

COMPILATION OF APPROVED SPECIFICATIONS

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

**REVISIONS
SUPPLEMENTAL SPECIFICATIONS
SPECIAL PROVISIONS**

JANUARY 2011

**THIS SPECIFICATION COMPILATION REPLACES THE FOLLOWING
DOCUMENTS**

<u>Document</u>	<u>Release Date</u>
RI Standard Specifications for Road and Bridge Construction, Division I, Part 100 – General Requirements and Covenants	07/01/2004
Compilation of Approved Specifications (Revised 10/21/2010) [Replaced Supplement Nos. 1 – 7]	09/15/2008
Compilation of Approved Specifications – Supplement No. 8	06/01/2009
Compilation of Approved Specifications – Supplement No. 9	10/26/2009
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DISCLOSURES:

- 1. EXCEPT FOR THE REMOVAL OF DIVISION I, PART 100 OF THE RI STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, ALL THE MATERIAL CONTAINED IN THIS DOCUMENT HAS BEEN PREVIOUSLY RELEASED IN THE SPECIFICATION COMPILATIONS LISTED ABOVE.**

- 2. DIVISION I, PART 100 – GENERAL REQUIREMENTS AND COVENANTS, INCLUDING ALL REVISIONS, IS REPLACED IN ITS ENTIRETY WITH SECTION 12 OF THE RI DEPARTMENT OF ADMINISTRATION DIVISION OF PURCHASES PROCUREMENT REGULATIONS.**

- 3. DIVISION II, CONSTRUCTION DETAILS AND DIVISION III, MATERIALS, OF THE 2004 EDITION OF THE RI STANDARD SPECIFICATIONS ARE REPLACED WITH THE RI STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, AMENDED DECEMBER 2010. REVISIONS TO DIVISIONS II AND III ARE CONTAINED IN THIS COMPILATION.**

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Delete **Division I, Part 100; General Requirements and Covenants**, pages 1-1 to 1-81 of the RI Standard Specifications for Road and Bridge Construction, 2004 Edition in its entirety. Refer to Section 12 of the RI DOA Division of Purchases Procurement Regulations for these requirements.

DIVISION I

PART 100

GENERAL REQUIREMENTS AND COVENANTS

[DELETED]

Revise **Section 202; Excavation and Embankment**, pages 2-11 to 2-22 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION 202

EXCAVATION AND EMBANKMENT

- **Replace Subsection 202.02; Materials in its entirety with the following.**

202.02 MATERIALS

202.02.1 Common Borrow. Common Borrow shall consist of approved material required for the construction of embankments or for other portions of the work. Common Borrow shall meet the requirements of **Subsection M.01.01** of these Specifications prior to its final placement on the Project. The practice of culling deleterious or out of specification material after placement and/or grading in-place will not be allowed.

202.02.2 Gravel Borrow. Gravel Borrow shall meet the requirements of **Subsection M.01.09; Gradation of Aggregates, Table I, Column I** prior to its final placement on the Project. The practice of culling deleterious or out of specification material after placement and/or grading in-place will not be allowed.

- **Replace Subsection 202.03.3(a); Compaction – General - Densities with the following.**

a. Densities.

1. Maximum density and optimum moisture content will be determined by AASHTO T180.
2. Field density of soil in place will be determined by either AASHTO T191 or a nuclear moisture density gauge conforming to AASHTO T310.
3. The method of correcting for oversize particles in soil compaction test results, if necessary, will conform to AASHTO T224.

Revise **Subsection 203.02; Materials**, page 2-23 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION 203

STRUCTURE EXCAVATION AND BACKFILL

- **Replace the first paragraph of Subsection 203.02; Materials, with the following.**

203.02 MATERIALS. Backfill materials as specified in the Contract Documents shall conform to the applicable requirements of **SECTION M.01; BORROW AND AGGREGATES**, of these Specifications. All backfill materials shall conform to all applicable specification requirements prior to its final placement on the project. The practice of culling deleterious or out of specification material after placement and/or grading in-place will not be allowed.

[Remainder of this Subsection is unchanged]

Remove **Section 206; Perimeter Erosion Controls**, pages 2-37 through 2-39 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace with the following.

SECTION 206

PERIMETER EROSION CONTROLS

206.01 DESCRIPTION. This work consists of the provision of perimeter erosion controls in reasonably close conformity with the dimensions and details indicated on the plans or as directed by the Engineer, all in accordance with these Specifications. Perimeter erosion controls consist of the following four types.

206.01.1 Baled Hay Erosion Checks. Baled hay erosion checks shall consist of baled hay or straw, each bale of which is embedded and attached to the ground with wood stakes, and are constructed as indicated on the Plans.

206.01.2 Silt Fence. Silt fencing shall consist of oak fence posts to which are attached industrial support netting and sediment control filter fabric, and are constructed as indicated on the Plans.

206.01.3 Baled Hay Erosion Check and Silt Fence Combined. Baled Hay Erosion Checks and silt fence combined shall consist of baled hay erosion check installed abutting the filter fabric side of a silt fence, with a minimum of six (6) inches along the bottom edge of the silt fence toed in under the baled hay erosion check as indicated on the Plans.

206.01.4 Compost Filter Sock. Compost filter sock shall consist of a flexible mesh tube filled with composted material and staked to the ground with wooden stakes, and constructed as indicated on the plans.

206.02 MATERIALS.

206.02.1 Baled Hay Erosion Checks. Baled hay or straw shall be baled within twelve months of use. Bindings shall be sufficiently strong to act as handles when placing bales in position by hand. The minimum dimension of any bale shall be 18 inches. Wood stakes shall be oak, 1-inch by 1-inch in section, and at least 3 feet in length.

206.02.2 Silt Fence. The filter fabric shall be a material suitable for erosion control applications and shall be one of those included on the Department's Approved Materials List. Wood posts shall be oak, 2-inch by 2-inch in section, and at least 4.5 feet in length. Support netting shall be heavy-duty plastic mesh. For prefabricated silt fence, 1-inch by 1-inch wood posts will be permitted.

206.02.3 Baled Hay Erosion Check and Silt Fence Combined. Baled Hay or straw shall conform to the requirements of **Subsection 206.02.1** above. Silt fencing shall conform to the requirements of **Subsection 206.02.2** above.

206.02.4 Compost Filter Sock. Compost filter sock material shall be in accordance with AASHTO Designation: MP 9-06 (2007 or latest revision). Compost filter material shall be in accordance with AASHTO Designation: MP 9-06 (2007 or latest revision). Compost material shall also meet all applicable Federal and State Regulations. For compost filter socks 18 inches or less in diameter, wooden stakes shall

be 1 inch by 1 inch, at 10 foot intervals on center, and of a length that shall project into the soil 1 foot leaving 3 inches to 4 inches protruding above the filter sock. For compost filter socks greater than 18 inches in diameter wooden stakes shall be 2 inch by 2 inch, at 10 foot intervals on center, and of a length that shall project into the soil 1 foot leaving 3 inches to 4 inches protruding above the filter sock.

206.03 CONSTRUCTION METHODS. Those erosion and pollution controls indicated on the Plans shall be installed and approved by the Engineer before the commencement of any drainage, roadway, or bridge construction.

206.03.1 Baled Hay Erosion Checks.

a. Installation. Baled hay erosion checks shall be constructed at the locations, and in accordance with the details indicated on the Plans, or as directed by the Engineer. The following stipulations also apply:

1. Bales shall be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another.

2. The erosion check shall be entrenched and backfilled. The trench shall be excavated the width of the bale and the length of the check to a minimum depth of 3 inches. After the bales are staked and chinked, the excavated soil shall be backfilled against the check. Backfill shall conform to the ground level on the downhill side and shall be built up to 4 inches against the uphill side.

3. The bales are to be installed so that the bindings are oriented around the sides of the bales rather than along their tops and bottoms.

4. Each bale shall be securely anchored by at least two stakes driven through the bale. The first stake in each bale should be driven toward the previously laid bale to force the bales together.

5. The gaps between bales shall be chinked (filled by wedging) with straw to prevent water from escaping between bales. Loose straw shall be scattered over the area immediately uphill from the bale erosion check to increase efficiency.

6. At approximate intervals of 100 feet, one bale is to be placed against those bales positioned along the limit of clearing. This bale is to be placed at a right angle to the line of the toe of slope, all as indicated on the Plans.

b. Removal. All stakes must be removed from the haybales at a time designated by the Engineer. In general the bales will be allowed to rot in place. If the Contract requires the haybales to be removed, they may be removed only when the adjacent exposed area has been stabilized, i.e., the area has an established grass or stone cover or has been paved, and is free from future uncontrolled discharges. Prior to such removal, however, all silt, mud, and debris entrapped by the haybales shall be removed and the area cleaned up in accordance with the applicable provisions of **SECTION 212** of these Specifications. Immediately upon removal of the bales the remaining exposed areas (under the bales) will be backfilled, raked, and graded as necessary to match the surrounding grade and then seeded.

206.03.2 Silt Fence.

a. Installation. Silt fence shall be constructed at the locations, and in accordance with the details indicated on the Plans, or as directed by the Engineer. The following stipulations also apply:

1. A 6-inch deep by 1-foot wide minimum trench shall be dug where the fence is to be installed.
2. The fence shall be positioned in the trench with the fence posts set at 8 feet on center (maximum) in wetland areas and 4 feet on center (maximum) in wetland ravine, gully or drop-off areas, as indicated on the plans.
3. The sedimentation control fabric and the industrial netting shall be stapled to each post. When joints are necessary, filter fabric shall be spliced together only at support posts. Splices shall consist of a 6-inch overlap, and shall be securely sealed.
4. Each wood post with industrial support netting and filter fabric attached shall be driven into the undisturbed soil in the trench as indicated on the Plans.
5. The trench shall be backfilled and the soil compacted over the filter fabric.
6. The installed height of the fence shall be 2½ feet (minimum). However, height shall not exceed 36 inches since higher barriers impound volumes of water sufficient to cause failure of the fence structure.

b. Removal. This work will include the removal of the silt fence erosion checks and posts. Silt fence will not be left to rot in place. The silt fence may be removed only when the adjacent exposed area is stabilized, i.e., the area has an established grass or stone cover or has been paved, and is free from future uncontrolled discharges. Prior to such removal, however, all silt, mud, and debris entrapped by the silt fence shall be removed and the area cleaned up in accordance with the applicable provisions of **SECTION 212** of these Specifications. Immediately upon removal of the silt fence the remaining exposed areas will be finished as specified above in **Para. b** of **Subsection 206.03.1**.

206.03.3 Baled Hay Erosion Check and Silt Fence Combined.

a. Installation. Baled Hay Erosion Check and Silt Fence Combined shall be installed in accordance with the requirements of **Para. a** of **Subsections 206.03.1** and **206.03.2**, with the following additional provisions:

1. Silt fencing shall be installed prior to the installation of the baled hay or straw.
2. The trench shall be a minimum of 6-inches deep and a width wide enough to accommodate the baled hay or straw as it abuts the filter fabric side of the silt fence.
3. Prior to backfilling the trench, the baled hay or straw shall be installed tight against the filter fabric side of the silt fence, with a minimum of six (6) inches of the bottom edge of the silt fence toed in under the baled hay within the trench.

b. Removal. This work will include the removal of the combined baled hay erosion check and silt fence in accordance with **Para. b** of **Subsections 206.03.1** and **206.03.2**, with the exception that the baled hay erosion checks will not be allowed to remain and rot in place.

206.03.4 Compost Filter Sock.

a. Installation. Compost Filter socks shall be constructed at the locations, and in accordance with the details indicated on the plans, or as directed by the Engineer. The following stipulations also apply:

1. Compost filter socks may be either fabricated on site or delivered to the site.
2. Trenching is not required. Compost filter socks shall be placed over the top of ground, wooden stakes shall be driven through the center of the filter socks to anchor them to the ground. To ensure optimum performance, heavy vegetation shall be cut down or removed, and extremely uneven surfaces shall be graded to ensure that the compost filter sock uniformly contacts the ground surface.
3. Filter socks shall be placed in a continuous line. Where ends intersect they shall be sleeved to create an interlock with a two (2) foot overlap. After one section is filled and the ends tied off, the next section shall be pulled over the tied off end of the previous section, to create a 2 foot overlap. The overlap shall be staked. The intersecting overlaps shall be constructed to ensure that stormwater does not break through at these intersection points.

b. Removal. This work, if required, shall include the removal of the compost filter sock and stakes. Unless biodegradable, the mesh filter sock material shall be cut open and the mesh removed. In general, the compost filter material may be left in place, however the material will be raked out leveled to surrounding grades, then seeded. Prior to such removal, however, all silt, mud and debris entrapped outside of the compost filter sock shall be removed and the area cleaned up in accordance with the applicable provisions of **Section 212** of these Specifications. Immediately upon removal of the compost filter socks the remaining exposed areas will be finished as specified in **Para. b of Subsection 206.03.1**.

206.04 METHOD OF MEASUREMENT.

206.04.1 Baled Hay Erosion Checks. "Baled Hay Erosion Checks" will be measured by the number of linear feet actually installed in accordance with the Plans and/or as directed by the Engineer.

a. Removal. If required by the Contract, "Removal of Baled Hay Erosion Checks" will be measured by the number of linear feet actually removed in accordance with the Plans and/or as directed by the Engineer.

206.04.2 Silt Fence. "Silt Fence" erosion checks will be measured by the number of linear feet actually installed in accordance with the Plans and/or as directed by the Engineer.

206.04.3 Baled Hay Erosion Check and Silt Fence Combined. "Baled Hay Erosion Check and Silt Fence Combined" will be measured by the number of linear feet of combined baled hay erosion check and silt fence actually installed in accordance with the Plans and/or as directed by the Engineer.

206.04.4 Compost Filter Sock. “Compost Filter Sock ”of the various sizes as indicated on the plans will be measured by the number of linear feet of continuous runs of such compost filter sock actually installed in accordance with the Plans and/or as directed by the Engineer.

206.05 BASIS OF PAYMENT.

206.05.1 Baled Hay Erosion Checks. The accepted quantity of "Baled Hay Erosion Checks" will be paid for at the contract unit price per linear foot as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment including excavation, haybales, stakes, removal of stakes, and all other incidentals required to finish the work, complete and accepted by the Engineer.

a. Removal. If required by the Contract, the accepted quantity of "Removal of Baled Hay Erosion Checks" will be paid for at the contract unit price per linear foot as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials, and equipment including, removal of hay, grading, raking, and seeding necessary to match the surrounding area, and all other incidentals required to finish the work complete and accepted by the Engineer.

206.05.2 Silt Fence. The accepted quantity of "Silt Fence" erosion checks will be paid for at the contract unit price per linear foot as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment including excavation, filter fabric, industrial netting, posts, removal of fence, grading, raking and seeding necessary to match the surrounding area, and all other incidentals required to finish the work complete and accepted by the Engineer.

206.05.3 Baled Hay Erosion Check and Silt Fence Combined. The accepted quantity of “Baled Hay Erosion Check and Silt Fence Combined” will be paid for at the contract unit price per linear foot as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment, including excavation; filter fabric, baled hay or straw, stakes, industrial netting, posts, removal of baled hay or straw, removal of fence, removal and disposal of entrapped material, backfill material, grading, raking and seeding as necessary to match the surrounding area, and all other incidentals required to finish the work complete and accepted by the Engineer.

206.05.4 Compost Filter Sock. The accepted quantity of “compost filter sock” will be paid for at the contract unit prices per linear foot as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment, including mesh filter socks, removal of mesh filter socks, compost filter material, stakes, removal of stakes, removal and disposal of entrapped material, grading, raking and seeding as necessary to match the surrounding area, and all other incidentals required to finish the work complete and accepted by the Engineer.

206.05.5 Cleaning and Maintenance. The cleaning and maintenance of Baled Hay Erosion Checks, Silt Fence Erosion Checks, Baled Hay Erosion Check and Silt Fence Combined and Compost Filter Socks will be paid for under the provisions of **SECTION 212; MAINTENANCE AND CLEANING OF EROSION AND POLLUTION CONTROLS.**

Revise **Section 207; Check Dams**, pages 2-40 through 2-43 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION 207

CHECK DAMS

- **Add the following Subsection 207.01.5.**

207.01.5 Compost Filter Sock Ditch and Swale Erosion Checks. Compost filter sock ditch and swale erosion checks shall consist of a flexible mesh tube filled with composted material and staked to the ground with wooden stakes, and constructed as indicated on the plans.

- **Add the following Subsection 207.02.5.**

207.02.05 Compost Filter Sock Ditch and Swale Erosion Checks. Compost filter sock material shall be in accordance with AASHTO Designation: MP 9-06 (2007 or latest revision). Compost filter material shall be in accordance with AASHTO Designation: MP 9-06 (2007 or latest revision). Compost material shall also meet all applicable Federal and State Regulations. For compost filter socks 18 inches or less in diameter, wooden stakes shall be 1 inch by 1 inch, and of a length that shall project into the soil 1 foot leaving 3 inches to 4 inches protruding above the filter sock. For compost filter socks greater than 18 inches in diameter wooden stakes shall be 2 inch by 2 inch and of a length that shall project into the soil 1 foot leaving 3 inches to 4 inches protruding above the filter sock. Stakes shall be placed at the ends and at 5 foot intervals, on center.

- **Add the following Subsection 207.03.5.**

207.03.5 Compost Filter Sock Ditch and Swale Erosion Checks.

a. Installation. Compost Filter sock ditch and swale erosion checks shall be constructed at the locations, and in accordance with the details indicated on the plans, or as directed by the Engineer. The following stipulations also apply:

1. Compost filter sock ditch and swale erosion checks may be either fabricated on site or delivered to the site.

2. Trenching is not required. Compost filter sock ditch and swale erosion checks shall be placed over the top of ground, wooden stakes shall be driven through the center of the filter socks to anchor them to the ground. To ensure optimum performance, heavy vegetation shall be cut down or removed, and extremely uneven surfaces should be graded to ensure that the compost filter sock uniformly contacts the ground surface. These may be placed over the top of rolled erosion controls mats or turf re-enforcement mats. These may also be stacked if additional height is needed.

3. Compost filter sock ditch and swale erosion checks shall be installed perpendicular to flow. This erosion check shall extend to such a length that the bottoms of each end are higher in elevation than the lowest middle part or the top of the banks (maximum flow line) are reached.

b. **Removal.** This work, if required, shall include the removal of the compost filter sock and stakes. Unless biodegradable, the mesh filter sock material shall be cut open and the mesh removed. In general, the compost filter material may be left in place, however the material shall be raked out leveled to surrounding grades, then seeded. Prior to such removal, however, all silt, mud and debris entrapped by the compost filter sock shall be removed and the area cleaned up in accordance with the applicable provisions of **SECTION 212** of these Specifications. Immediately upon removal of the compost filter socks the remaining exposed areas will be finished as specified in **Para. b of Subsection 206.03.1.**

- **Add the following Subsection 207.04.5.**

207.04.5 Compost Filter Sock Ditch and Swale Erosion Checks. “Compost Filter Sock Ditch and Swale Erosion Checks” of the various sizes as indicated on the plans will be measured by the number of linear feet of continuous runs of such compost filter sock actually installed in accordance with the Plans and/or as directed by the Engineer.

- **Add the following Subsection 207.05.5.**

207.05.5 Compost Filter Sock Ditch and Swale Erosion Checks. The accepted quantity of “Compost Filter Sock Ditch and Swale Erosion Checks” will be paid for at the contract unit prices per linear foot as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment, including mesh filter socks, removal of mesh filter socks, compost filter material, stakes, removal of stakes, removal and disposal of entrapped material, backfill material, grading, raking and seeding as necessary to match the surrounding area, and all other incidentals required to finish the work complete and accepted by the Engineer.

- **Add the following Subsection 207.05.6.**

207.05.6 Cleaning and Maintenance. The cleaning and maintenance of Baled Hay Ditch and Swale Erosion Checks, Log and Hay Check Dams, Sand Bag Erosion Checks, Stone Check Dams and Compost Filter Sock Ditch and Erosion checks will be paid for under the provisions of **SECTION 212; MAINTENANCE AND CLEANING OF EROSION AND POLLUTION CONTROLS.**

Revise **Section 212; Maintenance and Cleaning of Erosion and Pollution Controls**, pages 2-51 to 2-55 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION 212

MAINTENANCE AND CLEANING OF EROSION AND POLLUTION CONTROLS

- **Add the following to Subsection 212.01.1, Applicable Controls, subpart a.**

- a. **Perimeter Controls.**

- 3. Compost filter sock Subsection 206.01.4

- **Add the following to Subsection 212.01.1, Applicable Controls, subpart b.**

- b. **Check Dams.**

- 5. Compost Filter Sock Ditch and Swale Subsection 207.01.5
Erosion Checks

- **Replace paragraph (b) of Subsection 212.01.2 with the following.**

- b. **Maintenance.** Maintenance consists of the restoration and repair of damage sustained by erosion and pollution controls from “normal” rainfall events (Abnormal weather events are defined in **Subsection 212.03.4; Failure of Erosion and Pollution Controls**).

- **Replace the third paragraph of Subsection 212.03 with the following.**

- Erosion and pollution controls shall be routinely inspected by the Engineer. The Engineer shall immediately notify and direct the Contractor to take corrective action and make all necessary repairs whenever maintenance of the erosion and pollution controls is required. The Contractor shall commence with the requisite cleaning and maintenance measures no later than the next consecutive calendar day after receiving such a directive from the Engineer, and shall aggressively and expeditiously perform such cleaning and maintenance work until the original problem is remedied to the complete satisfaction of the Engineer. In the event of a holiday or weekend storm event, the Contractor must have resources available to restore and, if necessary, to replace any damaged erosion controls.

[Remainder of Subsection is unchanged]

- **Add the following to Subsection 212.03.1, Threshold for Cleaning Erosion Controls, subpart a.**

a. Perimeter Controls	Height
3. Compost filter sock	½ the compost filter sock height

- **Add the following to Subsection 212.03.1, Threshold for Cleaning Erosion Controls, subpart b.**

b. Check Dams	
5. Compost filter sock	½ the compost filter sock height

- **Replace Subsections 212.04 and 212.05 with the following.**

212.04 METHOD OF MEASUREMENT. “Maintenance and Cleaning of Erosion and Pollution Controls” as specified in this Section will not be measured by a single unit of measurement usually associated with a specific Proposal item. Rather, this work will be documented and paid for on a Force Account basis as set forth in **Subsection 212.05**.

212.05 BASIS OF PAYMENT. The “Maintenance and Cleaning of Erosion and Pollution Controls” will be paid for on a Force Account basis as set forth in **Subsection 109.04; Differing Site Conditions, Changes, Extra Work and Force Account Work; Para. a(4)** of these Specifications.

The estimated total amount established by the Department and indicated for this item in the Schedule of Prices in the Proposal is the amount from which said Force Account payments will be drawn.

Revise **Part 300; Aggregate and Gravel Base and Subbase Courses**, pages 3-1 through 3-5 of the RI Standard Specifications for Road and Bridge Construction as follows.

PART 300

AGGREGATE AND GRAVEL BASE AND SUBBASE COURSES

- **Replace Subsection 301.02; Materials in its entirety with the following.**

301.02 MATERIALS. The following materials shall conform to the applicable requirements of the indicated Subsections of **SECTION M; MATERIALS:**

- a. Gravel Borrow; Subsection M.01.09; Table I, Column I.**
- b. Crushed Stone or Gravel; Subsection M.01.09; Table I, Column II.**
- c. Fillers; Subsection M.01.08, Fine Aggregate.**

All materials shall conform to all applicable specification requirements prior to final placement on the project. The practice of culling deleterious or out of specification material after placement and/or grading in-place will not be allowed.

- **Add the following paragraph to Subsection 301.03.2; Shaping and Compaction.**

Field moisture content for Gravel Borrow shall be adjusted, if necessary, to be no greater than two percent (+2%) above the optimum moisture content.

[Remainder of Subsection is unchanged]

- **Replace Subsection 302.02; Materials in its entirety with the following.**

302.02 MATERIALS. Gravel Borrow shall meet the requirements of **Subsection M.01.09; Gradation of Aggregates, Table I, Column I** prior to its final placement on the Project. The practice of culling deleterious or out of specification material after placement and/or grading in-place will not be allowed.

- **Replace the fourth paragraph of Subsection 303.02; Materials with the following.**

303.02 MATERIALS.

The composite coarse and fine aggregate mix shall conform to the following gradation requirements as well as all other applicable specifications prior to its final placement on the Project:

Square Mesh Sieve Size:	Percentage by Weight Passing Indicated Square Mesh Sieve:
1½"	100
1"	85 - 100
½"	50 - 85
No. 4	40 - 75
No. 40	8 - 35
No. 200	2 - 10

[Remainder of this Subsection is unchanged]

- **Replace the fourth paragraph of Subsection 304.02; Materials with the following.**

304.02 MATERIALS.

The composite coarse and fine aggregate mix shall conform to the following gradation requirements as well as all other applicable specifications prior to its final placement on the Project:

Square Mesh Sieve Size:	Percentage by Weight Passing Indicated Sieve Size:
1½"	100
1"	70 - 100
¾"	50 - 85
⅜"	40 - 75
No. 4	30 - 55
No. 40	0 - 25
No. 200	0 - 8

[Remainder of this Subsection is unchanged]

Revise **Part 400; Bituminous Pavements**, pages 4-1 through 4-40 of the 2004 RI Standard Specifications for Road and Bridge Construction as follows.

PART 400

BITUMINOUS PAVEMENTS

- **Replace the second paragraph of Subsection 401.02.5 with the following.**

The Contractor shall submit for the Engineer's approval a job mix formula, including aggregate sources and mixing temperature, for each mixture to be supplied by each plant. The job mix formula shall be within the master ranges specified in **Subsection M.03.1** for the particular type of bituminous concrete. The job mix formula for each mixture shall be in effect until the Engineer is notified in writing of any modifications and approves the new mix. The job mix formula for each mixture shall establish a single percentage of aggregate passing each required sieve size, and a single temperature at which the mixture is to be delivered at the point of discharge.

[Remainder of Subsection is unchanged]

- **Add the following new Subsection 401.03.2(a); Material Transfer Vehicle.**

401.03.2a Material Transfer Vehicle (MTV). A material transfer vehicle (MTV) is required for the construction of all bituminous friction, surface and intermediate courses on all limited access highways. Table 1 contains a statewide list of limited access highways. When friction course is used, both the friction course and the underlying layer must be placed using an MTV.

The MTV shall independently deliver hot mix asphalt (HMA) from the hauling equipment to the paving equipment. A paving hopper insert with a minimum capacity of 14 tons shall be installed in the hopper of conventional paving equipment when a MTV is used.

As a minimum, the MTV shall have a high capacity truck unloading system which will receive HMA from the hauling equipment; a storage system in the MTV with a minimum capacity of 15 tons of HMA; and a discharge conveyor with the ability to swivel to either side to deliver the mixture to the paver while allowing the MTV to operate from an adjacent lane. In addition, the paving operation must contain a remixing system to blend the mixture prior to placement. The speed of the paver and MTV shall be adjusted to coordinate with the availability of HMA. Failure to keep the MTV supplied with HMA shall be cause to cease paving operations for that day.

When an MTV is to be used on a project, the Contractor shall further investigate the possible movement of the fully or partially loaded MTV on the project. If there are any structures on the project that the fully or partially MTV will traverse, the Contractor shall request an Overweight Permit Check from the Department. Such a request, including the axle configuration and weights, and the project limits, shall be made in writing and operations shall not begin until this permission is received from the Department and one copy forwarded to the Engineer.

TABLE 1 – LIMITED ACCESS HIGHWAYS

I-95	Connecticut State Line to Massachusetts State Line
I-195	I-95 to Massachusetts State Line
I-295	I-95 to Massachusetts State Line
US Route 1	Prosser Trail to Wakefield Cut-Off
RI Route 4	Route 138 to I-95
US Route 6	Route 102 to Route 101
RI Route 10	Park Avenue to Route 6
RI Route 24	Route 114 to Massachusetts State Line
RI Route 37	Natick Avenue to Post Road
RI Route 78	Route 1 to Connecticut State Line
RI Route 99	Route 146 to Mendon Road
RI Route 114	I-195 to Forbes Street
RI Route 138	Route 1 to Admiral Kalbfus Road
RI Route 146	I-95 to Reservoir Road
RI Route 146	Route 146A to Massachusetts State Line
RI Route 403	Route 4 to Quonset Point
Airport Connector	I-95 to Post Road
Red Bridge Extension	Waterman Street to Taunton Avenue

- **Replace the third paragraph of Subsection 401.03.9 with the following.**

The lift thickness for each type of mix shall be as follows or as approved by the engineer.

Class I-1	1-1/2" to 3"
Class I-2	1-1/4" to 2-1/2"
Binder Course	2-1/4" to 4-1/2"
3/4" Base Course	2-1/4" to 4-1/2"

[Remainder of Subsection is unchanged]

- **Replace Subsection 402.03.2 in its entirety with the following.**

402.03.2 Production and Placement. When placed on a newly reconstructed surface, the thickness shall be as shown on the Plans with a tolerance of $\pm 1/4$ inch. When used to overlay an existing roadway, the thickness shall be minimum of 1 inch and a maximum of 1 3/4 inches to accommodate for rut depths of up to 3/4 inch on the existing pavement.

The surface on which the friction course is to be placed shall be treated with a tack coat. Tack coat must be applied uniformly over the surface of the underlying pavement. The surface shall be broom cleaned before the application of tack coat.

Spreading of the mixture shall be performed carefully and the operation shall be as continuous as possible. Particular attention shall be given to the joints and any irregularities shall be removed before compacting.

After placement, the mixture shall be thoroughly and uniformly compacted with power rollers as directed by the Engineer. Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until all roller marks are eliminated, the surface is of uniform texture and true to grade and cross section.

The first pass with the specified roller shall be completed when the temperature of the layer is $240^{\circ}\text{F} \pm 20^{\circ}\text{F}$. At least three passes must be made at all locations on the mat. Each roller shall exert a minimum average force of 150 pounds per inch along the width of each drum. At least two of the rollers must have a minimum dry weight of eight tons each.

Excess concentrations of asphalt can be easily detected during paving operations. All "fat" areas shall be removed immediately. The wasted quantity, as determined by the Engineer, shall be subtracted from the quantity shipped that day.

- **Replace Subsection 403.02 with the following.**

403.02 MATERIALS. The asphalt emulsion shall be RS-1.

CODE 408.0100
CLEANING AND SEALING CRACKS IN BITUMINOUS CONCRETE PAVEMENT:
CRACKS LESS THAN ONE INCH IN WIDTH

CODE 408.0200
CLEANING AND SEALING CRACKS IN BITUMINOUS CONCRETE PAVEMENT:
CRACKS ONE INCH AND OVER IN WIDTH

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

All cracks shall be designated as follows:

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

408.02 MATERIALS.

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

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

1. Modified Asphalt Binder - This shall consist of a blend of neat asphalt cement and crumb rubber, which are chemically bonded to produce a modified asphalt binder that complies with all the requirements of AASHTO MP1a for PG 70-34, with a separation less than 5% (AASHTO PP 5-93, Section 8.3). The modified asphalt binder shall not contain any particles of rubber or elastomeric material when tested in accordance with AASHTO T 44. The viscosity shall not exceed 3 Pa·s at 300°F. The dynamic shear of the pressure aging vessel residue shall not exceed 5000 kPa at 7°C. The elastic recovery at 4°C (AASHTO T301) shall be not less than 70%. The modification at a minimum shall consist of 5% crumb rubber from tires. The supplier of the modified asphalt binder shall certify the composition and PG grade of the modified asphalt binder.

2. Asphalt Cement - The high temperature grade (AASHTO MP1a) of the neat asphalt cement shall not exceed PG 58-XX.

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

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

- 5. Fibers - Polyester, fully drawn.**
- | | |
|----------|--------------|
| Length | 10 mm (max) |
| Denier | 15 dpf (max) |
| Tenacity | 4 gpd (min) |
| Crimp | none |
| Color | natural |

Fiber Reinforced Modified Asphalt Compound Properties:

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

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

408.02.2 Filler. Filler shall consist of Bituminous Concrete Class I-2 or High Performance Bituminous Cold Patch. The crack filler shall be compatible with the crack sealer and be pre-approved by the Engineer.

408.02.3 Blotter Material. Blotter Material shall be black beauty.

408.03 CONSTRUCTION METHODS.

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

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

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

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

d. Melting Kettle. The unit used to melt the sealant shall be a double boiler, indirect fired type with a heating capacity of 550°F. The space between the inner and outer shells shall be filled with suitable heat transfer oil or substitute having a flash point of not less than 530°F. The kettle shall be equipped with a satisfactory means of agitating the crack sealer at all times. This may be accomplished by continuous stirring with mechanically operated paddles and/or by a continuous circulating gear pump attached to the heating unit. The kettle must be equipped with thermostatic control calibrated between 200°F and 550°F with a $\pm 5^\circ\text{F}$ accuracy and a temperature measuring device located such that the Engineer may safely check the temperature of the sealant material.

e. Wand Applicator. The wand applicator shall be capable of applying the sealant to the specified width. It shall be connected to the holding tank through a heated applicator hose that ensures

operator safety and allows operator control of material flow. A device shall be mounted to bypass material into a holding tank should the applicator nozzle shut off.

f. Squeegee. Industrial type to shape the surficial sealant material into a feather-edge band 2-1/2 inches wide.

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

a. General. No crack sealing material shall be applied when the ambient temperature is below 40°F or above 90°F; nor shall it be applied in wet weather, when the pavement is wet, or when frost, snow, or ice is present. If such conditions are present, drying of the cracked areas to be sealed with a hot compressed air lance may be performed with the approval of the Engineer. Care shall be taken so as not to damage traffic loops.

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

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

408.03.3 Sealing of Cracks

a. Cracks Under 1/16-Inch in Width shall not be sealed.

b. Cracks 1/16-Inch to Less than One Inch in Width.

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

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

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

c. Cracks One Inch and Over in Width.

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

2. Heating of Cracks. Cracks shall be filled and sealed within three minutes after being heated with the hot air lance.

3. Filling of the Cracks. All cracks of sufficient depth shall first be coated with sealant material on all contact surfaces, filled with Class I-2 bituminous mixture or high performance cold patch, compacted by rolling and tamping, and sealed in accordance with the provisions of **Subsection 408.03.3, Para. b.3** above with two or more adjacent passes of the wand.

d. Alligator Cracks.

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

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

3. Installation of Sealer. The cracks on the perimeter or boundary of the alligator cracked area shall be completely filled and banded with a 2-1/2 inch width of sealant in accordance with the provisions of **Subsection 408.03.3, Para. b.3** above. **There shall be no treatment of the alligator cracks within the boundary.**

408.04 METHOD OF MEASUREMENT.

408.04.1 Cracks Less than One Inch in Width. "Cleaning and Sealing Cracks in Bituminous Pavement: Cracks Less than One Inch in Width" will be measured by the number of linear feet of cracks actually sealed in accordance with this contract and/or as directed by the Engineer.

408.04.2 Cracks One Inch and Over in Width. "Cleaning and Sealing Cracks in Bituminous Pavement: Cracks One Inch and Over in Width" will be measured by the number of linear feet of cracks actually sealed in accordance with this contract and/or as directed by the Engineer.

408.04.3 Alligator Cracks. There will be no separate measurement for this item, however "Cleaning and Sealing Cracks in Bituminous Pavement: Alligator Cracks" will be measured by the number of linear feet of cracks actually sealed in accordance with this contract and/or as directed by the Engineer and included in the measurement under **Section 408.04.1** above.

408.05 BASIS OF PAYMENT.

408.05.1 Cracks Less than One Inch in Width. The accepted quantity of "Cleaning and Sealing Cracks in Bituminous Concrete Pavement: Cracks 1/16-Inch to less than One Inch in Width" will be paid for at the contract unit price per linear foot as listed in the Proposal. The price so-stated constitutes full and complete compensation for furnishing and applying all materials; labor, equipment, tools; cleaning of cracks and debris removal; maintenance and protection of traffic, including but not limited to trucks (with Truck Mounted Attenuators, Flashing Arrow Boards and Variable Message Signs), temporary construction signs, and any incidentals necessary to complete the work in accordance with the contract and to the satisfaction of the Engineer. Initial sweeping of the pavement will be paid for separately.

408.05.2 Cracks One Inch and Over in Width. The accepted quantity of "Cleaning and Sealing Cracks in Bituminous Concrete Pavement: Cracks One Inch and Over in Width" will be paid for at the contract unit price per linear foot as listed in the Proposal. The price so-stated constitutes full and complete compensation for furnishing and applying all materials; labor, equipment, tools; cleaning of cracks and debris removal; maintenance and protection of traffic, including but not limited to trucks (with Truck Mounted Attenuators, Flashing Arrow Boards and Variable Message Signs), temporary construction

signs, and any incidentals necessary to complete the work in accordance with the contract and to the satisfaction of the Engineer. Initial sweeping of the pavement will be paid for separately.

408.05.3 Alligator Cracks. There will be no separate payment for this item. The accepted quantity of "Cleaning and Sealing Cracks in Bituminous Pavement: Alligator Cracks" will be paid for at the contract unit price per linear foot as listed in the Proposal under the provisions of **Subsection 408.05.1** above. The price so-stated constitutes full and complete compensation for furnishing and applying all materials; labor, equipment, tools; cleaning of cracks and debris removal; maintenance and protection of traffic, including but not limited to trucks (with Truck Mounted Attenuators, Flashing Arrow Boards and Variable Message Signs), temporary construction signs, and any incidentals necessary to complete the work in accordance with the contract and to the satisfaction of the Engineer.

CODE 411.0100

PAVER PLACED ELASTOMERIC SURFACE TREATMENT

411.01 DESCRIPTION. This work shall consist of providing a paver placed elastomeric surface treatment (PPEST) at the locations designated on the plans and as directed by the Engineer. All work shall be performed in accordance with the provisions of Part 400 of the Standard Specifications for Road and Bridge Construction, with the following additions and amendments.

411.02 MATERIALS.

411.02.1 Modified Asphalt Binder. This shall consist of a blend of neat asphalt cement and crumb rubber, which are chemically bonded to produce a modified asphalt binder that complies with all the requirements of AASHTO MP1a for PG 76-34, with a separation less than 5% (AASHTO PP 5-93, Section 8.3). The modified asphalt binder shall not contain any particles of rubber or elastomeric material when tested in accordance with AASHTO T 44. It shall incorporate an aromatic VOC inhibitor to mitigate odors at a dosage rate that conforms to the manufacturer's recommendation. The modified asphalt binder shall contain no polyphosphoric acid. In addition, the dynamic shear of the pressure aging vessel residue shall not exceed 5000 kPa at 7°C. The elastic recovery at 4°C (AASHTO T301) shall be not less than 70%. The supplier of the modified asphalt binder shall certify the composition and PG grade of the modified asphalt binder.

