Plans and conform to the applicable provisions of **SECTION 601, Portland Cement Concrete** of these specifications.

### **817.03 CONSTRUCTION METHODS.**

**817.03.1 Surface Preparation (All Repair Methods).** All deteriorated soft or honeycombed concrete shall be removed from the areas to be repaired by means of suitable power and hand tools to a uniform depth, sufficient to expose a bonding surface of sound material. Power tools that cause or may cause over-breakage of concrete are prohibited. Pneumatic/chipping hammers shall not be heavier than the nominal 30 pound class. Pneumatic/chipping hammers or mechanical chipping tools, to remove concrete within two inches beneath or around reinforcing steel designated to remain, shall not be heavier than the nominal 15 pound class. Tools shall not contact reinforcing steel to remain.

The boundaries of areas to be removed where indicated on the Plans or as directed by the Engineer, shall be saw cut square to a minimum depth of 1 inch, unless otherwise noted on the Plans. Thin, tapered or feathered edges are prohibited.

In areas where reinforcing steel is found to be surrounded by deteriorated concrete or where at least one-half of the rebar surface area is exposed, the depth of concrete removal shall be such as to include all deteriorated concrete but not less than that depth necessary to allow for one inch minimum annular clearance around the reinforcing bars. All corroded reinforcing bars to remain within the concrete removal boundaries shall be thoroughly cleaned by sandblasting or by other suitable methods approved by the Engineer to remove all rust. Those bars that have lost 1/4 or more of their original diameter shall be supplemented by new bars spliced in place. New bars shall be lapped as indicated on the Plans to develop the full strength of the bar. Additional concrete removal may be necessary to provide this lap. Dual bars of equivalent or greater cross-sectional area may be used.

All newly exposed concrete repair surfaces shall be free of loose particles and other foreign material. The repair areas shall be thoroughly cleaned and be left roughened by the use of sandblasting, compressed air, air and water blasting, steam, wire brushing, or by other methods approved by the Engineer. The Contractor may use one or all of the various means of cleaning the repair areas as approved or as ordered by the Engineer.

Care shall be taken during the removal of the designated portions of the structure to avoid damaging the portions that are to remain in place. Any damage caused by the Contractor to the existing structure that is designated to remain in place shall be repaired or replaced by the Contractor at its own expense to the satisfaction of the Engineer. Regardless of the method of removal, if in the opinion of the Engineer the removal operation causes excessive damage to portions of the concrete which are to remain, the Contractor shall cease his operations until such time that an alternate removal method has been proposed by the Contractor and has been approved by the Engineer. Claims for additional time or compensation due to such cessation of operations will not be approved.

The Contractor shall ensure that no debris or any other material falls onto the roadway or waterway below the bridge. Should debris or material fall onto the roadway or waterway, such shall be removed immediately and all work shall stop until such time as a revised procedure of operation has been submitted and approved by the Engineer. All damages or injuries as a result of debris or material falling shall be the responsibility of the Contractor.

All such debris and materials shall be removed and legally disposed of off the project site. Storing or burying of material or debris on site is not allowed.

The surface against which mortar is to be placed shall be kept wet for at least one hour and then allowed to dry to a saturated surface dry (SSD) condition just prior to application of the repair material.

Where bonding agents are specified for use, they shall be applied in accordance with the manufacturer's recommendations. The Contractor shall be aware of the contact time, as per the manufacturer's recommendation after the placement of the bonding agent, and shall perform the necessary coordination between the associated construction activities, primarily the surface preparation, the erection of forms, and the delivery and placement of concrete. The Contractor shall take measures to ensure that the contact time is not exceeded. If the contact time is exceeded, the bonding agent shall be re-applied in accordance with the manufacturer's recommended procedures for reapplication, at no additional cost to the State.

**817.03.2 Placement of Reinforcing.** Repairs less than 1½-inches depth will not require wire mesh reinforcement unless otherwise directed by the Engineer. In cases where the thickness of the repair mortar exceeds 1½-inches depth and existing bar reinforcement is available, galvanized wire mesh reinforcement shall be attached to the bars with tie wire. If existing rebar is not available, wire mesh reinforcement shall be installed by means of mechanical concrete anchors in accordance with the requirements of Table 1. For areas where the repair exceeds 4 inches depth, a single layer of wire mesh shall be used to reinforce each 2-inch thickness of patch material.

**Table 1**

**Size and Spacing of Anchors**

<b>Thickness of Placement (in.)</b>	<b>Overhead Surfaces Dia.(in.) Spacing (in.)</b>	<b>Vertical Surfaces Dia. (in.) Spacing (in.)</b>	<b>Top Horizontal Surfaces Dia. (in.) Spacing (in.)</b>
1½ to 4	1/4 at 24	1/4 at 24	1/4 at 36
4 to 5	1/4 at 20	1/4 at 24	1/4 at 36
5 to 6	3/8 at 17	3/8 at 21	3/8 at 36
over 6	3/8 at 16	3/8 at 20	3/8 at 36

Mechanical concrete anchors shall be galvanized, hooked type expansion bolts to be approved by the Engineer. The exposed end of each anchor shall have at a minimum a right angle bend for engaging reinforcement. At least three anchors shall be used in each individual patch area.