Asphalt Cement. The high temperature grade (AASHTO MP1a) of the neat asphalt cement shall not exceed PG 58-XX.

Anti-Stripping Agent. An anti-stripping agent that heat stable and approved by the Engineer may be added to the neat asphalt cement prior to blending with the crumb rubber. The dosage (not exceeding 1.0% by weight of asphalt cement) shall be within the manufacturer's specified range and shall be determined during the course of the mix design. (Note: Notwithstanding the addition of an anti-stripping agent, the asphalt binder grade shall be PG 76-34.)

Crumb Rubber. The asphalt binder shall have a crumb rubber content of not less than 7% by weight of asphalt cement. The maximum size of the crumb rubber shall be 80 mesh.

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

411.02.2 Aggregate. The coarse aggregate shall be virgin crushed quarry rock from a RIDOT approved source. Processed gravel shall not be permitted. There shall be no more than 10% flat or elongated particles (ASTM D4791). The aggregate wear, from resistance to abrasion, shall be a maximum of 30% as determined by the Los Angeles Abrasion Test (AASHTO T 96).

The fine aggregate shall be crushed stone screenings, natural sand, or a blend thereof. No more than 10 percent of the total aggregate blend may be natural sand.

411.02.3 Mix Design. The mix design shall be in accordance with **Subsection 401.02.5** of the RI Standard Specifications, with the following exceptions:

- a. The job-mix formula shall be within the following master range:

<u>Sieve Size</u>	<u>Percent Passing</u>
1/2"	100
3/8"	91 - 95
#4	40 - 45
#8	22 - 26
#30	9 - 12
#50	6 - 8
#200	4.0

b. The modified asphalt binder shall be the same grade and shall consist of the same components in the same proportions as the asphalt binder that will be used in production. The mixing and compaction temperatures shall be the same as those that will be used in production. The optimum modified asphalt binder content shall be not less than 6.0%.

c. The Marshall specimens shall be compacted with 50 blows on each side. The Moisture Sensitivity shall be determined in accordance with AASHTO T-283. At the optimum modified asphalt binder content, the mix shall satisfy the following requirements:

<u>Property</u>	<u>Requirement</u>
Stability (lb)	1000 min.
Flow (1/100 in.)	8 - 16
Voids (%)	4 - 6
VMA (%)	18 min.
Moisture Sensitivity (%)	80 min.

411.03 CONSTRUCTION METHODS.

411.03.1 Surface Preparation. All surface preparations shall be completed prior to applying the PPEST. All manhole covers, water boxes, catch basins and other such structures shall be adjusted prior to paving. These shall be covered and the location of each referenced for cleaning after paving. All localized depressions, ruts, trench cuts, utility settlements and joint settlements shall be brought to grade with a Type I-2 hot mix or high performance cold patch shim course. A tack coat shall be applied to these surfaces before the shim course is placed. High spots, localized bumps and joints shall be brought to grade by milling or other treatments approved by the Engineer. The entire perimeter of the pavement on which the PPEST is to be placed shall be milled. The milled wedge shall be 3 feet wide, triangular in shape and 1-1/4 inches at the extreme edge and feathered at the inside edge. At the limits of the work and at all cross streets, driveways, and any other locations where the PPEST will adjoin an existing pavement, the milling shall facilitate a smooth transition of the profile between the PPEST and the existing pavement. The transition shall be prior to the termini of any traffic detector loops. The surface shall be swept and thoroughly cleaned of vegetation, debris, loose aggregate, soil and dust, particularly soil that is bound to the surface. All matter shall be legally disposed off site. Prior to application of the surface treatment, the Contractor shall obtain from the Engineer approval and acceptance of the surface preparation.

411.03.2 Production Tolerances. The aggregate gradation and asphalt binder content of the production mix shall comply with the job-mix formula and optimum asphalt binder content, within the following tolerances:

<u>Sieve Size</u>	<u>Tolerance</u>
1/2"	-
3/8"	±5%
#4	±7%
#8	±4%
#30	±4%
#50	±3%
#200	±1.5%
Asphalt Binder	±0.3%

411.03.3 Mixing and Compaction Temperatures. The mixing and compaction temperatures shall be as recommended by the supplier of the modified asphalt binder.

411.03.4 Weather Limitations. The PPEST shall be placed only when the surface is dry and the surface temperature is at least 50°F and rising.

411.03.5 Time Limitation. The PPEST shall not be placed before June 1 or after September 30.

411.03.6 Tack Coat. An SS-1 or RS-1 asphalt emulsion tack coat shall be applied uniformly over the surface on which the PPEST is to be placed. The application rate shall be 0.10 ± 0.01 gallons per square yard. The tack coat shall be applied using the proper nozzle settings and the “double coverage” or “triple coverage” techniques outlined in Chapter 5 of the Asphalt Institute publication MS-22 “Construction of Hot Mix Asphalt Pavements.”

411.03.7 Placement. The mix placement temperature shall be as recommended by the supplier of the modified asphalt binder.

Special attention shall be paid to the formation of longitudinal joints. The cold edge shall be as vertical and square as possible. Sloughed or disturbed material at the edge shall be luted back to form a vertical face in alignment with the joint.

411.03.8 Compaction. The compacted thickness of the PPEST shall be $1 \pm 1/4$ inch. Under no circumstances shall the minimum thickness be less than $3/4$ inch.

Compaction shall commence immediately after placement. All rollers shall weigh at least 10 tons and shall operate in the static mode. Compaction to the specified density shall be attained before the PPEST cools to a temperature 20°F less than the specified compaction temperature.

411.04 METHOD OF MEASUREMENT. “Paver Placed Elastomeric Surface Treatment” will be measured by the number of square yards of paver-placed surface treatment completed in place in accordance with the contract or as directed by the Engineer.

411.05 BASIS OF PAYMENT. The accepted quantities of “Paver Placed Elastomeric Surface Treatment” will be paid for at the contract unit price per square yard as listed in the Proposal. The price so-stated shall constitute full and complete compensation for all traffic control, including traffic control for adjustment of manholes, gates, catch basins and other such structures; mobile phones; surface preparation; furnishing, transporting, handling, placing and rolling the PPEST material as specified; site clean up; furnishing of all labor, tools equipment, and incidentals for the satisfactory completion of the work; and all work not specifically identified as separate pay items in the contract provisions.

Compilation of Approved Specifications

Date: 01/24/2011

The shim course, including the tack coat applied under the shim course, will be paid for under separate items in the Proposal.

Ten percent of the total amount due the contractor will be withheld until at least 60 days after all the contract work specified is completed, the surfaced highways have been opened to traffic and the surface treatment is determined to be performing satisfactorily.

CODE 412.0100

RUBBERIZED ASPHALT CHIP SEALING

412.01 DESCRIPTION. This specification covers all materials, equipment, construction, application and post-placement procedures for the rubberized asphalt chip sealing of existing paved surfaces at the locations designated on the plans and as directed by the Engineer. The work shall consist of an application of rubberized asphalt binder followed by an application of pre-coated cover aggregate in accordance with this specification and as directed by the Engineer.

412.02 MATERIALS.

412.02.1 Asphalt Cement. Neat asphalt cement for the rubberized asphalt shall meet all the requirements of AASHTO MP1a for PG 58-28. The high temperature grade shall not exceed PG 58.

412.02.2 Anti-Stripping Agent. If necessary for water resistance, an anti-stripping agent that is heat stable and approved by the Engineer shall be added to the neat asphalt cement prior to blending with the granulated rubber. The dosage (up to 1.0% by weight of neat asphalt cement) shall be determined during the course of the surface treatment design.

412.02.3 Granulated Rubber. The granulated rubber shall be vulcanized rubber from the ambient temperature processing of scrap pneumatic tires. The granulated rubber shall meet the following gradation. No substitutions will be accepted.

<u>Sieve</u>	<u>% Passing</u>
#10	100
#16	90-100
#30	25-75
#80	0-20

The use of rubber of multiple types from multiple sources is acceptable provided that the overall blend of rubber meets the gradation requirements. The length of the individual rubber shall not exceed 1/8". Certification shall be provided by the rubber supplier.

412.02.4 Cover Aggregate. The cover aggregate shall be virgin crushed quarry rock from a RIDOT approved source. Processed gravel will not be permitted. For the material retained on the #4 sieve, no more than 10% of the particles shall have a flatness or elongation ratio greater than 3:1 (ASTM D4791). The aggregate wear, from resistance to abrasion, shall be a maximum of 30% as determined by the Los Angeles Abrasion test (AASHTO T96). The aggregate shall be pre-heated to a temperature between 280° F and 320° F and be uniformly and completely pre-coated with a PG 64-28 or PG 58-28 prior to application. The asphalt content for the pre-coating shall be determined by laboratory and field testing and be approved by the Engineer. The gradation shall meet the following limits:

<u>Sieve Size</u>	<u>% Passing</u>
1/2"	100
3/8"	85-100
1/4"	0-25
#4	0-5
#8	0-3
#200	0-2

412.02.5 Engineering. The contractor shall determine the asphalt content and mixing time of the pre-coated aggregate to obtain a uniform and complete pre-coating. Samples of the same shall be forwarded to the Engineer for approval.

Design of the rubberized asphalt chip seal surface treatment shall be the responsibility of the contractor. The application rate of the rubberized asphalt shall be at least 0.60 gallons per square yard. The application rate of the pre-coated cover aggregate shall be between 30 and 40 pounds per square yard. No later than two weeks before work commences, the contractor shall submit for the approval of the Engineer the surface treatment design, with supporting test data, specifying the additives for the rubberized asphalt, application rate of the rubberized asphalt, and the source, composition, and application rate of the cover aggregate.

Samples of each material shall be included with the submittal. Once the materials and design are approved, no substitution will be permitted unless approved by the Engineer.

412.02.6 Rubberized Asphalt. Granulated rubber shall be added to the PG58-28 asphalt cement at a rate of $20 \pm 3\%$ by total weight (i.e., asphalt cement plus granulated rubber).

The supplier of the rubberized asphalt shall certify the percent of granulated rubber in the blend.

The temperature of the asphalt cement shall be between 350°F and 425°F at the time the granulated rubber is added. The asphalt cement and granulated rubber shall be combined and mixed together in a blender unit and reacted for a minimum of one hour. The temperature of the rubberized asphalt shall be above 325° F during the reaction period.

412.02.7 Delays. When a job delay occurs after full reaction, the rubberized asphalt may be allowed to cool. The rubberized asphalt shall be reheated slowly just prior to application, but not to a temperature exceeding 375°F. An additional quantity of granulated rubber or additive not exceeding 3% by volume of the rubberized asphalt may be added after reheating.

412.02.8 Field Viscosity Tests. Viscosity tests shall be run by the contractor on each load of rubberized asphalt using a Haake-type field viscometer. One viscosity test shall be run prior to, and another after, the addition of diluent (if used). The viscosity of the final product shall be in the range of 1000 to 3000 centipoise.

412.03 CONSTRUCTION METHODS.

412.03.1 Equipment

a. Mechanical Blender. A mechanical blender for proper proportioning and thorough mixing of the asphalt-cement and granulated rubber is required. This unit shall be equipped with: an asphalt totaling meter (gallons); a flow rate meter (gallons per minute); a positive displacement auger to feed the

rubber properly to mixing chamber at the specified rate; and a static motionless mixer. The blender will have a separate asphalt cement feed pump and finished product pump to maximize production, and shall be capable of providing 100% proportional mix at any given time during the blending cycle; supporting documentation from the manufacturer shall be submitted to the Engineer.

b. Distributor Truck. On projects exceeding 35 tons of rubberized asphalt, at least two pressure-type bituminous distributor trucks in good condition will be required. The distributor shall be equipped with an internal heating device capable of heating the material evenly up to 425°F, an internal agitation unit capable of maintaining a proper mix of asphalt cement and granulated rubber, have adequate pump capacity to maintain a high rate of circulation in the tank and to spray the rubberized asphalt at a viscosity of 1000 to 3500 centipoise, and have adequate pressure devices and suitable manifolds to provide constant positive cut-off to prevent dripping from the nozzles.

The distributor shall be equipped with an electronically controlled computerized compensation unit for controlling application rates at various width and speed changes. The application unit shall have electronic controls and a digital read-out installed and operated from the inside of the cab of the distributor. The distributor bar shall be fully circulating. Any distributor that produces a streaked or irregular distribution of the material shall be promptly repaired or removed from the project.

The distributor equipment shall include a tachometer, pressure gauges, volume measuring devices, and a thermometer for reading temperature of tank contents. Controls for the width and rate of spray from the spray bar shall be located in the cab of the truck, and shall enable uniform applications to be made at the specified rate per square yard within a tolerance of 0.05 gallons per square yard.

A “bootman” shall accompany the distributor and ride in a position so that all spray bar nozzles are in full view and readily accessible for unplugging.

c. Hauling Equipment. Trucks for hauling cover aggregate shall be rear discharge conveyor-fed or “live bottom” trucks and shall be equipped with a device to lock onto the hitch at the rear of the aggregate spreader to prevent spillage.

Sufficient hauling vehicles will be available to ensure continuous operation of the distributor and aggregate spreader.

d. Aggregate Spreader. The aggregate spreader shall be hydrostatically driven and self-propelled. It must be equipped with a hydraulically controlled variable adjustable head that is capable of spreading cover aggregate in widths from 4.5 to 18 feet. The spreader shall be mounted on pneumatic tires, and shall apply the cover aggregate on the road surface in a manner that ensures that the tires do not contact the road surface until after the cover aggregate has been applied. The unit shall be equipped with an electronic radar type sensor used to measure ground speed and that will automatically adjust the cover aggregate application rate depending on width of application and the speed of the spreader. It shall have the ability to apply cover aggregate at a uniform coverage on any grade from 0 - 6%. The spreader shall be equipped with an integral hopper with a minimum capacity of 5 tons of cover aggregate which shall be filled by trucks in a manner which ensures that the truck tires never come in contact with rubberized asphalt treated road surfaces until the cover aggregate has been properly applied. To maintain constant cover aggregate application, a self-locking truck hitch will permit towing of aggregate trucks without stopping the spreader. It will be capable of maintaining positive engagement over irregular terrain.

e. Pneumatic Tire Rollers. A minimum of two self-propelled, multiple wheel pneumatic tire rollers shall be used. Each shall weigh a minimum of 10 tons, have a total compacting width of at least 56 inches, and a minimum tire pressure of 100 psi.

412.03.2 Weather Limitations. The rubberized asphalt shall not be applied when weather conditions are unfavorable to obtaining a uniform spread. Construction shall proceed only when the surface temperature is at least 50°F and rising. No water or moisture shall be present on the road surface.

412.03.3 Surface Preparation. The area to be sealed shall be swept and thoroughly cleaned of vegetation, debris, loose aggregate and soil, particularly soil that is bound to the surface. All cracks shall be thoroughly cleaned. All localized depressions, trench cuts, utility settlements, and joint settlements shall be brought to grade with hot mix Type I-2 shim course. A tack coat shall be applied to the surfaces before the shim course is placed. High spots, localized bumps and joints shall be brought to grade by milling or other treatments as approved by the Engineer. At the limits of the work, there shall be a smooth milled transition of the profile between the existing pavement and the rubberized asphalt chip seal. All thermoplastic pavement markings shall be removed and disposed off site. Manholes, valve boxes and other service entrances will be protected from the applied material. Bridge joints, appurtenances, drainage openings, etc., shall be covered and sealed so as not to clog or permit the entry of loose aggregate. Prior to application of the rubberized asphalt chip seal, the Contractor shall obtain from the Engineer approval and acceptance of the surface preparation.

412.03.4 Construction Procedures.

a. Treatment of Distressed Areas. Prior to rubberized asphalt chip sealing of the entire roadway within the specified limits, a rubberized asphalt chip seal shall be applied to any distressed areas within these limits, as directed by the Engineer. The Construction Procedure shall be as specified under Rubberized Asphalt Application, Aggregate Application, and Rolling. This quantity of work shall be measured and paid under **Sections 412.04** and **412.05** of this specification.

b. Rubberized Asphalt Application. The rubberized asphalt shall be applied uniformly at double coverage at a temperature of 325°F to 425°F at the approved design application rate within a tolerance of ± 0.05 gallons per square yard. The application rate shall be not less than 0.60 gallons per square yard.

Longitudinal joints shall be reasonably true to line and parallel to centerline. Where any construction joint occurs, the edges shall be broomed back and blended so there are no gaps and the elevations are the same, and free from ridges and depressions. Longitudinal joints shall be overlapped from 4 to 6 inches.

During application, adequate provision shall be made to prevent marring and discoloration of adjacent pavements, curbing, structures, vehicles, foliage or personal property.

c. Cover Aggregate Application. The application of cover aggregate shall follow as close as possible behind the application of the rubberized asphalt which shall be applied no further in advance of the aggregate spreader than can be immediately covered. Construction equipment or other vehicles shall not drive on the uncovered rubberized asphalt. The cover aggregate shall be spread uniformly and completely across the hot rubberized asphalt by a self-propelled spreader at the approved design application rate within a tolerance of ± 5 pounds per square yard. In no case shall the application rate shall be less than 30 pounds per square yard. Any deficient areas shall be covered with additional cover material to provide complete coverage.

d. Rolling. Rolling with pneumatic tire rollers shall commence immediately following spread of pre-coated aggregate. There shall be at least three passes of a roller to embed the cover aggregate particles firmly into the rubberized asphalt. No steel wheel rollers will be allowed.

e. Initial Sweeping. After the aggregate has been rolled and embedded into the rubberized asphalt and the pavement has cooled, all loose material shall be swept and removed offsite. This shall be done at a time and in a manner so as to not displace any embedded aggregate or damage the rubberized asphalt surface. The accumulations of the sweepings shall be collected and disposed properly off site.

f. Site Clean Up. The contractor shall uncover and unseal all drainage openings and clean any covers or grates that the cover aggregate and rubberized asphalt may have adhered to, and shall remove any excess material in areas such as driveways, gutters, and intersections as specified by the Engineer. The contractor shall, on a daily basis, remove any debris associated with the performance of the work.

g. Traffic. Traffic will not be permitted on the surface until the rubberized asphalt binder has cured sufficiently to minimize any dislodging of cover aggregate. The pilot car shall be used to guide and control speed of traffic. The contractor shall be responsible for any damage done to vehicles as a result of the operation. Any damage to the rubberized asphalt chip seal shall be repaired by the contractor, to the satisfaction of the Engineer and at no additional cost to the State.

h. Post Placement Sweepings. There shall be post placement sweepings at the following times:

1. Seven to ten days after the rubberized asphalt chip sealing operation;
2. Three to five weeks after the rubberized asphalt chip sealing operation;
3. At the end of the first winter after the rubberized asphalt chip sealing operation.

For each sweeping, all loose cover aggregate shall be removed from the pavement surface, including the shoulders. The accumulations of sweepings shall be collected and properly disposed off-site.

412.04 METHOD OF MEASUREMENT. “Rubberized Asphalt Chip Sealing” will be measured by the number of square yards of rubberized asphalt chip seal completed in place in accordance with the contract or as directed by the Engineer.

412.05 BASIS OF PAYMENT. The accepted quantities of “Rubberized Asphalt Chip Sealing” will be paid for at the contract unit price per square yard of the type and application rate specified. The price so-stated shall constitute full and complete compensation for traffic control and pilot car; mobile phones; surface preparation; furnishing, transporting, handling, placing and rolling the material specified; initial sweeping and removal of excess aggregate; site clean up; furnishing of all labor, tools, equipment and incidentals for the satisfactory completion of this item; and all other work not specifically identified in the Contract Provisions as separate items of work.

The shim course, including tack coat, and each post placement sweeping will be paid for under separate items in the contract.

Ten percent of the total amount due the contractor will be withheld until the final sweeping and at least 60 days after all the rubberized asphalt chip seal locations have been open to traffic and it has been determined that the rubberized asphalt chip seal is performing satisfactorily.

Replace **Table 1** of **Subsection 601.01.1; Classification**, page 6-2 of the RI Standard Specifications for Road and Bridge Construction in its entirety with the following.

SECTION 601

PORTLAND CEMENT CONCRETE

Table 1

Class of Concrete ¹	General Classification of Work	
X	Structural & Precast Elements	Highway Bounds, Modular Wall Units, Flared Ends, Drilled Shafts, Concrete-Filled Shell Piles.
HP	Structural & Prestressed/Precast Elements:	I-Beams, Cellular Slabs, Box Beams, Cast-in-place Bridge Structures, Box Culverts, Retaining Walls, Backwalls, Beam Seats, Pier Caps, Pier Columns, Diaphragms, Abutment Stems, Pier Stems, Wall Stems, Bridge Decks, Railings, Parapets, End Posts, Bridge Sidewalks, Cast-in-place Piles, Reinforced Overhead Sign Foundations, Miscellaneous Prestressed/Precast Elements.
XX	Precast Elements:	Collars, Catch Basins, Manholes, Drop Inlets, Sumps, Electrical Handholes, Median Barriers, Copings, Pipe.
	Structural Elements:	Reinforced Footings, Approach Slabs.
	Miscellaneous:	Road Pavements, Commercial Driveways, Headwalls, Endwalls, High Capacity Inlets, Road Base, Residential Driveways, Mast Arm Foundations.
A	Miscellaneous & General Use:	Tremie Seals, Sidewalks, Fence Post Footings, Guardrail Anchorage, Unreinforced Footings, Paved Waterways, Concrete-Filled Pipe Piles, Non-specified use.
Z	Precast Elements:	Curbing, Pipe.
B	General Use:	Void Filler, Thrust Blocks, Class A Bedding.

Notes: 1. All concrete shall be air entrained.

Revise **Subsection 601.03; Portland Cement Concrete – Construction Methods**, pages 6-6 through 6-25 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION 601

PORTLAND CEMENT CONCRETE

601.03 CONSTRUCTION METHODS.

- **Replace the PE note at the end of Subsection 601.03.1b, Step 1 with the following.**

Original copies of concrete mix designs and trial batch reports submitted for approval to the Department shall have an original Rhode Island Professional Engineer's stamp and signature.

- **Replace Subsection 601.03.2f, paragraph (4) with the following.**

4. Batching Controls. Batching controls shall be electrically interlocked with the scales to prevent cycling or recycling of batching until scales tare zero.

The batching controls shall meet the following tolerances with respect to the various components weighed in each batch:

Coarse Aggregate:	±2.0 percent of required weight of the total coarse aggregate being weighed.
Fine Aggregate:	±2.0 percent of required weight of the total fine aggregate being weighed.
Portland Cement:	±1.0 percent of required weight of cement being weighed.
Pozzolans:	±1.0 percent of required weight of pozzolans being weighed.
Water:	±1.0 percent of required weight or volume of water being weighed.
Admixtures:	±3.0 percent of required weight or volume of each admixture being used.

The total weight of the batch shall not vary more than ±1.0 percent from the theoretical design weight.

[Remainder of Subsection is unchanged]

- **Replace Section 601.03.4 with the following.**

601.03.4 Limitations for Mixing and Placement. No concrete shall be mixed, placed, or finished when the natural light is insufficient, unless an adequate artificial lighting system is operational and approved by the Engineer.

The Contractor, at all times during and immediately after placement, shall protect the concrete from adverse affects of rain.

When the air temperature is 40°F or less at the time and location of placement, or when there is a local forecast indicating that the temperature will be below 40°F during the 5 (cast in place masonry) or 7 (bridge deck) day curing period cold weather concreting, as defined herein and in **Subsection 601.03.5**, will apply. At least 24 hours prior to placement the Contractor shall submit for approval by the Engineer, a cold weather concreting and curing plan detailing the methods and equipment which will be used to assure that the concrete temperature does not fall below 50°F during the curing period after placement and shall be considered the protection period. Concrete mixing operations shall conform to **Subsection 601.03.5; Cold Weather Concrete.**

- **Replace Subsection 601.03.5 with the following.**

601.03.5 Cold Weather Concrete.

a. Plant Procedures: When concreting is authorized by the Engineer during cold weather, the aggregates and/or water may be heated by either steam or dry heat prior to being placed in the mixer. The apparatus used shall heat the mass uniformly and shall be so arranged as to preclude the possible occurrence of overheated areas which might injure the materials. Unless otherwise authorized, the temperature of the mixed concrete shall be not less than 50°F and not more than 90°F at the time of placing it in the forms.

If the air temperature is 40°F or less at the time of placing concrete, the Engineer may require the water and the aggregates to be heated to not less than 70°F, nor more than 150°F, and be verifiable by a temperature measuring device. No frozen aggregates shall be used in the concrete.

Stockpiled aggregates may be heated by the use of dry heat or steam. Aggregates shall not be heated directly by gas or oil flame or on sheet metal over fire.

When aggregates are heated in bins, steam-coil or water-coil heating, or other methods which will not be detrimental to the aggregates, may be used. The use of live steam on or through binned aggregates will not be permitted without approval by the Engineer.

b. Concrete Placement Procedures. No concrete shall be placed on frozen subgrade. Sufficient heating devices of a type approved by the Engineer shall be installed under an enclosure or covering, capable of maintaining at all times and under all weather conditions during the protection period, a uniform concrete temperature of not less than 50°F. Heating devices shall be arranged to prevent overheating any areas of forms or concrete. Before any concrete is placed, the enclosure and heating apparatus shall be as nearly complete as the placing of the concrete will permit. The minimum temperature shall be continuously maintained around deposited concrete for the curing period of 5 days (cast in place masonry) or 7 days (bridge deck) immediately after concrete has been placed and then reduced gradually so the concrete will not be subjected to sudden change in temperature. When permitted

by the Engineer, the heating period may be reduced when the concrete units involved will not be subjected to any appreciable bending stress from dead or live load until after seasonal conditions have permitted normal curing.

In general, a steam heating system may be used to supply heat during the protection period. Auxiliary devices such as stoves, covered salamanders with stacks or unit heaters shall be provided for use during the periods required for preheating the forms, reinforcing steel and previously placed concrete to 40°F minimum prior to placing the concrete, during placing of concrete, during the time required for the removal of forms and during the surface finishing operations.

When approved by the Engineer, heat for protection may be supplied by any method which will maintain the required concrete temperature of not less than 50°F. When methods other than live steam are used, provisions shall be made in the enclosure being heated to maintain a humid condition of sufficient vapor (minimum humidity of 100 percent) content to prevent the moisture in the concrete from being evaporated.

The Contractor shall provide adequate fire protection when heating is in progress and shall maintain watchmen or other attendants to keep heating units in continuous operation. The use of open fires will not be permitted.

When approved by the Engineer, concrete may be protected and cured by the use of insulating materials of sufficient thickness to properly maintain the concrete at the specified minimum temperature. The insulating materials and methods of application shall meet with the approval of the Engineer. In general, the insulating material used on vertical forms shall consist of blankets having a durable liner on the side exposed to the weather. The liners shall be asphalt-bonded to both sides of the insulating mat. The insulation material shall be applied tightly against the wood form with the nailing flanges extending out from the blanket so they can be stapled or battened to the sides of the horizontal or vertical studs, spaced as required. The top of all piers, abutments and like concrete shall be covered with the insulating blanket, tightly secured to prevent loss of heat. Areas around protruding reinforcing which cannot be protected with the insulation blankets shall be first covered with sufficient straw or hay to prevent loss of heat from the concrete. In addition to the above, tarpaulins shall be used as an overall cover on top of such concrete. Failure to attain satisfactory control and results with insulation materials will be cause for rejection.

The Contractor will keep a daily permanent record of the concrete surface temperatures throughout the curing period with the use of a 24-hour temperature recording device (disc or other approved type). The Engineer will retain these records.

During freezing weather, all keyways, anchor bolt holes or other depressions in exposed horizontal concrete surfaces shall be sealed against the admission of water, and any damage to the concrete due to the freezing of water in such depressions shall be repaired if practicable, or the concrete shall be replaced by the Contractor at his expense and as directed by the Engineer.

Although permission may be granted to mix and place concrete under the conditions described above, the Contractor is not relieved of any responsibility for obtaining satisfactory results. Unsatisfactory concrete placed under such conditions shall be removed and replaced at the Contractor's expense.

Revise **Subsections 602.03.1; Fly Ash** and **602.03.3; Ground Granulated Blast Furnace Slag**, page 6-27 of the 2004 RI Standard Specifications for Road and Bridge Construction as follows.

SECTION 602

MINERAL ADDITIVES FOR PORTLAND CEMENT CONCRETE

- **Replace Subsection 602.03.1 with the following.**

602.03.1 Fly Ash. Fly ash shall be substituted or added to Portland cement in the amounts specified in the Contract Documents. If no quantity has been so-specified the Contractor has the option of substituting fly ash for Portland cement up to 15 percent by weight on a 1-to-1 ratio.

The fly ash supplier shall maintain a quality control program open for inspection by the State as deemed by the Engineer.

- **Replace Subsection 602.03.3 with the following.**

602.03.3 Ground Granulated Blast Furnace Slag. Ground granulated blast furnace slag shall be substituted or added to Portland cement in the amounts specified in the Contract Documents. The use of ground granulated blast furnace slag shall be in accordance with the requirements of **Subsection M.02.06.3** of these Specifications.

Prequalification of a source may be based upon test results by the Department's laboratory or a certified report of test results by a Cement Concrete Reference Laboratory (CCRL) approved or nationally recognized independent laboratory attesting that the material is in full compliance with these Specifications.

Revise **Subsection 604.02.1; Liquid Admixtures**, page 6-32 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION 604

CLASS HP(AE) PORTLAND CEMENT CONCRETE

- **Replace Subsection 604.02.1 with the following.**

604.02.1 Liquid Admixtures.

a. Corrosion Inhibitor. Calcium nitrate based corrosion inhibitor shall conform to the requirements of **SECTION 605** of these Specifications.

b. Mineral Additives shall conform to the requirements of **SECTION 602** of these Specifications.

Add the following new **Section 606; Self-Consolidating Concrete** to the RI Standard Specifications for Road and Bridge Construction.

SECTION 606

SELF-CONSOLIDATING CONCRETE (SCC)

606.01 DESCRIPTION. This Specification covers the requirements for modifying all Classes of concrete mix designs, except Classes “B” and “Z”, for self-consolidating applications. Concrete containing this admixture shall conform to the applicable requirements of **PARTS 600 and 800** of these Specifications, together with the additional provisions set forth below.

606.02 MATERIALS. All concrete material components shall conform to the requirements of **SECTION M.02; PORTLAND CEMENT CONCRETE** of these Specifications with the following additional provisions.

606.02.1 Chemical Admixture for SCC. SCC admixture shall be a viscosity modifying admixture and shall conform to the requirements of **Subsection 601.02.2**, ASTM C494 Type A & F and be on the Approved Product Listing.

606.02.2 Concrete Mix Design Approval Process. Proportioning of ingredients and the design and approval of mixtures shall conform to the requirements of **Paras. a and b** of **Subsection 601.03.1** of these Specifications, together with the following additional provisions:

- a. **Rate.** SCC generating chemical admixture shall be added at a rate that is recommended by the admixture manufacturer with a tolerance of ± 3 percent by weight.
- b. **Water-to-Cementitious Ratio.** The maximum water to cementitious matter by weight ratio shall be 0.36.
- c. **J-Ring Test.** During the trial batch, the mix shall be tested in accordance with ASTM C 1621. The difference between the slump flow and J-Ring shall be a maximum of 2 inches. This will ensure that the mix will not be in the ‘noticeable to extreme blocking’ range. If the difference is greater than 2 inches, the mix will be revised and retested prior to approval.

606.03 CONSTRUCTION METHODS. Construction methods shall conform to the applicable requirements of **Sections 600 and 800** of these Specifications except as modified below.

606.03.1 Sampling of SCC Admixtures. A sample of SCC admixture may be taken by a Department representative. Sampling and approval of SCC admixtures shall conform to **Subsection 601.02.2** of these Specifications.

606.03.2 Placement and Finishing of SCC. The placement of SCC shall be in accordance with **Sections 600 and 800** of these Specifications where applicable, except that a minimal amount of concrete vibrating is necessary to prevent segregation of SCC.

606.03.4 Testing of SCC. The testing of SCC shall be in accordance with **Subsections 601.03.7, 809.03.09 and 816.03.6** where applicable except the following:

Slump Flow Test. This test will be in lieu of the conventional slump test. The slump flow range shall be 23 in. \pm 3 in. measured diameter as per ASTM C1611.

606.04 METHOD OF MEASUREMENT. The SCC admixture required for “Self-Consolidating Concrete” will not be measured for payment.

606.05 BASIS OF PAYMENT. No separate payment will be made for the addition of the SCC admixture required for “Self-Consolidating Concrete.” Portland cement concrete with SCC admixture will be paid for under the appropriate item or items as listed in the Proposal.

Revise **Section 701, Culverts and Storm Drains**, pages 7-1 through 7-7 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION 701

CULVERTS AND STORM DRAINS

- **Replace Subsection 701.02.1(a) with the following.**

a. Smooth Interior Corrugated Polyethylene Pipe. Pipe, couplings and fittings shall conform to the applicable requirements of AASHTO M294 and ASTM D2321, together with the following provisions.

1. The pipe shall be Type S, subscribe to the requirements of the Eastern States Consortium (ESC) for High Density Polyethylene Pipe, and shall be included in the Department's Approved Materials List.

2. The basic materials shall be virgin or cleaned, reworked polyethylene compounds. No recycled materials shall be used.

3. All joints shall be watertight in accordance with ASTM D3212, and shall be sealed with elastomeric gaskets that conform to ASTM F477.

- **Replace Subsection 701.03.6 with the following.**

701.03.6 Smooth Interior Corrugated Polyethylene Pipe. The following additional requirements apply to this classification of pipe.

a. Limitation of Use. Polyethylene pipe may only be used where the top of the pipe will be at least 3 feet below the finish grade.

b. Bedding for pipe diameters less than or equal to 24" shall be Class B or Class C as defined above in **Subsection 701.02.5**, except that Class B shall have 100 percent pass the 3" sieve. The choice of material will be approved by the Engineer.

Bedding for pipe diameters greater than 24" shall be excavatable Class I Controlled Low Strength Material (CLSM), as defined in **Subsection 603.01.1** of these Specifications.

c. Trench Excavation and Backfill. Trench excavation shall conform to the requirements of **SECTION 205** of these Specifications.

1. Where the Engineer determines the excavation to be in an area of high water table, an approved separation filter fabric shall be placed against the bottom and sides of the excavation to completely enclose the pipe embedment material, with a minimum 12-inch overlap, to a minimum height of 12 inches above the top of the pipe. After the Class C pipe embedment material is placed and compacted, the filter fabric shall be lapped to completely enclose the material.

2. The trench shall be excavated to a minimum depth below the specified bottom invert of the pipe of 4 inches in soil trenches and 6 inches in rock trenches. Bedding shall be placed and compacted to a height of one inch above the specified bottom invert of the pipe. The surface of the bedding shall be shaped to fit the contour of the pipe. The pipe shall be installed and be supported or constrained to prevent its movement as the trench is filled and the material compacted. Bedding material shall be placed and compacted simultaneously on both sides of the pipe within the pipe zone. Hand tamping shall be used as needed to fill and compact the haunch zone of the pipe. Placement and compaction shall be simultaneous on both sides of the pipe to prevent damage to or movement of the pipe. Bedding material shall continue to be placed, in 6-inch compacted lifts, to a minimum of 12 inches above the top of the pipe (initial backfill). The final backfill shall be placed in lifts no greater than 6 inches after compaction.

3. With the approval of the Engineer, Controlled Low Strength Material, Classification I, as defined in **Subsection 603.01.1** of these Specifications, may be used as pipe embedment and the remaining backfill.

d. Testing. No sooner than 30 days after the completion of the compaction of the backfill, the Contractor, under the direction of the Engineer, shall conduct mandrel testing or hand measurement of the pipe. Testing may be required for up to 25 percent of the total length of pipe. The Engineer shall determine the actual sections of pipe to be tested.

Mandrel testing shall be conducted for pipe diameters of 24-inches and less. The mandrel shall be rigid steel, with a pulling ring at each end, an odd number of legs (9 legs minimum), and an effective diameter at least 95 percent of the base inside diameter. (The base inside diameter is the nominal pipe size less a 1.5 percent fabrication tolerance.) Any pipe through which the mandrel fails to pass shall be removed and a replacement pipe installed by the Contractor.

Mandrel testing or hand measurement shall be conducted for diameters greater than 24-inches up to and including 36-inch diameter pipe.

Hand measurement of deflection shall be conducted for pipe diameters greater than 36-inches. Hand measurement shall be conducted every five (5) linear feet of a selected length of pipe. Minimum diameter measurements are shown in the table below and are based upon 5 percent maximum deflection and 1.5 percent manufacture fabrication tolerance.

<u>Nominal Pipe Diameter</u>	<u>Allowable Deflected Diameter</u>
27"	25.26"
30"	28.07"
36"	33.69"
42"	39.30"
48"	44.92"
54"	50.53"
60"	56.15"

Removed pipe may be reused as the replacement pipe only when it is deemed by the Engineer to be undamaged. Otherwise, the removed pipe shall be removed from the work site by the Contractor. All costs associated with mandrel or hand measurement testing, including the replacement of deflected pipe and any delays that are incurred shall be borne by the Contractor at no additional cost the State.

- **Replace Subsection 701.04.4(a) with the following.**

701.04.4 Bedding Material.

a. "Class A, B, C and CLSM Bedding Material" will be measured by the number of cubic yards of each type of bedding actually placed. When bedding is specified and no measurement method is shown on the Plans, bedding material shall be measured within the horizontal Pay Limits specified for Trench Excavation under **Subsection 205.04.2, Para. a** of these Specifications and vertically from 12 inches below grade to a height of 50 percent of the diameter of the pipe excluding, however, the volume occupied by the pipe.