If any reinforcement is damaged by the Contractor during the repair procedure, it shall be replaced at the Contractor's expense, as directed by the Engineer.

**817.03.3 Application of Pneumatically Applied Mortar (Shotcrete).**

**a. Submittals.** Submittal shall include shop drawings, details, material Certificates of Compliance including mill test reports, mix designs, Quality Control (QC) Plan to include but not be limited to staff qualifications, construction procedures, detailed construction sequencing plans, and details of temporary debris shields. Submittals shall be submitted for review and approval by the Engineer a minimum of 45 days prior to the commencement of work.

The Contractors QC Plan shall detail the following:

1. Number and qualifications of personnel involved in shotcrete placement
2. Surface preparation method
3. Equipment and materials for placement, finishing and curing
4. Placement method including application rates, plans for multiple layers where applicable, and methods for achieving required thickness and finish
5. Curing method
6. QC testing and inspection personnel
7. QC testing and inspection methods and frequencies including determinations of thickness and strength of placed shotcrete and checking for hollow areas and surface defects
8. Methods for correcting deficiencies in shotcrete thickness, strength, hollow areas and surface defects

The Contractor shall submit documentation substantiating that project personnel have appropriate qualifications. Inadequate documentation or substantiation of personnel qualifications will be cause for rejection of the QC Plan. Changes to previously approved personnel must be approved in writing. Shotcreting nozzle operators shall have at least one year of experience in the application of shotcrete and completed at least three projects of comparable nature or work under the immediate supervision of a

foreman or instructor with at least two years of such experience. Documentation of nozzle operator's experience shall be submitted with the QC Plan.

Work shall not begin until the Contractor's QC Plan is approved. The Engineer will suspend the work if the Contractor substitutes unqualified personnel for approved personnel during construction or if work is found to be unsatisfactory during placement of shotcrete. Claims for additional time or compensation due to such cessation of operations will not be approved.

**b. Batching and Mixing.** Aggregate and cement may be batched by weight or by volume. Mixing equipment shall be capable of thoroughly mixing the materials in sufficient quantity to maintain placing continuity. Ready mix shotcrete shall comply with the requirements of **Section 601**.

**c. Delivery Equipment.** The shotcrete shall be applied by pneumatic equipment that sprays the mix onto the prepared surface at the velocity needed to produce a compacted dense homogeneous mass. The velocity of the material as it leaves the nozzle must be maintained at a uniform rate determined for the given job conditions to minimize rebound.

**1. Dry Mix Process.** The delivery equipment shall deliver a continuous, smooth uniformly mixed material to the nozzle. The nozzle shall be equipped with a water ring and valve to permit adjustment of the water. The nozzle shall be capable of delivering a conical discharge stream.

**2. Wet Mix Process.** Only pneumatic-feed type delivery equipment will be allowed.

**d. Pre-Construction Testing.** Test panels shall be made by each application crew using the equipment, materials, mixture proportions and procedures proposed for the job prior to the commencement of the work. A test panel at least 30" x 30" shall be made for each mixture being considered and for each shooting position to be encountered in the job. The test panels shall be fabricated to the same thickness as in the structure, but not less than 4 inches. Take at least five, 3-inch minimum diameter cores from each panel for testing in accordance with ASTM C1604. Samples for testing shall be obtained by the Contractor in the presence of the Engineer, and tested by the Engineer.

**e. Placement of Shotcrete.** Shotcrete shall be applied with the same equipment and the same technique as used to construct the approved test panels. The nozzle operator constructing the test panels shall be the same operator used in placing shotcrete in the work. The shotcrete shall be applied as dry as practicable to prevent shrinkage cracking, sagging and sloughing off.

Shooting guide strips or wires shall be employed to ensure square corners, straight lines and a plane surface of mortar, except as otherwise indicated on the Plans or approved by the Engineer. They shall be so placed to minimize trapping of rebound. The re-use of rebounded materials is not allowed. Thickness measuring pins shall be installed on 5-foot centers in each direction. The pins shall be non-corrosive. Other methods to establish if the required minimum thickness of shotcrete is being applied may be approved if the Contractor can satisfactorily demonstrate the reliability of these other methods.

A sufficient number of mortar coats shall be applied to obtain the required thickness. On vertical and overhead surfaces, the thickness of each coat shall not be greater than 1 inch, except as approved by the Engineer, and shall be so placed that it will neither sag nor decrease the bond of the preceding coat. The time interval between successive layers in sloping, vertical or overhanging work, shall be sufficient to allow initial set but not final set to develop. At the time initial set is developing, the surface shall be

cleaned to remove the thin film of laitance in order to provide for a bond with succeeding applications. Rebound or accumulated loose sand shall be removed from the surface by brooming or scraping to be covered prior to placing of the original or succeeding layers of mortar and shall not be embedded in the work. All laitance which has been allowed to take final set shall be removed by sandblasting and thoroughly cleaning the surfaces.

To achieve an SSD condition, care shall be taken to thoroughly wash down all previously hardened concrete with water and compressed air before shooting new material.

The wire fabric reinforcement shall be positioned to minimize vibration while the shotcrete is being applied. Lap mesh one and a half squares in both directions. Tie wires shall be bent flat in the plane of the mesh and not form large knots.

The shotcrete shall be applied from the bottom up to prevent accumulation of rebound on the surface still to be covered.

Horizontal and vertical corners and any area where rebound cannot escape or be blown free shall be filled first. Nozzle shall be held at such distance and angle to place material behind reinforcement before material is allowed to accumulate on its face. Do not place shotcrete through more than one layer of reinforcing steel in one application. Unless suitable means to screen the nozzle is provided, discontinue shotcreting if wind or air currents will cause separation of the stream during placement.

The Contractor shall check in the presence of the Engineer for hollow areas by hammer sounding. Hollow areas, and areas containing any other non-conforming work or defects, are deemed to be deficient areas. An approved repair method including proposed mitigation measures shall be used to correct deficient areas. The repair method shall be submitted by the Contractor for review and approval by the Engineer prior to commencement of any repair work. Deficient areas shall be corrected at the Contractor's expense. At the discretion of the Engineer, deficient areas shall be repaired after initial placement of the shotcrete is completed. All shotcrete defects, including but not limited to, lack of uniformity, segregation, honeycombing, lamination, or which contains any dry patches, slugs, voids, or sand pockets shall be removed and replaced with fresh shotcrete at the Contractor's expense.

**f. Acceptance Testing.** The Contractor shall prepare one test panel for every 50 cubic yards of shotcrete placed or one panel per one days production, whichever is less. . Test panel shall have minimum dimensions of 24" x 24" x 4" gunned in the same position as the work represented. Panels shall be gunned during the course of the work by the previously qualified nozzle operator. Cure the panels and obtain a minimum of three cores as described under "Preconstruction Testing." Cores will be tested by the Engineer in accordance with the requirements listed under "Preconstruction Testing."

**g. Limitation of Mixing.** Shotcrete shall be placed in accordance with the temperature and weather conditions listed in **Section 601**.

**h. Finish.** All exposed surfaces shall be finished straight and true, approximating the original contour as close as practicable. The final finish shall be as indicated on the plans.

**i. Curing.** Shotcrete shall be cured in accordance with **Section 601**.

Curing compounds shall not be used on any surfaces against which additional shotcrete or other cementitious finishing materials are to be bonded.

**817.03.4 Application of Patching Mortar.** Concrete patching mortar shall be mixed, applied and cured in strict accordance with the manufacturer's recommendations. All exposed surfaces shall be finished straight and true, approximating the original contour as close as practicable. The final finish shall be as indicated on the plans.

**817.03.5 Application of Form and Cast-in-Place Concrete**

**a. General.** Repairs accomplished by the form and cast-in-place method shall be performed in accordance with the applicable requirements of **Section 808, CAST-IN-PLACE STRUCTURE CONCRETE MASONRY** of these specifications.

**b. Bonding to Existing Surfaces.** Prior to placing the Cast-in-Place Concrete, surfaces shall be prepped in accordance with these specifications or as indicated on the Plans. .

**c. Use of Self Consolidating Concrete (SCC) in Form and Cast-in-Place Concrete.** SCC concrete may be used for form and cast-in-place concrete repairs or as indicated on the plans. Concreting procedures shall be performed by personnel experienced with the placement of SCC mixes. All repair areas shall be adequately formed to contain the proposed SCC material, and all resulting holes from the required formwork fasteners shall be properly filled with an approved cementitious material. Special care shall be taken so that the form is properly sealed against leaks, since SCC is more fluid than standard mixes. If excessive surface voids are observed when stripping a form, further placements of the SCC shall cease until the mix and/or placement problem is identified and corrected to the satisfaction of the Engineer.

**d. Final Finish.** All exposed surfaces shall be finished straight and true, approximating the original contour as close as practicable. The final finish shall be as indicated on the plans.