- **Replace Subsection 701.05.1 with the following.**

701.05.1 Culverts and Storm Drains. The accepted quantities of the various types and sizes of "Culverts and Storm Drains" indicated on the Plans will be paid for at the respective contract unit prices per linear foot as listed in the Proposal. The prices so-stated constitute full and complete compensation for all trench excavation (except for Trench Excavation-Rock, Trench Rock Excavation-Mechanical, and excavation of unsuitable material below grade) to a depth equal to the invert of the proposed pipes when bedding material is not required, or to a depth sufficient to receive the appropriate layer of bedding material, of whatever class, when such material is required; for the shaping of either the bottom of the trench or the top of bedding material, whichever the case may be, to receive the bell of the pipe; for all dewatering, including pumping, draining, or bailing; for laying, setting and jointing all pipe, pipe couplings, fittings and gaskets, including connections to existing drainage structures or pipes; filter fabric; for placing and compacting backfill; for design and furnishing, placing and subsequently removing all temporary timber or steel sheeting, bracing, shoring or trench protection; for the legal disposal of all excess or unsuitable excavated materials; and for all other work and incidentals required to finish the work, complete and accepted by the Engineer.

a. **Smooth Interior Corrugated Polyethylene Pipe.** The accepted quantities of the various sizes of "Smooth Interior Corrugated Polyethylene Pipe" indicated on the Plans will be paid for at their respective contract unit prices per linear foot as listed in the Proposal. In addition to the above, the prices so-stated constitute full and complete compensation for all pipe embedment material, CLSM, buoyancy constraint, post-installation mandrel testing or hand measurement, remedial work, including all labor, equipment, tools, and all other incidentals required to finish the work, complete and accepted by the Engineer.

b. **Trench Excavation-Rock, Trench Rock Excavation-Mechanical.** "Trench Excavation-Rock," "Trench Excavation-Mechanical," and excavation of unsuitable material below grade will not be included in the contract unit prices for the various types and sizes of "Culverts and Storm Drains" but will be paid for separately as set forth in **Subsection 205.05.2** of these Specifications.

- **Replace Subsection 701.05.4(a) with the following.**

701.05.4 Bedding Material.

a. Class B bedding material, and all Class C and CLSM used for the installation of Smooth Interior Corrugated Polyethylene Pipe, will be paid for under the applicable "Culvert," "Storm Drains," or "Flared End Sections" Proposal items and, therefore, shall not be paid for separately. The single exception relates to the replacement of unsuitable material. In this case, Class B bedding will be paid for separately as set forth in **Subsection 205.05.5** of these Specifications.

Remove **Section 714; Remove and Relocate Post Type Hydrants**, page 7-26 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace with the following.

SECTION 714

POST TYPE HYDRANTS

714.01 DESCRIPTION. This work consists of installing or removing and relocating post type hydrants to locations indicated on the Plans, or as directed by the Engineer, all in accordance with these Specifications.

714.02 MATERIALS. All materials shall conform to the applicable requirements established by both the water company or municipality that owns the particular system involved, and these Specifications. All new and relocated post type hydrants shall be a break-away type. The Contractor shall provide documentation to the effect that the hydrants, fittings and all appurtenances conform to the requirements of the respective manufacturers, water companies and municipalities.

714.03 CONSTRUCTION METHODS. The Contractor will be required to notify the applicable water company and/or municipality and the local fire company at least 24 hours in advance of any work involving the hydrants. All installations for new and relocated hydrants shall be subject to the approval of the applicable water company or municipality. Additional requirements for the installation of hydrants, including but not limited to pressure testing, disinfection, inspection and thrust block installations must be performed in accordance with the AWWA and the established practices and requirements of the owner.

714.03.1 Relocation of Post Type Hydrant. Hydrants to be relocated shall be carefully removed and transported to a stockpile location as directed by the Engineer. Upon removal of the hydrant, the Contractor shall note the depth of the standpipe section such that the proper height can be placed to ensure that the break-away coupling is at the proper height. At the stockpile area, the hydrants shall be cleaned and made ready for use. Hydrants shall be relocated and installed in accordance with the established practices of the water company or municipality that owns the water system.

714.03.2 New Hydrant Installation. Hydrants shall be installed in accordance with the established practices of the water company or municipality that owns the system. The Contractor is required to set the seating flange/breakaway coupling above finish grade within the limits shown on the Plans.

714.04 METHOD OF MEASUREMENT. "Remove and Relocate Post Type Hydrant" and "Post Type Hydrant" will be measured by the number of such assemblies actually relocated or installed in accordance with the Plans and/or as directed by the Engineer. Hydrants which have been set with the seating flange/breakaway coupling outside the limits shown on the Plans will not be accepted.

714.05 BASIS OF PAYMENT. The accepted quantities of "Remove and Relocate Post Type Hydrant" and "Post Type Hydrant" will be paid for at the contract unit price per each such assembly as listed in the Proposal. The prices so-stated shall constitute full and complete compensation for all labor, materials, tools and equipment, including excavation, removal, hauling, stockpiling, backfill, compaction, piping, plugs, disinfection, testing, thrust blocks, bedding materials and all other incidentals required to finish the work, complete and accepted by the Engineer and the respective water company or municipality.

In the event the relocated or newly installed hydrant requires a tapping sleeve and valve, these items will be paid for separately under the appropriate water service item in the Proposal.

Hydrants to be removed and disposed will be paid for separately under the appropriate item(s) in the Proposal.

CODE 803.0300

PARTIAL REMOVAL AND DISPOSAL OF EXISTING CONCRETE MASONRY

DESCRIPTION. This work shall consist of the removal and disposal of existing structure concrete and associated items as described herein to the payment limits as shown on the Contract Plans and/or as directed by the Engineer.

The areas of "Partial Removal of Existing Concrete Masonry" shall be the areas of deck, sidewalk, and parapet, concrete at fixed or expansion joints, and all joint hardware cast within or attached to the concrete, including adjacent traffic plates, trough assemblies, hardware at curbs and sidewalks/safety walks, reinforcing steel, and portions of granite bridge curbing (to the nearest joint) and other components, to the limits shown on the Contract Plans. This item of work shall not include removal of deteriorated concrete for deck repairs. Removal of concrete for deck repairs is paid for separately under the applicable deck repair items.

Stud shear connectors, if encountered, and longitudinal reinforcing steel in the deck are to remain in place unless the plans designate otherwise. Stud shear connectors damaged by the Contractor during the removal of concrete shall be replaced in accordance with the details on the Contract Drawings at no additional expense. Scuppers shall be removed and disposed when so specified on the Contract Drawings. Bridge rail shall be temporarily supported as required to complete the work. Bridge rail anchorage shall be replaced where required, and the rail shall be reset as an incidental item of work.

The areas of "Partial Removal of Existing Concrete Masonry" shall also include the removal and disposal of such items or portions of such items as backwall concrete, approach sidewalk concrete, parapets, walls, sidewalks, footings, abutments and associated reinforcing steel to the limits indicated on the Contract Plans.

All utility ducts and fittings in the sidewalks, safety walks and backwalls are to remain in place unless otherwise designated on the plans. Any damage to existing utility lines shall be repaired by the Contractor to the satisfaction of the Engineer and the respective Utility Company.

The work shall also include the cutting of reinforcing steel, where required, and the surface preparation of reinforcing steel and concrete prior to placing new concrete.

CONSTRUCTION METHODS. The concrete shall be saw cut square to a minimum depth of 3/4" along the limits of the concrete removal, as indicated on the Plans or as directed by the Engineer. The Contractor shall then remove all concrete, specified reinforcement, bridge curbs and deck joint hardware by means of suitable power and hand tools which will not cause over-breakage, and properly dispose of the material in a manner satisfactory to the Engineer. All repairs resulting from over-breakage shall be performed to the satisfaction of the Engineer at no additional payment. All work shall proceed in accordance with the Traffic Control plans and the Sequence of Construction, as per the Plans. The removal of concrete adjacent to the fixed or expansion joints, along with all associated hardware, shall be performed in stages as defined by the Plans and/or Sequence of Construction.

The Contractor shall submit to the Engineer for approval, at least 30 calendar days prior to the commencement of work, the methods and equipment to be used for the removal and disposal of the items detailed in this Specification, including any special removal methods adjacent to existing utility lines, the disclosure of the Contractor's proposed disposal area(s), and the methods and shop drawings for

temporary shielding. These approvals, however, shall in no way relieve the Contractor of sole liability for damages resulting from his operations.

When required by the Contract Documents, the Contractor shall erect and maintain a temporary shield system to insure that no materials, debris, or equipment will fall to the ground or below the structure, or damage the structure or utilities supported beneath the deck. Shop drawings shall be submitted for approval, showing the details and design of the shield system. The system shall be designed for the anticipated weight of all material to be supported, but not less than a live load of 100 psf. Any materials, debris, or equipment that accidentally fall to the ground below the structure shall be immediately retrieved and disposed of properly. At no time shall the temporary shield system extend below the bottom of the bottom flanges of the beams within the travel lanes of the roadway below. No concrete removal operations shall commence in areas where shielding is required until the shielding is installed to the satisfaction of 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. The pneumatic hammer used to remove concrete near reinforcing steel that is to remain shall not be heavier than the nominal 30 pound class. Chipping hammers or mechanical chipping tools to remove concrete beneath reinforcing steel shall not be heavier than the nominal 15 pound class. These power-drive hand tools shall never be placed in direct contact with the reinforcing steel that is to remain. If in the opinion of the Engineer, the removal operation causes excessive damage to portions of the concrete which is to remain, the Contractor shall cease his operation until such time that an alternate removal method has been proposed by the Contractor and approved by the Engineer. Any resulting delays in the concrete removal operation shall be the sole responsibility of the Contractor.

All Utility Companies shall be given a minimum of forty-eight (48) hours advance notice of concrete removal operations to be performed adjacent to their respective utility lines. This notice will also apply in the case of any deactivation of utility lines which may be required by the Contractor. The Contractor shall confirm the location, materials, and status of each utility line with the respective Utility Companies prior to any concrete removal.

Special concrete removal methods shall be used during the locating and removal of concrete around existing utilities. These methods may be limited to chipping hammers or small pneumatic hammers posing minimal risk of damage to the utility lines. The Contractor shall submit these special removal methods to the Engineer for approval prior to any concrete removal. The Contractor may, at the discretion of the Engineer, leave a minimal cover of existing concrete around the ducts (thereby leaving the ducts in place), provided that the new concrete section is of adequate thickness (minimum 4" from top of existing concrete to top of proposed sidewalk), and that a suitable bonding agent is applied at the interface of the old and new concrete. When required, the Contractor shall provide temporary supports for any utility ducts left unsupported during construction.

All ducts, including inactive or empty ducts, which are damaged as a result of the Contractor's operations shall be repaired to the satisfaction of the Engineer and the respective Utility Company at no additional cost. This repair work may include the installation of expansion fittings, backwall sleeves and other incidental hardware, as required.

The remaining concrete surfaces shall be cleaned of oil, solvent, grease, dirt, dust, bitumen, laitance, loose particles, and other foreign matter. The surface cleaning shall be accomplished by means of sandblasting, wire brushing, vacuuming, blowing the area with compressed air, or by a combination of these. When compressed air is used, care shall be taken to avoid deposits by the air pump. All sound

concrete surfaces on which new concrete is to be placed shall be roughened by mechanical means approved by the Engineer.

Loose and small concrete fragments shall be cleaned from reinforcing steel, stud connectors, and girder top flanges left in place by means of sandblasting and vacuuming. Prior to sandblasting, all petroleum contamination shall be removed by appropriate solvent or detergent cleaning operations. Reinforcing steel and girder top flanges shall be sandblasted in accordance with SSPC-SP-6, Commercial Blast Cleaning, to remove all contaminants, rust and rust scale. Any surface contamination not removed during sandblasting shall be removed in accordance with SSPC-SP-1, Solvent Cleaning. When using sandblasting equipment, all work shall be shielded for the protection of the public.

Existing reinforcing steel to be embedded in new concrete shall not be bent or damaged during the removal operations. All damaged reinforcing steel shall, under the direction of the Engineer, be repaired or replaced by the Contractor at his own expense. Cutting of reinforcing steel shall be accomplished by a method approved by the Engineer. Flame cutting of reinforcing steel will not be permitted.

The Contractor shall insure that his removal and disposal operations do not cause damage to the existing structure or to adjacent property. Any resulting damage shall be repaired to the satisfaction of the Engineer and property owner(s) at the Contractor's expense.

All removed materials shall be taken from the site as the work progresses. Storing or burying of material/debris on site will not be permitted except with the prior approval of the Engineer.

All concrete removal or cleaning/sand blasting, etc., that effects the painted surfaces of the structural steel shall be performed in a manner that complies with all applicable State and Federal health and environmental regulations. Removal of asbestos materials or lead based paint if required, will be paid for separately under the applicable contract items.

The Contractor shall provide a means of dust control satisfactory to the Engineer, including the use of water and/or any alternate methods as may be specified in the Plans.

METHOD OF MEASUREMENT. "Partial Removal of Existing Concrete Masonry" will be measured for payment by the cubic yard (CY) of concrete removed and disposed of in accordance with the Plans and/or as directed by the Engineer.

BASIS OF PAYMENT. The accepted quantity of "Partial Removal of Existing Concrete Masonry" will be paid for at the contract unit price per cubic yard as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, tools, materials, equipment, disposal, saw cutting, surface preparation of reinforcing steel and concrete surfaces, removal of all concrete and incidental items, saw cutting of reinforcing steel, replacement of damaged studs and reinforcing steel, removal and disposal of scuppers, repair of damaged utility ducts, temporary utility supports, utility expansion fittings, sleeves, and incidental hardware, resetting of bridge rail, coordination with owners and agencies, water for dust control and all other incidentals necessary to finish the work as shown on the Plans and to the satisfaction of the Engineer.

Removal of asbestos materials or lead based paint, if required, will be paid for separately under the appropriate pay item(s) listed in the Proposal.

The installation and removal of temporary protective shielding if required, will be paid for separately under the appropriate pay item(s) listed in the Proposal.

CODE 803.0400

CLEANING BRIDGE BEAM SEATS

DESCRIPTION. Work under this item shall consist of cleaning the existing bridge beam seats at piers and abutments, and the disposal of sand, bird excrement, feathers, nests, etc. and all other debris resulting from the cleaning operation. Also included shall be the installation and removal of temporary protective shielding as shown on the plans, to prevent debris from falling onto adjacent waterways and/or roadways and sidewalks. The contractor is herewith advised that the debris to be removed from bridge beam seats may contain bird excrement, feathers, nests, etc, which may contain bacterium considered by OSHA to be an occupational hazard. The contractor shall adhere to the latest provisions of sections 5(a)(1), 1910.134, 1926.95, and 1926.103 of the Occupational Safety and Health Act of 1970 for protecting workers.

A beam seat consists of the entire horizontal surface from end to end of a pier or abutment. The area to be cleaned also includes the bearings and the immediate ends of beams, which may contain debris. This work shall include all materials, equipment, labor and other incidentals necessary to complete the work to the satisfaction of the Engineer.

MATERIALS. The Contractor shall supply water and chlorine bleach as required for the washing operation and for the spraying of debris. Plastic or Canvas tarps, plywood, or similar materials as specified in the contract provisions, shall be provided to contain debris.

CONSTRUCTION METHODS. Abutment and pier seats shall be thoroughly cleaned and all sand, debris, bird excrement, nests, feathers etc, be carefully removed and properly disposed. Prior to removal, all material shall be wet down using a pressurized garden tank type sprayer with a solution of 1 part chlorine bleach to 10 parts water to minimize any airborne dust potentially containing bacterium. Debris shall be removed by shoveling or scraping using hoes, shovels, or by other approved methods, after which all cleaned surfaces shall be high-pressure water washed (minimum pressure 1500 psi, maximum pressure 3000 psi).

The Contractor shall take all precautions and perform all work in such a manner as to prevent damage to the remaining portions of the structure. Temporary protective shielding shall be installed to the limits indicated on the plans to prevent the fall of material onto the waterway and/or roadway and sidewalk areas below. All damage incurred as a result of the Contractor's operations shall be repaired by the Contractor to the satisfaction of the Engineer at no additional expense to the Department.

The contractor shall also adhere to the latest OSHA Standards 1926.95 for worker personal protective equipment and 1910.134 and 1926.103 for respiratory protection and, is referred to OSHA Publications 3079 and 3151. Workers shall wear (HEPA filter) masks, gloves, goggles, protective suits and, use other personal protective equipment as necessary to conform with all applicable OSHA regulations. All material removed shall be packaged and transported in accordance with 49 CFR 172, 173, 177 and, 178 and, shall be disposed at a facility approved for disposal of hazardous material.

Upon completion of the work, all temporary installations and debris shall be removed and the work area restored to the satisfaction of the Engineer.

METHOD OF MEASUREMENT. "Cleaning Bridge Beam Seats" will be measured per each bridge cleaned in accordance with the Plans and/or as directed by the Engineer.

BASIS OF PAYMENT. The accepted quantity of “Cleaning Bridge Beam Seats” will be paid for at the respective contract unit price per each as listed in the Proposal. The price so-stated constitutes full compensation for all labor, tools, materials, equipment, removal and disposal of all sand, bird excrement, nests and all other material and debris resulting from the cleaning operation, installation and removal of temporary shielding, and all other incidentals necessary to complete the work to the satisfaction of the Engineer.

CODE 803.0500**TEMPORARY DECK UNDERSIDE & SIDE PROTECTIVE SHIELDING**

DESCRIPTION: This work shall consist of designing, furnishing, fabricating, erecting, maintaining, removing, and disposing of temporary deck underside and deck side protective shielding at locations shown on the Plans and/or as directed by the Engineer.

The temporary deck underside and deck side protective shielding shall provide for the safe passage of vehicles, pedestrians, and shall provide protection for utilities. The use of the protective shielding is to insure that no debris falls to the roadway or sidewalks below the structure. This protective shielding is to be used for or in conjunction with deck demolition.

MATERIALS: At the discretion of the Contractor and as called for in the Contractor's design, deck underside and side protective shielding may be constructed from timber, steel, or aluminum. Steel and aluminum shall conform to the requirements of **SECTION M.05; METALS** of the Rhode Island Standard Specifications for Road and Bridge Construction, 2004 Edition, with all latest revisions.

Timber and hardware shall conform to the requirements of **SECTIONS M.11 and M.05**, respectively, of the Rhode Island Standard Specifications for Road and Bridge Construction, 2004 Edition, with all latest revisions. The material shall be structural lumber in accordance with the National Design Specifications for stress graded lumber recommended by the National Forest Products Association (NFPA). The grade shall be $F_b=1200$ psi minimum. Minimum lumber size for underside shielding shall be 3" x 8".

CONSTRUCTION METHODS: The deck underside and side protective shielding shall be erected at the locations and to the limits indicated on the contract drawings and/or as directed by the Engineer. All work shall be performed in accordance with the Maintenance and Protection of Traffic Plans, and in accordance with the demolition and construction sequences shown on the Plans and as specified in the Contract Documents.

All shielding shall meet or exceed the following requirements:

1. It shall be the Contractor's responsibility, as part of this item of work, to design and detail the protective shielding to conform to all Federal, State, and Local laws and regulations, as well as to the requirements contained here in this Specification.
2. The shielding shall extend under all areas of concrete decks, safety walks, and safety barriers to be removed. It shall extend horizontally a minimum of 3 feet beyond the bridge railings or safety barriers, and it shall extend vertically to a point 2 feet above the top of the bridge parapet, or to a point 4 feet above the top of bridge safety walks or decks, whichever is higher.
3. The Contractor shall submit shop drawings, stamped by a Professional Structural Engineer registered in Rhode Island, in accordance with **Subsection 105.02; Plans and Shop Drawings**, of the Standard Specifications, of all proposed shielding to the Engineer for his approval prior to installation. The drawings shall include details of all connections, brackets, and fasteners. The various components of the deck underside protective shielding system shall be designed for the anticipated weight of all material and debris to be supported, based on the Contractor's method and sequence of removal, but in no case shall it be designed for less than 150 pounds per square foot. Vertical shielding shall be designed for anticipated loads, or a minimum of 30 pounds per square foot, whichever is higher.

4. The shielding shall be placed and secured in a manner as to prevent it from being blown out by wind. If, in the opinion of the Engineer, the shielding is not secure, then the Contractor shall remove and install it to the Engineer's satisfaction.
5. Shielding shall be placed so as to maintain the existing vertical clearance under the bridge.
6. The Contractor may utilize the existing steel or prestressed concrete beams as supports. However, the Contractor will not be permitted to drill or weld to any existing or new beams, unless otherwise noted on the Construction Drawings.
7. The protective shielding shall not contain any gaps or openings that would allow debris to pass through, and shall be sufficiently strong to support any debris or section of demolished concrete from falling onto the roadway or walkway below.

If the Contractor's operations damage any existing portions of the bridge that are not within the scope of the contract, such damage shall be repaired at the Contractor's expense, and to the satisfaction of the Engineer.

METHOD OF MEASUREMENT: "Temporary Deck Underside and Side Protective Shielding" will be measured for payment by the square foot of shielding installed, including the deck side protective shielding, as required by the stage construction sequences and in accordance with the plans and as directed by the Engineer.

BASIS OF PAYMENT: The accepted quantity of "Temporary Deck Underside and Side Protective Shielding" will be paid for at the contract unit bid price per square foot as listed in the Proposal. The actual square foot measurement will be determined by the pay limits specified herein. No payment will be made for additional shielding beyond these pay limits, regardless of the approved design. This payment shall constitute full and complete compensation for all labor, equipment, tools, accessories, hardware and incidentals necessary to complete the work, including design and detailing and all installation and removal of the protective shielding, including the deck side protective shielding, all as required by the stage construction sequences and complete and accepted by the Engineer.

Revise **Section 804; Driven Piles**, pages 8-4 to 8-27 of the RI Standard Specifications for Road and Bridge Construction as shown below.

SECTION 804

DRIVEN PILES

- **Replace the first paragraph of Subsection 804.03.4(f) with the following.**

f. Placement of Reinforcement and Concrete. Accumulated soils and water shall be removed from driven shells before concrete is placed. The class of concrete shall be as specified in **Subsection M.07.08.2** of these Specifications, and arrangement of reinforcing shall be as shown and specified in the Plans. Reinforcing steel cages shall be fabricated, secured, and lowered down the shell pile in such a manner as to insure proper placement throughout the length of the pile, and to provide pile cap connections as shown in the Plans.

[Remainder of Subsection is unchanged]

- **Replace the first paragraph of Subsection 804.03.5(g) with the following.**

g. Placement of Concrete and Steel Reinforcement. Where driven steel pipe piles shall be concrete-filled and no interior steel reinforcement is to be installed except within 5 feet of the cut-off elevation, concrete shall be placed in one continuous operation with flow directed down the center of the pile to consolidate by impact. Vibration or rodding shall be required only to a depth of 5 feet below the design cut-off elevation. The class of concrete shall be as specified in **Subsection M.07.10.2** of these Specifications.

[Remainder of Subsection is unchanged]

- **Replace Subsection 804.04.4 with the following.**

804.04.4 Pile Cut-offs. Pile Cut-offs will not be measured separately for payment.

- **Replace Subsection 804.04.11 with the following.**

804.04.11 Incidental Items. The following items of work shall not be measured separately for payment, but shall be considered incidental to the other items of work inherent to this Section unless listed separately for payment in the contract documents: Wave Equation Analysis; Pre-Construction Survey and Monitoring; Layout, Elevation and Location Control; Templates and Support Spuds; Measurement and Marking; Pile Splices; Concrete Encasement for H-Piles; Cleanout and Dewatering of Shell Piles and Pipe Piles; Collars, Bands, Strapping and Trimming for Timber Piles; Extensions of Precast/Prestressed Concrete Piles; Hammer Cushions; Drive Heads; Pile Cushions; Pile Cutoffs; Leads; Followers; Jetting; Mobilization and Demobilization of equipment; and Steel Reinforcement Anchorages and Welding (materials and labor).

- **Replace Subsection 804.05.2 with the following.**

804.05.2 Pile Cut-offs. No separate payment will be made for this work, but will instead be included as an incidental under the payment for “Piles Furnished and Driven” or “Piles Driven” as appropriate, under **Subsection 804.05.1** of these Specifications

Remove **Subsection 805.05.7; Basis of Payment - Ground Anchors**, page 8-36 the RI Standard Specifications for Road and Bridge Construction in its entirety and replace with the following:

SECTION 805

EARTH RETAINING SYSTEMS

805.05 BASIS OF PAYMENT

805.05.7 Ground Anchors. The accepted quantity of “Ground Anchors” shall be paid for at the contract unit price per each as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, equipment, tools and materials, and all other incidentals required to furnish and install the ground anchors, including testing, complete and accepted by the Engineer.

CODE 808.1860

**CONCRETE ARCHITECTURAL TREATMENT
FORM LINER FINISH**

DESCRIPTION. Work under this item shall include all labor, materials and equipment required to provide a Concrete Architectural Treatment on the exterior face of concrete surfaces indicated on the plans. The Architectural Treatment shall be achieved through the use of form liners as described herein and as shown on the contract plans.

MATERIALS.

Release Agent: Compatible with the form liner and all other components of this work.

Form Liner: Form liners shall be constructed of high-strength urethane and shall attach to the concrete formwork. They shall be of the single-use type and from the same manufacturer. Form liners shall produce a surface pattern as shown on the plans.

CONSTRUCTION METHODS. The Contractor shall be trained by the manufacturer in the use of form liners for the intended application. The form liner manufacturer and installer shall have a minimum of three (3) consecutive years experience in textured concrete construction. Evidence shall be furnished to the satisfaction of the Engineer that the products and their installation have been successfully utilized in similar applications.

Prior to construction, the Contractor shall present a sample panel to the Engineer for approval. The sample shall include a butt joint to ensure that the form liner panels produce a consistent surface pattern and appearance without any visible seams. The sample panel shall be a minimum size of five (5) square-feet.

The Contractor shall submit Shop Drawings for the entire Concrete Architectural Treatment system in accordance with the provisions of Subsection 105.02 of the Standard Specifications. The Engineer shall consult with the RIDOT Historical Preservation Specialist if required, and shall review the Shop Drawings and samples for compliance with the specifications.

The Concrete Architectural Treatment shall be applied to the exterior face of concrete surfaces within the limits shown on the Plans to a minimum of 1'-0" below the finish grade.

Form liners shall be applied per the manufacturer's recommendations, and in accordance with the following provisions:

Form liners shall be mated with the adjacent panels to produce a consistent pattern and shall be placed adjacent to each other with a 1/8" seam or less. The form liners shall be securely attached to the forms per the manufacturer's recommendations. Wall ties shall be coordinated with the form liner system.

Form liners shall be rigid and capable of withstanding the anticipated concrete placement pressures without leakage, which could cause physical or visual defects, and should be able to be removed without causing concrete surface deterioration or weakness in the substrate. Form release agents, form stripping methods and patching materials, as well as related construction materials, shall be compatible with all other elements of Concrete Architectural Treatment.

Form liner butt joints shall be carefully blended into the approved pattern. No visible vertical or horizontal seams or conspicuous form marks created by butt-joined form liners will be accepted. The finished concrete surface shall have a finished texture and continuous pattern, in accordance with the information shown on the plans or as directed by the Engineer.

The use of wall ties that result in a portion of the tie being permanently embedded in the concrete shall require approval by the Engineer prior to the commencement of the work. Wall ties shall be provided with break set backs of 1" minimum from the finished concrete surface. The wall tie holes shall be placed in the high point of the rustication or mortar joint.

Concrete placement shall be in accordance with the provisions of Subsection 808.03.5 of the Standard Specifications, with an emphasis on the importance of proper vibration of the concrete next to the form liner to ensure that no honeycombs or other deficiencies occur in the face of the concrete.

After stripping the forms and form liners, the concrete surface shall be cleaned and shall be free of all laitance, dirt, dust, grease, release agents, efflorescence and any other foreign or deleterious materials.

Sandblasting shall not be permitted for cleaning concrete surfaces; pressure washing with water is the preferred method for removing laitance. When pressure washing is to be used, it shall be performed in accordance with specification 820.0200, High Pressure Water Cleaning of Concrete Surfaces. The completed surface shall be free of blemishes, discolorations, surface voids greater than 3/8" in diameter and conspicuous form marks. The cleaning process shall not diminish the "rustic" appearance created by the form liner.

Materials shall be furnished, prepared, applied, cured and stored according to the product manufacturers' directions.

When directed by the Engineer, the Contractor shall have the manufacturers' technical representatives available to answer questions and/or make recommendations prior to and during the work operations.

METHOD OF MEASUREMENT. "Concrete Architectural Treatment – Form Liner Finish" will be measured by the number of square feet complete, in-place and accepted in accordance with the Plans and/or as directed by the Engineer.

BASIS OF PAYMENT. "Concrete Architectural Treatment – Form Liner Finish" will be paid for at the contract unit price per square foot as listed in the Proposal. The price so-stated constitutes full and complete compensation for furnishing and installing the Concrete Architectural Treatment and for all labor, materials, tools, equipment, and all other incidentals necessary to finish the work, complete and accepted by the Engineer. Pressure washing of concrete surfaces will be paid for separately under the applicable bid item(s) in the Proposal.

Revise **Section 809; Precast/Prestressed Structure Concrete Masonry**; pages 8-69 to 8-79 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION 809

PRECAST/PRESTRESSED STRUCTURE CONCRETE MASONRY

- **Replace Subsection 809.03.4; Reinforcement and Prestressing Steel with the following.**

809.03.4 Reinforcement and Prestressing Steel. Prior to installation in the units, reinforcement and prestressing steel shall be free of rust, frost, dirt, oil, paint, mill scale, corrosion, or any foreign material that may prevent bonding between the steel and the concrete, in accordance with **Section 810** of these specifications and to the satisfaction of the Engineer. Prestressing steel that has sustained physical damage at any time will be rejected. The development of pitting or other results of corrosion (other than rust stain) will be cause for rejection when so directed by the Engineer. Prestressing steel exhibiting rust stains shall be examined to determine if pitting exists, prior to its use. Any coil that is found to contain broken strands will be rejected and the coil replaced.

The splicing of prestressed strands inside the casting form is not permitted. Splicing of strands outside the casting form may be allowed only with prior approval of the Engineer. Tack welding of bar reinforcement will not be allowed under any circumstances.

Placing and fastening of all steel reinforcement shall be in accordance with **Subsection 810.03.4** of these Specifications.

The Contractor shall furnish a manufacturer's Certificate of Compliance and a Mill test report per size, per heat number, per source and per load for all prestressing strands. The Engineer may obtain strand steel samples for verification testing.

- **Replace Subsection 809.04 and add new Subsection 809.04.1; Incidental Items.**

809.04 METHOD OF MEASUREMENT. "Precast, Prestressed Concrete Elements" will be measured for the particular item or items of work as called for in the Proposal and installed as shown on the Contract Drawings and as directed by the Engineer.

809.04.1 Incidental Items. All labor, equipment, tools and materials, including but not limited to backer rods, grouting between units, post tensioning, patching of duct pockets and all other incidental items required to complete the work as shown on the Contract Drawings, complete, in place and accepted by the Engineer, shall not be measured separately for payment but shall be considered incidental to the other items of work covered in this section.

- **Replace Subsection 809.05 with the following.**

809.05 BASIS OF PAYMENT. The accepted quantities of “Precast Prestressed Concrete Elements” of the sizes and types specified, will be paid for at their respective contract unit prices per item or items of work as listed in the proposal. “The prices so stated shall constitute full and complete compensation for all labor, equipment, tools and materials, including but not limited to backer rods, grouting between units, post tensioning, patching of duct pockets and all other incidentals necessary to finish the work as shown on the Contract Drawings, complete and accepted by the Engineer.”

a. Payment for Compensation for Out-of-State Inspection Services. The Contractor shall pay for such out-of-state inspection services by the day (per diem) for each Department Engineer and/or Technician assigned to the plant for inspection of the project. The rates, which shall be established based on the radius, in miles, from the base of operations, shall be as follows:

Distance in Radial Miles	Rates per Inspector/Day
51-to-100 miles	\$150.00
101 or more miles	\$500.00

There will be a maximum charge of one inspector for precast operations and two inspectors for prestress operations. The Contractor will be credited 50 percent when a plant is performing operations for two or more Department contracts.

The contractor will not be charged for an initial inspection of a company or a single follow-up inspection for plant approval prior to initial production.

The compensation payment for out-of-state inspection services shall be paid as a progress payment deduction.

Revise **Section 810; Reinforcing Steel**, pages 8-79 to 8-85 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION 810

REINFORCING STEEL

- **Replace the first paragraph of Subsection 810.03.2; Test Bars with the following.**

810.03.2 Test Bars. The schedule of bars shown on the Plans shall include extra bars for field sampling, for supplementary analyses; and for weight, tensile and bending tests, as may be required by the Engineer. In general, one bar of a length sufficient for two samples each, 36 inches long, shall be furnished for testing..

[Remainder of Subsection is unchanged]

- **Replace Subsection 810.03.3; Fabrication and Delivery with the following.**

810.03.3 Fabrication and Delivery.

a. Bar Reinforcement. Bent bar reinforcement shall be cold bent to the shapes shown on the Plans. Bars partially embedded in concrete shall not be field bent except as shown on the Plans. Bends and details shall be in accordance with the AASHTO Standard Specifications for Highway Bridges and the Manual of Standard Practice of the Concrete Reinforcing Steel Institute.

Bar reinforcement shall be shipped in standard bundles, tagged and marked in accordance with the Code of Standard Practice of the Concrete Reinforcing Steel Institute.

The dimensions of hooks and the diameters of bends measured on the inside of the bar shall be as shown on the Plans. When the dimensions of hooks or the diameter of bends are not shown, they shall be in accordance with Division I, Article 8.23 or ACI 318, "Building Code Requirements for Reinforced Concrete."

b. Uncoated Bars. All reinforcement bar, wire, or fabric when unloaded at the site shall be stored above the ground on sills, blocking, or other supports and shall be protected as far as practicable from mechanical injury or corrosion causing conditions.

Immediately prior to placement of concrete, all reinforcement shall be free from dirt, loose rust or scale, mortar, paint, grease, oil, or other materials that would reduce bond. Rusted areas must be thoroughly hand wire brushed just prior to installation as directed by the Engineer. After hand wire brushing, any remaining rusted areas will be acceptable provided the minimum dimensions, cross sectional area, and tensile properties meet the physical requirements for the size and grade of steel specified.

c. Coated Bars. In addition to the above requirements for uncoated bars, the following special conditions will apply for coated bars.

All systems for handling coated bars shall have padded contact areas for the bars wherever possible.

All bundling bands shall be padded and all bundles shall be lifted with a strong back, multiple supports, or a platform bridge to prevent bar to bar abrasion from sags in the bar bundle.

The bars or bundles shall not be dropped or dragged.

Coated bars shall not be exposed outdoors for more than 2 months unless protected per AASHTO M 284. Exposure time shall include storage time and any additional time for those sections of bars left exposed after casting.

- **Replace Subsection 810.03.4(a) paragraph 6; Splicing of Reinforcing Steel with the following.**

6. Splicing Reinforcing Steel. All reinforcement bars shall be furnished in full lengths as indicated on the Plans. Splicing of bars and wire fabric reinforcing, except where so indicated, will not be permitted without the written approval of the Engineer. Splices shall be staggered as far as possible.

Lapped splices shall not be used for bar sizes larger than #11.

Bars #11 and smaller shall be lapped as shown on the plans but in no case less than 24 diameters nor less than 12 inches.

The laps above are for non-critical splices. All critical splices are detailed on the Plans.

In deck slabs: Top bars shall be spliced at center of spans between girders. Bottom bars shall be spliced over girders.

Mechanical devices for splicing bars shall be equivalent in strength to an approved welded splice and must be approved by the Engineer.

- **Replace Subsection 810.03.4(d); Coated Bars, paragraphs (1) and (6) with the following.**

d. Coated Bars. In addition to the applicable provisions of **810.03.3(c)** and **Para. a** above, the following special conditions will apply for coated bars.

1. Referenced Specifications. The provision of epoxy-coated bar reinforcement shall conform to the requirements of AASHTO M 284 and M 317.

6. Repair of Epoxy Coating. Coating repair shall be per AASHTO M 317 (Subsection 7 – Repairs), for all visible damage. Where repair is required, all damaged areas shall be repaired as soon as possible after each span is placed. Repairs shall be made in accordance with the manufacturer's recommendations and to the prescribed thickness.

[Remainder of Subsection is unchanged]

Revise **Subsection 814.03.8; Curing**, page 8-100 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION 814

PLACEMENT OF CONCRETE BRIDGE DECKS

- **Replace the first paragraph of Subsection 814.03.8(c) with the following.**

814.03.8 Curing.

c. Falling Temperatures. The Contractor shall provide suitable measures to maintain the concrete surface temperature between 50°F and 85°F which shall be monitored by a continuously recording thermometer. The minimum 50°F temperature requirement shall be continuously maintained around the forms and deposited concrete for the entire curing period of the first 7 days.

[Remainder of Subsection is unchanged]

Delete **SECTION 815; Latex Modified Concrete for Bridge Overlays**, pages 8-102 through 8-105 of the RI Standard Specifications for Road and Bridge Construction in its entirety.

SECTION 815

LATEX MODIFIED CONCRETE FOR BRIDGE OVERLAYS

[SECTION DELETED]

Revise **Section 817; Repairs to Structure Concrete Masonry**, pages 8-110 to 8-116 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION 817

REPAIRS TO STRUCTURE CONCRETE MASONRY

- **Replace Section 817.01 with the following.**

817.01 DESCRIPTION. This work consists of making repairs to structure concrete masonry by removing and disposing deteriorated concrete, preparing bonding surfaces of concrete and reinforcing steel, and replacing the deteriorated concrete with approved mortar or concrete to the lines and grades specified and at the locations indicated on the Plans or as directed by the Engineer all in accordance with these Specifications.

- **Replace Subsection 817.02.5 with the following.**

817.02.5 Form and Cast-in-Place Concrete. Concrete shall conform to Class HP(AE) 3/8" concrete in accordance with the applicable provisions of **SECTION 601; Portland Cement Concrete** and **SECTION 604; Class HP Portland Cement Concrete**, of these specifications.

- **Replace Subsection 817.03.4b with the following.**

b. Placing and Consolidation. Prior to placing the patching mortar, an epoxy bonding agent conforming to **Subsection 817.02.4** of these Specifications shall be applied to all exposed reinforcing and mating concrete surfaces.

The Contractor shall follow the manufacturer's recommendations for application and curing of the epoxy bonding agent prior to placing the patching mortar. The patching mortar shall not be placed if the epoxy bonding agent has exceeded the manufacturer's recommended contact time. If the epoxy bonding agent has exceeded its contact time, the Contractor shall follow the manufacturer's recommendations for re-application. An epoxy bonding agent with an extended contact time should be used if required by the timing of concrete placement and/or weather conditions.

The patching mortar shall be placed in accordance with the manufacturer's recommendations, otherwise it shall be placed in maximum 1-inch lift layers within 5-to-10 minutes after mixing water is added to avoid the rapid setup of the material.

If more than one lift layer is required to perform the repair, the previously placed lift layer shall not be allowed to dry. Its surface shall be roughened prior to placing the next layer.

- **Add the following new Subsection 817.03.5.**

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 an epoxy bonding agent conforming to **Subsection 817.02.4** of these Specifications shall be applied to all exposed reinforcing and mating concrete surfaces.