**817.04 METHOD OF MEASUREMENT.** "Repairs to Structure Concrete Masonry - Pneumatically Applied Mortar", "Repairs to Structure Concrete Masonry - Patching Mortar" and "Repairs to Structure Concrete Masonry - Form and Cast-in-Place Concrete" will be measured by either the number of "Square Feet" or "Cubic Feet" of new concrete actually placed in accordance with the Contract Documents and/or as directed by the Engineer.

**817.05 BASIS OF PAYMENT.** The accepted quantities of "Repairs to Structure Concrete Masonry - Pneumatically Applied Mortar", "Repairs to Structure Concrete Masonry - Patching Mortar" and "Repairs to Structure Concrete Masonry - Form and Cast-in-Place Concrete" will be paid for at the respective contract unit prices per "Square Feet" or "Cubic Feet" as designated in the Proposal. The price so stated shall constitute full and complete compensation for all labor, materials, equipment, and all incidentals required to finish the work, complete in place and accepted by the Engineer.

Steel reinforcing bars and wire mesh reinforcement will be paid for separately by Force Account in accordance with the provisions of **Subsection 109.04** of these specifications, or when applicable will be paid under the respective pay item for Reinforcing Steel **Section 810**.

Remove **Section 820; Concrete Surface Treatment Protective Coating**, pages 8-120 through 8-122 of the RI Standard Specifications for Road and Bridge Construction and page AC14-18 of the August 2013 Compilation of Approved Specifications in its entirety and replace it with the following:

## **SECTION 820**

### **CONCRETE SURFACE TREATMENT PROTECTIVE SEALER**

**820.01 DESCRIPTION.** This work consists of providing two or more applications of a uniform coating to those concrete surfaces indicated on the Plans, or as directed by the Engineer, all in accordance with these Specifications.

**820.02 MATERIALS.** Concrete protective sealers shall conform to the requirements of **Subsection M.12.03** of these Specifications.

**820.02.1 Film Forming Sealers.** Concrete surface protective sealers applied to concrete median barriers shall be of the film forming sealer type and conform to the requirements of **Subsection M.12.03.1** of these Specifications. Other surfaces may receive film forming sealers in accordance with the contract plans and specifications.

**820.02.2 Penetrant Sealers.** Penetrant sealers shall be applied at locations in accordance with the contract plans and specifications and shall conform to the requirements of **Subsection M.12.03.2** of these Specifications.

#### **820.03 CONSTRUCTION METHODS.**

##### **a. Surface Preparation.**

1. Concrete to be coated shall be thoroughly clean and free of any efflorescence, laitance, frost, grease, curing compounds, form release oil, etc. or foreign substances that may impair the bond of the sealer. Surface preparation shall be performed in strict accordance with the manufacturer's written recommendations for the selected product. This cleaning must be completed no more than 24 hours prior to coating the concrete unless otherwise indicated by the manufacturer's recommendations.

2. Curing time of concrete surfaces to receive the sealer shall be as per the manufacturer's recommendations, but not less than 21 days after concrete has been placed and finished.

3. All adjacent surfaces not specified to be coated shall be properly masked to protect from potential over-spray or spillage.

4. Areas adjacent to the surface to be coated shall be cleaned by high pressure water washing prior to commencing work.

##### **b. Application.**

1. The protective coating shall be applied evenly in a continuous operation over all surfaces to be treated in order to obtain a uniform coat. The work shall be scheduled so that the stopping point each day falls at an opening, joint, column or corner.

2. Unless otherwise specified, protective concrete sealers shall be applied to concrete surfaces in alternating coats of light gray and white, with the top coat being white. Further application procedures shall follow the manufacturer's recommendations.

3. Protective concrete sealer shall be applied within the environmental conditions specified in accordance with the manufacturer's recommendations. The coating shall not be applied in the rain, at the imminent approach of rain or when it is windy so that it adversely affects the application procedure. The time interval between coats shall be as recommended by the manufacturer.

4. Storage and preparation of the sealer prior to application shall be per the manufacturer's recommendations. For multi-component systems, the ratio, ratio tolerance and blending method shall be in accordance with the manufacturer's recommendations.

5. The protective concrete sealer shall be applied by methods and equipment types as given in the manufacturer's recommendations and as approved by the Engineer. The methods employed shall provide an aesthetically pleasing, uniform, consistent protective coat, without splatter, holidays or other defects.

At the Engineer's discretion, the Contractor may be required to apply the coating to a sample section of not less than 25 square feet, prior to the start of work to demonstrate that the applicator is capable of performing work to the satisfaction of the Engineer. The surface for the sample shall be representative of the concrete to be coated for the project, as accepted by the Engineer. The sample shall provide a reference for the minimum quality level for the project application. No concrete sealer work shall start on the project until the sample section, if required, has been approved by the Engineer.

6. When spray equipment is used to apply a coating consisting of two or more parts, the spray equipment shall be capable of automatically shutting down if the mixing ratio cannot be maintained with the tolerance specified.

7. Coverage shall be applied at both the rate and the number of coats as recommended by the manufacturer of the selected product.

8. The applicator shall be experienced and qualified by the manufacturer in the proper application procedure for the concrete sealer. Documentation attesting to this shall be provided for the Engineer's review and approval prior to the start of any work. A manufacturer's representative may be required to be present during all or part of the work at the discretion of the Engineer, at no additional cost to the State.

9. The operation may commence or proceed only with the approval of the Engineer.

**820.04 METHOD OF MEASUREMENT.** "Concrete Surface Treatment Protective Sealer" will be measured by the number of square feet of concrete surface actually coated in accordance with the Plans and/or as directed by the Engineer.

**820.05 BASIS OF PAYMENT.** The accepted quantity of "Concrete Surface Treatment Protective Sealer" will be paid for at the contract unit price per square foot as listed in the Proposal. The price stated shall constitute full and complete compensation for all labor, materials, equipment, and all incidentals required to complete the work as described in this Specification and elsewhere in the Contract Documents, complete in place and accepted by the Engineer.

Remove **Subsection 839.03; Remove and Dispose Bituminous Concrete Pavement from Concrete Bridge Decks – Construction Methods**, pages 8-190 and 8-191 of the RI Standard Specifications and replace it with the following.

## SECTION 839

### REMOVE AND DISPOSE BITUMINOUS CONCRETE PAVEMENT FROM CONCRETE BRIDGE DECKS – PARTIAL-DEPTH AND FULL-DEPTH

#### 839.03 CONSTRUCTION METHODS.

**839.03.1 Partial-Depth Removal.** The Contractor shall ensure that the process of partial pavement removal will not cause any damage to the waterproofing membrane, underlying concrete deck and/or bridge joints to remain. The Contractor shall also ensure that the method proposed will remove the specified layer thickness of the bituminous wearing surface as indicated on the Plans. Under no circumstances will full depth removal be allowed. The specifications, including gross weight(s) of the proposed equipment and/or machinery to be used for the removal operation shall be submitted to the Engineer for approval a minimum of 14 calendar days prior to the start of work; the Engineer will respond to the Contractor within 7 calendar days of receipt of the Contractor's submission. The proposed equipment and/or machinery loads shall not exceed the legal load limit or the posted load limit for the bridge, whichever is less. In addition, equipment and/or machinery to be used shall have the capability and precision necessary to adhere to the pavement removal depth requirements. Damage caused to the waterproofing membrane, bridge deck and/or bridge joints as a result of the Contractor's operation shall be repaired to the satisfaction of the Engineer at no additional cost to the State.

The pavement removal shall be performed in accordance with the sequence of construction and traffic controls indicated on the Plans. Where required, the Contractor shall saw cut the pavement to prevent over-breakage into the vehicular travel areas. In the event that this type of over-breakage does occur, the Contractor shall immediately patch the damaged bituminous areas using a bituminous patching material which conforms with **SECTION 410, TEMPORARY PATCHING OF POTHOLES AND TRENCHES**, of these Specifications at no additional cost to the State. The removal operation shall not endanger the general public or interfere with the established traffic maintenance plan.

All materials removed shall be transported from the site and legally disposed of by the Contractor.

**839.03.2 Full-Depth Removal.** The Contractor shall ensure that the process of removal of the pavement and the waterproofing membrane will not cause any damage to the underlying concrete deck and/or bridge joints to remain. The Contractor shall also ensure that the method proposed will completely remove the existing waterproofing membrane to allow for the proposed deck patching repairs and new waterproofing system installation. The Contractor will note that the thickness of the existing pavement may vary. The specifications, including gross weight(s) of the proposed equipment and/or machinery to be used for the removal operation, shall be submitted to the Engineer for approval a minimum of 14 calendar days prior to the start of work; the Engineer will respond to the Contractor within 7 calendar days of receipt of the Contractor's submission. The proposed equipment and/or machinery loads shall not exceed legal load limit or the posted load limit for the bridge, whichever is less. Damage caused to the

deck and/or bridge joints as a result of the Contractor's operation shall be repaired to the satisfaction of the Engineer at no additional cost to the State.

The pavement and waterproofing removal shall be performed in accordance with the sequence of construction and traffic controls indicated on the Plans. Where required, the Contractor shall saw cut the pavement to prevent over-breakage into the vehicular travel areas. In the event that this type of over-breakage does occur, the Contractor shall immediately patch the damaged bituminous areas using a bituminous patching material which conforms with **SECTION 410, TEMPORARY PATCHING OF POTHoles AND TRENCHES** of these Specifications, at no additional cost to the State. The removal operation shall not endanger the general public or interfere with the established traffic maintenance plan.

All materials removed shall be transported from the site and legally disposed of by the Contractor.