The Contractor shall follow the manufacturer's recommendations for application and curing of the epoxy bonding agent prior to placing the cast-in-place concrete. The cast-in-place concrete shall not be placed if the epoxy bonding agent has exceeded the manufacturer's recommended contact time. If the epoxy bonding agent has exceeded its contact time, the Contractor shall follow the manufacturer's recommendations for re-application. An epoxy bonding agent with an extended contact time should be used if required by the timing of concrete placement and/or weather conditions.

c. Final Finish. All repaired surfaces shall be finished straight and true, approximating the original contour as close as practicable. The final finish shall have a steel trowel, wood float, or other finish approximating the existing adjacent concrete finish.

- **Replace Sections 817.04 and 817.05 with the following.**

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 the number of cubic feet of the respective mortars or concrete actually applied in accordance with the Plans 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 cubic foot as listed in the Proposal. The prices so stated shall constitute full and complete compensation for all labor, materials, equipment described above, including scaffolding, and all other incidentals required to finish the work, complete and accepted by the Engineer.

Remove **Section 818; Portland Cement Concrete Bridge Deck Repair**, pages 8-116 through 8-119 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace with the following.

SECTION 818

PORTLAND CEMENT CONCRETE BRIDGE DECK REPAIR

818.01 DESCRIPTION. This work consists of removing deteriorated concrete from bridge deck surfaces, erecting form-work and the placement of new Portland cement concrete, all as indicated on the contract drawings and in accordance with these Specifications.

a. Partial Depth Removal. The limits of partial depth concrete removal shall be those areas for which deteriorated concrete extends less than 50 percent of the depth of the original deck as indicated on the contract drawings.

b. Full Depth Removal. The limits of full depth concrete removal shall be those areas for which deteriorated concrete extends more than 50 percent of the depth of the original deck as indicated on the contract drawings.

818.02 MATERIALS. Materials shall conform to the following requirements:

818.02.1 Concrete shall conform to the requirements for Class HP material as set forth in **Subsections 601.01.1 and 601.03.1; Classification and Proportioning**, of these Specifications, with the exception that the coarse aggregate gradation shall meet the requirements of **Subsection M.02.03** for aggregate size ½" or 3/8". The size used shall be at the discretion of the Contractor.

818.02.2 Epoxy Adhesive shall be an all-purpose, high-strength, moisture-insensitive, rigid epoxy adhesive. Such adhesive shall be listed on the Department's approved materials list. The Contractor shall ensure that the material used is compatible with the surfaces to be bonded.

818.02.3 Reinforcement shall conform to the requirements for ASTM 615 Grade 60 Reinforcing Steel as set forth in Section 810 of these Specifications.

818.03 CONSTRUCTION METHODS.

818.03.1 Removal of Deteriorated Concrete. Removal of concrete shall be performed in a workmanlike manner to prevent damage to the bridge deck that is to remain. Any damage to remaining portions of the bridge deck or to the structural girders caused by the Contractor's operations shall be repaired or replaced by the Contractor, at his own expense and to the satisfaction of the Engineer.

All loose, deteriorated or unsound concrete shall be removed as designated by the Engineer. A saw cut to an approximate depth of 3/4-inch shall be made along all boundaries of the repair patches prior to removal, except those patches bounded by the bridge curbing. Particular care shall be taken not to cut into the top mat of bridge deck reinforcing steel.

Concrete removal shall be performed in a manner that will not damage reinforcing steel or saw cut areas at the repair boundaries. Any damage caused by the concrete removal process shall be repaired at the Contractor's expense.

The concrete deck shall be removed to a minimum depth of 1 inch. "Jackhammers" heavier than nominal 30-pound class shall not be used. "Chipping Hammers" heavier than a nominal 15-pound class shall not be used to remove concrete from areas beneath reinforcing bars. Hand tools such as hammers and chisels shall be provided for removal of particles of unsound concrete or to achieve the required depth throughout the repair areas, including the saw cut edges. In no case shall pneumatic tools be placed in direct contact with reinforcing steel so as to damage its bond to the surrounding concrete.

In areas where reinforcing steel is found to be surrounded by deteriorated concrete or where at least one-half of its surface area is exposed, the depth of concrete removal shall be such to include all deteriorated concrete but not less than that depth necessary to allow for 3/4-inch clearance below the primary reinforcing bars in the top mat of reinforcing steel. Should removal extend deeper than 50% of the original deck thickness solely for obtaining the aforementioned 3/4-inch clearance, the repair shall still be considered a partial-depth repair. It is not necessary to remove concrete underneath any temperature and distribution reinforcement which has at least one half of its surface area exposed. Reinforcing bars that have lost 1/4 or more of their original diameter shall be supplemented by new bars spliced in place. In splicing new bars, they shall be lapped sufficiently (30 diameters on both sides of the effected areas) to develop the full strength of the bar and, if necessary, additional concrete removal will be required to provide this lap. Dual bars of equivalent or greater section may be used.

a. Deck Removal by Hydro Demolition. Deck removal by hydro demolition shall be performed in accordance with the provisions of **SECTION 840** of these Specifications.

818.03.2 Preparation of Sound Concrete and Reinforcing. All exposed reinforcing bars and newly exposed concrete shall be thoroughly cleaned by sandblasting or other mechanical abrasion methods approved by the Engineer.

The exposed concrete and reinforcing steel surfaces shall be free of rust, oil, solvent, grease, dirt, dust, bitumen, loose particles, and other foreign matter just prior to the application of the epoxy adhesive. A large sized vacuum cleaner and/or an air jet shall be used to remove dust and other particles just prior to placing the epoxy adhesive.

818.03.3 Forms for Full Depth Removal. Forms used for the patching work shall be capable of supporting the quantity of fresh concrete needed to install the patch and shall otherwise conform to the applicable requirements of **Subsection 808.03.4** of these Specifications.

818.03.4 Epoxy Adhesive shall be applied to the substrate with a stiff-bristled broom to a thickness of approximately 20 mils or in accordance with the recommendations of the manufacturer of the material.

The Contractor shall follow the manufacturer's recommendations for curing the epoxy adhesive prior to placing the concrete.

818.03.5 Placing and Finishing Concrete. The new concrete shall be hand manipulated and struck off slightly above the final grade. It shall then be mechanically consolidated and screeded to a final grade.

A mechanical or hand trowel finish shall be provided to produce a tight and uniform surface.

As soon as finishing has been completed, all vertical joints with adjacent concrete shall be sealed by painting with thinned grout.

White pigmented liquid curing compound shall be applied immediately after the joint application is completed. The rate of application shall be 15 square yards per gallon, applied evenly and uniformly

over the surface area. If the curing compound is not applied within 10 minutes after the final screeding, the finished concrete surfaces shall be immediately covered with wet burlap until the application of curing compound can be made. Failure to apply either curing compound within 10 minutes or burlap within 30 minutes after the concrete is deposited on the floor shall be cause for rejecting the work so effected. Repaired concrete in the rejected areas shall be removed, and the re-repair shall be implemented at no additional cost to the State.

Traffic or external loads from heavy equipment such as pavers shall not be allowed on the repaired deck surfaces until the concrete has reached a minimum of 95 percent of its twenty-eight (28) day compressive design strength.

818.04 METHOD OF MEASUREMENT. "Portland Cement Concrete Deck Repairs (Partial Depth Removal)" and "Portland Cement Concrete Deck Repairs (Full Depth Removal)" will be measured by the number square feet of such repairs actually made in accordance with the Plans and/or as directed by the Engineer.

818.05 BASIS OF PAYMENT. The accepted quantities of "Portland Cement Deck Repairs (Partial Depth Removal)" and "Portland Cement Concrete Deck Repairs (Full Depth Removal)" will be paid for at the respective contract unit prices per square foot as listed in the Proposal. The prices so-stated constitute full and complete compensation for all labor, tools, materials and equipment, and all other incidentals required to finish the work, complete and accepted by the Engineer. Supplemental reinforcing bars shall be paid for separately by force account in accordance with the provisions of **Subsection 109.04** of these Specifications.

a. Reinforcing Bar Clearances. Existing reinforcing steel clearances indicated on the contract drawings are nominal and may vary due to the as-built conditions. An adjustment in the bid price for partial depth removal based on the percentage increase in depth of removal will be made should concrete need to be removed beyond the depth indicated by the contract drawings.

CODE 820.0200

HIGH-PRESSURE WATER CLEANING OF CONCRETE SURFACES

DESCRIPTION. This work shall consist of removing dirt, organic growth such as moss or lichens, efflorescence and all other accumulated foreign matter from concrete surfaces through the application of a high-pressure water spray to the affected surfaces. The limits of this work shall be as indicated on the plans and/or as directed by the Engineer, and shall be completed to the satisfaction of the Engineer prior to beginning any repair or rehabilitation work. The intent of this work is to produce a sufficiently clean surface for color matching of replacement and repair work, the application of concrete sealers, or other structural repair or rehabilitation work as specified in the contract documents.

EQUIPMENT. Equipment shall be operated by qualified personnel. The high-pressure water cleaning equipment shall have sufficient controls to vary the water pressure such that it can be adjusted to clean the concrete surfaces without damaging the surface being cleaned. The equipment shall produce a maximum pressure of up to 3000 psi, and shall have a functional pressure gauge and control incremented in a manner such that the pressure can be adjusted and maintained consistently. A sufficient variety of nozzle tips and accessories shall be available to ensure that the spray can be applied uniformly to all applicable parts of the structure. The tip shall not concentrate the spray at less than 25 degrees to the surface.

CONSTRUCTION METHODS. The Contractor shall, in the presence of the engineer, perform a test cleaning in an inconspicuous area of the structure for the purpose of establishing the appropriate pressure to produce a sufficiently clean and undamaged surface. The initial pressure for the test area shall start at approximately 500 psi and be gradually increased as necessary until the surface has been adequately cleaned to the satisfaction of the engineer. When the test area has been sufficiently cleaned, the engineer shall record the pressure, nozzle used, angle of impingement of the water stream, approximate cleaning rate per square foot, and other pertinent information for reference and inspection during the course of the cleaning operations. The contractor shall provide a supply of clean potable water for the operation. No additives such as de-greasers, chemical cleaners, detergents, or abrasives shall be combined with the water used for cleaning. Cleaning of concrete surfaces shall be accomplished by moving the wand in a smooth stroke to achieve uniform and thorough cleaning over the entire surface without pitting or marring.

The Contractor shall exercise due caution and take all necessary precautions to prevent property damage and to protect the general public from exposure to spray, debris and any other potentially hazardous conditions. In cases where the plans and/or contract documents specify the use of temporary shielding or other similar measures to protect property and/or the general public, the Contractor shall install, at all designated locations, the required temporary protective measures as indicated and detailed on the plans. The installation of temporary protection shall be considered incidental to the cleaning operation.

METHOD OF MEASUREMENT. “High Pressure Water Cleaning of Concrete Surfaces” will be measured by the number of square feet of surface actually cleaned in accordance with the Plans and/or as directed by the Engineer.

BASIS OF PAYMENT. “High Pressure Water Cleaning of Concrete Surfaces” will be paid for at the contract unit price per square foot as listed in the proposal. The price so-stated constitutes full and complete compensation for all materials, tools, equipment, labor and all incidentals, including the installation and removal of temporary protective measures, necessary to finish the work, complete and accepted by the Engineer.

CODE 820.0300

HIGH-PRESSURE WATER CLEANING OF BRIDGE STRUCTURES

DESCRIPTION. This work shall consist of the removal of all dirt, organic growth, efflorescence and all other foreign particles, including sand, salt and other debris from steel or concrete bridge girders, cross frames, trusses, pier tops, utility supports, utility pipes and conduits, bearing devices, beam seats, scuppers and other bridge components through the application of a high-pressure water spray to the affected surfaces. The limits of this work shall be as indicated on the plans and/or as directed by the Engineer.

The Contractor shall not remove or attempt to remove paint, sealant, or any other weatherproof material or waterproof coating.

MATERIALS AND EQUIPMENT. The cleaning equipment shall include the necessary high-pressure water cleaning equipment and all ancillary equipment necessary to flush, clean and remove all foreign material from the bridge structure, including hand tools, compressors, water tanks and water pumps. The contractor shall determine the method and equipment, subject to the Engineer's approval, which is best suited to successfully complete the cleaning operation.

The high-pressure water cleaning equipment shall have sufficient controls to vary the water pressure such that it can be adjusted to clean the surfaces without damaging the structure. The equipment shall be capable of producing a water pressure of up to 3000 psi, and shall have a functional pressure gauge incremented in a manner such that the pressure can be adjusted and maintained consistently. A sufficient variety of nozzle tips and accessories shall be available to ensure that the spray can be applied uniformly to all applicable parts of the structure. The tip shall not concentrate the spray at less than 25 degrees to the surface.

CONSTRUCTION METHODS. The equipment shall be operated by qualified and experienced personnel.

When required by the engineer, the contractor shall conduct a test cleaning in an inconspicuous area of the structure for the purpose of establishing the appropriate pressure to produce a sufficiently clean and undamaged surface. The initial pressure for the test area shall start at approximately 500 psi and be gradually increased as necessary until the surface has been adequately cleaned to the satisfaction of the engineer. The water pressure shall be sufficient to remove the accumulated material without damaging the paint coverage of structural steel. When the test area has been sufficiently cleaned, the engineer shall record the pressure, nozzle used, angle of impingement of the water stream, approximate cleaning rate per square foot, and other pertinent information for reference and inspection during the course of the cleaning operations.

The cleaning shall proceed in an orderly manner, subject to the limitations of traffic control. No residue from the cleaning operation shall be left on the surfaces to be cleaned at the completion of the operation. The Contractor shall provide a supply of clean water for the operation. No additives such as degreasers, chemical cleaners, detergents, or abrasives shall be combined with the water used for cleaning. Cleaning of concrete surfaces shall be accomplished by moving the wand in a smooth stroke to achieve uniform and thorough cleaning over the entire surface without pitting or marring.

The solid material removed from the bridge structure by the cleaning operation shall be collected and disposed of at approved waste sites in accordance with all applicable Federal and local regulations. Under no circumstances will any wastewater or debris from the cleaning operation be allowed to enter adjacent water bodies.

The Contractor shall exercise due caution and take all necessary precautions to prevent property damage and to protect the general public from exposure to spray, debris and any other potentially hazardous conditions. In cases where the plans and/or contract documents specify the use of temporary shielding or other similar measures to protect property and/or the general public, the Contractor shall install, at all designated locations, the required temporary protective measures as indicated and detailed on the plans. The installation of temporary protection shall be considered incidental to the cleaning operation.

METHOD OF MEASUREMENT. “High-Pressure Water Cleaning of Bridge Structures” will be measured by the number of bridge(s) actually cleaned in accordance with the Plans and/or as directed by the Engineer.

BASIS OF PAYMENT. “High-Pressure Water Cleaning of Bridge Structures” will be paid for at the contract unit price per each as listed in the proposal. This price so-stated shall constitute full and complete compensation for all materials, labor, tools, equipment and all incidentals, including the installation and removal of required temporary protective measures, necessary to finish the work, complete and accepted by the Engineer.

Revise **Section 823; Roadway Joints – Expansion and Fixed**, pages 8-125 to 8-131 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION 823

ROADWAY JOINTS – EXPANSION AND FIXED

- **Add new paragraph (f) to Subsection 823.03.3.**

823.03.3 Asphaltic Expansion Joint System.

f. Temporary Bituminous Joint System. A temporary bituminous joint system must be installed if the contractor is unable to complete the installation of the asphaltic expansion joint system prior to the ambient temperature falling below the minimum manufacturer recommendation. The temporary joint system must include the galvanized steel backing plate and be filled with compacted bituminous asphalt. A joint one-half the depth of the wearing surface shall be sawed and sealed along the temporary joint centerline from curb to curb.

The contractor shall remove and dispose of all unnecessary materials, repair any damage caused by the installation or removal of the temporary system and leave the joint in a condition acceptable for the installation of the final joint system per the manufacturer's recommendations. The contractor may elect to reuse the steel backing plate(s) if the warranty standards can be met; otherwise the Engineer will determine if the plate(s) may be reused or must be replaced.

- **Replace Subsection 823.05.3 with the following.**

823.05 BASIS OF PAYMENT

823.05.3 Asphaltic Expansion Joint System. The Accepted quantities of "Asphaltic Expansion Joint System" of various widths will be paid for at their respective contract unit prices per linear foot as listed in the Proposal. The prices so-stated constitute full and complete compensation for all labor, materials and equipment, the temporary bituminous joint, including the sawed and sealed joint, and for all other incidentals required to finish the work, complete and accepted by the Engineer.

CODE 823.1755

**ASPHALTIC EXPANSION JOINT SYSTEM
AND MATERIALS AND WORKMANSHIP WARRANTY**

DESCRIPTION. The work consists of the placement of a 20-inch nominal width, or as specified on the plans, of a special asphalt material with elastic properties over concrete deck joints in the space usually occupied by the bituminous wearing surface. This deck joint system is a commercial product and must be installed in strict accordance with the manufacturer's recommendations. Manufacturers of this joint system are included in the RIDOT's List of Approved Materials and Suppliers. The asphaltic expansion joint system shall also be fabricated and installed in accordance with the Plans or as directed by the Engineer, and in accordance with these Specifications.

LIMITS OF WARRANTED WORK. The warranted work includes all asphaltic expansion joint systems within the project limits unless otherwise indicated on the proposal. This includes all necessary Maintenance and Protection of Traffic (M&PT), all M&PT incidentals, and any uniformed traffic control personnel required to complete the warranted work. The M&PT shall be designed and implemented in accordance with the Contract requirements and with the latest edition of the Manual of Uniform Traffic Control Devices (MUTCD) Part 6, including all addenda.

WARRANTED PERIOD. The length of the warranty will be three (3) years from the acceptance date of Construction, as specified in the following sections of this specification.

AMOUNT OF WARRANTY BOND. The Contractor will supply a warranty bond equal to 100% of the warranted work for asphaltic expansion joint systems, as described in the above section "Limits of Warranted Work."

MATERIALS.

a. Backer Rod. The backer rod material shall be an expanded closed cell polyethylene foam capable of withstanding the temperature of the hot binder material, shall have a diameter 150 percent the width of the joint opening and shall have the following properties:

- Density - 2.0 lbs./cu.ft. min. ASTM D1622
- Tensile Strength - 25 psi min. ASTM D1623
- Water Absorption - 1-percent of weight max. ASTM C509

b. Asphaltic Joint System. The materials for the joint system, both aggregate and binder, shall be provided by one of the manufacturers included in the RIDOT's List of Approved Materials and Suppliers.

1. Binder. The binder shall be a hot applied polymer modified bituminous material conforming to all specifications as detailed in ASTM D6690, and manufactured under strict quality control procedures as approved by the Engineer and meet the following specifications:

- Softening Point, (ASTM D36).....180°F min.

2. Aggregate. The aggregate shall be of the Basalt, Gabbro or Granite groups, meeting the manufacturer's size and gradation requirements. All stones shall be crushed, double-washed, dried and delivered to the site pre-weighed in labeled packs. When tested in accordance with AASHTO T-11, the material passing the #200 sieve will be no more than 0.3% by weight of the stone. The broadcast stone for the surface of the joint system will be basalt and shall be sized as to pass the #8 sieve and be retained on the #16.

c. Steel Backing Plate. The backing plate shall conform to requirements of AASHTO M270, Grade 36, Steel, minimum 1/4" thick and shall be galvanized in accordance with AASHTO M232. Holes for locating pins shall be approximately 1-foot center to center along the centerline of the plate, unless indicated otherwise on the Plans.

d. Locating Pins. Locating pins shall be 16d common nails or larger and shall be hot-dipped galvanized in accordance with ASTM A153.

CONSTRUCTION METHODS.

a. Removal of Bituminous Pavement. Saws shall be set to cut the full depth of the bituminous concrete and any membrane present. Bituminous concrete pavement shall be removed from those areas where asphaltic joint material is to be placed by the use of saws and pneumatic hand tools. Variations in the thickness of the bituminous concrete across the road should be considered to ensure that the deck is not damaged.

b. Joint Preparation.

1. Cleaning. The entire joint must be thoroughly cleaned and dried using a Hot Compressed Air Lance immediately prior to tanking. All loose debris shall be removed from the gap. Care must be taken to ensure that the sawcut surfaces have been thoroughly cleaned of any dust or wet paste from the cutting operation.

2. Caulking. The joint gap shall be caulked with a backer rod as shown on the Plans. It shall be placed in such a manner as to allow for the appropriate placement of the required binder material.

3. Tanking. Immediately after cleaning/caulking, the bottom of the blockout area shall be coated with a layer of hot binder that has been heated in accordance with the manufacturer's recommendations. If a delay greater than one (1) hour occurs between cleaning and tanking, the joint shall be re-cleaned using a Hot Compressed Air Lance as described above.

4. Plating. The gap shall be bridged with three to four feet long steel backing plates. Steel plates shall be located with pins along the centerline. The plates shall be butted to each other and shall not be overlapped. Immediately coat the walls of the blockout area and the bridging plates with binder, making sure that the plate is entirely encapsulated by the binder.

c. Asphaltic Joint Material Preparation.

1. Aggregate. The aggregate must be dried, cleaned and heated in a drum mixer by hot compressed air. The stone shall be heated to a temperature between 375°F (190°C) and the maximum safe binder temperature, as specified by the manufacturer. The temperature shall be monitored with a calibrated infrared thermometer. Under no circumstances shall the binder be mixed with the aggregate if its temperature is above the maximum. All tangible signs of dust must be removed prior to mixing of the binder with the aggregate.

2. Binder. The binder shall be heated to and maintained at the manufacturer's recommended placement temperature in excess of 350°F (177°C). At no time shall the manufacturer's recommended safe heating temperature be exceeded.

d. Material Installation. The method used shall be according to the manufacturer's recommended procedure. Variations from the manufacturer's procedure or from this specification must be approved by the Engineer prior to commencement of work.

1. Placement of the aggregate/binder mix into the blackout area. Binder material shall be added to the mixer just sufficient to thoroughly coat the aggregate. The coated aggregate shall be placed into the blackout in layers as recommended by the joint material manufacturer. The blackouts shall be overfilled with coated aggregate as required to compensate for compaction. Equipment for compaction shall be capable of sufficient compaction force as recommended by the joint manufacturer. Additional binder material shall be screeded over the compacted joint to fill any surface voids.

2. Surface Layer. Accurately measured quantities of hot aggregate shall be mixed with the binder in a rotating drum mixer. The binder should be at the approved temperature to insure complete coating of all the stone. This mix shall be transferred to the joint and leveled to be slightly higher than the adjacent road surface.

3. Compaction. Compaction shall begin immediately after the placement of the material in the blackout, using equipment as specified by the joint system manufacturer and the joint surface made flush with the existing road surface.

4. Screeding. Prior to the final screeding, the surface of the joint and surrounding road shall, if necessary, be dried and cleaned with a Hot Compressed Air Lance. Immediately thereafter a single screed of hot binder shall be applied to fill all surface voids.

5. Joint Sealing. The interface between the joint and the pavement shall be sealed with a 2-inch wide band of the binder, centered on the interface, for the entire length of the joint on both the leading and trailing edges, relative to traffic. The surface adjacent to the interface shall be heated with a Hot Compressed Air Lance to promote adhesion of the binder. Immediately after the application, while the binder is still hot, basalt stone shall be broadcast onto the band. It shall cover 75% of the surface of the band.

6. Opening to Traffic. The joint shall not be opened to traffic before the surface reaches a temperature of 120°F or 30 minutes has elapsed from placing the basalt stone.

e. Equipment. The following equipment is required for the proper installation of asphaltic bridge deck joints:

1. A manually propelled, high speed water-cooled saw with diamond tipped blades capable of cutting to the full depth required in one pass.

2. A pneumatic compressor of 185 CFM capacity to power drills and breakers of various sizes with suitable size bits.

3. Two Hot Compressed Air Lances (HCA Lances), each capable of delivering a flame retarded air stream with a temperature of 3,000°F (1,648°C), at a speed of 3,000 feet per second. The use of a torch rather than a Hot Air Lance to heat the block out surfaces is not allowed.

4. A 200-gallon air-jacketed, trailer-mounted melter with two flame baffled L.P. ribbon type burners rated a minimum output of 175,000 BTU which shall apply indirect heat to the melting chamber. The unit shall have automatic temperature controls which can accurately maintain the material temperatures between 100°F and 650°F (38°C and 343°C). A temperature gauge, calibrated to $\pm 10^\circ\text{F}$ of actual, must be provided and mounted such that the temperature is clearly visible to the operator and the Engineer.

The burner system shall have a safety pilot capable of shutting off the base supply in the event of a flame-out.

The melter shall be equipped with a horizontally mounted double-paddle, full sweep reversible agitation system which runs the length of the melting chamber and is driven hydraulically with a dedicated engine and compressor. Material delivery shall be by an angled 3-inch discharge port.

5. Storage tanks capable of holding a minimum of 600 pounds propane, 600 pounds oxygen, 200 pounds acetylene.

6. A dedicated drum mixer, with compressed hot air apparatus sufficient to heat the aggregate and aggregate/binder mix in the drum to the specified temperature range.

7. Acetylene cutting torches.

8. An arc welder powered by a suitable generator.

9. 500-gallon capacity water tank fitted with suitable spigots.

10. A hand-held infrared thermometer, calibrated to $\pm 10^\circ\text{F}$.

11. A vibratory plate compactor.

12. A powered roller sufficient to span the width of the joint system in a single pass.

13. In the event of equipment failure during installation, backup equipment must be available, or in the case of a major breakdown, replacement equipment should be on site within 48 hours.

f. Submittals. The Contractor shall submit to the Engineer, for approval at least thirty (30) days prior to start of work, the following:

1. The name of Manufacturer.
2. The Manufacturer's Warranty Certificate.

METHOD OF MEASUREMENT: "Asphaltic Expansion Joint System" will be measured by the number of linear feet of such joints actually installed in accordance with the Plans and/or as directed by the Engineer.

BASIS OF PAYMENT: The accepted quantities of "Asphaltic Expansion Joint System" will be paid for at their respective contract unit prices per linear foot as listed in the Proposal. The prices so-stated constitute full and complete compensation for all labor, materials, and equipment, and for all other incidentals required to finish the work as shown on the Plans and as described herein, complete and accepted by the Engineer.

WARRANTY PARAMETERS. Condition parameters are used to measure the performance of the asphaltic expansion joint system during the warranty period. Each condition parameter has a threshold limit that defines when corrective action (warranty work) is required.

DEFINITIONS.

a. Debonding. Physical separation of the asphaltic expansion joint from the adjacent vertical face of the pavement or the bridge deck.

b. Transverse crack. Any open crack that extends more in the transverse (perpendicular to traffic flow) than in the longitudinal direction.

c. Longitudinal crack. Any open crack that extends more in the longitudinal (parallel to traffic flow) than in the transverse direction.

d. Perviousness. Absence of watertightness.

e. Rutting. Depression, displacement, or dislodgment of the asphaltic expansion joint surface.

WARRANTY REQUIREMENTS. The table lists the allowable threshold limit for each condition parameter for each asphaltic expansion joint. If any of the warranty requirements are not met as a result of a defect in materials and/or workmanship, corrective action (warranty work) is required.

<u>Condition Parameter</u>	<u>Threshold Limit for each Asphaltic Expansion Joint</u>
Debonding (either edge)	5% total for the joint, with no debond greater than two (2) feet.
Transverse cracking	5% total for the joint, with no crack greater than two (2) feet.
Longitudinal cracking	3 times joint longitudinal dimension
Perviousness	Visible seepage of water
Rutting	Maximum depth ½"

CORRECTIVE ACTIONS. The following corrective actions are required to outline typical acceptable treatments for the various condition parameters. The Department will accept the listed corrective action if the action addresses the cause of the condition parameter. The Contractor may use an alternative action subject to the Department's approval. All corrective actions shall include all incidentals necessary to complete the work, all M&PT, all M&PT incidentals and any uniformed traffic control personnel required. The M&PT shall be designed and implemented in accordance with the Contract and the latest edition of the Manual of Uniform Traffic Control Devices (MUTCD), Part 6, including all addenda.

CORRECTIVE ACTIONS

<u>Condition Parameter</u>	<u>Required Action</u>
Debonding:	Sawcut and remove the affected area; Replace with new asphaltic expansion joint system as shown on the Plans and described in this Specification.
Transverse cracking:	Sawcut and remove the affected area; Replace with new asphaltic expansion joint system as shown on the Plans and described in this Specification.
Longitudinal cracking:	Seal
Perviousness:	Seal
Rutting:	Sawcut and remove the affected area; Replace with new asphaltic expansion joint system as shown on the Plans and described in this Specification.

MATERIALS AND WORKMANSHIP WARRANTY

DESCRIPTION. The materials and workmanship pavement warranty shall consist of the warranty bond and the terms of this special provision in its entirety. This special provision establishes the common terms and definitions applied to all projects requiring a warranty (the warranted work). The previous sections of this specification contains information unique to the asphaltic expansion joint system. The Materials and Workmanship Warranty warrants the Department against defects in materials and workmanship.

DEFINITIONS.

1. Materials & Workmanship Warranty. The Contractor is responsible for correcting defects in the asphaltic expansion joint system caused by elements within the Contractor's control (i.e., the materials supplied and the workmanship) during the warranty period. The Contractor is also responsible for all necessary Maintenance and Protection of Traffic (M&PT), all M&PT incidentals, and any uniformed traffic control personnel required to complete said corrections. The M&PT shall be designed and implemented in accordance with the Contract and the latest edition of the MUTCD Part6, including all addenda. Since the Department is responsible for the bridge design, the Contractor assumes no responsibility for defects that are design related. If a defect is attributable to both the materials and/or workmanship and the design, responsibility for correcting the defect shall be shared by the Department and the Contractor; the Contractor is responsible for the percentage of fault attributable to the workmanship and/or materials, and the Department is responsible for the percentage of fault attributable to the design.

2. Acceptance Date of Construction. The date when the warranted work is complete and confirmed, in writing, on the initial acceptance document by the Department to be in compliance with the contract specifications and is open to traffic. This is the date of initial acceptance and constitutes the start date for the warranty period. There may be more than one acceptance date of construction for a project.

3. Warranty Bond. A bond issued by a surety which guarantees that the warranty requirements will be met.

4. Warranty Work. Corrective action taken to bring the warranted work into contract compliance.

INITIAL ACCEPTANCE. The Department and the Contractor shall jointly review all completed warranted work, or a portion thereof, as determined by the Department. If the work does not meet contract requirements, the Contractor shall make all necessary corrections, at their expense, prior to initial acceptance. Initial acceptance will occur as soon as the Department confirms, in writing, on the initial acceptance form that contract requirements have been met for the warranted work. The date on which initial acceptance occurs is termed the Acceptance Date of Construction.

Initial acceptance will be documented and executed jointly by the Department and the Contractor on a form furnished by the Department. A copy of the form will be sent to the Contractor's warranty bond surety agent by the Department. Neither the initial acceptance nor any prior inspection, acceptance or approval by the Department diminishes the Contractor's responsibility under this warranty.

The Department may accept the work and begin the warranty period, excluding any area needing corrective work, to accommodate seasonal limitations or staged construction.

Acceptance of material, in penalty, under the Department's quality assurance program will not relieve the Contractor from meeting the material and workmanship warranty requirements for the accepted material.

WARRANTY BOND. The Contractor shall furnish a single term warranty bond, in an amount stipulated in the "Amount of Warranty Bond" subsection of this Specification, prior to contract award. The effective starting date of the warranty bond shall be the Acceptance Date of Construction. The warranty bond will be released at the end of the warranty period or after all warranty work has been satisfactorily completed, whichever is latest.

RIGHTS AND RESPONSIBILITIES OF THE DEPARTMENT.

The Department:

1. Reserves the right to approve the schedule proposed by the Contractor to perform warranty work.
2. Reserves the right to approve all materials and specifications used in warranty work.
3. Reserves the right to determine if warranty work performed by the Contractor meets the contract specifications.
4. Reserves the right to perform, or have performed, routine maintenance during the warranty period, which routine maintenance will not diminish the Contractor's responsibility under the warranty.
5. Reserves the right, if the Contractor is unable, to make immediate emergency repairs to the asphaltic expansion joint system to prevent an unsafe road condition as determined by the Department. The Department will attempt to notify the Contractor that action is required to address an unsafe condition. However, should the Contractor be unable to comply with this requirement, to the Department's satisfaction and within the time frame required by the Department, the Department will perform, or will have performed any emergency repairs deemed necessary. Any such emergency repairs undertaken will not relieve the Contractor from meeting the warranty requirements of this Special Provision. Any costs associated with the emergency repairs will be paid by the Contractor if it is determined the cause was from defective materials and/or workmanship.
6. Is responsible for monitoring the asphaltic expansion joint system throughout the warranty period and will provide the Contractor all written reports of the system's condition related to the warranty requirements. The Contractor shall not be relieved of any responsibility based upon a claim that the Department failed to adequately monitor the asphaltic expansion joint system to report its findings to the Contractor.
7. Is responsible for notifying the Contractor, in writing, of any corrective action required to meet the warranty requirements.

RIGHTS AND RESPONSIBILITIES OF THE CONTRACTOR.

The Contractor:

1. Shall warrant to the Department that the warranted work will be free of defects in materials and workmanship for a period of five (5) years from the Acceptance Date of Construction, as defined in

previous sections of this Specification. The warranty bond shall be described on a form furnished by the Department. The completed form shall be submitted to the Department prior to award of contract.

2. Is responsible for performing all warranty work, including but not limited to, all M&PT, all M&PT incidentals, and any uniformed traffic control personnel required to complete the warranty repairs or replacement work, and restoring all associated bridge and pavement features, at the Contractor's expense.

3. Is responsible for performing all temporary or emergency repairs, resulting from being in non-compliance with the warranty requirements, using Department approved materials and methods. Upon receipt of a notice of non-compliance with the warranty requirements from the Department, shall submit to the Department within 21 calendar days a written course of action for performing the warranty work with all work items broken out, and the materials and methods to be used. All of the said warranty work shall be completed within 30 calendar days of the date of the submittal or as agreed to by the Department.

4. Shall follow a Department approved maintaining traffic plan when performing warranty work. All warranty work shall be performed under permit issued by the Department.

5. Is required to supply to the Department original documentation that all insurance required by the contract is in effect during the period(s) that warranty work is being performed, as required by subsection 107.13 of the standard specifications.

6. Shall furnish to the Department, in addition to the regular performance and lien bond for the contract, supplemental performance and lien bonds covering any warranty work being performed. These supplemental bonds shall be furnished prior to beginning any warranty work, using Department approved forms. These supplemental bonds shall be in the amount required by the Department to cover the costs of warranty work.

7. Shall complete all warranty work prior to conclusion of the warranty period, or as otherwise agreed to by the Department.

8. Shall be liable during the warranty period in the same manner as Contractors currently are liable for their construction related activities with the Department pursuant to the Standard Specifications. This liability shall continue until the warranty work is accepted by the Engineer. This liability is in addition to the Contractor performing and/or paying for any required warranty work, and shall include liability for injuries and/or damages and any expenses resulting which are not attributable to normal wear and tear of traffic and weather, but are due to non-compliant materials, faulty workmanship, and to the operations of the Contractor.

QUALITY CONTRAL. The Contractor shall provide an affidavit from the joint manufacturer certifying that the aggregate meets all requirements, and a certificate of compliance from the binder manufacturer certifying that the binder conforms to these Specifications.

At the direction of the Engineer, the Contractor shall arrange for, and have present at the time the first joint-sealing operation is to be performed, a manufacturer's representative knowledgeable in the methods of installation of the joint system. The Contractor shall also arrange to have the representative present at such other times as the Engineer may request.

EVALUATION METHOD. The Department will conduct evaluations of each asphaltic expansion joint system installed under this contract.

WARRANTY REQUIREMENTS. Warranty work will be required when the threshold limit for a condition parameter is exceeded as a result of a defect in material and/or workmanship.

Specific threshold limits and segment limits and other items that the Contractor is responsible for are covered in the previous sections of this specification.

To determine whether the failure to meet the warranty criteria is a result of defects in materials and/or workmanship, a joint field investigation by the Department and the Contractor will be conducted. The Department and Contractor may elect to have a forensic investigation conducted. The decision to undertake a forensic investigation, the scope of it, and the selection of the party to conduct it will be agreed to by the Department and the Contractor. All costs related to the forensic investigation will be shared proportionately between the Contractor and the Department based on the determined cause of the condition.

During the warranty period, the Contractor will not be held responsible for distresses that are caused by factors unrelated to materials and workmanship. These include, but are not limited to: chemical and fuel spills, vehicle fires, snow plowing, and quality assurance testing such as coring. Other factors considered to be beyond the control of the Contractor which may contribute to distress will be considered by the Engineer on a case by case basis upon receipt of a written request from the Contractor.

EMERGENCY REPAIRS. If the Department determines that emergency repairs are necessary for public safety, the Department or its agent may take repair action.

Prior to emergency repairs, the Department will document the basis for the emergency action. In addition, the Department will preserve evidence of the defective condition.

NON-EXTENSION OF CONTRACT. This Special Provision shall not be construed as extending or otherwise affecting the claim process and statute of limitation applicable to this Contract.

MEASUREMENT AND PAYMENT. All costs, including engineering and all necessary Maintenance and Protection of Traffic (M&PT), all M&PT incidentals, and any uniformed traffic control personnel required to complete the warranted work associated with meeting the requirements of this special provision are considered to be included in the Contract unit price for the warranted work item regardless of when such costs are incurred throughout the warranty period. These costs include but are not limited to, all materials, labor and equipment necessary to complete required warranted work.

**RHODE ISLAND DEPARTMENT OF TRANSPORTATION
WARRANTY BOND**

Bond Number _____

KNOWN ALL MEN BY THESE PRESENTS:

That we, _____ (hereinafter called the "Principal"), and _____, a corporation duly organized under the laws of the State of _____ and duly licensed to transact business in the State of Rhode Island (hereinafter called "Surety"), are held and firmly bound unto the Rhode Island Department of Transportation (hereinafter called the "Obligee"), in the sum of _____ Dollars (\$), for the payment of which sum well and truly to be made, we, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the said Principal has heretofore entered into a contract with the Rhode Island Department of Transportation dated _____ under Rhode Island Contract No. _____ and;

WHEREAS, the said Principal is required to guarantee the _____ installed under said contract, against defects in materials or workmanship which may develop during the period(s) of _____ years beginning the date(s) of the Acceptance Date of Construction by the Obligee.