Remove Code 901.0198 and Code 901.0199, **Guardrail End Treatment - Non-Energy Absorbing Terminal** and **Guardrail End Treatment - Energy Absorbing Terminal**, page AC-96 of the January 2011 Compilation of Approved Specifications in its entirety and revise **Section 901, Steel Beam Guardrail**, pages 9-1 to 9-3 of the RI Standard Specifications for Road and Bridge Construction as follows.

## SECTION 901

### STEEL BEAM GUARDRAIL

- **Add the following Subsection 901.01.1.**

**901.01.1 Guardrail End Treatment, Non-Energy Absorbing Terminal and Guardrail End Treatment, Energy Absorbing Terminal.** Work under these items shall consist of furnishing and installing a guardrail end treatment in the form of a non-energy or energy absorbing terminal section approved in accordance with MASH or NCHRP 350 and that passes, at a minimum, Test Level 3 (TL-3) crash test criteria at locations indicated on the Plans or as directed by the Engineer. As part of this work, an object marker shall be furnished and affixed to the approach end of the guardrail terminal in accordance with the latest MUTCD.

- **Add the following Subsection 901.02.4.**

**901.02.4 Guardrail End Treatment, Non-Energy Absorbing Terminal and Guardrail End Treatment, Energy Absorbing Terminal.** The non-energy and energy absorbing terminals shall be products listed on the Department's Approved Materials List, or approved equivalents. Any products not included on the Approved Materials List shall have been tested and verified to meet all the criteria for MASH or NCHRP 350, TL-3, and the Contractor shall provide supporting documentation such as an FHWA acceptance letter.

The object marker affixed to the approach end of the guardrail terminal shall meet the requirements of the latest MUTCD. Every terminal shall have an object marker. The object marker shall conform to the size and shape of the approach end of the guardrail terminal with alternating black and retroreflective yellow stripes sloping downward at an angle of 45 degrees toward the side of the guardrail on which traffic is to pass. High intensity retroreflective sheeting shall be used for the object marker, and it shall conform to the requirements of AASHTO M 268, Type A, Standard Specification for Retroreflective Sheeting for Flat and Vertical Traffic Control Applications. The object marker shall have a smooth weather-resistant outer surface, a pre-coated pressure sensitive adhesive backing, and adhere to steel. The adhesive shall have no staining effect on the retroreflective sheeting and shall be mildew resistant.

- **Add the following to Subsection 901.03.1, Installation.**

**e. Guardrail End Treatment, Non-Energy Absorbing Terminal and Guardrail End Treatment, Energy Absorbing Terminal.** The guardrail end treatments in the form of non-energy and energy absorbing terminals shall be installed per the manufacturer's recommendations. The Contractor shall affix the object marker in accordance with the manufacturer's recommendations and their provided

application instructions, all in accordance with this specification. Placement and orientation of the object marker shall be in accordance with the latest MUTCD. The finished object marker shall show careful workmanship, be free of burrs, scratches, or damage and shall have a smooth surface.

- **Add the following Subsection 901.03.3.**

**901.03.3 Submittals.** Prior to installation of the “Guardrail End Treatment, Non-Energy Absorbing Terminal” and “Guardrail End Treatment, Energy Absorbing Terminal”, the Contractor shall furnish three (3) copies of the manufacturer’s installation manual to the Engineer. The Contractor shall submit for approval Shop Drawings for guardrail terminals not on the Approved Materials List in accordance with the provisions of **Subsection 105.02** of the Standard Specifications.

- **Add the following Subsection 901.04.4.**

**901.04.4 Guardrail End Treatment, Non-Energy Absorbing Terminal and Guardrail End Treatment, Energy Absorbing Terminal.** “Guardrail End Treatment, Non-Energy Absorbing Terminal” and “Guardrail End Treatment, Energy Absorbing Terminal” will be measured by the number of units installed in accordance with the Plans and/or as directed by the Engineer.

- **Add the following Subsection 901.05.4.**

**901.05.4 Guardrail End Treatment, Non-Energy Absorbing Terminal and Guardrail End Treatment, Energy Absorbing Terminal.** The accepted quantities of “Guardrail End Treatment, Non-Energy Absorbing Terminal” and “Guardrail End Treatment, Energy Absorbing Terminal” will be paid for at their respective contract unit prices per each as listed in the Proposal. The prices 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 945, Removal of Traffic Signal Equipment** to the RI Standard Specifications for Road and Bridge Construction.

## **SECTION 945**

### **REMOVAL OF TRAFFIC SIGNAL EQUIPMENT**

**945.01 DESCRIPTION.** This work consists of removing and either disposal or salvaging of existing traffic signal equipment, as called for on the Plans. Traffic signal equipment to be removed may include, but is not limited to, traffic signal wire and cable; mast arm, span, and pedestal poles with or without foundations; traffic signal cabinets with or without foundations; traffic detectors and pedestrian pushbuttons; controllers, relays, and associated equipment housed inside traffic signal cabinets; and traffic signal heads. Removal of existing handholes, manholes, conduit, and risers associated with a traffic signal will be paid for under the appropriate individual and separate pay item.