In no event shall losses paid under this bond aggregate more than the amount of the bond.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if said Principal shall faithfully carry out and perform the said guarantee, and shall, on due notice, repair and make good at its own expense any and all defects in materials or workmanship in the said work which may develop during the period specified above or shall pay over, make good and reimburse to the said Obligee all loss and damage which said Obligee may sustain by reason of failure or default of said Principal so to do, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

PROVIDED HOWEVER, that in the event of any default on the part of said Principal, a written statement of the particular facts showing such default and the date thereof shall be delivered to the Surety by registered mail, promptly in any event within ten (10) days after the Obligee or his representative shall learn of such default and that no claim, suit or action by reason of any default of the Principal shall be brought hereunder after the expiration of thirty (30) days from the end of the warranty period as herein set forth.

Signed this _____ day of _____, _____.

Contractor _____

By _____

Surety _____

By _____

Attorney-In-Fact

Remove **Section 825; Painting Structural Steel**, pages 8-152 through 8-161 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace with the following:

SECTION 825

PAINTING STRUCTURAL STEEL

825.01 DESCRIPTION. This work shall consist of the thorough cleaning; preparation of surfaces; painting or repainting of new or existing steel, galvanized and metalized structures, its components or other steel materials. The above shall be performed at the locations indicated on the Plans or as directed by the Engineer, all in accordance with these Specifications.

825.01.1 Toxic Caveat. The Contractor is hereby notified that existing paint systems on the State's bridges may contain toxic substances such as lead, chromium or cadmium, and that these substances are considered to be hazardous to personnel, the environment, and the public proximate to the project. The contractor must plan and take appropriate precautions during the painting operations and for waste disposal to meet the State and Federal requirements for the protection of workers, the public and the environment. Details of these requirements are provided in **SECTION 826; PERSONNEL AND ENVIRONMENTAL PROTECTION**, of these Specifications.

825.01.2 Protection of Personnel, Public, Environment and the Structure. This provision covers the requirements for removal and containment of paint and/or corrosion products from any steel bridge or other specified appurtenances during cleaning and painting operations. Conduct all activities associated with the coating work described and specified herein in accordance with all applicable Federal, state and local regulations, **SECTION 826; PERSONNEL AND ENVIRONMENTAL PROTECTION**, the Contract Special Provisions and SSPC-PA Guide 3, A Guide to Safety in Paint Application.

Furnish and have available to the Engineer at all times during the painting operations, and at no additional expense to the Department, four approved respirators for the intended purpose, and other safety equipment needed to permit proper inspection of ongoing work. Furnish the required safety equipment before the start of work. Provide scaffolding and rigging, as needed, in compliance with OSHA regulations to enable safe and ready access to all work areas for inspection purposes.

Protect pedestrians, vehicular, and/or other traffic on or under the bridge or structure, surrounding property, surfaces, buildings, grounds, etc., against damage or disfigurement from surface preparation media, or spatters, splashes, overspray and smears of paint or material. Furnish adequate containment materials for protection.

Remove paint drips, spills or overspray from concrete or other surfaces not designated to receive coatings. Remove debris from cleaning operations, empty paint containers, and other refuse. Correct all damage created at no additional cost to the Department.

825.01.3 Pollution Controls. Prevent environmental pollution of air, soil and water caused by surface preparation media, paint spills or overspray, paint chips, dust or other harmful materials. Comply with the regulations of Rhode Island Department of Environmental Management (DEM) and provide notification as required. No extension of contract time or claims for costs will be allowed in order to comply with requirements of regulatory agencies.

825.01.4 Contractor Applicator Qualification. When the contract requires painting more than 1,500 square feet of steel surface, the contractor(s) performing coating application must demonstrate qualification by obtaining either The Society for Protective Coatings (SSPC) QP 1 for field painting and SSPC QP-3 certification as appropriate, or the American Institute of Steel Construction (AISC) Sophisticated Paint Endorsement (SPE). Contractors involved in the removal of paint containing lead or other toxic metals shall be certified SSPC QP2, “Standard Procedure Evaluating the Qualifications of Painting Contractors to Remove Hazardous Paint.” Qualification must be maintained throughout the painting portion of the project. If it expires or is revoked for any reason, the Engineer shall be notified and may require that a qualified contractor complete the coating portion of the project.

825.02 MATERIALS. Provide paint materials that conform to the applicable provisions of **SECTION M.06; PAINT**, of these Specifications and to any manufacturer’s recommendations contained herein. In the event of a conflict between the manufacturer’s technical data and the requirements of this Section, comply with this Section unless the requirements of the manufacturer are more restrictive. In these cases, advise the Engineer of the discrepancies, in writing, and comply with the Engineer’s written resolution. The decision of the Engineer in such cases shall be final.

825.02.1 Paint Supplier. Provide all paint material products including primer, intermediate, finish coat and thinners from the same paint supplier to ensure compatibility of components. Use the same paint manufacturer throughout all work. Provide paints that are lead and chromium free.

825.02.2 Finish Coat Color. Provide a semi-gloss finish coat in the color specified on the plans, in the Special Provisions or elsewhere in the contract documents. Provide color chips and the Munsel color designation for verification of the color of the finish.

825.02.3 Literature. Provide Product Data Sheets (PDS) and Material Safety Data Sheets (MSDS) in accordance with **Subsection M.06.01.1; Literature**, of these Specifications.

825.02.4 VOC Compliance: All paint products must have less than 420grams/liter (3.5 pounds/gallon) and must conform to all Federal, State and local requirements at the point of application as determined using EPA Method 24.

825.03 CONSTRUCTION METHODS.

825.03.1 Surface Preparation.

a. General Requirements. Surface preparation shall be in accordance with the most recent edition of the Society of Protective Coatings Specifications and any additional requirements contained in the Contract Documents.

b. Engineer’s Access. Provide safe access and time for the Engineer or his authorized representative(s) for inspection of all phases of work, including but not limited to surface preparation, the application of each coat of paint, including stripe coats, and for the inspection of the completed system. Provide access for sampling and testing paint material components. Samples may be subject to chemical and physical testing. Materials found to be of unsatisfactory quality will be rejected.

c. Surface Anomalies. Corner Condition – Remove all sharp corners created by flame cutting or shearing using a grinder. A single pass with a grinder is usually sufficient to break sharp corners and create a chamfer. It is not necessary to grind a radius. Rolled corners do not require grinding.

Stripe-coat all corners resulting from sawing, burning, or shearing operations unless an inorganic zinc-rich primer is used.

Select the coating system and apply it as indicated on plans and/or contract documents. Unless otherwise noted, apply no coating to flange surfaces that will be embedded in concrete, or inside bolt holes, although overspray is permitted.

Preparation of Thermal Cut Edges – Thermal cut edges (TCEs) shall be softened before blast cleaning, as necessary to achieve proper blast profile.

Base Metal Surface Irregularities – Remove all visually evident surface defects in accordance with ASTM A 6 or AASHTO M 160 prior to blast cleaning steel. When material defects exposed by blast cleaning are removed, the blast profile must be restored by either blast cleaning or by using mechanical tools in accordance with SSPC-SP 11.

Weld Irregularities or Spatter – Remove or repair all sharp weld prominences, weld deficiencies (overlap, rollover, excessive concavity, convexity, or roughness) and all heavy, sharp, or loose weld spatter. Occasional individual particles of rounded tight weld spatter may remain, but widespread, sharp, or clustered particles of tight weld spatter must be removed.

d. Pre-Cleaning: Remove all oil, grease, and other adherent deleterious substances from areas to be painted, in accordance with SSPC-SP 1 “Solvent Cleaning”, prior to abrasive blast cleaning.

e. Abrasive Blast Cleaning: Abrasive blast clean the entire surface in accordance with the cleanliness and profile required by the manufacturer’s Product Surface Sheet. The profile shall be assessed per ASTM D 4417. All new structural steel shall be cleaned in accordance with SSPC SP-10, “Near White Blast Cleaning”. If the material for the project is heavily rusted or pitted, or as directed by the Engineer, measure the non-visible contaminant in accordance with SSPC SP12 SC-2 and ensure detectable chloride levels are less than 10 micrograms per square centimeter.

Compressed air supply lines shall be equipped with oil traps and moisture separators. Conduct a white blotter test in accordance with ASTM D 4285 to verify the cleanliness of the compressed air. Conduct the test at least once per shift for each compressor system. Sufficient freedom from oil and moisture is confirmed if no soiling or discoloration is visible on the paper.

f. Lighting: Provide adequate lighting for all surface preparation, paint application, and inspection work. Maintain a minimum of 10 foot-candles for surface preparation and painting, and a minimum of 30 foot-candles of general area lighting for inspection. Increase the lighting if workers or other personnel have difficulty seeing. Use explosion-proof lighting.

825.03.2 Paint Application.

a. General Requirements. Apply coatings in accordance with the Contract requirements, SSPC-PA 1, “Shop Field and Maintenance Painting of Steel” and the manufacturer’s instruction. Apply the coating to provide a continuous, uniform film of the specified thickness that is well bonded to the substrate or previously applied coating; is free of laps, streaks, sags, or other visually evident defects; and

applied within the manufacturer's specified pot life. Areas that fail any required test shall be repaired as outlined in Removal/Repair of Unsatisfactory Material.

b. Coating Material Storage. Record the daily storage temperature range for coating materials and verify conformance with the coating manufacturer's product data sheet. Inventory the components to ensure they are used within the shelf life prescribed by the manufacturer. Record the following in the application log: coating batch numbers from each mixed component, amount and type of thinner used, date of application.

Paint in storage shall not be exposed to temperatures lower than those recommended by the paint manufacturer. Paint exposed to temperatures lower than specified is subject to rejection or retesting.

Any paint which is rejected shall be removed from the project before any painting operations are allowed to continue.

c. Intermediate and Topcoat. The color of the topcoat shall be as specified in the contract documents. The intermediate coat color shall contrast with both the primer and final coat. Stripe coats may be tinted as necessary to assure proper coverage. Coating materials used to apply piece marks shall be compatible with the existent and any subsequent coats.

d. Stripe Coats. Apply a stripe coat to corners, weld seams, around nuts and bolts or as otherwise directed in the contract documents. Do not apply the full coat any sooner than 15 minutes after the application of the stripe coat, or any later than the manufacturer's recommended recoat times. Inspection personnel shall be notified and be given ample time to verify and approve the stripe coat application. Do not apply the full coat until the Engineer has approved the striping. The coating material used for the stripe coat is typically the intermediate coat, but for painting metalizing the urethane finish coat is striped.

e. Conditions for Application. Apply the paint material to clean dry surfaces. Comply with the atmospheric conditions specified below, or the written requirements of the material manufacturer, whichever is most stringent. Do not apply materials when:

- The temperature of the air or substrate is below 40°F or greater than 110°F, or is forecasted to drop below 40°F before the coating dries in accordance with the dry times specified in the manufacturer's technical data sheet.
- The surface temperature is less than 5°F above than the dew point.
- The relative humidity is above 85%.
- There is rain, mist, fog or snow during application and/or cure.

f. Methods of Application. Use brushes, rollers, spray equipment, or any combination of equipment recommended by the manufacturer and authorized by the Engineer that provides a finish that is acceptable to the Department.

g. Recoat Interval. Comply with the coating manufacturer's minimum and maximum recoat interval for each coating layer. Ensure that each coating layer is sufficiently cured before applying the next scheduled coating layer.

h. Field Touchup. Prior to applying field touch-up coatings, verify that all surfaces, including installed bolts, nuts and zinc-rich primer around connection plates are thoroughly cleaned of grease, oil, chalk, bird droppings, lubricants and other surface interference material. Use pressure washing or solvent cleaning, as appropriate, to remove the interference material. Use hand and power tool cleaning for spot repair of localized damage to the coating system. Pressure wash, using 2500 psi water pressure, all surfaces primed with inorganic zinc to remove zinc salts. Do not proceed with touchup and painting until the Engineer has accepted the surface cleaning. Repair any damaged areas of coating and reapply all affected coating layers. Perform field touchup in areas such as around bolts, nuts, and connection plates that had not previously been painted.

i. Field Applied Finish Coat Application. Apply urethane finish coat in the field after the Engineer has accepted the touch up (primer and intermediate) and after the structure has been erected on the project site. Verify that the amount of time between the application of the intermediate and the urethane finish is within the coating manufacturer's maximum recoat time, as stated in manufacturer's technical data sheets. Verify that the surface is clean and dry prior to the application of the finish. If grease, oil, or other contaminants become deposited on the intermediate coat, remove it in accordance with SSPC-SP1 prior to the application of the finish coat.

j. Removal/Repair of Unsatisfactory Material. The coating system is unsatisfactory if any of the following defects occur: abrasion damage, peeling, blistering, wrinkling, excessive runs or sags. It is also unsatisfactory if there is evidence of application under unfavorable conditions; the workmanship is poor; unauthorized coating material was used; or for other reasons determined by the Engineer.

Remove and replace unsatisfactory coating layers at no additional cost to the Department as specified below.

Comply with the surface preparation requirements of this section and as follows.

- When the defective paint or damage extends to the bare steel or bare steel is exposed in areas less than 4" x 4" in size, clean the surface by power tool cleaning to SSPC-SP11. Feather the surrounding paint to expose a minimum of 1/2" of each coat and to provide a smooth transition into the surrounding intact, adherent material. Select a primer recommended by the manufacturer of the intermediate and finish paint. For new steel, apply a spot coat of organic zinc primer to the prepared surface. Follow with a spot coat of the intermediate and urethane finish.
- When the damage covers an area greater than 4" x 4" in size, blast clean the area in accordance with SSPC SP10, feather the surrounding paint and repair as described above.
- When the damaged or defective paint does not expose the substrate, and for primed areas around and on connection plates, clean the surface by hand or power tool cleaning. Clean in accordance with SSPC SP2 or SSPC SP3 to remove oxidation, zinc-salts, or contamination from the zinc-rich primer. Do not burnish or polish the surface. Supplement hand and power tool cleaning with pressure washing (1500 psi minimum) accompanied by scrubbing with stiff bristled brushes or other means as necessary. Feather the surrounding material to expose a minimum of 1/2" of each coat and to provide a smooth transition into the surrounding intact, adherent coating material. Solvent clean in accordance with SSPC SP1 and re-paint the affected areas with the intermediate and urethane finish.
- For all repairs, roughen the paint in overcoat areas to assure good adhesion of the overcoat material to the underlying paint.

k. Scaffolding. Use rubber rollers or other protective devices to prevent damage to the finished coatings. In particular, sufficient support pads shall be utilized for bracing on fascias. Temporary supports or attachments for scaffolding or forms shall not damage the coating system. Areas damaged by scaffolding shall be repaired in accordance with Removal/Repair of Unsatisfactory Material in **Subsection 825.03.2(j)** above.

l. Technical Supervision. Coating manufacturer's representation will be required for shop and field applications. The coating representative shall be present to provide the Contractor with an evaluation of the surface preparation and to provide such aid and instruction in the application of the coating system as required to obtain a satisfactory result that meets the approval of all parties. At a minimum, the services of this representative will be required at the start up of all shop and/or field operations. In addition, services may be required on an "as needed" basis until painting is satisfactorily completed. The Contractor/fabricator is responsible for securing the services of the technical representative.

825.03.3 New Steel Structures. Work under this paragraph shall include only those structures being built new or structures whose superstructure is being replaced in its entirety. New steel utilized in partial replacement or rehabilitation shall be addressed in **Subection 825.03.4; Existing Steel Structures**, and in the Contract Documents.

a. General. The coating system shall be an approved NEPCOAT three-coat system and shall conform to the requirements of **SECTION M.06; PAINT**, of these Specifications and the following:

Exterior Steel Surfaces. The system shall consist of a prime coat, intermediate stripe coat, intermediate coat, and topcoat.

Interior Steel Surfaces. The coating system for the interior surfaces such as: open box girders, arch ribs and ties and tubular wind bracing shall consist of a zinc-rich epoxy primer and epoxy top coat. Select the same primer and epoxy topcoat for application to both interior and exterior surfaces of the same steel member. Interior surfaces require no urethane finish coat. The topcoat applied to interior surfaces shall be white.

b. Priming Faying Surfaces. Coatings applied to contact surfaces of bolted connections between primary members shall satisfy the requirements of the Research Council on Structural Connections (RCSC). Prior to shop bolting, verify that the coating on faying surfaces is applied at the recommended dry film thickness and that the temperature adjusted cure time for shop and field slip critical bolted faying surfaces are within the range previously validated by testing. Verify cure in accordance with ASTM D 4752 or the manufacturer's requirements.

Apply the zinc-rich primer to all surfaces. Do not apply intermediate and finish coats to faying surfaces, connection areas, and within 2" of a connection area that is to be welded. Mask or otherwise protect these surfaces to prevent the application of intermediate and finish coats. Apply the intermediate coat to completely and thoroughly cover all zinc-rich primed steel surfaces that will be embedded in concrete.

Apply the urethane finish coat to the same surfaces coated with the intermediate, except those surfaces that will be embedded in concrete.

c. Bolts (Fasteners). Prepare bolts for priming that have been installed and final tightened before shop priming as necessary so as ensure that exposed bolt surfaces that have been abrasive blast cleaned will satisfy the requirements outlined in Table 1.

TABLE 1
SURFACE PREPARATION REQUIREMENTS FOR FASTENERS & BOLTS

Item	Shop-Installed Bolts Prior to Cleaning & Primer Application		Shop- or Field-Installed Bolts to Primed Steel	
	Coating System	Surface Preparation	Coating System	Surface Preparation
Black Iron Bolts	OZ or IOZ	SSPC SP10	OZ	SSPC-SP 1 and as req'd to remove lubricant
Galvanized (Mechanical or Hot Dip)	OZ	SSPC-SP 1	Intermediate Coat	SSPC-SP 1, 2, 3, and/or 12

OZ= Organic Zinc-Rich Primer

IOZ= Inorganic Zinc-Rich Primer

If the zinc coating on shop-installed galvanized bolts is damaged during shop abrasive blast cleaning or tightening, it may be left as is if the entire coating system (including the zinc-rich primer) will be applied over the fasteners.

Remove the lubricant from bolts. The Fabricator shall obtain the identity of solvents and methods needed to remove the lubricant. The Fabricator shall also consult with the coating supplier to assess the compatibility of the coating with any lubricant residue. The Fabricator shall supply to the General Contractor, shop and field painters, the Engineer and other interested parties the information concerning the lubricant removal and the cleanliness necessary for satisfactory adhesion of the intermediate coat.

Any dye coloring remaining on galvanized nuts after weathering or after removing the lubricant is not believed to be detrimental to coating performance or appearance. Use a white cloth wipe test to confirm that all lubricant and non-absorbed dye has been removed; only residual "stain" is permitted to remain on the surface.

d. Shipping, Storage, and Erection of Steel. Use extreme care in handling, storing, shipping and erecting the steel to avoid damage to the coating system. Do not move coated steel in the shop until sufficient cure time has elapsed to ensure that no damage will be done to the fresh coating.

Install padding on hooks and slings used to hoist the steel and use softeners approved by the Engineer to insulate the steel from binding chains. Place small structural pieces in such a manner that no rubbing will occur during shipment.

Store the steel at the job site on pallets or by other means to prevent members from resting directly on the ground or from falling onto each other.

825.03.4 Existing Steel Structures. Work under this paragraph shall include only those structures that are being rehabilitated or where new steel is used for partial replacement. Specific requirements may be found in the Contract Documents.

a. Protection of Painted Surfaces. Protect freshly coated surfaces and those surfaces not scheduled for painting from over blast and stray abrasive during blast cleaning operations. Previously coated surfaces damaged by subsequent blast cleaning operations shall be cleaned in accordance with SSPC SP10 and recoated.

b. Surface Preparation. Obtain the Engineer's approval of the preparation of all surfaces to be painted before applying any paint.

Surface preparation and coating requirements are dependent upon the scope of work and the type and condition of the existing coating system. Table 2 provides the required surface preparation methods for four scenarios. Detailed descriptions of the surface preparation methods follow the table. Specific coating material requirements for each surface preparation method are provided in **SECTION M.06; PAINT**, of these Specifications.

**TABLE 2
SURFACE PREPARATION METHODS**

Scope of Work	Surface Preparation	Existing Coating System
Spot Prime and Overcoat	Method 1	Alkyd Coatings
Spot Prime and Overcoat	Method 2	Zinc-rich or Metallizing with Topcoat
Zone Painting	Method 3	Alkyd Coatings
Zone Painting	Method 3 or Method 4	Zinc-rich or Metallizing with Topcoat

Method 1: Spot Prime and Overcoat an Existing Alkyd Coating System. Localized areas of corrosion or coating breakdown shall be spot cleaned using vacuum shrouded power tools in accordance with SSPC-SP3, "Power Tool Cleaning". Feather the edges of the power tool cleaned areas. The intact alkyd coating should be prepared for overcoating by cleaning in accordance with Low-Pressure Water Cleaning (LP WC) of SSPC-SP12. The minimum acceptable water pressure is 1500 psi. Use low pressure water cleaning to remove chalk, pigeon droppings, dirt and other deleterious materials from the surface.

Method 2: Spot Prime and Overcoat an Existing Coating System that consists of a zinc-rich primer or metallizing and a urethane finish coat. Localized areas of corrosion or coating breakdown shall be spot cleaned using vacuum shrouded power tools in accordance with SSPC-SP11, "Power Tool Cleaning to Bare Metal" or using vacuum blast cleaning equipment in accordance with SSPC-SP10, "Near White Blast Cleaning". Feather the edges of the repaired area. The intact topcoats (epoxies or urethanes) should be prepared for overcoating by hand sanding to roughen the surface.

Method 3: Abrasive Blast Clean to remove all coating material from a well defined zone (portion of the structure). Blast clean steel in accordance with SSPC SP10, "Near White Blast Cleaning". The surface area of the steel to be blast cleaned shall be no greater than the surface area of steel that can be primed during the same day. The maximum time lapse between surface preparation and application of the prime coat shall not be greater than 8 hours, unless atmospheric controls are used to prevent "rust back". Should any "rust back" occur prior to priming, re-clean surfaces to provide the specified degree of cleanliness. The abrasive blast profile should be in accordance with the manufacturer's requirements as stated on the product data sheets.

Method 4: Water Wash and Ultrahigh Pressure Water Clean in a well defined zone (portion of the structure). Thoroughly pressure wash all surfaces in the zone that will be coated, including areas of limited access such as crevices between back to back angles. The cleaning may be conducted in a two step process. Low pressure washing to remove the loose debris, followed by ultrahigh pressure water cleaning to remove all existing coating and corrosion from the steel surfaces scheduled to be coated.

Comply with the requirements of SSPC- SP 12, "Surface Preparation and Cleaning of Steel and Other Hard Materials by High- and Ultrahigh-Pressure Water Jetting Prior to Recoating". Use pressures greater than 25,000 psi and hold the nozzle 2 to 10 inches from the surface. To remove heavy scale, the nozzle may need to be held 0.25 inches from the surface.

Cleanliness requirements - Cleaned steel surfaces that are scheduled to be painted shall conform to the Visual Surface Preparation Definitions of the surface condition WJ-3 in SSPC SP12.

The use of rust inhibitors is prohibited. Medium "rust back" is permitted. Steel surfaces not primed within 72 hours shall be re-cleaned by water jetting.

Collect all water and paint chips dislodged by the water cleaning process.

Use potable filtered water for the washing to achieve a surface that is free of paint, corrosion and visible contaminants. Reduce detectable chloride levels to 10 micrograms/square centimeter or less.

c. Limited Access Areas. The design of the structure may create areas of limited access which can not be cleaned to the specified degree of surface preparation across every square inch of the surface. In these cases provide surface preparation as follows.

Thoroughly clean all areas that can be viewed without the use of mirrors to the specified degree of cleanliness. Localized areas of limited access due to the configuration of the structure may prevent the specified degree of cleanliness from being achieved. In these instances, at a minimum, remove all loose coatings. Inspect the surfaces by touch, using a putty knife, and by using inspection mirrors. Cleaning and painting of these areas may require the use of specialized equipment. If the limited access area is a crevice or gap from which pack rust cannot be removed, such as between mating plies or between back-to-back angles or between structural members, apply sealants/caulks in order to seal the top and side surfaces to prevent moisture intrusion. Do not caulk the bottom crevice. Use sealants/caulks compatible with the coating system and Provide written verification from the coatings supplier as to the compatibility of the sealant/caulk and coating.

825.03.5 Painting Galvanized Surfaces. White corrosion deposits such as wet storage stains must be removed before coating. Overcoat with any of the NEPCOAT approved intermediate coats followed by the application the compatible NEPCOAT approved urethane finish coat.

Aged galvanized surfaces that have weathered for 12 months or more can be coated after the surfaces have been cleaned by low pressure water washing (minimum 2500 psi water pressure).

Newly galvanized surfaces that have been exposed to less than 12 months of weathering must have the surfaces lightly abraded by hand sanding or brush-off blast cleaning using a fine abrasive (200 to 500 microns).

825.03.6 Painting Metalized Surfaces. The paint system shall consist of a recoatable epoxy, a stripe coat of urethane and a full coat of urethane finish coat. The coating materials shall be selected from the approved list provided in **SECTION M.06; PAINT**, of these Specifications.

a. Shop Application. Apply the epoxy sealer to the metalizing as soon as possible after the Engineer has accepted the metalizing and no later than 8 hours after the metalizing application. If more than 8 hours elapses, provide written recommendations from the metalizing supplier and paint (sealer) manufacturer that indicate what steps must be taken to remove the oxidation from the metalized surface prior to sealer application. Do not implement the steps without written approval from the Engineer. Apply a stripe coat of urethane to all edges and bolted connections, followed by a full finish coat of urethane.

b. Stenciling of Final Product. After the final coat of paint has dried, stencil information about the project on the inside face of the fascia member at the near and far abutment ends unless directed otherwise by the Engineer. Use suitable black paint to stencil uniform block lettering 2 to 3 inches high. Stencil the following information

- The bridge identification number,
- The month and year of completion,
- The specification identification of the cleaning method, and
- Identification of the system (for example: Z, E, U) with the name of manufacturer

c. Quality Control/Quality Assurance. Furnish the Engineer with the following Equipment and Standards:

- PTC Surface Temperature Thermometer
- Psychron 566 Psychrometer (Battery Operated) with two sets of new batteries
- Psychometric Charts for Dew Point and Relative Humidity
- SSPC VIS Standard appropriate for the specified degree of cleaning:
 - SSPC VIS 1, "Visual Standard for Abrasive Blast Cleaned Steel"
 - SSPC VIS 3, Visual Standard for Power- and Hand-Tool Cleaned Steel"
 - SSPC VIS 4/NACE VIS 7, "Guide and Reference Photographs for Steel Surfaces Prepared by Waterjetting"
- Wet film thickness gage
- Positector 6000 Coating Thickness Gauge
- NIST (NBS) Calibration Standards
- SSPC Surface Preparation Standards appropriate for the surface preparation requirements of the Contract Documents.

Conduct and document an on-going quality control inspection of the materials, prepared surfaces, and the prime, intermediate, and topcoat application as necessary to assure that all work is performed in

strict compliance with the Contract Documents and the manufacturer's instructions. The minimum inspections required are identified below. Conduct the inspections at the minimum frequencies specified herein and describe the test procedures in a Quality Control Program. Submit the Program for Engineer review and acceptance prior to beginning the work.

- Inspect steel substrate prior to the start of surface preparation work
- Check ambient conditions/compressed air cleanliness at 4 hour intervals
- Monitor material storage, mixing, and coating application
- Assure dry film thickness and continuity of each coat
- Verify dry time, curing, and cleanliness of each coat prior to the application of next coat
- Touch up and repair damaged or defective coats

d. Submittal Requirements. Submit the following information to the Project Engineer a minimum of 14 days prior to beginning the work:

- Finish coat color chips. Submit a color chip of the finish coat.
- Paint Certifications. Provide the brand names of the products selected for the coating system and the test results for the paints identified in "Material Certification" of **SECTION M.06; PAINT**, of these Specifications.
- Quality Control Plan. Provide written plans for verifying the application of the paint coats, in accordance with the inspection points identified in "Quality Control/Quality Assurance" of the Contract Documents.
- Work Schedule. Provide the schedule for surface preparation, painting, shipping, and field touch up. Notify the Engineer a minimum of one week prior to starting surface preparation.

e. Pre-Construction Meeting. Arrange for a meeting at the site where the surface preparation and painting is to be done. Arrange the meeting 1 month in advance of starting the work to discuss the project requirements with the Department, and to allow for an examination of the surface preparation and paint application equipment, including inspection instrumentation.

825.04 METHOD OF MEASUREMENT.

825.04.1 Painting Structural Steel. "Painting Structural Steel," i.e., new steel, will be measured by the number of square feet of steel actually painted in accordance with the Plans and/or as directed by the Engineer. Cleaning, surface preparation and paint systems will be considered as incidental to the painting work and, therefore, will not be measured separately.

825.04.2 Painting Existing Structural Steel. "Painting Existing Structural Steel" will be measured by the number of square feet of steel actually painted in accordance with the Plans and/or as directed by the Engineer.

a. Surface Preparation. "Surface Preparation" will be measured by the number of square feet of steel surface actually prepared in accordance with the Plans and/or as directed by the Engineer.

Separate levels of surface preparation necessary to accomplish the final specified surface preparation shall not be measured separately for payment but shall be considered included in the single square foot measurement.

825.04.3 Lump Sum Alternative. In certain cases any or all of the above items of work may be paid on a lump sum basis. In such cases, no measurement will be required.

825.04.4 Personnel and Environmental Protection. "Personnel and Environmental Protection" shall be measured in accordance with the appropriate paragraphs in **SECTION 826** of these Specifications.

825.05 BASIS OF PAYMENT.

825.05.1 Painting Structural Steel. The accepted quantity of "Painting Structural Steel" will be paid for at either the contract unit price per square foot or the contract lump sum price, as the case may be, as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials, and equipment including cleaning, surface preparation, selection of paint system, painting and all other incidentals required to finish the work, complete and accepted by the Engineer.

825.05.2 Painting Existing Structural Steel. The accepted quantity of "Painting Existing Structural Steel" will be paid for at either the contract unit price per square foot or the contract lump sum price, as the case may be, as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials, equipment, selection of paint system, and all other incidentals required to finish the work, complete and accepted by the Engineer.

a. Surface Preparation. The accepted quantity of "Surface Preparation" will be paid for at either the contract unit price per square foot or the contract lump sum price, as the case may be, for the final level of surface preparation as listed in the Proposal. Separate levels of surface preparation necessary to accomplish the final specified surface preparation shall not be paid for separately but shall be considered included in the single square foot or lump sum for payment. The price so-stated constitutes full and complete compensation for all labor, materials, equipment, and other incidentals required to finish the work, complete and accepted by the Engineer.

CODE 901.0198

GUARDRAIL END TREATMENT - NON-ENERGY ABSORBING TERMINAL

CODE 901.0199

GUARDRAIL END TREATMENT - ENERGY ABSORBING TERMINAL

DESCRIPTION. Work under these items shall consist of furnishing and installing NCHRP 350 Test Level 3 (TL-3) approved guardrail end terminal sections at the locations designated on the plans or as directed by the Engineer.

MATERIALS. The energy and non-energy absorbing guardrail end terminals shall be products listed on the Department's approved materials list, or approved equals. Any products not included on the approved materials list shall be tested and verified as meeting all the criteria for NCHRP350, Test Level 3.

CONSTRUCTION METHODS. The guardrail end treatments shall be installed per the manufacturer's recommendations. Prior to installation, the Contractor shall furnish three (3) copies of the manufacturer's installation manual to the Engineer.

Shop Drawings for the guardrail terminal sections shall be submitted by the Contractor in accordance with the provisions of **Subsection 105.02** of the Standard Specifications.

METHOD OF MEASUREMENT. "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.

BASIS OF PAYMENT. The accepted quantities of "Guardrail End Treatment - Non-Energy Absorbing Terminal" and "Guardrail End Treatment - Energy Absorbing Terminal" will be paid for at the contract unit price per each as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, tools, materials, equipment, accessories, hardware and all other incidentals required to finish the work, complete and accepted by the Engineer.

Remove **Subsection 905.02.1; Sidewalks and Driveways – Portland Cement Concrete**, page 9-9 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace with the following.

SECTION 905

SIDEWALKS AND DRIVEWAYS

905.02.1 Portland Cement Concrete. Portland cement concrete for sidewalks, typical driveways and commercial driveways shall conform to the requirements as set forth in **Subsections 601.01.1; Classification, and 601.03.1; Proportioning**, of these Specifications. Concrete for sidewalk applications shall be modified by the addition of 10% to 20% ground granulated blast furnace slag (GGBFS) or fly ash as a replacement for Portland cement per **SECTION 602**.

Revise **Section 906; Curbing for Roadways**, pages 9-12 through 9-17 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION 906

CURBING FOR ROADWAYS

- **Replace Subsection 906.02.2(b) with the following.**

b. Tolerances. Precast concrete curbing, apron stones, inlets and related concrete curb products shall conform to the dimensions shown on the Plans. Said dimensions shall fall within the following tolerances:

Dimension	Tolerance ±
Width	1/4"
Height	1/2"
Length	3/4"
Surface Profile	1/8"

Details and dimensions shall be true and square. The tolerance allowance on each precast element shall not relieve the Contractor from obtaining a suitable configuration of the various installed products.

- **Replace Subsection 906.03.1 in its entirety with the following.**

906.03.1 Granite Curbing.

a. Excavation. Excavation shall be made to the dimensions shown on the Plans or as directed by the Engineer to a sufficient width and depth to allow for the proper trimming and fine grading and compaction of a gravel subbase course. The gravel subbase upon which the curbing is to be set shall be compacted to a firm, even surface. All soft and unsuitable material shall be removed and replaced with gravel borrow material. Gravel borrow shall be placed in layers not exceeding 6 inches in depth before compaction. Each layer shall be compacted to 95 percent of maximum density (AASHTO T-180) by means of a vibratory compactor of size and type approved by the Engineer.

b. Installation. The curbing shall be set such that the front top arris line conforms to the required line and grade.

c. Joints. Curbing units shall be placed end-to-end as close as possible. No more than ½-inch opening shall show for the full width of the top and the top 8 inches of the vertical joint.

d. Backfilling. After the curbing has been set, any remaining excavated areas shall be backfilled with approved material and thoroughly compacted back and front to grade. Methods of compaction shall preserve the line and grade of the curbing.

- **Replace Subsection 906.03.2 with the following.**

906.03.2 Precast Concrete Curbing. The construction of precast concrete curbing shall conform to the requirements of **Subsection 906.03.1**, above.

- **Replace the last paragraph of Subsection 906.03.4 with the following.**

The berm shall be founded entirely on the base course. Any adjacent surface course shall be saw cut as required to form a true and even edge. The portion of the base course on which the berm is to be placed as well as any vertical saw cut edge shall be cleaned to the satisfaction of the Engineer and covered with an approved bituminous tack coat. The berm shall be placed in one layer and shall be compacted by a smooth steel wheel roller of a type and weight acceptable to the Engineer. After the berm is placed, the joint between the berm and the existing pavement shall be sealed with an approved highway joint sealant.

- **Replace Subsection 906.03.5 in its entirety with the following.**

906.03.5 Remove, Handle, Haul, Trim, and Reset Curbing and Edging, Straight and/or Circular, All Types. The existing curbing or edging shall be carefully removed to minimize damage to said units and adjacent pavement or sidewalks. The curbing or edging will then be handled, hauled and stockpiled as required. The individual units shall be trimmed and cut as necessary so that the ends are squared, the joints of the installed curbing or edging are tightly butted and no more than a ½-inch opening shall show at the full width of the top and the top 8-inches of the vertical joint. All curbing or edging shall be thoroughly cleaned prior to resetting.

The construction of reset curbing and edging, straight and/or circular, shall conform to the requirements of **Subsection 906.03.1** above.

The Contractor shall replace with new material any existing curbing or edging that is to be reset which is lost, damaged, or destroyed as a result of either its construction operations or failure to properly store and protect said units, all at no additional cost to the State.

- **Replace Subsection 906.04 in its entirety with the following.**

906.04 METHOD OF MEASUREMENT.

906.04.1 Granite Curbing. "Granite Curb-Straight" and "Granite Curb-Circular" will be measured (along the front face of the section at the finished grade elevation) by the number of linear feet of such curbing actually installed in accordance with the Plans and/or as directed by the Engineer.

"Granite Curb Corners," "Granite Curb Transitions," "Granite Curb Apron Stones," "Granite Curb Inlet Stones," "Granite Curb Wheelchair Ramp Transition" and "Granite Ramp Stones" will be measured by the number of each such units actually installed in accordance with the Plans and/or as directed by the Engineer.

906.04.2 Precast Concrete Curbing. "Precast Concrete Curb-Straight" and "Precast Concrete Curb-Circular" will be measured (along the front face of the section at the finished grade elevation) by the

number of linear feet of such curbing actually installed in accordance with the Plans and/or as directed by the Engineer.

"Precast Concrete Curb Corners," and "Precast Concrete Curb Transitions," "Precast Concrete Curb Apron Stones," "Precast Concrete Curb Inlet Stones," "Precast Concrete Curb Wheelchair Ramp Transition, Stones" and "Precast Concrete Ramp Stones" will be measured by the number of each such units actually installed in accordance with the Plans and/or as directed by the Engineer.

906.04.3 Bituminous Curbing. "Bituminous Curbing" will be measured (along the front face of the section at the finished grade elevation) by the number of linear feet of such curbing actually installed in accordance with the Plans and/or as directed by the Engineer. Deduction in length will be made for the presence of drainage structures installed along the curbline such as catch basins, drop inlets, etc.

906.04.4 Bituminous Berm. "Bituminous Berm" will be measured by the number of linear feet actually installed in accordance with the Plans and/or as directed by the Engineer.

906.04.5 Remove, Handle, Haul, Trim, and Reset Curbing and Edging, Straight and/or Circular, All Types. "Remove, Handle, Haul, Trim and Reset Curbing and Edging, Straight and/or Circular, All Types" will be measured (along the front face of the section at the finished grade elevation) by the number of linear feet of such curbing reset in accordance with the Plans and/or as directed by the Engineer.

"Curb Corners," "Curb Transitions," "Apron Stones," "Inlet Stones," "Curb Wheelchair Ramp Transition Stones" and "Ramp Stones" will be measured (along the front face of the section at the finished grade elevation) by the number of linear feet of such curbing reset in accordance with the Plans and/or as directed by the Engineer.. Deductions in length will be made for the presence of new drainage structures installed along the curbline such as catch basins, drop inlets, etc.

- **Replace Subsection 906.05 in its entirety with the following.**

906.05 BASIS OF PAYMENT.

906.05.1 Granite Curbing. The accepted quantities of "Granite Curb-Straight" and "Granite Curb-Circular" will be paid for at their respective contract unit prices per linear foot as listed in the Proposal.

The accepted quantities of "Granite Curb Corners," "Granite Curb Transitions," "Granite Curb Apron Stones," "Granite Curb Inlet Stones," "Granite Curb Wheelchair Ramp Transition-Stones" and "Granite Ramp Stones" will be paid for at their respective contract unit prices per each as listed in the Proposal.

The prices so-stated constitute full and complete compensation for all labor, materials and equipment, including excavation, joints, gravel borrow subbase course including compaction and trimming and fine grading unless otherwise noted, backfilling, compacting, and all other incidentals required to finish the work, complete and accepted by the Engineer.

The following work will paid for separately under appropriate work items: sawcutting, the removal and disposal of existing pavements, both rigid and flexible, and sidewalks.

906.05.2 Precast Concrete Curbing. The accepted quantities of "Precast Concrete Curb-Straight" and "Precast Concrete Curb-Circular" will be paid for at their respective contract unit prices per linear foot as listed in the Proposal.

The accepted quantities of "Precast Concrete Curb Corners," "Precast Concrete Curb Transitions," "Precast Concrete Curb Apron Stones," "Precast Concrete Curb Inlet Stones," "Precast Concrete Curb Wheelchair Ramp Transition Stones" and "Precast Concrete Ramp Stones" will be paid for at their respective contract unit prices per each as listed in the Proposal.

The prices so-stated constitute full and complete compensation for all labor, materials and equipment, including excavation, joints, gravel borrow subbase course including compaction and trimming and fine grading unless otherwise noted, backfilling, compacting, and all other incidentals required to finish the work, complete and accepted by the Engineer.

The following work will be paid for separately under appropriate work items: sawcutting, the removal and disposal of existing pavements, both rigid and flexible, and sidewalks.

906.05.3 Bituminous Curbing. The accepted quantity of "Bituminous Curbing" will be paid for at the contract unit price per linear foot as listed in the Proposal.

The prices so-stated constitute full and complete compensation for all labor, materials and equipment, including excavation, joints, gravel borrow subbase course including compaction and trimming and fine grading unless otherwise noted, backfilling, compacting, and all other incidentals required to finish the work, complete and accepted by the Engineer.

The following work will be paid for separately under appropriate work items: saw cutting, the removal and disposal of existing pavements, both rigid and flexible, and sidewalks.

906.05.4 Bituminous Berm. The accepted quantity of "Bituminous Berm" will be paid for at the contract unit price per linear foot as listed in the Proposal. However, the quantity of bituminous material used in the berm is not included in this contract unit price, but rather is included in the unit price listed for Class I-1, Bituminous Concrete Pavement. The unit price for Bituminous Berm includes all preparatory items required for proper placement of the berm, including saw cutting; brooming and cleaning; bituminous tack coat; placement and compaction of the berm; sealing of the joints; and all other incidentals necessary to finish the work, complete and accepted by the Engineer.

906.05.5 Remove, Handle, Haul, Trim and Reset Curbing and Edging, Straight and/or Circular, All Types. The accepted quantities of "Remove, Handle, Haul, Trim and Reset Curbing and Edging, Straight and/or Circular, All Types," for each kind and type specified, will be paid for at the respective contract unit prices per linear foot as listed in the Proposal. The prices so-stated constitute full and complete compensation for all labor, materials, and equipment, including removal and disposal of existing pavement structure, excavation for removal and setting unless otherwise noted that resetting excavation is to be paid for separately, all handling, hauling and stockpiling, cleaning all sections to be reset, cutting and trimming as necessary to provide the maximum ½-inch opening across the top and down the front of the curbing, gravel borrow subbase course including compaction and trimming and fine grading unless otherwise noted, the resetting of the curbing or edging to line and grade, backfilling, compacting, and all other incidentals required to finish the work, complete in place and accepted by the Engineer.

Saw cutting, replacement concrete base, and any concrete required between the reset curbing or edging and the existing pavement structure will be paid for separately under appropriate work items.

Remove **Subsections 913.02 and 913.04; Trafficpersons – Qualifications and Method of Measurement**, pages 9-30 and 9-31 of the RI Standard Specifications for Road and Bridge Construction and replace with the following:

SECTION 913

TRAFFICPERSONS

913.02 QUALIFICATIONS. Police officers shall wear regulation uniforms and should be regular, reserve or special officers of the communities in which they serve.

High-visibility safety apparel should be worn by all police officers providing traffic control. The apparel background (outer) material color shall be either fluorescent orange-red or fluorescent yellow-green, and the retroreflective material shall be either orange, yellow, white, silver, yellow-green, or a fluorescent version of these colors, and shall be visible at a minimum distance of 1000 feet. The retroreflective safety apparel shall be designed to clearly identify the wearer as a person.

913.04 METHOD OF MEASUREMENT. Services of “Trafficpersons” will be measured for payment by the number of hours for each person rendering services in accordance with directions of the Engineer. This is to include, however, only such trafficpersons as are employed within either the limits of the construction right-of-way for the project, upon detours stipulated in the Contract; or upon detours ordered by the Engineer. Trafficpersons furnished by the Contractor for continued use of a detour, bypass or temporary traffic control beyond the period for which the Engineer deems such trafficpersons necessary to the proper completion of the project, or at locations where traffic is unnecessarily restricted by the Contractor’s method of operation will not be measured for payment.

Remove **Subsection 914.02; Flagpersons – Qualifications**, page 9-31 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace with the following:

SECTION 914

FLAGPERSONS

914.02 QUALIFICATIONS. Flagpersons must be trained in safe traffic control practices and public contact techniques, be thoroughly familiar with the most recent publication of the “Flagging Handbook,” published by the Federal Highway Administration and must possess a certificate of satisfactory completion from a training course approved by the Department. All flagpersons should be able to demonstrate the following abilities:

- a. Receive and communicate specific instructions clearly, firmly and courteously;
- b. Move and maneuver quickly in order to avoid danger from errant vehicles;
- c. Control signaling devices (such as STOP/SLOW paddles, flags and lights) in order to provide clear and positive guidance, in frequently changing situations, to drivers approaching a Traffic Control zone;
- d. Understand and apply safe traffic control procedures, sometimes in stressful or emergency situations; and
- e. Recognize dangerous or potentially dangerous traffic situations and alert workers to the situation.

Flagpersons must wear attire appropriate for construction site work, and high-visibility safety apparel shall be worn by all flagpersons actively engaged in providing traffic control. The apparel background (outer) material color shall be either fluorescent orange-red or fluorescent yellow-green, and the retroreflective material shall be either orange, yellow, white, silver, yellow-green, or a fluorescent version of these colors, and shall be visible at a minimum distance of 1000 feet. The retroreflective safety apparel shall be designed to clearly identify the wearer as a person.

Flagpersons unqualified or unable to meet the above requirements or who are, for any reason, unable to provide proper and effective traffic control may be removed at the discretion of the Engineer. In such instances, the Contractor shall provide qualified replacement flagpersons and shall maintain the required traffic control measures for the work site at all times.

Remove **Section 926; Precast Concrete Median Barrier for Temporary Traffic Control**, pages 9-47 and 9-48 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace with the following.

SECTION 926

ANCHORED AND UNANCHORED PRECAST CONCRETE BARRIER FOR TEMPORARY TRAFFIC CONTROL

926.01 DESCRIPTION. This work consists of providing anchored or unanchored precast concrete barrier for temporary traffic control at the locations shown on the Plans or as directed by the Engineer, all in accordance with these Specifications.

Anchored barrier on bridge decks will be double-face type barrier except when single-face type units are specified on the Plans.

926.02 MATERIALS.

926.02.1 Anchored and Unanchored Barrier Units. Portland cement concrete and reinforcing shall conform to the requirements of **Subsection 909.02.1** of these Specifications.

926.02.2 Delineators. Delineators shall have a minimum of 9 square inches of reflective surface area. The unit shall be capable of being mounted on the side of barrier by use of an adhesive or other method approved by the manufacturer. Such delineators may be one of those products which appear on the Department's Approved Materials List.

926.02.3 High Strength Non-Shrink Grout. High Strength Non-Shrink Grout shall conform to the requirements of **Subsection 819.02.2** of these specifications.

926.02.4 Anchorage System. For new or existing bridge decks, anchors shall be a minimum $\frac{3}{4}$ inch diameter and shall be listed on the Department's approved materials list. Each anchor must be capable of developing a minimum of 6,000 pounds tension and 2500 pounds shear for a 10-foot barrier section, with the number of anchors and spacing as shown on the Plans. Anchors shall be installed per manufacturer's recommendations.

For existing bridge decks, $\frac{3}{4}$ inch minimum diameter through-bolts may be used in lieu of adhesive or expansion anchors.

All anchors, nuts and washers shall conform to ASTM A325 and shall be galvanized according to ASTM A153. All bolts, anchors, nuts, and washers shall conform to the applicable requirements of **Subsection M.05.04.4** of these Specifications except as modified by the Plans.

Other anchorage systems may be used in lieu of above only upon approval of the Engineer.

926.03 CONSTRUCTION METHODS.

926.03.1 Plant Requirements. Plant requirements shall conform to the applicable provisions of **Subsection 909.03.1** of these Specifications.

926.03.2 Delineators. White delineators shall be installed on the right side of the travel way and amber delineators on the left side of the travel way. The delineators shall be installed at 50-foot intervals and they shall be located 3 inches from the top of the concrete barriers.

926.03.3 Placement. Precast concrete barrier used for temporary traffic control shall be placed on the pavement at locations indicated on the Plans or as directed by the Engineer.

Care shall be exercised during transporting, storing, hoisting and handling of the units to prevent cracking or damage. No damaged units or units that have markings painted on them from previous work-sites shall be installed. Units showing defects or damage as a result of the Contractor's operations or negligence shall be removed and replaced or repaired by the Contractor at no additional cost to the State.

Unanchored barrier shall be carefully removed from their initial locations and transported to alternate locations where they shall be placed on the pavement as directed by the Engineer.

Anchored barrier units shall be firmly secured to the bridge deck surface. Traffic shall not be allowed near the barrier until units are firmly anchored and highway approach transitions are in place.

Anchors shall be placed on the traffic side of the barrier and located such that interference with the longitudinal deck reinforcement is minimized. Prior to barrier placement, deck reinforcement shall be located and marked using a pachometer. The position of the barrier shall then be adjusted, at the direction of the Engineer, to minimize interference between the anchors and deck reinforcement,.

The barrier units shall be placed in such a manner as not to leave exposed blunt ends of said units.

926.03.4 Removal. Upon completion of the work the Contractor shall completely remove and legally dispose of said barrier units from the project site. For anchored barrier, the remaining holes in the new deck shall be patched with high strength non-shrink grout.

926.04 METHOD OF MEASUREMENT.

926.04.1 Unanchored Barrier Units. "Unanchored Precast Concrete Barrier for Temporary Traffic Control" will be measured in linear feet of continuous runs of those units actually placed in accordance with the Plans and/or as directed by the Engineer. The measured length includes all 3-inch joints between the units.

926.04.2 Anchored Barrier Units. "Anchored Precast Concrete Barrier for Temporary Traffic Control" and "Anchored Single-Face Precast Concrete Barrier for Temporary Traffic Control" will be measured in linear feet of continuous runs of those units actually placed in accordance with the Plans and/or as directed by the Engineer. The measured length includes all 3-inch joints between the units.

926.04.3 Delineators. "Reflective Delineators" will be measured by the number of said units provided and installed in accordance with the Plans and/or as directed by the Engineer.

926.05 BASIS OF PAYMENT.

926.05.1 Unanchored Barrier Units. The accepted quantity of "Unanchored Precast Concrete Barrier for Temporary Traffic Control" will be paid for at the contract unit price per linear foot as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, tools, materials, equipment, initial placement of the units in accordance with the Plans, furnishing, hauling, handling, any new parts required to secure the units to the pavement or to adjacent units, subsequent removal of said units and for all other incidentals required to finish the work, complete and accepted by the Engineer.

The Contractor shall not be compensated for any work necessary to realign barrier units if they are disturbed or damaged as a result of the Contractor's operations.

The Contractor shall be paid 90 percent of the contract unit price when the barrier units are in place. The remaining 10 percent of the contract unit price will be paid when the barrier units have been removed from the project.

926.05.2 Anchored Barrier Units. The accepted quantity of "Anchored Precast Concrete Barrier for Temporary Traffic Control" and "Anchored Single-Face Precast Concrete Barrier for Temporary Traffic Control" will be paid for at the contract unit price per linear foot as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, tools, materials, equipment, initial placement of the units in accordance with the Plans, anchoring, furnishing, hauling, handling, any new parts required to secure the units to the bridge deck or to adjacent units, subsequent removal of said units, grouting and for all other incidentals required to finish the work, complete and accepted by the Engineer.

The Contractor shall not be compensated for any work necessary to realign barrier units if they are disturbed or damaged as a result of the Contractor's operations.

The Contractor shall be paid 90 percent of the contract unit price when the barrier units are in place. The remaining 10 percent of the contract unit price will be paid when the barrier units have been removed from the project.

926.05.3 Delineators. The accepted quantity of "Reflective Delineators" for anchored and unanchored barrier units will be paid for at the contract unit price per each as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment, including surface preparation and adhesives, and all other incidentals required to finish the work, complete and accepted by the Engineer.

Delete **Section 927; Remove and Relocate Precast Concrete Median Barrier for Temporary Traffic Control**, page 9-49 of the RI Standard Specifications for Road and Bridge Construction in its entirety.

SECTION 927

**REMOVE AND RELOCATE PRECAST CONCRETE MEDIAN
BARRIER FOR TEMPORARY TRAFFIC CONTROL**

[SECTION DELETED]

Revise **SECTION 929; Field Offices and Materials Laboratory**, pages 9-52 through 9-58 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION 929

FIELD OFFICES AND MATERIALS LABORATORY

- **Replace Subsection 929.01; DESCRIPTION with the following.**

929.01 DESCRIPTION. This work consists of providing and maintaining an adequate weatherproof and ADA compliant field office or materials laboratory for the exclusive use of the Engineer and his staff during both the contract period and approximately 180 days thereafter, all in accordance with these Specifications.

- **Replace Subsection 929.02.2; Minimum Spatial Requirements with the following.**

929.02.2 Minimum Spatial Requirements. Unless specified otherwise in the Special Provisions of the Contract, the Engineer's field office or materials laboratory each shall contain a minimum of 550 square feet of floor area, at least 3 rooms, and 7 feet minimum of headroom. It shall contain a sufficient number of windows to provide at least 27 square feet of natural light.

Existing building structures meeting the above minimum requirements are considered acceptable.

- **Replace Subsection 929.02.3b; Other Requirements with the following.**

b. The Engineer's field office or materials laboratory shall be fully equipped, operational and ready for occupancy at least two (2) weeks prior to the start of actual construction operations.

- **Add the following new Subsection 929.02.4; ADA Considerations.**

929.02.4 ADA Considerations. The Department is committed to providing equal access and opportunity for all persons in conjunction with Federal Law under Title I of the American's with Disabilities Act (ADA).

The United States Access Board defines a reasonable accommodation as; "a modification or adjustment to a job, an employment practice, or the work environment that makes it possible for a qualified individual with a disability to enjoy an equal employment opportunity."

In keeping with these directives, the Department will ensure that construction field offices will be accessible to anyone with a disability, and will also ensure that reasonable accommodation in a manner consistent with the ADA will be made to allow Department employees to be productive and efficient members of the Department's workforce.

Personnel may contact the Department's Human Resources Office with any reasonable accommodation requests.

- **Replace Subsection 929.03.2; Interior Utility Services with the following.**

929.03.2 Interior Utility Services.

a. Lighting. Lighting fixtures required to provide a minimum illumination of 70 foot-candles in all areas.

b. Electrical receptacles. Duplex electrical receptacles shall be provided as required in the State Building Code and as directed by the Engineer. At least $\frac{1}{3}$ of these receptacles shall be 20-amp capacity.

c. Heating and Air Conditioning. Heating and cooling equipment capable of maintaining a year round temperature between 68°F and 78°F shall be provided.

d. Sanitary Facilities. A water closet, lavatory, slop sink, vent fan, and a hot water heater of a minimum 5-gallon capacity shall be provided.

e. Telephone. Telephone service and instruments for two (2) incoming phone lines shall be provided.

The Contractor shall also provide and install 4 additional phone jacks, required wiring, and phones to be located throughout the field office at the locations specified by the Engineer.

f. Network Internet Service. The Contractor shall provide and install a secure high speed internet service capable of interconnecting and networking a combination of 8 computers, printers, copiers, and scanners, compatible with the equipment specified in **Special Provision 929.1000**.

- **Replace Subsection 929.03.6(c); Concrete Curing Box with the following.**

929.03.6 Special Requirements for Materials Laboratory.

c. Concrete Curing Box. A concrete cylinder curing box shall be provided and shall conform to the following minimum requirements: approximate internal dimensions of 54 inches in length; 18 inches in width; and 17 inches in depth. The box shall be insulated, hinged at the back and with a lock at the front. The box shall be made of a durable, rust proof material with a moisture-proof seal between the lid and the box. The box shall be leak-proof and be able to hold a pool of water at the bottom of the container approximately 4 inches deep. A drainpipe shall be provided through the side of the box for maintenance purposes. Suitable means of support shall be provided to hold the concrete cylinders above the water surface. A thermometer which can be read from the outside shall be installed to measure the internal temperature of the box. A thermostat shall maintain the water at a uniform temperature of $73^{\circ}\text{F} \pm 3^{\circ}\text{F}$ using heating or cooling cycles throughout an ambient temperature range of -10°F to 100°F .

1. Equal Characteristics. A concrete curing box of a design and manufacture different from that described above, but which possesses equal characteristics may be employed provided that it is approved in writing by the Engineer.

- **Replace Subsection 929.03.8; Project Sign with the following.**

929.03.8 Project Sign. Both the field office and the materials laboratory shall be equipped with a sign for the purpose of identifying the use of the structure and providing notice against trespassing. The Field Office Identification Sign is detailed in the RI Standard Details.

CODE 929.0300

CHAMP MANAGEMENT SYSTEM

DESCRIPTION. The Rhode Island Department of Transportation has engaged a computerized contract compliance management system specifically designed to monitor conformity with Rhode Island and Federal affirmative action and Disadvantaged Business Enterprise (DBE) laws and regulations. Champ-CM (Contractor's Module) and Champ-SM (Sub-Contractor's Module) monitor DBE participation, On-The-Job Training (OJT) and employment utilization more accurately and in less time than other manual methods. This program is in support of Executive Order 11246, Training Special Provision, and Special Provisions - Disadvantage Business Enterprise contained within this contract.

This program will be obtained by the Contractor and all approved sub-contractors from Washington & Rice, LLC, Chagrin Center Suite 201, 27629 Chagrin Blvd., Woodmere, Ohio 44122. The telephone number is 1-216-591-9130. The Department will require the input of data from payroll files for both the Prime Contractor and all approved Sub-Contractors with contracts in excess of \$10,000. The RIDOT Champ Coordinator will provide the Contractor/Sub-Contractor with assistance as needed during the term of this contract (**For more information, contact the RIDOT Champ Coordinator at 401-222-3260 ext. 4190**).

EQUIPMENT. Minimum system requirements for Champ-CM Standalone Edition are as follows:

- A Pentium Processor or higher (Pentium IV recommended)
- Microsoft Windows 98 Second Edition or greater (Windows XP or 2000 recommended)
- A minimum of 16MB of RAM (64MB recommended; 128 MB of RAM for Windows 2000 XP)
- CD-ROM Drive for installation
- High resolution 17" color monitor (recommended)
- A minimum of 60MB hard disk space (100 MB hard disk space recommended)

For more information and the system requirements for the Champ-CM Network Edition, contact the RIDOT Champ Coordinator.

METHODS. After award of contract and prior to notice to proceed, the contractor will contact Washington & Rice, LLC to purchase the Champ-CM program. For the duration of the contract, the Contractor will be required to keep the database updated and to provide, on a monthly basis, its Champ information, including its Sub-Contractor activity, to the Department via floppy disk, CD-ROM or e-mail. The Champ information shall be submitted to the Rhode Island Department of Transportation's Champ Coordinator, Two Capitol Hill Room 105, Providence, RI 02903, by the tenth of the month and shall include all the previous month's activity. This requirement does not preclude the Contractor from the obligation to maintain records as a backup to this program. The Contractor will be subject to a review of back-up records by the Business and Community Resources Unit, DBE Program, as deemed necessary by that office. The Contractor will be required to notify the RIDOT Champ Coordinator of any errors or "bugs" which are discovered in the use of the Champ program.

NON-COMPLIANCE. Failure to comply with the above will result in delay of progress payments and continued violations will lead to a notice of non-compliance. If a notice on non-compliance is issued, the Engineer may suspend all payments and/or initiate other sanctions against the Contractor.

METHOD OF MEASUREMENT. This item does not require a measurement for payment.

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BASIS OF PAYMENT. All expenses associated with the purchase of Champ, computer equipment, training, maintenance fees, updating the database, submitting the appropriate reports to the Department and maintaining records as a backup will not be paid for separately, but shall be considered a subsidiary obligation of the Contractor.

CODE 929.1000

FIELD OFFICES AND MATERIALS LABORATORY

DESCRIPTION. The items of computer equipment and software to be provided for this Contract in accordance with **Para. c. of Subsection 929.03.5; Special Requirements for Field Office**, of the RI Standard Specifications for Road and Bridge Construction, 2004 Edition, consist of the following:

1. One (1) DeskJet color printer capable of printing standard and custom paper sizes from 3 by 5 inches to 11 by 17 inches. Print quality shall be 1200 by 1200 dpi minimum resolution for black and white printing and 4800 X 1200 optimized dpi for color printing. It shall be capable of printing up to 20 ppm (black and white) and up to 15 ppm (color). The printer must be setup and shared by both computers, via a USB Hub with all cables.

2. One (1) laser printer capable of printing standard and custom paper sizes from 3 by 5 inches to 11 by 17 inches. Print quality shall be 1200 by 1200 dpi minimum resolution and have a minimum of 64 MB RAM. The printer must be setup and shared by both computers.

3. Two (2) IBM compatible laptop computers with an Intel Core 2Duo 2.16 processor (2.16 GHz minimum); 80 GB (5400 rpm) hard drive (minimum); 14" LCD screen (minimum); 1 GB of RAM (minimum); 10/100 network interface card; 1.44 MB 3.5" floppy disk drive; CD-RW/DVD drive; 56K KPS modem; wireless network card, broadband internet access (3Mbps nominal connection speed) and Internet Service Provider, 9 cell primary battery, AC/DC power adaptor, extra 9 cell battery, and carrying bag. Installed software shall include: Microsoft Windows XP Professional with the latest service packs and security updates, Microsoft Office Professional (2003 version or better) with latest service packs, Word Perfect for Windows, AutoCAD 2005 or better, McAfee Anti Virus (2005 or better) with subscription support for the life of the project.

4. Two (2) Docking Stations with a minimum of the following: 1 Ethernet RJ-45 port, 4 USB 2.0 ports, 2 PS/2 ports, 1 serial port and 1 parallel port and a compatible monitor stand, two (2) 101 key enhanced keyboards, two (2) optical mouse with scroll wheel, and two (2) 19" flat panel LCD monitors.

5. One (1) desktop copying machine with an automatic document feeder, or a compatible machine approved by the Engineer.

6. One (1) approved facsimile machine meeting the following minimum standards: desktop transceiver; automatic fax/tel switch with only one phone line needed; 10 page document feeder; 9600 bps modem speed with automatic fallback; answering machine interface; 20 location capacity; one-touch dial with 16 locations; PSTN line connection; monitor speaker; 16 character LCD size; local copy function; status/error indicators; transmit and receive confirmation reports; no more than 15 pounds in weight; 120V-60 HZ power requirement; built-in handset; image control resolution of 200 x 100 ipi at standard, 200 x 200 ipi at fine, and 200 x 400 ipi at super-fine; 16 level gray scale; automatic redial 2 times at 3 minute intervals and 128 KB memory capacity. The Contractor shall provide a separate phone line for the facsimile machine.

7. Dust shields and a security cabinet capable of physically containing all hardware, software, and accessories.

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8. The Contractor shall provide maintenance and supplies for the life of the project. Supplies shall include but, are not limited to, 3.5" DSHD floppy disks, 700 MB CD-R disks with jewel cases, CD storage case, toner, inks, all paper, etc. All supplies shall be provided with the original installation of the computer equipment and as required, as soon as possible after notification by the Resident Engineer.

Remove **Subsection 930.02; Plant Field Laboratory - Laboratory Building**, pages 9-58 and 9-59 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace with the following.

SECTION 930

PLANT FIELD LABORATORY

930.02 LABORATORY BUILDING. The laboratory building shall not be less than 16 feet wide and 12 feet long and shall have a ceiling height of at least 7½-feet. The floor shall be sturdy, level, and constructed of concrete. The building shall be watertight. There shall be at least three standard windows and a door equipped with an adequate lock. The site shall include restroom facilities that are fully equipped and accessible.

If the Engineer permits, the Plant Field Laboratory may be part of an existing building. In this case, the laboratory portions of the building shall be entirely partitioned off from the remaining unrelated areas. The use of a trailer, utility control rooms such as electric, telephone, water, sewage, etc., as a Department designated laboratory and/or office is not permitted.

The laboratory shall be air conditioned. Adequate and satisfactory lighting, heating and drinking water shall be provided. The Contractor shall furnish all water, fuel, and electrical power required to conduct the various tests. The power provided shall be adequate to simultaneously operate all laboratory equipment and utilities, including an air conditioner if the laboratory is so-equipped. A table, chairs, desk, work bench, fireproof filing cabinet and telephone shall be provided in each laboratory.

In case of fire, theft or breakdown, all equipment involved shall be repaired or replaced by the Contractor. Production of any material may be discontinued at the discretion of the Engineer until the equipment is repaired or replaced. In the event buildings are destroyed or rendered untenable for any reason they shall be replaced within two weeks or as directed. In the interim, the Contractor shall provide temporary facilities for laboratory operations.

When both bituminous and cement concrete mixing plants are located in the same compound and when the Contractor provides one laboratory building for both bituminous and cement concrete testing facilities, duplication of laboratory equipment will not be required with the exception of the computer equipment specified in **Subsection 930.03.3**.

930.02.1 ADA Considerations. The Department is committed to providing equal access and opportunity for all persons in conjunction with Federal Law under Title I of the American's with Disabilities Act (ADA).

The United States Access Board defines a reasonable accommodation as; "a modification or adjustment to a job, an employment practice, or the work environment that makes it possible for a qualified individual with a disability to enjoy an equal employment opportunity."

In keeping with these directives, those entities that provide field material laboratories utilized by Department staff shall ensure that said facilities provide reasonable accommodation to allow Department employees to be efficient and productive in their work. Reasonable accommodations shall be provided in a manner consistent with the ADA, and as found in similar working conditions in Department-owned facilities.

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Entities that provide such facilities must demonstrate to the Department in advance that reasonable accommodations consistent with the ADA have been made available.

Personnel may contact the Department's Human Resources Office with any reasonable accommodation requests.

CODE 930.1000

PLANT FIELD LABORATORY

DESCRIPTION. The items of computer equipment and software to be provided for in this Contract in accordance with **Subsection 930.03.3; Computer Equipment**, of the RI Standard Specifications for Road and Bridge Construction, 2004 Edition, shall meet the following minimum specifications.

One Windows compatible computer with a 2.66 GHz Core 2 Duo or equivalent; 1066 MHz system bus; 3 MB L2 Cache; 2 GB RAM; 500 GB hard drive; 256 MB graphics adapter; 10/100 Ethernet Network Interface Port; DVD +/-RW; 101 key enhanced keyboard; optical mouse; four USB 2.0 ports (the computer case shall have front and rear USB ports); 19" LCD monitor with 1000:1 contrast ratio; broadband Internet access (3 Mbps nominal connection speed); 450 VA backup power supply with surge protector; USB color laser or inkjet printer (20 ppm in black mode); all cables and cartridges for printer; paper; permanent computer dust shield; permanent keyboard dust shield; blank CD-R's with jewel cases; most recent Professional version of Microsoft Windows; Microsoft Access (latest version); McAfee Total Protection (latest version) with subscription support.

Remove **Section 934; Field Control and Construction Layout**, pages 9-66 through 9-69 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace with the following.

SECTION 934

FIELD CONTROL AND CONSTRUCTION LAYOUT

934.01 DESCRIPTION. The work of this Section shall consist of provisions for establishing, on the ground, all required Field Control and Construction Layout. Project Field Control and Layout is defined as accurately providing all necessary computations, stakes and marks required to establish lines, slopes, elevations, points, and continuous profile grades in order to perform all the required work for the project in accordance with the Contract requirements. Field Control and Layout is required to enable the Engineer to complete all necessary inspection, checks, verification of quantities and Contract Administration duties. The staking shall include, but not be limited to, clearing and grubbing, grading, drainage, culverts, embankments, borrow, aggregate base course, pavements, bridges, utilities, signs, pavement markings, erosion control, and turf establishment items to complete the project as represented in the plans. The Surveying must be done in a way that is timely, and that is reflective of the continuing and ongoing nature of construction and inspection activities which will generally require frequent, separate project visits by the Contractor's survey crew, to the project to accommodate the various stages of construction and inspection activities that will occur. Field Control shall also be defined to include all survey required to accurately generate standard cross sections, measure quantities, layout for utility companies, and generate as-built drawings.

934.02 MATERIALS. All survey wedges and survey stakes shall be of seasoned oak and free of knots. Survey wedges used for control staking shall be 1- $\frac{3}{4}$ " x 1- $\frac{3}{4}$ " and 18-inches in length. For slope limits, pavement edges, gutter lines, etc., the use of survey stakes will be acceptable and shall be 1" x 1" and 4'-0" in length.

934.03 CONSTRUCTION LAYOUT

934.03.1 General Responsibilities. It will be the responsibility of the Contractor to establish field control and to lay out the work which is proposed within the Contract. The Engineer will furnish the Contractor with basic field control and survey data for all projects except for resurfacing projects, as basic field control is not necessary to perform the work on these projects.

934.03.02 Department's Responsibility. As noted above, the Engineer shall furnish the Contractor with basic field control and survey data for all projects, except resurfacing projects, upon Contract Award. This shall include confirming and re-establishing control, in the field. The basic field control shall include control points, benchmarks, survey data files, survey plan sheets, and other data, which may be required for the Contractor to perform construction staking, layout, and maintenance of the basic field control.

Survey work may be monitored by the Engineer for conformance to standard survey practices. The Engineer shall be notified, by the Contractor, 24 hours prior to any survey work being performed in the field. The Engineer/Surveyor may check the control of the work, as established by the Contractor, at any time as the work progresses.

At the discretion of the Engineer, spot checks may be performed upon the Contractor's surveying calculations, records, field procedures, or actual staking. If the Engineer determines that the work is not being performed in a manner that will assure proper controls and accuracy, the Engineer will direct the

Contractor to redo such work to the standards specified in the contract at no additional cost to the Department. Also, should the Department sustain costs checking and/or correcting Contractor survey and resultant product caused by Contractor survey errors and/or omissions, the Engineer will deduct those related costs incurred by the Department from the Contractor in accordance with the Department's established rates for surveyors.

934.03.3 Contractor's Responsibilities. The Contractor shall be responsible, at a minimum, for the following:

a. Pre-Construction Surveys shall be submitted to the Department five (5) working days prior to the commencement of any clearing and grubbing, or earthwork. These surveys shall accurately record the existing conditions of areas where work is proposed. Pre-Construction Surveys shall be submitted to the Engineer electronically in both CADD and survey data files.

Pre-construction surveys shall accurately record the existing conditions, as identified in the Contract Documents, and areas where work (disturbance) is proposed. This shall include original grades; curb line and grades, sanitary and drainage structures and inverts; easements; visible utility locations; etc.

The Contractor shall notify the Department, in writing, of any discrepancies between the Design Plans and their pre-construction survey. The Contractor shall not disturb the areas in question, until the Engineer responds to the Contractor's notification. The Engineer will respond to Contractor within five (5) working days.

b. Construction stakes shall be set for all project construction, and shall be installed as reference points, as needed, for the use of any public utility crews that are staking or accomplishing utility relocations, or construction associated with this contract. References to staking, additional or replacement thereof, which may be required for the construction operations shall be furnished, set and properly referenced by the Contractor. Construction stakes shall be clearly labeled by referencing station, offset, and purpose. The intent of the labeling is so both the Contractor and Engineer may accurately interpret the field control. In particular, the Department's personnel need to be able to orientate themselves in the field based on the staking to confirm construction operations are in conformance with design plans and specifications.

c. Re-staking shall be performed, as needed, due to progressive change in operation including, but not limited to:

1. Identification of Limits
2. Staking for Excavation
3. Re-staking for Grading
4. Staking for new Drainage and Utilities including center of proposed structures and elevation.
5. Staking for curbing and final pavement
6. Staking of easements

d. Structures and Bridges construction staking which includes setting and reestablishing Working Points and Reference Points by XYZ coordinates to provide line and grade during all stages of work, and at all substructures and segments of Bridge or Structure Construction, as shown below:

1. Establish Working Points or Reference Points, approved by the Engineer, on the ground as shown on the Bridge Layout sheet in the Plans.

2. Transfer of required points from the ground to the top of footing after the completion of concrete footing construction. If the structure is a curved wall or bridge edge of slab, curb, coping, median, or railing, the Contractor's Surveyor shall mark a curved line on the footings, forms, or deck slab, to the proper degree of curvature within 1/8" in ten (10) feet, as needed for construction and inspection activities.

3. Transfer required points to the top of all finished structures.

4. Transfer required points to the superstructure deck forming.

5. Measurements and marks for plumbness are also required.

e. Establish and Protect adequate ties to all control points such that they may be conveniently re-established if disturbed or destroyed. This includes the preservation of all reference points, monuments, horizontal and vertical control points, stakes, and marks that are established by the Department or their representatives, within the project limits. If the Contractor or its surveyor fails to preserve these items and if they must be reestablished it will be the responsibility of the Contractor to do so.

f. A Rhode Island Registered Land Surveyor (RLS) shall be retained by the Contractor to be responsible for all survey work; which shall be performed in accordance with the Department's procedures and the procedures established by the "Procedural and Technical Standards for the Practice of Land Surveying in the State of Rhode Island and Providence Plantations" prepared by the Rhode Island Society of Professional Land Surveyors and adopted by the Rhode Island Board of Registration for Professional Land Surveyors. The Contractor shall submit to the Engineer for approval the RLS who will be responsible for the survey work on the project. The Engineer shall review the qualifications of the RLS and respond, in writing, to the Contractor within five days as to the acceptance of the candidate. The Contractor must notify the Engineer prior to any changes to the RLS in charge. While all work must be overseen by an RLS, the survey Party Chief shall also be an RLS.

Any surveying or measurements necessary for the computing of pay quantities shall be performed by the Contractor's RLS in the field. The Contractor shall notify the Engineer at least five (5) working days prior to disturbing any areas where survey will be used to calculate pay quantities. Additionally, the Contractor shall afford the Department five (5) working days for verification, upon receipt, of cross sections stamped by the RLS. Where the Department deems it necessary and appropriate to check the Contractor's quantity-related field survey data, the Contractor shall not perform any operations during the five (5) day period that may render Department's efforts to check the Contractor's survey ineffective.

The final monumentation of the project must be supervised by the Contractor's RLS.

g. Field Records shall be maintained by the Contractor in Department approved field books. Copies of field book pages, survey documentation and calculations shall be submitted to the Engineer, in a form acceptable to the Department, on a daily basis. Upon completion of the construction work, original field books and records shall be submitted to the Department. The copies shall be submitted in both hard copy and electronic files (Adobe PDF format, latest edition on approved DVD media).

The survey documentation shall include:

1. Control station monumentation with reference ties.

2. Field notes that were used to set construction stakes, control the Project, and document monument locations. The Contractor shall use bound, hard cover field books for recording survey data and field notes; store field notes on an electronic medium; or use both methods. If an electronic medium is used, the raw field data files must be available. When using an electronic medium, the Contractor shall make all files and data available in the Standard formats used by the Department.

h. As-Built surveys shall be performed and drawings submitted to the Engineer to document any changes to the proposed Contract work. The Contractor shall provide the Engineer with the as-built data in both hard copy reproducible material and electronic files. This data will be provided to the Engineer as changes/additions occur. The Engineer may request verification of any and all survey data. The Contractor will be responsible for submitting this data within five (5) working days of the request. The as-built data shall include the following:

1. Construction changes/additions in alignment, profiles, typical sections, structures, drainage, tapers, roadway widths, utilities, and curb types pertaining to location and elevation, on the copy of the appropriate construction Plans.

2. Revised coordinates for any of the above items.

3. Revisions in centerline station and offset.

4. Pile cut-off elevations.

5. Bearing elevations.

i. Miscellaneous.

1. The Engineer's acceptance of all or any part of the Contractor's layouts shall not relieve the Contractor of responsibility to secure proper dimensions for the completed work.

2. The Contractor shall bear all costs, including but not limited to the cost of actual reconstruction of contract work, that may be incurred due to errors in the Contractor's field control and construction layout.

3. No claims for extensions of time or additional costs associated with delays as the result of this work will be allowed.

If needed, the Engineer will instruct the Contractor, in writing, to make the necessary minor surveying and staking adjustments to fit construction to actual field conditions. In addition, some Plan details may be dependant upon actual field conditions at the time of construction. It may be necessary to perform some field survey and/or office computations in order to stake these components.

All level runs, traverses, or GPS control surveys, shall start and end from known control. Complete all control surveys in accordance with "Procedural and Technical Standards for the Practice of Land Surveying in the State of Rhode Island and Providence Plantations".

934.04 METHOD OF MEASUREMENT. The field control and construction layout work is considered incidental to the contract and will not be measured for payment. The incidental survey and survey-related work shall include, but not be limited to, all on-site field work as well as on-site and off-site office work such as calculations, sketches, drawings, tabulations, correspondence, research and any other tasks required to complete the work to the satisfaction of the Engineer. Re-work, including re-staking, performed for any and all reasons, is deemed incidental and will not be measured for payment.

a. Measurement for Extra Work. Survey work performed outside the scope of the original contract at the direction of the Engineer will be deemed Extra Work, and will be documented and paid for on a Force Account basis as set forth in **Subsection 934.05**.