#### **945.02 CONSTRUCTION METHODS.**

**945.02.01 General.** Where traffic signal equipment is to be removed from an intersection that will remain open to traffic and be controlled by a new or improved traffic signal implemented as part of the Contract, the Contractor shall minimize the amount of time that a traffic signal is not operational and actively controlling traffic at the intersection, and the Contractor shall plan for and schedule the work accordingly. Unless otherwise approved by the Engineer, the Contractor's schedule shall provide for the new or improved traffic signal to be operational before the end of the same working day when the existing traffic signal is turned off. An appropriate number of Trafficpersons and other temporary traffic control devices, as approved by the Engineer and as may be shown on the Plans, must be used to safely control traffic at such intersections when the traffic signal is not operational.

The Contractor shall avoid damaging existing equipment and materials that are to remain in place while removing traffic signal equipment. Damage that occurs due to the action or inaction of the Contractor shall be repaired by the Contractor at no additional cost to the State.

When a gap or opening remains on an existing-to-remain pole after the removal of traffic signal equipment, the Contractor shall cover such openings using a knockout seal or other appropriate material in order to provide a secure closure of the opening to the satisfaction of the Engineer. There will be no separate payment for this work.

Unless otherwise indicated on the Plans, a Plan callout to remove and dispose the foundation of a traffic signal pole or cabinet shall require the removal of the foundation, including all reinforcement, ground rods, and conduit/wiring within, to a minimum depth of twenty-four (24) inches below the finished grade surrounding the foundation, with the remaining portion of the foundation to remain buried in place. The resulting excavated areas shall be backfilled with suitable material, compacted, and finished in accordance with the applicable Sections of these Specifications so that the patched areas will match existing conditions to the satisfaction of the Engineer.

**945.02.02 Removal and Disposal of Traffic Signal Equipment.** All existing traffic signal equipment to be removed and disposed will be identified on the Plans, and all such designated equipment shall, upon removal, be legally disposed of.

**945.02.03 Removal and Salvaging of Traffic Signal Equipment.** All existing traffic signal equipment to be removed and salvaged will be listed in a table on the Plans. The delivery address and contact person information for all such salvaged equipment will also be provided on the Plans. All pieces of equipment to be salvaged shall be tagged by the Contractor, with each tag identifying the Contract number, the intersection or location from which the equipment was removed, the date that the equipment was removed, and a description of the name and/or type/function of the equipment. The Contractor shall call the contact person to coordinate the delivery of the salvaged equipment, and no delivery shall be scheduled prior to confirming an acceptable date/time with such contact person. All salvaged traffic signal equipment shall be delivered to the address noted on the Plans. The Contractor shall obtain a written receipt(s) for all equipment that has been received at the delivery address and submit such to the Engineer to allow for processing of payment(s).

**945.03 METHOD OF MEASUREMENT.** “Remove and Dispose Traffic Signal Equipment” and “Remove and Salvage Traffic Signal Equipment” do not require a measurement for payment. The lump sum unit of measure will be used and included in the Contract where these items are specified.

**945.04 BASIS OF PAYMENT.** “Remove and Dispose Traffic Signal Equipment” and “Remove and Salvage Traffic Signal Equipment” will be paid for in accordance with **Section 109.07** of the Standard Specifications and at the Contract lump sum price as listed in the Proposal. The price constitutes full and complete compensation for all labor, materials, equipment, and all incidentals required to finish the work, complete and accepted by the Engineer.

Remove **Section M12, Waterproofing Dampproofing and Sealers (Concrete Protective Systems)**, pages M-45 to M-49 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace it with the following:

## SECTION M.12

### WATERPROOFING, DAMPPROOFING AND SEALERS (CONCRETE PROTECTIVE SYSTEMS)

**M.12.01 WATERPROOFING.** Products shall be on the RIDOT Approved Products List or submitted for review and approval by the Engineer.

**M.12.01.1 Heat-applied Pre-fabricated Membrane.** Primer: The primer shall allow the quick application of the prefabricated waterproofing sheet membrane and shall be as specified by the manufacturer of the membrane.

Sheet Membrane: The membrane material shall consist of a prefabricated reinforcement of synthetic nonwoven material, thoroughly impregnated and coated with styrene-butadiene-styrene (SBS) modified bitumen. It shall be provided in rolled sheet form.