934.05 BASIS OF PAYMENT. The field control and construction layout work will not be paid for separately, but shall be included in the bid for the items of work to which the layout is incidental, including all labor, materials and equipment, transportation of crews, surveying supplies and all other incidentals required to finish the work, complete and accepted by the Engineer.

a. Payment for Extra Work. When the Engineer determines that extra construction surveying beyond the scope of the original contract is required, such work will be paid for on a Force Account basis as set forth in **Subsection 109.04; Differing Site Conditions, Changes, Extra Work and Force Account Work**; Para. a(4) of these Specifications.

935.99

REMOVING BITUMINOUS PAVEMENT BY MICRO-MILLING

(Job Specific)

935.01 DESCRIPTION. This work consists of the removal of bituminous material using micro-milling to a depth specified on the Plans or as directed by the Engineer, all in accordance with these Specifications.

935.02 MATERIALS. Not applicable.

935.03 CONSTRUCTION METHODS.

935.03.1 Equipment. The milling equipment for removing the bituminous pavement shall be designed specifically for grinding asphalt surfaces to close tolerances and shall be operated at a rate that will avoid tearing and gouging of the pavement surface. The equipment shall be capable of accurately establishing profile grades and cross slopes, and shall have a positive means for preventing any dust resulting from the operation from escaping into the air. An averaging ski not less than 25 feet in length shall be utilized with the pavement removal equipment on all limited-access highways and on other types of highways when indicated in the Contract Documents.

The equipment furnished by the Contractor shall be in good repair and shall be maintained so as to produce a clean cut to the pavement at all times.

935.03.2 Control Strip. The Contractor shall grind a control strip at least 500 feet long with uniformly textured surface and cross section. The milled pavement surface shall have a transverse pattern 0.3 inches or less between the centers of each strike area. The macrotexture shall be 1/16 inches or less as measured using ASTM E965.

935.03.3 Pavement Grinding. Upon the approval of the Control Strip by the Engineer, all areas designated for micro-milling shall be ground using the identical procedures, settings and speed, and shall conform in all respects to the requirements for the control strip.

No asphalt cuttings shall remain on the project at the end of the workday. Asphalt cuttings shall be removed and legally disposed of by the Contractor.

935.04 Method of Measurement. "Removing Bituminous Pavement by Micro-Milling" will be measured by the number of square yards of said pavement actually removed in accordance with the Plans and/or as directed by the Engineer.

935.05 Basis of Payment – The accepted quantity of "Removing Bituminous Pavement by Micro-Milling" will be paid for at the contract unit price per square yard as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials, equipment, disposal and all other incidentals required to finish the work, complete and accepted by the Engineer.

Revise **Section 937; Maintenance and Movement of Traffic Protective Devices**, pages 9-71 through 9-73 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION 937

MAINTENANCE AND MOVEMENT OF TRAFFIC PROTECTIVE DEVICES

• **Replace Subsection 937.01; Description with the following.**

937.01 DESCRIPTION. This work consists of removing (from original locations), maintaining, storing, covering and uncovering, relocating and re-erecting all temporary construction signs, sign mountings, portable barricades, traffic cones, delineators and other traffic warning devices when so-directed by the Engineer, for conformance with the Plans, or for compliance with the traffic-related work restrictions included in the Transportation Management Plan, all in accordance with this Specification. All such maintenance and movement work on these devices shall take place after their initial installation on the project and prior to their final removal from same.

• **Replace Subsection 937.05.1; Basis of Payment – Payment for Full Compliance with the following.**

937.05.1 Payment for Full Compliance. "Maintenance and Movement of Traffic Protective Devices" will be paid for at the contract lump sum price as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials, and equipment, including removing the devices from their initial locations, handling, maintaining, transporting and relocating said devices to storage or to subsequent intermediate locations at which they are to be used for traffic control, and all other incidentals required to finish the work, complete and accepted by the Engineer.

Monthly progress payments under this item will be made at a rate determined by dividing the contract lump sum price by the number of months allocated for completion of the contract. Said number of months shall be equal to the difference between the contract completion date and the date of the Notice to Proceed.

At the discretion of the Engineer, payment for authorized contract time extensions will be made at either the calculated monthly rate as defined above or on a Force Account basis in accordance with **Subsection 109.04; Differing Site Conditions, Changes, Extra Work and Force Account Work**, of these Specifications.

If the contract is completed prior to the authorized completion date, the final monthly payment will consist of the remaining balance of the contract lump sum price.

No payment will be made for unauthorized contract time extensions.

• **Replace Subsection 937.05.2; Basis of Payment - Failure to Comply with the following.**

937.05.2 Failure to Comply.

a. Maintenance. If, in the judgment of the Engineer, the Contractor fails to adequately and safely maintain traffic control devices along any portion of the project, a charge will be assessed as follows:

For each day the Engineer determines that the Contractor has failed to comply with the provisions of this Section, the daily charge set forth in **Special Provision Code 937.1000** will be deducted from monies due the Contractor.

b. Movement. If the Contractor fails to remove and/or relocate traffic control devices for compliance with the traffic-related work restrictions included in the Transportation Management Plan or to otherwise meet changes in traffic conditions, construction operations, or other conditions affecting the safety and/or mobility of the traveling public, a charge(s) will be assessed as follows:

When the Engineer determines that the Contractor has failed to comply with the provisions of this Section, the appropriate charge(s) set forth in **Special Provision Code 937.1000** will be deducted from monies due the Contractor.

Remove **Subsection 938.03; Price Adjustment**, page 9-73 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace with the following.

938.03

PRICE ADJUSTMENT

938.03 PRICE ADJUSTMENT. Price adjustment will be determined by the difference between the Period Price and the Base Price. Price adjustments will be made at the end of each month during which a); work was accomplished on the project and b); prices varied.

Price adjustments for work performed after the contract completion date, as may be modified by approved time extension(s), will be the lesser amount calculated from the following two algorithms (a & b); whereas credit due the Department will be greater of the two calculations.

a. The price adjustment calculated using the actual monthly Period Prices in effect at the time of the construction.

b. The price adjustment calculated using the monthly Period Prices in effect during a period determined by setting the last day of relevant work to the contract completion date as may have been modified by approved time extensions.

Price adjustments due the contractor will be made in accordance with an approved Contract Addendum. Credit due the Department will be processed by deducting monies from progress payments or by other means if there are insufficient progress payments remaining.

CODE 943.0100

TRAINING PROVISIONS

The purpose of this specification is to require the establishment of a contractor-based program to provide on-the-job training for the purpose of developing full journey-workers through apprenticeship programs in accordance with the Rhode Island Department of Transportation's Training Provisions. The program overview is available at the Rhode Island Department of Transportation, Office of Business and Community Resources (OBCR). This training is to be provided as part of the Contractor's equal employment opportunity affirmative action program and selections to this program should be based on the Contractor's needs relative to achieving compliance. Therefore, until such time as the Contractor can show full utilization of minorities and women with respect to its affirmative action goals, this program shall, for the most part, be limited to minorities and/or women. The Department maintains the right to reject any applicant whom it feels is not appropriate given all the pertinent factors and information available at the time of appointment. As such, the Contractor shall supply to the Department's Office of Business and Community Resources (OBCR) any information utilized in the consideration of the appointments. The Department will then notify the Contractor in writing, with proper explanation as necessary, as to the acceptability of an applicant. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training, whether a member of a minority group or not. Furthermore, no employee shall be employed as a trainee in any classification in which they have successfully completed a training course leading to journey-worker status or in which they have been employed as a journey-worker.

The Contractor shall submit to the Department's Office of Business and Community Resources, for written approval, prior to the start of the normal construction season and not later than April 1st of that year, a training plan outlining and detailing the proposed number of trainees, projected hours to be worked and the type of training to be provided. The number of trainees maintained within the training program annually will be based on the Contractor's projected gross Rhode Island work for that particular year. The Contractor will provide training for one individual for up to every five million dollars (\$5,000,000.00) of the Contractor's anticipated gross Rhode Island work less subcontracting expenses. Due to the fact that the original yearly staffing for this program will be based on projection, adjustments to the program will be allowed upon written approval of the Department.

The minimum length and type of training for each classification will be as established in the training program selected by the Contractor and approved by the Department. The Department shall approve the program if it is reasonably calculated to meet the equal employment opportunity obligations of the Contractor and to qualify the average trainee for journey-worker status in the classification concerned. Furthermore, apprenticeship programs registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training or with a state apprenticeship agency recognized by the Bureau of Apprenticeship and Training, and training programs approved but not necessarily sponsored by the U.S. Department of Labor, Bureau of Apprenticeship and Training will also be considered acceptable provided they are being administered in a manner consistent with the equal employment obligations of the Contractor. The intent of this provision is to provide training in the construction crafts rather than clerk-typists or secretarial-type positions. Training is permissible in lower level management positions such as office engineers, schedulers, estimators, timekeepers and so on where the training is oriented towards construction applications. The Department reserves the right to accept or reject any training classifications submitted by a contractor, and initiate a new programs under the volition of the Department.

Although the intent of this requirement of this requirement is to utilize trainees on RIDOT projects, the program is not limited solely to this venue. The Contractor may utilize trainees on private contracts as well. The intent of this allowance is for the purpose of maintaining, to the extent possible, continuous training for the trainee and his or her ultimate achievement of journey-worker status. Therefore, the Contractor shall make every effort to reinstate those persons laid-off who were entered in its training program prior to any new recruitment in said program. Furthermore, those trainees satisfactorily completing a construction season and still classified as a trainee shall be automatically enlisted in the Contractor's next training program when work projections allow, unless the trainee is unavailable or not returned for reasons mutually agreed upon by the Department and the Contractor.

The Contractor shall submit to the Department's Office of Business and Community Resources monthly reports on all personnel incorporation all achievements associated with the training program for that particular period. The report shall list all trainees and their employment status categorizing all hours for each trainee by contract, and further divided by FAP and Non-FAP projects. The report shall also be accompanied by a narrative on each trainee outlining any substantive achievements or problems encountered during the reporting period. Discussion should also be included as to the ability, attitude, attendance and potential of the individual trainees, and any recommendations the Contractor may have relative to trainees and/or the trainee program. These reports are subject to verification by RIDOT's Office of Business and Community Resources and must be supported by certified payrolls. Any attempt on the contractor's part to simply submit a formatted report without an original personal discussion on each trainee taking part in the program will be deemed unacceptable. Monthly reports shall be submitted on standardized forms incorporated into the Department's CHAMP program.

Based on submitted proper documentation for payment, the Contractor will receive reimbursement at the bid price rate for each trainee-hour worked by an approved trainee within the training program on RIDOT federally funded projects. Payments will be processed against those projects in which training occurred, subject to verification by the Department. Reimbursement requests shall be submitted by the Contractor monthly, where applicable. The Contractor will not receive any financial reimbursement for hours worked on non-RIDOT or non-federally funded RIDOT activities; however, the hours worked which are not financially reimbursable will still be attributed to and count as credit towards the contractor's approved training program.

Compliance determinations with respect to the Contractor's efforts to achieve those goals established for a training season as outlined in the contractor's approved training program will be conducted and completed bi-annually within a particular season during the summer and winter months. The summer review will allow for adjustment in staffing based on more definitive contract work information. However, should the Department determine through the year-end review that the Contractor has failed to comply with the goals outlined and included in the Contractor's training program, then the number of remaining hours not met for the compliance period (April-December) on FAP projects will be multiplied by the prevailing wage rate for those trainee classifications deficient, with the resulting costs being reimbursed to the Department by the Contractor prior to the beginning of the next training period. Should the Contractor fail, and without just cause, to comply with this reimbursement requirement, then it will be precluded from bidding on all RIDOT projects until such time as this financial obligation to the Department has been met and a new and approved training program is established and initiated with the Department.

Basis of Payment: The Contractor will be paid for trainee work-hours at the contract unit price per Man-Hour (MNHR), as listed in the Proposal. The unit bid price per work hour as paid to the Contractor shall constitute full compensation for the trainee services, including all fringe benefits. Reimbursement will be made only in accordance with the requirements of this specification and only for work performed on federally funded RIDOT projects.

Special Notes:

If a “Trainee” pay item is not carried in the proposal pages, then this provision is not applicable.

Minimum bid for this item is \$6.00/hour.

The reference to “Contractor” includes both prime contractors and subcontractors with RIDOT approved training programs.

If a subcontractor of the Contractor has a training program approved by RIDOT the same “Basis of Payment” is applicable.

Revise **Section T.01; Electrical Work**, pages T-1 to T-5 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION T.01

ELECTRICAL WORK

- **Replace the first paragraph of Subsection T.01.02 with the following.**

T.01.02 MATERIALS. Rigid steel conduit, PVC conduit, fiberglass conduit, handholes, pull boxes, manholes, wire and cable shall conform to the requirements specified in **SECTION M.15; TRAFFIC CONTROL AND HIGHWAY LIGHTING SYSTEMS**, of these Specifications.

- **Replace the second paragraph of Subsection T.01.03.1 with the following.**

All foundations shall rest on firm ground and shall be placed monolithically. Conduits and anchor bolts shall be placed in proper position and shall be held in place by means of a template until the concrete sets. Forms shall not be removed until the concrete has hardened properly and not less than 24 hours after the concrete has been placed. All exposed portions of foundations shall be neatly finished with a wood float. The tops of foundations shall be finished flush with the finished grade or as detailed on the Plans.

- **Replace Subsection T.01.03.2 with the following.**

T.01.03.2 Bonding and Grounding. Traffic signals, highway lighting, illuminated sign circuits, conduits and aboveground equipment shall be effectively bonded and grounded as hereinafter specified and as shown on the Plans for the respective installations. Bonding and grounding shall conform to the requirements of the National Electric Code and the utility company.

Ground wire and grounding rods shall conform to the applicable requirements set forth in **SECTION M.15; TRAFFIC CONTROL AND HIGHWAY LIGHTING SYSTEMS**, of these Specifications.

The Contractor shall be responsible for maintaining 25 ohm to ground resistance in all systems.

- **Replace the second paragraph of Subsection T.01.03.4 with the following.**

With all equipment connected to the wiring system, a functional test shall be performed by the Contractor, in the presence of the Engineer, to demonstrate that the system as a whole, and all parts thereof, function as specified or intended herein. Any defective materials or faulty or improper installation shall be permanently corrected by repairs or replacements to be made by and at the expense of the Contractor, to the satisfaction of the Engineer and the utility company.

- **Replace the second paragraph of Subsection T.01.03.7(a) with the following.**

All complete shop drawings and design computations shall bear the stamp of a Professional Engineer licensed by the State of Rhode Island. Shop drawings shall be approved prior to fabrication, and it shall be expressly understood and agreed upon that said approval does not relieve the Contractor of its responsibility for the design, fabrication and erection of the structure.

- **Replace the second paragraph of Subsection T.01.03.8 with the following.**

Existing systems or portions thereof may be abandoned in place only with written permission of the Engineer.

- **Replace Subsection T.01.03.9 with the following.**

T.01.03.9 Lines and Grades. It shall be the responsibility of the Contractor to arrange for the furnishing of lines and grades as may be necessary to lay out the work correctly, all as specified in **Subsection 105.08** of these Specifications.

Revise **Section T.02; Highway Lighting**, pages T-5 and T-6 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION T.02

HIGHWAY LIGHTING

- **Replace the fourth paragraph of Subsection T.02.01 with the following.**

Reference is made to the following Sections which are relevant to highway lighting:

SECTION T.03; GROUND RODS AND BARE OR INSULATED GROUND WIRE

SECTION T.04; WIRE AND CABLE

SECTION T.05; HANDHOLES, MANHOLES, AND PULL BOXES

SECTION T.06; CONDUIT

SECTION T.07; LUMINAIRES

SECTION T.08; ALUMINUM LIGHT STANDARDS AND FOUNDATIONS

SECTION T.09; SERVICE PEDESTAL

Revise **Section T.03; Ground Rods and Bare Ground Wire**, pages T-6 and T-7 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION T.03

GROUND RODS AND BARE OR INSULATED GROUND WIRE

- **Replace Subsection T.03.01 with the following.**

T.03.01 DESCRIPTION. This work consists of effectively grounding lighting circuits, service pedestals, conduits, lighting and signal poles, illuminated sign circuits and traffic signal controller cabinets as shown on the Plans or as directed by the Engineer, all in accordance with these Specifications and the requirements of the National Electric Code.

- **Replace the first paragraph of Subsection T.03.03 with the following.**

T.03.03 CONSTRUCTION METHODS. Equipment grounding conductors will be provided for all lighting circuits between service pedestals and lighting standards. Conductors will be connected to each ground rod at each handhole and at each lighting standard.

Remove **Section T.04; Wire and Cable**, pages T-7 to T-9 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace with the following.

SECTION T.04

WIRE AND CABLE

T.04.01 DESCRIPTION. This work consists of furnishing and installing wire and cable of the type and at the locations indicated on the Plans, or as directed by the Engineer, all in accordance with these Specifications. This work also includes the use of material and equipment for furnishing and installing splice kits in handholes and manholes, as indicated on the Plans or as directed by the Engineer, all in accordance with these Specifications.

T.04.02 MATERIALS. Wire, cable and splice kits shall conform to **Subsection M.15.02** of these Specifications.

T.04.03 CONSTRUCTION METHODS. Splices, taps and terminations shall be made using premolded splice kits fabricated of 6061-T aluminum and insulated with EPDM rubber compound rated for 600 volts and capable of accepting copper conductors. This splice has four terminals and can be used for a two-, three-, and four-way splice application. The splice is to be suitable for submersible installations

Note: Taped splices are allowed only as temporary installations, as directed by the Engineer. Taped splices must be “built-up” and rated for 600 volts using self-vulcanized high voltage tape covered with two (2) layers of PVC tape.

Wires and cables shall be handled carefully during storage. All conductors and cables shall be drawn into the conduit system without damage to covering sheath insulation or conductor. Wiring shall not be done until the raceway system has been completed. Only lubricant manufactured specifically to assist cable pulling shall be used.

Wires on poles shall be installed by a licensed electrician and/or a licensed journeyman.

Wiring installed in raceways shall have slack cable left at all pulling points. No wiring shall be installed until conduit systems have been approved by the Engineer.

Installation of splice kits shall be as recommended by the manufacturer and the National Electric Code. All splices shall be in a handhole, manhole or junction box.

The Contractor shall submit for approval the manufacturer's notarized certificates of compliance for all wire and cable.

T.04.04 METHOD OF MEASUREMENT.

T.04.04.1 Wire and Cable. "Wire" and "Cable" will be measured by the linear foot of each type actually installed in accordance with the Plans and/or as directed by the Engineer.

Measurement shall be along the centerline of the conduit. A 5-foot allowance will be made for slacked cables in handholes. A 6-foot allowance will be made for slacked cables in traffic signal controller cabinets.

T.04.04.2 Splice Kits. "Splice Kits" will be measured by the number of units actually installed, regardless of the number of actual splices made each unit, all in accordance with the Plans and/or as directed by the Engineer.

T.04.05 BASIS OF PAYMENT.

T.04.05.1 Wire and Cable. The accepted quantities of "Wire" and "Cable" will be paid for at their respective contract unit prices per linear foot of the various types as listed in the Proposal. The prices so-stated constitute full and complete compensation for all materials, equipment, tools, labor and all other incidentals required to finish the work, complete in place and accepted by the Engineer.

T.04.05.2 Splice Kits. "Splice Kits" will be paid for at the contract unit price per each as listed in the Proposal. This unit price includes the labor cost to install splice kits for two, three and four-way splice applications. The contract unit price constitutes full and complete compensation for furnishing and installing all tools, labor, splice kits, equipment and all other incidentals required to finish the work, complete in place and accepted by the Engineer.

Remove **Section T.05; Handholes and Pull Boxes**, pages T-9 and T-10 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace with the following.

SECTION T.05

HANDHOLES AND PULL BOXES

T.05.01 DESCRIPTION. This work consists of providing Precast Type “A” Handholes, Precast Type “B” Heavy Duty Handholes, and Precast Type “H” Heavy Duty Handholes at the locations indicated on the Plans or as directed by the Engineer. The work also includes the provision of Type “V” and Type “W” Pull Boxes on those structures indicated on the Plans. All such work will be in full accordance with these Specifications.

T.05.02 MATERIALS.

T.05.02.1 Precast Handholes and Pull Boxes. Precast handholes and pull boxes shall conform to **Subsection M.15.03.1** of these Specifications.

T.05.02.2 Metal Pull Boxes. Pull boxes shall conform to **Subsection M.15.03.2** of these Specifications.

T.05.03 CONSTRUCTION METHODS.

T.05.03.1 Plant Requirements for Precast Units.

a. Casting. Precast concrete units shall be cast true and square in accordance with the applicable details as shown on the Plans. Dimensions of units shall be accurate within the following tolerances:

Dimension	Tolerance ±
Greater than 0" to 12"	1/4"
Greater than 12" to 24"	1/2"
Greater than 24" to 72"	3/4"

b. Manufacture. Precast concrete units shall be designed and manufactured in accordance with ASTM C478; “Precast Concrete Manhole Sections,” with the additional stipulation that the concrete mix design shall be Class XX(AE) as set forth in **SECTION 601** of these Specifications.

c. Inspection. All precast concrete units shall be inspected both at the points of manufacture and on the project site. Any units showing defects or damage shall be removed and replaced by the Contractor at no additional cost to the State.

T.05.03.2 Setting. Except as otherwise specified, precast units shall be placed on previously prepared gravel borrow subbase to the lines and grades shown on the Plans.

The grade of the handhole frame and cover shall be even with the surrounding ground or as directed by the Engineer. The maximum allowable adjustment for the frame and cover is 3- inches

All holes for conduit and ground wire shall be drilled. No punched holes will be allowed. All holes drilled in handholes shall be grouted with a material approved by the Engineer. The frame and cover are to be provided with a ground connector and both items shall be bonded to the ground rod using a #6 bare ground wire.

T.05.03.3 Metal Pull Boxes. Pull boxes, when used in cast-in-place bridge parapets or barrier, shall conform to the details indicated on the Plans and shall be adequately anchored in place to prevent displacement during concrete pouring operations. Surface mounted pull boxes shall be anchored with stainless steel mechanical anchors.

T.05.03.4 Excavation. Excavation for precast handholes and pull boxes shall be completed as nearly as practicable to the dimensions shown on the Plans.

T.05.04 METHOD OF MEASUREMENT. "Precast Type "A" Handholes," "Precast Type B Heavy Duty Handholes," "Precast Type "H" Heavy Duty Handholes," and "Type "V" Pull Boxes" and "Type "W" Pull Boxes" will be measured by the number of units of each type actually installed in accordance with the Plans and/or as directed by the Engineer.

T.05.05 BASIS OF PAYMENT. The accepted quantities of "Precast Type "A" Handholes," "Precast Type B Heavy Duty Handholes," "Precast Type "H" Heavy Duty Handholes," "Type "V" Pull Boxes" and "Type "W" Pull Boxes" will be paid for at their respective contract unit prices per each such type as listed in the Proposal. The prices so-stated constitute full and complete compensation for all materials, labor, tools, and equipment including concrete, ground wire, grounding clamps and support grips, ground rods, gravel, cast iron frame and cover, grounding of frame and cover, excavation and backfill, and for all incidentals required to finish the work, complete in place and accepted by the Engineer.

Payment for "Trench Excavation - Rock" will be made under the applicable provisions of **SECTION 205; TRENCH EXCAVATION**, of these Specifications.

Remove **Section T.06; Conduit**, pages T- 11 to T-13 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace with the following:

SECTION T.06

CONDUIT

T.06.01 DESCRIPTION. This work consists of furnishing and installing rigid steel conduit, fiberglass conduit and PVC plastic conduit of the size specified, including the necessary fittings, at the locations indicated on the Plans or as directed by the Engineer, all in accordance with these Specifications.

T.06.02 MATERIALS. Conduit and fittings shall conform to **Subsection M.15.04** of these Specifications.

T.06.03 CONSTRUCTION METHODS. All work shall be performed strictly in accordance with the requirements of the National Electric Code.

T.06.03.1 Rigid Steel Conduit. Conduit shall be placed as shown on the Plans or as directed by the Engineer. Bends which are not smooth or which show any evidence of flattening or destruction of the protective coating will not be accepted. All joints requiring rethreading shall be made with a zinc-based, cold galvanized, spray-applied compound as approved by the Engineer, applied to the male threads. Oils shall be removed from the threads prior to applying the galvanizing compound. All threaded couplings shall be tightened until the ends of the conduit are brought together to form a good electrical connection.

A nylon pulling rope shall be installed in all conduits which do not carry conductors under the contract. Such pull rope shall be for subsequent use to facilitate pulling of cables. Cost of this pull rope shall be considered incidental in the price of the conduit involved.

Conduit bends and elbows made in the field shall have a radius of not less than twelve (12) times the inside diameter of the conduit, and all such bends shall be made without crimping, heating, denting or otherwise damaging the conduit.

Conduit ends at handholes shall be supplied with insulated bonding bushings with threaded ends. All conduits shall be bonded to the ground rod within the handhole using #6 bare ground wire.

a. Underground. All conduit shall be grounded in accordance with the National Electric Code. Ends that have bonding clamps shall be filled with sealing compound to prevent the entrance of moisture, except at handholes. All ground lugs shall be copper, bronze or brass. Underground conduit shall refer to all conduit placed underground in non-paved areas or in paved areas where the pavement will be replaced as part of the project under other contract items. Underground conduit shall be placed at a minimum depth of 24 inches under vehicular travel areas and 18 inches under non-vehicular travel areas.

Conduits shall be placed on a 6-inch sand bed. Conduits within roadways shall be backfilled with Class 1 controlled low-strength material (CLSM) to the bottom of the gravel subbase. Yellow warning tape shall be placed 1 foot below finished grade.

When two or more conduits are placed in the same trench, conduit spacers shall be used. Spacers shall be placed at 6-foot intervals or as directed by the Engineer.

If the condition of the bottom of the trench is in any way unsatisfactory as determined by the Engineer, the Engineer may require the Contractor to excavate additional material and replace it with clean gravel to provide a firm bearing for the conduit. The backfill shall be compacted in layers not more than 6 inches in depth.

After the trench is backfilled, the Contractor shall, in the presence of the Engineer, test the installation by pushing or pulling a mandrel, not less than 1/4-inch less than the inside diameter of the conduit, through the entire length of the conduit. Any debris, including stones and dirt, shall be removed. All damaged conduit shall be removed and replaced at the Contractor's expense.

b. Conduit Under Existing Pavement. Conduit under existing pavement shall refer to all conduit placed under existing paved areas where removal of the pavement is required only for the placement of conduit and the pavement is to be restored as part of this item. Conduit under existing pavement shall be placed in accordance with all applicable requirements of **Para. a** of this Subsection. - The use of an automatic trenching machine is preferred. The excavation shall be patched in accordance with the Plans regardless of the method of excavation. When conduit is placed in existing paved sidewalks, the sidewalk shall be replaced in accordance with **Subsection T.01.03.11** of these Specifications.

c. Overhead. All conduit above grade shall be securely attached using clamps and/or hangers at intervals not exceeding 5 feet or as directed. All clamps and hangers shall be galvanized. A weatherhead shall be installed on all risers.

d. Conduit in Structure. Conduit to be embedded in concrete structures shall be rigidly supported in the concrete form by methods and materials which will not cause injury to the zinc coating of the conduit.

Rigid steel conduit installations on bridges and other structures shall be provided with expansion fittings at all structure expansion joints. The expansion joint fittings shall be installed as shown on the Plans and meet the requirements of **Subsection M.15.04.3** of these Specifications.

T.06.03.2 PVC Plastic Conduit. PVC plastic conduit shall be installed as shown on the Plans and in conformity with the requirements previously specified in **Subsection T.06.03.1** except those referring specifically to rigid steel conduit.

PVC Conduit shall be installed with bell ends on the inside of each handhole.

T.06.03.3 Fiberglass Conduit. Fiberglass conduit shall be installed as shown on the Plans and in conformity with the requirements previously specified in **Subsection T.06.03.1** except those referring specifically to rigid steel conduit.

T.06.04 METHOD OF MEASUREMENT. "Rigid Steel Conduit," "Fiberglass Conduit" and "PVC Plastic Conduit" will be measured by the number of linear feet actually installed of the type or types indicated on the Plans and/or as directed by the Engineer, with no deduction for fittings and couplings.

T.06.05 BASIS OF PAYMENT.

T.06.05.1 Conduit Underground. The accepted quantities of "Rigid Steel Conduit -Underground" and "PVC Plastic Conduit - Underground" will be paid for at their respective contract unit prices per linear foot for the type or types as listed in the Proposal. The prices so-stated constitute full and complete compensation for all materials, equipment, tools, and labor including all fittings, couplings and restoration of existing ground surfaces, excavation and backfill, saw cutting pavements, temporary patch, testing, and all other incidentals necessary to satisfactorily finish the work, complete in place and accepted by the Engineer.

T.06.05.2 Conduit Under Existing Pavement. The accepted quantities of "Rigid Steel Conduit - Under Existing Pavement" and "PVC Plastic Conduit - Under Existing Pavement" will be paid for at their respective contract unit prices per linear foot for the type or types as listed in the Proposal. The prices so-stated constitute full and complete compensation for furnishing all materials, equipment, tools, and labor including fittings, couplings, saw cutting, excavation and backfill, restoration of existing pavements and sidewalks, testing, and all other incidentals required to finish the work, complete in place and accepted by the Engineer.

T.06.05.3 Conduit Overhead. The accepted quantities of "Rigid Steel Conduit - Overhead" and "PVC Plastic Conduit - Overhead" will be paid for at their respective contract unit prices per linear foot for the type or types as listed in the Proposal. The prices so-stated constitute full and complete compensation for furnishing all materials, equipment, tools and labor, including fittings, couplings, clamps and hangers, and weatherhead, and all other incidentals required to finish the work, complete in place and accepted by the Engineer.

T.06.05.4 Rigid Steel or PVC Conduit in Structure. The accepted quantities of "Rigid Steel or PVC Conduit in Structure" will be paid for at their respective contract unit prices per linear foot for the various types as listed in the Proposal. The prices so-stated constitute full and complete compensation for furnishing all materials, equipment, tools and labor, including fittings, couplings and all other incidentals necessary to satisfactorily finish the work, complete in place and accepted by the Engineer.

T.06.05.5 Fiberglass Conduit on Structure. The accepted quantities of "Fiberglass Conduit on Structure" will be paid for at the contract unit prices per linear foot of conduit as listed in the Proposal. The price so-stated constitutes full and complete compensation for furnishing all materials, equipment, tools and labor, including fittings, hangers and support systems, expansion fittings and all other incidentals necessary to satisfactorily finish the work, complete in place and accepted by the Engineer.

T.06.05.6 Expansion Couplings. The accepted quantities of expansion couplings of various types will be paid for at the contract unit price per each as listed in the Proposal. The price so-stated constitutes full and complete compensation for furnishing all materials, equipment, tools and labor, and all other incidentals necessary to satisfactorily finish the work, complete in place and accepted by the Engineer.

Remove **Section T.07; Luminaires**, pages T- 13 and T-14 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace with the following.

SECTION T.07

LUMINAIRES

T.07.01 DESCRIPTION. This work consists of furnishing and installing 250- or 400- watt high pressure sodium cutoff luminaires on appropriate lighting standards, and understructure luminaires, along with their supports and protective screens, at the locations indicated on the Plans or as directed by the Engineer, all in accordance with these Specifications.

T.07.02 MATERIALS. Luminaires, understructure luminaires and photo-electric controls shall conform to **Subsection M.15.05**, of these Specifications.

T.07.03 CONSTRUCTION METHODS.

T.07.03.1 High Pressure Sodium Luminaires. The 250- or 400-watt high pressure sodium luminaires shall be installed as shown on the Plans or directed by the Engineer. Luminaires shall be securely attached to ends of arms and shall be accurately plumbed, with the luminaire reflector properly and accurately placed.

Note: Luminaires installed on bridges must be secured with a belt through end of davit arm in addition to the manufacturer's recommendation due to possible vibration of the bridge span.

T.07.03.2 Understructure Luminaire with or without Protective Screen. Angle iron shall be drilled to accept wire mesh. Wire mesh ends shall be crimped at every end into holes in the angle iron. The protective screen shall be of the size indicated on the Plans and shall be secured to the bridge structure with galvanized "C" clamps located in each corner. The furnishing and installing of supports for the understructure luminaires shall include 3/4-inch conduit installed between the luminaire and the junction box. The high pressure understructure luminaire shall be furnished and installed as indicated on the Plans and/or as directed by the Engineer. Tunnel or underpass luminaries without protective screens shall be specified and ordered with tempered rated glass lens.

T.07.04 METHOD OF MEASUREMENT.

T.07.04.1 High Pressure Sodium Luminaires. "250-Watt High Pressure Sodium Luminaires" or "400-Watt High Pressure Sodium Luminaires" will be measured by the number of units of each type actually installed in accordance with the Plans and/or as directed by the Engineer.

T.07.04.2 Understructure Luminaire with Protective Screen. "Understructure Luminaire with or without Protective Screen" will be measured by the number of units actually installed in accordance with the Plans and/or as directed by the Engineer.

T.07.05 BASIS OF PAYMENT.

T.07.05.1 High Pressure Sodium Luminaires. The accepted quantities of "250-Watt High Pressure Sodium Luminaires" or "400-Watt High Pressure Sodium Luminaires" will be paid for at the contract unit price per each as listed in the Proposal. The price so-stated constitutes full and complete compensation for all materials, equipment, tools and labor, including ballast, lamp and photo-electric control, and all other incidentals required to finish the work, complete in place and accepted by the Engineer.

T.07.05.2 Understructure Luminaire with or without Protective Screen. The accepted quantities of "Understructure Luminaires with or without Protective Screens" will be paid for at the contract unit price per each as listed in the Proposal. The price so-stated constitutes full and complete compensation for all materials, including angle, mesh and clamps for the protective screen, luminaire support, luminaire, ballast, photo-electric cell (if needed), lamp and conduit, and all labor, tools, equipment and all other incidentals required to finish the work, complete in place and accepted by the Engineer.

Revise **Section T.08; Aluminum Lighting Standards and Foundations**, pages T-14 to T-17 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION T.08

ALUMINUM LIGHTING STANDARDS AND FOUNDATIONS

- **Replace Subsection T.08.01 with the following.**

T.08.01 DESCRIPTION. This work consists of furnishing and installing aluminum lighting standards, foundations, anchor bolts, in-line fused and unfused kits, and breakaway support couplings of the sizes and at the locations indicated on the Plans or as directed by the Engineer, all in accordance with these Specifications.

- **Replace the third paragraph of Subsection T.08.03.2(a) with the following.**

After the concrete foundation has been placed, finished level and cured, forms shall be removed. The area around the concrete base shall be backfilled and compacted in 6-inch uniform layers. Available stones in the area shall be used to chink the backfill to insure the concrete foundation remains in a stable vertical position.

- **Replace Subsection T.08.03.2(c) with the following.**

c. Preparation of Subbase. The subbase shall be furnished and placed in accordance with **Subsections 302.03.1 and 302.03.2** of these Specifications.

- **Add the following new paragraph at the end of Subsection T.08.03.2(d).**

Foundations shall be installed such that no portion of the foundation or any non-breakaway portion of the installation extends more than 4-inches above the finished grade. Measurement shall be made in accordance with Section 12.5.3; Additional Requirements of the AASHTO Standard Specifications for Structural Supports for Highway Signs and Traffic Signals.

- **Replace Subsection T.08.05.1 with the following.**

T.08.05.1 Light Standards. The accepted quantities of "Light Standards" will be paid for at the contract unit price per each as listed in the Proposal. The price so-stated constitutes full and complete compensation for all materials including poles, cast aluminum bases, ground wire, ground lugs, grounding bushings, in-line fused or unfused kits, No. 10 AWG cable between the luminaire and the in-line fused or unfused kits, and for all labor, tools, equipment and incidentals required to finish the work, complete in place and accepted by the Engineer.

Revise **Section T.09; Service Pedestal**, pages T-17 and T-18 of the RI Standard Specifications for Road and Bridge Construction as follows:

SECTION T.09

SERVICE PEDESTAL

- **Replace Subsection T.09.03 with the following.**

T.09.03 CONSTRUCTION METHODS. All work shall be performed in accordance with the National Electric Code and the National Electric Safety Code. The service pedestal shall be installed as shown on the Plans or as directed by the Engineer. The work under this item shall include all conduit contained within the concrete base. The pedestal shall be installed on the concrete mat as indicated on the Plans with the power distribution panel mounted inside. The concrete pad shall be placed on 12 inches of gravel subbase. The enclosure shall be made watertight. A bead of silicon sealer shall be applied to the base of the cabinet, inside and out. All electrical conductors within the cabinet shall be enclosed in PVC conduit. The electrical components shall be mounted with machine screws and wired as shown on the Plans or as directed. All rigid steel conduits in the service cabinet shall be bonded together and grounded to the cabinet with No. 6 AWG bare copper conductors. A ground grid system consisting of four (4) ground rods and #2 bare copper wire shall be installed around the foundation and as shown in the Standard Details. Foundation rebar and pedestal enclosure are to be bonded to the ground grid.

The Contractor shall provide a shop drawing of the service pedestal foundation showing the location of all conduit.

- **Replace Subsection T.09.05 with the following.**

T.09.05 BASIS OF PAYMENT. The accepted quantities of "Service Pedestal" will be paid for at the contract unit price per each as listed in the Proposal. The price so-stated constitutes full and complete compensation for all material, labor and equipment, including furnishing and installing the service pedestal, anchor bolts, concrete foundation, grounding system, crushed stone, excavation and backfill, meter socket, contactor, panelboard, photo control, relays, neoprene gasket, grounding bushings and ground wire, and for all incidentals required to finish the work, complete in place and accepted by the Engineer.

Revise **Section M.01; Borrow and Aggregates**, page M-1 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION M.01

BORROW AND AGGREGATES

- **Replace Subsection M.01.01; Common Borrow in its entirety with the following.**

M.01.01 COMMON BORROW. Common Borrow shall be gravelly in nature and shall conform to the minimum test data as specified below.

1. Boulders (retained on a 3-inch sieve) up to 9 inches in diameter and not exceeding three-quarters of the thickness of horizontal layers placed after compaction, as specified in **Subsection 202.03.2, Para. C**, are included for use in construction. However, these sizes are not included in the analysis for gradation.

2. The material shall contain not more than 17 percent by weight passing the No. 200 sieve.

Common Borrow shall conform to all applicable specification requirements prior to its final placement on the project. The practice of culling deleterious or out of specification material after placement and/or grading in-place will not be allowed.