Curb bitumen shall be a SBS modified liquid bitumen that conforms to the following tests:

Test	Method	Required Result
Softening Point	ASTM D-2398	Penetration at 77°F
Tensile strength	UEAtc	100 lbs. /in min (170N/cm min)
Low Temperature Flexibility	Appearance of the membrane lower face after bending at 5°F (-15°C)	No damage
Puncture Resistance	ASTM-E154	315 lbs. (1400N) min 1 ½ in. (40mm min)
Softening Point	ASTM-D36	≥ 150°C

**M.12.01.2 Cold Spray-applied Liquid Membrane.**

**a. Primer.** Primer shall be a 100-percent reactive, monomer or polymer-based, two-component resin.

**b. Membrane.** The coating system shall be a spray applied, 100% solids, fast cure, high-build monomer or polymer system. Primer is required. The membrane system shall pass ASTM C 836 Crack Bridging Test at 80 mils, or the thickness applied shall be at least equal to the thickness used by the manufacturer for the ASTM C 836 Crack Bridging Test. A manufacturer-approved tack coat shall be included for overlays on the waterproofing membrane. In addition the membrane shall meet or exceed the following properties, submitted with a Certificate of Compliance, as related to laboratory prepared samples. Broadcast aggregate, if required, shall be per the manufacturer's recommendations.

**Test Method Required Results**

<b>Test</b>	<b>Method</b>	<b>Required Results</b>
Initial Cure Time	N/A	≤30 Minutes, 73°F 50-85% RH
Water Vapor Transmission	ASTM E 96	0.026 gr./ft <sup>2</sup> /hr (0.18 g/m <sup>2</sup> /hr)
Adhesion to Concrete	ASTM D 4541	>100 psi
Adhesion to Steel	ASTM D 4541	>290 psi
Tensile Strength, Method A, Die C	ASTM D 638	>435 psi
Elongation at Break, Method A, Die C	ASTM D 638	>100%
Low Temperature	¼" (6.35mm) mandrel @ -13°F (-25°C)	Pass
Crack Bridging	ASTM C 836	Pass @ 10 cycles, 0.0625 in, -15°F (1.6mm, -26°C)

**M.12.02 DAMPPROOFING.** Products shall be on the RIDOT Approved Products List or submitted for review and approval by the Engineer.

**M.12.02.1 Primer** shall be as required by the Manufacturer.

**M.12.02.2 Mop Coats** shall conform to ASTM D449.

**M.12.03 CONCRETE PROTECTIVE SEALERS.** All material is subject to the approval of the Engineer. It shall have been tested by the manufacturer in accordance with these specifications and submitted to the Engineer for approval prior to the start of application. The material shall conform to the following requirements.

- a. Shall meet all current Federal and State environmental regulations.
- b. Shall not contain oxidizing ingredients such as marine oils, stearates and vegetable oils.
- c. Shall reduce the chloride intrusion into concrete by 90 percent when tested in accordance with AASHTO T259 "Resistance of Concrete to Chloride Ion Penetration" or by 55 percent when tested in accordance with RIDOT Materials Laboratory Test "Chloride Penetration Resistance of Concrete Sealers" as described in research report FHWA-RI-RD-90-1 "Laboratory Evaluation of Concrete Sealers for Vertical Highway Structures."
- d. Shall reduce the net moisture weight gain of concrete after drying to 30 percent or less as tested in accordance with RIDOT Materials Laboratory Test "Water Absorption and Water Vapor Transmission of Concrete Sealers," as described in RIDOT research report FHWA-RI-RD-90-1 "Laboratory Evaluation of Concrete Sealers for Vertical Highway Structures."
- e. Shall provide effective freeze-thaw protection to the underlying concrete as tested in accordance with ASTM C666; "Resistance of Concrete to Rapid Freezing and Thawing," as modified by RIDOT for coated specimens, as described in RIDOT research report FHWA-RI-RD-90-1 "Laboratory Evaluation of Concrete Sealers for Vertical Highway Structures."
- f. Shall be applied in a minimum of two coats, or as recommended by the manufacturer.
- g. Shall be used as supplied by the manufacturer. It shall not be diluted or altered in any way.
- h. At least 2 weeks prior to the start of application a one gallon sample of the product and all pertinent information, including but not limited to manufacturer's protective coating test results, shall be submitted to the Engineer by the manufacturer.

**M.12.03.1 Film Forming Sealers** shall form a durable, impermeable surface coat over the concrete substrate, and shall conform to the following.

- a. Shall be a formulation which, when set, is weatherproof, waterproof, resistant to most chemicals, inhibits the intrusion of chloride salts and has exceptionally strong adhesive qualities.
- b. Shall, in the case of two-component coatings, be shipped in new containers identified Part "A" and Part "B," and shall be proportioned in each container to provide the manufacturer's specified mixing ratio.

**M.12.03.2 Penetrant Class Sealers** shall penetrate the surface of the concrete substrate and leave no visible trace of its presence.