- **Replace Subsection M.01.02; Gravel Borrow in its entirety with the following.**

M.01.02 GRAVEL BORROW. Gravel Borrow shall consist of bank run sand and gravel or plant processed, crushed or uncrushed gravel with fine aggregate added as filler. Alternatively, Gravel Borrow may consist of selected materials which have been reclaimed from within project limits, are proportioned and processed to produce granular material for reuse as Gravel Borrow within the source project limits. Gravel Borrow, whether consisting of bank run or plant processed sand and gravel, or reclaimed and processed granular material, shall consist of sound, durable particles free from loam, clay, organic soil, vegetative matter, soft and elongate particles.

Gravel Borrow shall conform to all applicable specification requirements prior to its final placement on the project. The practice of culling deleterious or out of specification material after placement and/or grading in-place will not be allowed.

- **Add the following paragraph to the end of Subsection M.01.02.2.**

M.01.02.2 Reclaimed and Processed Granular Material.

Reclaimed and Processed Granular Material shall conform to all applicable specification requirements prior to its final placement on the project. The practice of culling deleterious or out of specification material after placement and/or grading in-place will not be allowed.

[Remainder of Subsection is unchanged]

Delete **Subsection M.02.08; Latex Emulsion Admixture**, page M-10 of the RI Standard Specifications for Road and Bridge Construction in its entirety.

M.02.08

LATEX EMULSION ADMIXTURE

[SUBSECTION DELETED]

Revise **Section M.03.01; Bituminous Concrete Pavement** and **M.03.02; Materials**, pages M-13 through M-15 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION M.03

BITUMINOUS PAVEMENTS

- **Replace the Table in Subsection M.03.01 with the Table on the following page.**

[Refer to Table on the following page]

- **Replace the second paragraph of Subsection M.03.02.1(c) with the following.**

The asphalt cement shall be sampled and tested in accordance with and meet all the requirements of AASHTO M 320 for PG 64-28 binder. A direct tension test shall not be used.

Compilation of Approved Specifications
Date: 01/24/2011

SIEVE SIZE	BASE COURSE	BINDER COURSE	BRIDGE BINDER	SURFACE COURSES		FRICTION COURSES	
				CLASS I-1	CLASS I-2 or SIDEWALK	DENSE	RAMP
GRADATION: PERCENT PASSING BY WEIGHT							
1-1/4"	100						
1"		100				100	
3/4"	70-100	70-100		100		90-100	100
1/2"			100	80-100	100	70-90	95-100
3/8"	46-74	46-74	70-100	70-90	95-100	45-75	70-100
#4			25-45	50-70	55-75	20-40	25-45
#8	22-52	22-52	20-35	35-50	40-55	8-18	20-35
#30	10-34	10-34		18-29	20-30		8-15
#50	6-26	6-26	8-17	10-20	13-23	4-12	5-12
#200	3-8	3-8	2-6	3-8	3-8	2-6	2-6
Asphalt % By Weight	4.0 - 6.5	4.0 - 6.5	5.0 - 7.0	5.5 - 7.0	6.0 - 7.5	4.5 - 5.5	5.0 - 7.0
Marshall Stability Lbs. (min)	1600	1600	750	1000	1000	750	750
% Voids VFA	3 - 8 60 - 75	3 - 8 60 - 75	3 - 8 -	3 - 5 65 - 85	3 - 5 65 - 85	8 min. -	5 min. -
Flow (0.01 in)	8 - 16	8 - 16	8 - 16	8 - 16	8 - 16	-	8 - 16
Mixing Temp °F	300	300	260	300	300	260	260
Compaction #blows at Each end	75	75	50	50	50	50	50

Remove **Subsection M.04.02.1; Ductile Iron Pipe**, page M-20 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace with the following.

SECTION M.04

DRAINAGE

M.04.02.1 Ductile Iron Pipe. All ductile iron pipe, joints, fittings and appurtenances shall be Class 52 and meet the requirements of the latest revisions and addenda of the following standard specifications.

a. American National Standards Institute, ANSI (parenthesis designations are American Water Works Association designations for the standard).

1. A21.51 (C151) Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand Lined Molds, for Water and Other Liquids.
2. A21.11 (C111) Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings.
3. A21.53 (C153) Ductile Iron Compact Fittings.

b. ASTM A716 – Ductile Iron Culvert Pipe.

Remove **Subsection M.05.07.2; Metalizing – Blast Abrasive**, page M-30 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace with the following.

M.05.07

METALIZING

M.05.07.2 Blast Abrasive. Material shall be fresh, dry and sharp. The grain size shall be such as to provide a surface profile of 2.0 to 3.0 mils (approximately 30 to 70 mesh). In no case may round, soft sand be used. Samples of the abrasive shall be submitted to and approved by the Engineer prior to the commencement of any work.

The Contractor shall verify that abrasive cleaning materials meet the requirements of SSPC AB2, “Cleanliness of Recycled Ferrous Metallic Abrasives,” or SSPC AB 3, “Newly Manufactured or Remanufactured Steel Abrasive.” The condition and cleanliness of the recycled abrasives shall be in accordance with the fabricators approved quality control program as per SSPC QP3 and/or AISC Special Paint Endorsement.

Remove **Section M.06; Paint**, pages M-31 and M-32 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace with the following.

SECTION M.06

PAINT

M.06.01 GENERAL. Obtain certification from the coating manufacturer that all paint materials satisfy composition and testing requirements, are in conformance with the approved qualified products list or other applicable requirements, and will not exceed the manufacturer's specified shelf life before use.

Materials will be rejected if the material arrives at the application site in containers other than original, unopened containers; if a container has a break in the lid seal or a puncture; or if the coating materials have started to polymerize, solidify, gel, or deteriorate in any manner.

There shall be no significant difference in color between batches of finish paint used on an individual structure. The tri-stimulus color value shall be no greater than a ΔE of 2. The Volatile Organic Content (VOC) shall comply with prevailing federal and state regulations.

M.06.01.1 Material Certification.

Test Data: Have the coating manufacturer or an approved laboratory test a sample from each production batch and forward the results to the Resident Engineer. Provide the following test data for each of the coating material components (primer, intermediate and finish coats):

- Infrared spectra (2.5 μm to 15 μm (2.5 to 15 microns))
- Mass per liter (weight per gallon), at 25°C (77F)
- Viscosity in Krebs Units, at 25°C (77F)
- Percent solids by mass (weight)

M.06.01.2 Literature. Product data sheets shall be supplied with each of the products and shall include but not be limited to the following information:

a. Basic Description. Generic type, recommended service environment/use, recommended substrates, recommended surface preparation, recommended compatible coatings and recommended thinners.

b. Physical Characteristics and Performance. Solids by volume of the mixed components, recommended thickness per coat, weathering ability, minimum and maximum recoat interval and cure requirements.

c. Application Instructions. Mixing instructions, pot life for catalyzed materials, temperature application limitations, instructions for application by spray including equipment recommendations, cleanup recommendations, and storage conditions.

d. Solvent Identification Sheets. Solvent Identification Sheets shall indicate a listing of the volatile portions of vehicle and categorize solvents by type and photochemical reactivity.

e. Product Certification. Product Certification shall be provided on materials used to meet State Department of Transportation Specifications.

f. Material Safety Data Sheets. Material Safety Data Sheets (MSDS) shall be provided to the Contractor and Engineer and shall accompany all shipped materials so the person receiving the material is aware of storage requirements and of the hazards presented by the products. Additional copies of the MSDS shall be available upon request.

M.06.01.3 Shipping and Delivery. All paint shall be delivered to the shop or jobsite in their original containers, unopened, and with labels intact.

All coating layers in the Paint system shall be supplied by the same manufacturer.

The Contractor/fabricator shall insure that sufficient quantities of paint are ordered. All finish coat material shall be supplied from the same lot or batch number.

Unless otherwise specified, all paint furnished shall be delivered in metal containers that are U.S. Standard 5 (five) gallon size or the similar metric equivalent. One gallon containers may be used for small quantities only for touch-up or spot maintenance work.

All containers shall be labeled in accordance with ANSI Z129.1-2000 "Hazardous Industrial Chemicals- Precautionary Labeling"

The following information shall be listed in clear, legible type on the label of each container for each product:

- Manufacturer's name and complete address
- Product name including component type, if applicable
- Color name or number of the particular product or component
- The lot and/or batch number of the product and components
- The date of manufacture of the product and components
- Identification of any toxic substances contained in the product.

M.06.01.4 Sampling. The contractor is required to provide to the Department for testing an unopened container of each component of paint from the project site. Provide containers that are representative of each production batch of paint used on the project. A production batch is one distinct, identifiable unit of production of material outlined in the manufacturer's quality control plan. The Department reserves the right to sample any container of paint material on the job site. No paint shall be applied until the batch sample has been approved by the Department.

M.06.02 PAINT SYSTEMS. The paint shall be selected from either the NEPCOAT Qualified Products List or from the qualified products list in this document, as appropriate for the substrate, or as specified in the Contract Documents.

M.06.02.1 New Structural Steel. NEPCOAT approved paint systems are required for new structural steel that is fabricated and painted in the shop. The intermediate and finish coats of NEPCOAT systems

may be used to overcoat galvanizing. If the galvanizing is damaged, apply one of the NEPCOAT approved organic zinc-rich primers before applying the intermediate and finish coat.

M.06.02.2 Metallized Steel. Approved coating systems for top coating metalizing shall consist of a recoatable epoxy sealer and urethane finish. The recoatable epoxy shall be thinned in accordance with the manufacturer's instructions, for use in sealing the metalizing prior to the application of a urethane finish. The coating systems in Table 1 are approved.

TABLE 1

Coating Supplier	Recoatable Epoxy for Sealing	Urethane Finish
Carboline	Carboguard 888	Carbothane 133 HB
Sherwin Williams	Recoatable Epoxy B67 Series	Hi-Solids Polyurethane B65 Series
Tnemec	Series 27 Typoxy	Series 73 Endura Shield
International	Interseal 345	Interthane 870

M.06.02.3 Existing Steel Structures. Coating material selection is dependent on the method of surface preparation as shown in Table 2. Surface preparation methods are described in **SECTION 825; PAINTING STRUCTURAL STEEL**, of these Specifications.

TABLE 2

Coating Materials – 3 Coat Systems	Surface Preparation Method	Existing Coating System
System A – Waterborne System (Noxyde) System B - Calcium Sulfonate	Method 1	Alkyd Coatings
System C – NEPCOAT approved	Method 2	Zinc-rich Primer or Metallized & Urethane Topcoat
System D – MCU, NEPCOAT approved	Method 3	Alkyd Coatings
System C – NEPCOAT approved	Method 4	Zinc-rich Primer or Metallized & Urethane Topcoat

a. System A. The 3-coat acrylic system in Table 3 consists of a solvent borne primer and waterborne intermediate and finish coat that is intended for spot priming and full overcoat. Products are available through Rust-Oleum Distributors.

TABLE 3

Waterborne	Mathys Coatings	Thickness
Spot Prime	Pegarust	8 mils DFT
Full Overcoat	Noxyde	7 mils DFT
Full Overcoat	Rust Acryl 3700	1.5 to 2.5 mils DFT
Surface Preparation – Power Tool Clean (SP3) followed by Water Washing using 3500 psi.		

b. System B. The 3-coat solvent borne system in Table 4 is intended for spot priming and full overcoat. Products are available through CPC Corporation of Durham, Connecticut. Consideration will

be given to other generically similar products that contain a minimum of 22% crystalline calcium sulfonate in the dry film.

TABLE 4

Solvent borne	CPC Corporation	Thickness
Spot Prime	Chemotex Bridgecote 4100	7 to 10 mils
Full Overcoat	Chemotex Bridgecote 4100	7 to 10 mils DFT
Full Overcoat	Generic silicone alkyd finish coat *	2 to 3 mils DFT
Surface Preparation – Power Tool Clean (SP3) followed by Water Washing using 3500 psi.		

* Generic silicone alkyd must contain 30% silicone. May be obtained from a supplier such as Keeler-Long.

c. System C. This system consists of any approved NEPCOAT coating systems, except those which include an inorganic zinc-rich primer. Coating systems with inorganic zinc-rich primers are only to be used on new steel in the shop. Systems with organic (epoxy or urethane) zinc-rich primers are to be used for renovation work on existing steel structures. Surface preparation requirements are provided in **Subsection 825.03.4, Existing Steel Structures**, of these Specifications.

d. System D. This system consists of a 3 coat moisture cured urethane (MCU) coating system that has been approved by NEPCOAT. The system consists of a zinc-rich primer, an intermediate coat pigmented with micaceous iron oxide and an aliphatic urethane finish coat. All products are single package and do not require blending with other components. Surface preparation requirements are provided in **Subsection 825.03.4; Existing Steel Structures**, of these Specifications.

M.06.03 CAULKING AND SEALANTS. Supply caulking and sealants that are compatible with the coating system specified for the project. Provide written confirmation from the coating manufacturer that the caulking and sealant products are compatible. The color of the caulking or sealants shall be the same as the finish coat color or clear.

Revise **Subsections M.07.08.2; Concrete** and **M.07.10; Steel Pipe Piles**, page M-35 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION M.07

SHEET PILING AND PILES

- **Replace Subsection M.07.08.2 with the following.**

M.07.08.2 Concrete. Concrete for concrete-filled shell piles shall be Class X(AE) and shall otherwise conform to the applicable requirements of **SECTION 601; PORTLAND CEMENT CONCRETE**, of these Specifications. Reinforcement shall conform to the requirements of **Subsection M.05.01; Bar Reinforcement**, of these Specifications.

- **Replace Subsection M.07.10 with the following.**

M.07.10 STEEL PIPE PILES. This Subsection covers steel piles where the casing is considered a permanent load-carrying member.

M.07.10.1 STEEL PIPE. Steel for pipe piles shall conform to the Standard Specifications for Welded and Seamless Steel Pipe Piles, ASTM A 252, Grade 2.

M.07.10.2 CONCRETE. Concrete for steel pipe piles shall be Class A(AE) and shall otherwise conform to the applicable requirements of **SECTION 601; PORTLAND CEMENT CONCRETE**, of these Specifications.

Remove **Section M.15; Traffic Control Systems**, pages M-52 through M-69 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace with the following.

SECTION M.15

TRAFFIC CONTROL AND HIGHWAY LIGHTING SYSTEMS

M.15.01 GROUND RODS. Ground rods shall be a 5/8-inch diameter by 10-foot long rod of copper-clad steel and shall be equipped with a clamp of sufficient size to receive the ground wire.

M.15.02 WIRE AND CABLE.

M.15.02.1 Wire for Highway Lighting.

a. General. Wire and cables shall be single conductor except where otherwise specified or indicated on the Plans. Conductors of sizes No. 10 AWG and larger shall be stranded. Wires of sizes smaller than 10 AWG shall be solid.

The conductors shall be factory identified by printing the size and type of insulation. Each conductor shall be colored in accordance with the National Electric Code. Insulation color shall be constant throughout the length of the conductor and shall not otherwise need to be taped or tagged for identification. The color of the insulation of the neutral conductor shall be white. The remaining conductors shall not be white but shall be of dissimilar colors for identification. The grounding conductor, unless otherwise shown, shall be insulated to 600 volts. The grounding conductor insulation shall be green in color.

b. Conductors. Wire conductors shall be annealed copper conforming to the following specifications as applicable.

American Society for Testing Materials

ASTM B3 - specification for annealed copper wire.

ASTM B8 - specification for concentric-lay-standard, copper conductor, hard, medium hard or soft.

ASTM B33 - specification for tinned soft or annealed copper wire for electrical purposes.

c. Insulation. Insulation shall be indicated and shall conform to the following specifications as applicable.

American Society for Testing Materials

ASTM D1351 - (THW and THWN) specification for polyethylene insulated wire and cable.

ASTM D2655 - XLPE (XHHW-2) specification for crosslink, thermosetting polyethylene insulation for wire and cable 0 to 600 volts.

All wire below finish grade shall be XLPE (XHHW-2). THW or THWN may be used between the handhole and fixture if the percent of wire above ground is greater than the percent below ground.

d. Cable Jacket. Insulation shall be jacketed and have an outer covering as specified in the National Electric Code, Table 310-13, "Conductor Applications and Insulations." When specified by the National Electric Code, the neoprene jacket shall conform to ASTM D752.

e. Insulation and Jacket Thickness. The minimum thickness of insulation and jacket thickness shall be as follows:

Conductor Size	Insulation Thickness in 64ths	Jacket Thickness in Inches
14 thru 10 AWG	3	.015
8 thru 2 AWG	4	.030
1 thru 4/0 AWG	5	.045
250 thru 500 MCM	6	.065
600 thru 1000 MCM	7	.065

M.15.02.2 Ground Wire. Ground wire shall be seven strand, No. 2 AWG or No. 6 AWG, soft drawn copper and shall conform to the requirements of **Para. b** of **Subsection M.15.02.1**.

M.15.02.3 Service Conductors. Service conductors shall be as shown on the Plans, type THHN or TWH and shall meet the requirements of **Para's. a** through **e** of **Subsection M.15.02.1**.

M.15.02.4 Traffic Signal Cable. Traffic signal cable or wire shall conform to IMSA Specification 19-1 or 20-1.

M.15.02.5 Loop Detector Wire. Wire for inductance loop detectors shall consist of No. 14 AWG, meeting the requirements of IMSA Specification 51-5.

A roadway loop embedding sealer approved by the Engineer shall be used to encapsulate traffic signal loop wires embedded in highway materials. The sealer shall be cold applied and may be a one- or two-component system, the viscosity of which shall be sufficient to allow the material to be either poured or placed under pressure and fully encapsulate the loop wires. The sealer shall be curable at temperatures of 40°F and above, and, when bonded to common paving materials, it shall have sufficient strength and resiliency to withstand stresses due to vibrations and differences in expansion and contraction as a result of temperature changes or traffic conditions. The sealer shall be compatible with the sheathing and covering of loop inductance wire, and shall be resistant to most chemicals and solvents, including salts, acids, hydrocarbons, etc.

M.15.02.6 Loop Detector Lead-In Cable. Loop Detector Lead-In Cable shall meet the requirements of IMSA Specification 50-2.

M.15.02.7 In-Line Disconnect Device. Each unfused disconnecting device shall consist of a copper pin and a copper receptacle of at least 90 percent conductivity to be crimped to the cable. The receptacle shall establish contact pressure with the pin through the use of a copper beryllium sleeve spring and shall be equipped with a disposable mounting pin. The receptacle shall be fully annealed. Both the copper pin and receptacle shall have a centrally located recessed locking area adaptor to be complementarily filled and retained by the rubber housing. The fused disconnecting device shall consist of a spring loaded 90 percent minimum conductivity contact suitable for gripping the specified cartridge fuse. These contacts shall be fully annealed and adapted to be crimped to the cable and shall be adapted to be retained securely in the proper position within the rubber housing. The disconnect device housing shall consist of water

resisting synthetic rubber capable of being buried in the ground. Each housing shall provide a section to form a water seal around the cable, have an interior pin or fuse contacts, and a section to provide a water seal between the two housings at the point of disconnection. Each housing shall be permanently marked "load side" or "line side." Fuse for the disconnecting devices shall be rated 600 volts, 100,000 ampere interrupting capacity, and shall be 13/32-inches in diameter.

M.15.02.8 Splice Kits. All material under this item shall consist of a splice made of fabricated 6061-T aluminum and is to be insulated with EPDM rubber compound rated 600 volts to accept copper conductors. Splices shall be approved for submersible installations.

Each splice shall consist of 4 terminals with rubber "boots" suitable to accept recommended conductor sizes. Unused "boots" are to be left intact to keep the watertight integrity of the splice. Splice to be manufactured by HOMAC, RAB 350 Series or approved equal.

M.15.03 HANDHOLES AND PULL BOXES.

M.15.03.1 Precast Handholes and Pull Boxes. Precast Type "A" Handholes, Precast Type "B" Heavy Duty Handholes, and Precast Type "H" Heavy Duty Handholes shall be designed and manufactured in accordance with ASTM C478; "Precast Concrete Manhole Sections," with the additional stipulation that the concrete mix design shall be Class XX (AE) as set forth in **SECTION 601** of these Specifications.

Cast iron frames and covers shall conform to the relevant provision of **Subsection M.04.03.6**, or as indicated on the drawings. Covers on traffic signal handholes shall have the word "Signal" cast into them. Covers on telephone handholes shall have the word "Comm" cast into them. Covers for electric pull boxes shall have the word "Electric" cast into them. Frames and covers shall be provided with ground connectors as shown in the standard drawings for bonding purposes.

Steel reinforcing shall conform to the relevant requirements of **Subsection M.05.01** of these Specifications.

Support grips shall be provided for each cable, including ground wire, in each handhole or pull box. Supporting grips shall be of the closed mesh type for permanent support of the cable; ends shall be made of stainless steel and shall have the capability of supporting 600 pounds complete with supporting hook.

M.15.03.2 Metal Pull Boxes.

a. Type V Pull Box (Within Structure). Type "V" pull boxes shall be galvanized steel, thickness as indicated on the standard drawings. Boxes shall be furnished complete with tapped hubs, galvanized checkered plate covers, and neoprene gaskets. The cover shall be fastened flush to the frame using stainless steel bolts with hex head. A grounding lug is to be provided. Sizes shall be as shown on the Plans.

Pull boxes shall be listed by Underwriters Laboratories and shall be tested for submersible application.

Drainage, including a 1-inch plastic drain pipe, shall be provided as shown on the Plans.

b. Type W Pull Box (Surface Mounted). Type "W" pull boxes shall be galvanized steel, thickness as indicated on the standard drawings. Boxes shall be furnished complete with tapped hubs,

galvanized checkered plate covers, and neoprene gaskets. The cover shall be fastened using stainless steel screws. The box can be secured by using mounting lugs (optional) or using stainless steel bolts through back or bottom. Alternate methods of securing this box can be made using unistrut or other means accepted by the Engineer. Sizes shall be as shown on the Plans.

Pull boxes shall be listed by Underwriters Laboratories and shall be tested for submersible application.

M.15.04 CONDUIT AND FITTINGS.

M.15.04.1 Rigid Steel Conduit and Fittings. This conduit shall conform to Federal Specification WW-C-581. The latest revision of the Underwriters' Laboratories, Inc. Publication UL-6-Standard for Rigid Metallic Conduit also forms a part of this Specification. In addition to the above requirements, the exterior surface conduit including fittings shall be zinc-coated and the interior coated with zinc, enamel, or other corrosion resisting coating. The conduit shall be metalized galvanized, hot-dip galvanized or electro-galvanized.

Threads and couplings shall conform to the provisions of Appendix III of ASTM A53; "Basic Threading Data for Pipe."

M.15.04.2 PVC Plastic Conduit. Plastic conduit and elbows shall conform to the NEMA Standards Publication TC 2. Plastic fittings shall conform to the requirements of the NEMA Standards Publication TC 3. All conduit, elbows and fittings shall be UL listed.

M.15.04.3 Fiberglass Conduit. Fiberglass conduit shall be filament-wound reinforced epoxy resin. All conduit shall be manufactured in accordance with NEMA TC 2 and UL 1684. Fittings shall be manufactured using the same materials and process as the conduit.

Joints shall be watertight and have a minimum pullout strength of 2000 pounds. Watertight joints may be formed by the use of a gasket or epoxy adhesive.

Hanger systems for fiberglass conduit on bridge structures shall be as shown on the Plans. No adhesive anchors will be allowed to support the conduit hanger system.

M.15.04.4 Expansion Couplings. The fittings shall be designed to compensate for expansion in a horizontal line of conduit at expansion joints in a structure and shall be as detailed.

Expansion fittings shall provide for a maximum of 4 inches longitudinal conduit movement, 2 inches in either direction. Expansion fittings shall provide for transverse conduit movement as indicated where required by structural conditions.

Expansion fittings shall be bonded with heavy duty, two bolt, ground fittings. Strap type clamps will not be acceptable.

M.15.05 LUMINAIRES.

M.15.05.1 Luminaires with Integral Ballast and Photo Cell. Luminaires shall be multiple cutoff high pressure sodium type. Each luminaire shall be constructed of a two-piece aluminum die-cast housing. Latching assembly shall be a double action snap safety type. The hinge pin and hinge plate shall be of stainless steel with complete sealed and tilted optical system. The projected surface area of each luminaire shall not exceed 2.25 square feet, excluding the photo electric control when required.

The slip fitter shall be of an adjustable type accommodating 1¼-inch to 2-inch diameter pipe with four stud mounting bolts with two "U" brackets locking a full 7½-inch desirable, 5½-inch minimum of bracket to sustain a 130 mph wind load.

Housing for the luminaries shall be die-cast aluminum with standard grey polyester powder coat finish. The optical assembly shall include a specular Alzak aluminum reflector removable without tools. A flat lens heat resistant glass shall be factory installed. The lamp holder shall be of high grade porcelain, mogul base, enclosed type with both axial and vertical adjustment with visible marking. The luminaries shall be of the horizontal type for IES Type III medium cutoff optics.

The high-pressure sodium lamps shall be mogul base, rated 250 volts and have an initial lumen output of 28,500 lumens for 250-watt fixtures and 50,000 lumens for 400-watt fixtures. Lamps shall have a rated average life of 30,000+ hours, and shall be TCLP compliant with a Prompter end-of-life indicator.

The glass envelope of the lamp shall have a maximum diameter of 1-7/8" and maximum overall length (MOL) of 9-3/4". The light center length (LCL) shall not exceed 5-3/4". The lamp base shall be mogul (E), nickel plated brass with a glass insulation between the outer shell and the center contact.

Luminaires shall be provided with twist lock receptacles for individual photoelectric control. Provisions shall be made to orient the receptacles to the north. Receptacles shall be molded hard rubber, and shall be installed with neoprene gasket and retaining ring.

If circuits are energized via a photocell-controlled contactor at the service pedestal, photo-control shorting caps shall be supplied for each luminaire.

M.15.05.2 Ballast. The luminaire shall contain a high-power-factor reactor type ballast, multi-tap connected for 240 volts plus or minus 10% starting voltage. Ballasts shall be suitable for operation at minus 20°F.

M.15.05.3 Photo-Electric Controls. The controls shall be tubeless type suitable for 240-volt operation with the multiple high pressure sodium luminaires specified above. The photo-electric controls shall be rated 105-285 volts, 50/60 cycles, alternating current, 1,800 volt-amperes, for high pressure sodium loads with peak currents not greater than 120 amperes, and shall be rated with an inrush current rating of 60 amperes complete with single-pole, double-throw 1,000 watt relay. Controls shall have an adjustable turn-on at 1.0 - 2.5 foot-candles. The turn-off value shall be 10 foot-candles maximum. The operating level shall be from 0.5- 10 foot-candles.

The temperature operating range shall be from minus 50°F to plus 150°F.

Each photo-electric control shall consist of a dependable, simple, tubeless circuit, including a hermetically sealed, broad area cadmium sulfide photo-cell capable of controlling a relay without intermediate amplification. The relay shall be de-energized during the night with normally closed contacts in the closed position and the luminaire energized. During the day the relay shall be energized

with contacts open and the luminaire de-energized. Fail-safe features shall provide for the lighting load to remain turned on in the event of failure of the electric circuit. Directional design features and a time delay shall be incorporated in the photo-electric controls to prevent false turn-offs to headlights and other transient light sources.

The individual components of each photo-electric control shall be mounted on a Bakelite chassis and protected by a weatherproof acrylic housing. The photo-electric controls shall mount directly on the high pressure sodium luminaires and shall conform to EEI-NEMA standards for locking, sealing and base dimensions.

M.15.05.4 Protective Screen for Understructure Luminaire. Angle iron shall be 1½" x 1¼" x 2.34 pounds per foot. Angles shall be galvanized after welding corners and drilling. Wire mesh shall be galvanized chain link type, #6 gauge, with approximately 1-inch square openings.

M.15.06 LIGHT STANDARDS AND FOUNDATIONS.

M.15.06.1 Light Standards. Poles are to be designed for a basic wind speed of 130 miles per hour with 1.3 gust factor with loading in accordance with the latest revision of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.

All luminaire structures on Interstate Highways or limited access type facilities must comply with fatigue Category I requirements, including galloping, vortex shedding (if applicable), natural wind gusts, and truck induced gusts. The truck induced loading shall be based on 65 mph velocity.

All luminaire structures on all other roadways must comply with fatigue Category II requirements, including galloping, vortex shedding (if applicable), natural winds gusts, and truck induced gusts. The truck induced loading shall be based on 30 mph velocity.

Lighting structures that have tapes of 0.14 inch per foot or greater are not susceptible to vortex shedding.

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

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

The breakaway support couplings shall meet the requirements of the latest revision of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.

Design and fabrication of aluminum lighting standards for the support of high pressure sodium luminaires shall be similar and compatible in design and appearance with lighting standards installed on various sections of Interstate highways in the State of Rhode Island, except as otherwise noted or indicated on the Plans. The nominal luminaire mounting heights shall be 30 and 40 feet.

Each shaft shall be tampered by a cold working process from a seamless extruded tube of 6063-T6 or 6005-T5 wrought-aluminum alloy. The davit arm shall taper from 6 inches at the base to 4 inches at the tip.

A 2-inch diameter slip fitter, 9 inches long, shall be provided at the end of each davit arm.

All arms shall be curved on an approved radius through an angle within 3 degrees of the horizontal. Twin davit lighting standards shall be provided with approved type field joints. The bottom of the bases shall be coated with bituminous paint after assembly.

The base shall be of 356-T4 permanent mold cast aluminum alloy. The base shall be approximately 12 inches square at the bottom with a height of 3½-inches. Welding shall be performed by the inert gas shielding arc method, and welds shall be free from cracks and porosity. The base shall be capable of withstanding a load of 18,500 foot-pounds. The base shall have slotted anchor bolt holes to allow mounting on 11-inch or 12-inch bolt circles. Bases shall be provided with cast aluminum bolt covers.

The aluminum after fabrication shall have a minimum yield of 25,000 pounds per square inch. The shaft shall be capable of withstanding 1,500-pound horizontal load 18 inches down from the top without fracture or apparent permanent deformation after the load has been released. The base shall be capable of withstanding the maximum allowable bending moment of the shaft.

When the arm is welded to the shaft, the arm shall withstand a vertical load of 100 pounds and a horizontal load of 50 pounds applied at the end of the arm without fracture or apparent permanent deformation after the load has been removed.

M.15.06.2 Light Standard Foundation.

a. Concrete. Light standard foundations may be cast in place or precast units. Cast-in-place units shall be constructed of Class A(AE) cement concrete masonry. Precast units shall be constructed of Class XX(AE) cement concrete masonry.

Cement concrete masonry shall conform to the applicable provisions of **SECTION 601** of these Specifications.

b. Steel Reinforcement. Steel reinforcement shall conform to the requirements of **Subsection M.05.01**.

c. Anchor Bolts. Anchor bolts shall be high strength steel having a minimum yield of 55,000 psi. They shall be 1 inch in diameter by 66 inches long, with a 4-inch L bend on the unthreaded end. Each anchor bolt shall have cut or rolled thread 6 inches long. These threads shall be one inch-8 National Coarse Class 2 fit. A hexagon nut and leveling washers shall be furnished with each bolt. The anchor bolt, washers and the hexagon nut shall be hot dipped galvanized conforming to ASTM A153.

Anchor bolts for roadway lighting are to be provided and set according to templates furnished by the manufacturer.

Anchor bolts for bridge lighting are to be furnished as detailed on structural drawings.

d. Steel Conduit. Steel conduit, elbows, and fittings shall conform to the provisions of **Subsection M.15.04** of this Section.

e. Breakaway Support Couplings. The breakaway support couplings shall be the same as those manufactured by Manitoba Safe-T-Base of Winnipeg, Canada, or an approved equal.

M.15.07 SERVICE PEDESTAL. Service shall be at 120/240, 120/208 or 240/480 volt, single phase, three-wire.

M.15.07.1 Enclosure. Exterior mounted, weatherproof, NEMA 3R, Type 304 stainless steel two-door service enclosure with body stiffeners and mounting shall be provided on a concrete pad and shall conform to the general arrangement and dimensions indicated. The enclosure walls and top shall be cast solid with one opening on the north wall. This opening shall be covered with a lexan, watertight window approximately 5½-inches by 9 inches long. A 10-gauge steel back panel with white baked enamel finish shall be provided for mounting the panelboard, photo control, relay and contactor. The back panel shall be drilled and tapped as required to mount equipment. The enclosure shall be provided with stainless steel, hinged bolted gasketed doors, combination flush access handles, hasp and brass padlock, directory frame and two sets of keys. The enclosure shall be anchored to the concrete base using two (2) 1/2-inch “thunderstuds” stainless steel anchor bolts on each side embedded into the concrete. The service pedestal shall be provided with a 1/4-inch thick by 2-inch wide neoprene gasket continuous around the perimeter of the enclosure base. Joints or splices in gasket shall be vulcanized in an approved manner. The entire installation shall be watertight.

The enclosure shall include space for all materials listed.

The enclosure shall have a watertight air vent in the roof, a 20 amp GFI receptacle, a keyless light with 15-amp single pole switch, and a 500-watt electric utility heater with controlling thermostat mounted inside at the base.

M.15.07.2 Panelboards and Miscellaneous Equipment.

a. 240/480 Volt, Single-Phase, Three-Wire Service. For 240/480 volt services, panelboards and other miscellaneous electrical equipment shall be provided as shown on the Standard Details.

Panelboards and other equipment shall be of dead front safety type with breaker sizes as shown on the Plans, and all conductors enclosed in conduit or other approved enclosed wireways.

The circuit breaker mechanisms shall be quick-make, quick-break on manual as well as automatic and shall be trip-free from the handle so that the contacts cannot be held closed against circuit faults or abnormal overloads.

The main circuit breaker shall be two-pole 200-amp, rated 600 volts in a NEMA 1 enclosure. The main breaker shall have a 200-amp trip setting and have a minimum interrupting rating of 22,000 amps at 480 volts. The breaker shall have dual lug capabilities on the load side or an auxiliary distribution power block shall be provided.

The controlled lighting panelboard shall be a 225-amp, single-phase, 3-wire with 32 circuit positions. All lighting branch circuit breakers shall be single-pole, rated 277 volts, with sizes according to the Plans. Single pole breakers shall have an interrupting rating of not less than 14,000 amps at 277 volts.

A 3.0 Kva dry-type step-down transformer rated 240/480 volts primary to 120/240 volts secondary shall be provided to supply power to the miscellaneous loads distribution panelboard.

Miscellaneous load panelboard shall be rated 100 amps, 120/240 volts, single-phase, three-wire with a 60-amp main breaker and minimum of 12 single-pole positions. Single-pole breakers shall be rated for 120-volt application with an interrupting rating of not less than 10,000 amps at 120 volts.

The mounting panel on which circuit breakers, busses and bolts for making copper connections shall be equipped with lock washers to prevent loosening. Riveter bus connections will not be acceptable. The busses shall be securely fastened to insulating bases and shall have copper based on 1,000 amperes per square inch copper density. Busses shall be drilled and tapped to permit future circuit changes without the necessity for additional machining. Panelboards shall be designed and assembled so any individual breaker may be removed without disturbing adjacent breakers or necessitating the removal or loosening of required insulation. All terminal lugs shall be copper, bronze or brass.

b. 120/240 or 120/208 Volt, Single-Phase, Three-Wire Service. For 120/240 or 120/208 volt services, panelboards and other miscellaneous electrical equipment shall be provided as shown on the Standard Details.

Panelboards and other equipment shall be of dead front safety type with breaker sizes as shown on the Plans, and all conductors enclosed in conduit or other approved enclosed wireways.

The circuit breaker mechanisms shall be quick-make, quick-break on manual as well as automatic and shall be trip-free from the handle so that the contacts cannot be held closed against circuit faults or abnormal overloads.

The main circuit breaker shall be two-pole 200-amp, rated 240 volts in a NEMA 1 enclosure. The main breaker shall have a 200-amp trip setting and have a minimum interrupting rating of 22,000 amps at 240 volts.

Note: For installations where service is at 120/208 volts from a three-phase system, minimum interrupting rating shall be 65,000 amps at 240 volts.

The breaker shall have dual lug capabilities on the load side or an auxiliary distribution power block shall be provided.

Controlled lighting panelboard shall be 225-amp, single-phase, three-wire, with 32 circuit positions for 120/240 volt operation. All lighting branch circuit breakers shall be single-pole, rated 240 volts, with sizes according to the Plans. Single-pole breakers shall have an interrupting rating of not less than 10,000 amps at 120 volts. The mounting panel on which circuit breakers, busses and bolts for making copper connections shall be equipped with lock washers to prevent loosening. Riveter bus connections will not be acceptable. The busses shall be securely fastened to insulating bases and shall have copper based on 1,000 amperes per square inch copper density. Busses shall be drilled and tapped to permit future circuit changes without the necessity for additional machining. Panelboards shall be designed and assembled so any individual breaker may be removed without disturbing adjacent breakers or necessitating the removal or loosening of required insulation. All terminal lugs shall be copper, bronze or brass.

Miscellaneous load panelboard shall be rated 100 amps, 120/240 volts, single-phase, three-wire with a 60-amp main breaker and minimum of 12 single-pole positions.

M.15.07.3 Service Pedestal Concrete Mat. The service cabinet concrete mat shall be constructed of Class A(AE) concrete in accordance with **SECTION 601; PORTLAND CEMENT CONCRETE**, of these Specifications.

M.15.07.4 Photo-Electric Control. Photo-electric controls shall conform to the requirements of **Subsection M.15.05.3** of this Section, and shall mount inside the service pedestal or as indicated on the Plans.

M.15.07.5 Contactors. Contactors shall be rated for H.I.D. lighting inductive loads, 600 volts, 2-pole, continuous duty ampere as indicated and shall be mechanically held. Contacts shall be silver tungsten. A separate 120- volt circuit shall be provided for coil operation with a hand-off automatic selector switch. Contactor to be ASCO 920 or approved equal.

M.15.07.6 Poles. Poles for temporary work shall conform to U.S.A.S.I. Class 5. Poles shall be southern yellow pine treated in accordance with **Subsection M.11.03; Preservative Treatment**, of these Specifications.

M.15.08 SERVICE UNITS.

a. Disconnect Switch. Disconnect switch shall be of the fusible type, heavy duty, 250 Volt A.C., NEMA 3R rain-tight and shall conform to Federal Specification W-S-865.

b. Fuses. Fuses shall be dual-element and shall be capable of carrying 500 percent of the indicated rating for a minimum of 10 seconds, shall have an interrupting rating of 100,000 RMS amperes and shall have standard National Electrical Code dimensions.

c. Disconnect Switches – Lighting Pedestals. For 240/480 volt and 120/208 volt services, a safety disconnect switch must be installed ahead of the meter socket for cold-sequence operation. The disconnect switch shall be rated 2-pole, 3-wire, 600-volt enclosed in a NEMA 3R enclosure. The switch shall have the capability of being locked with customer or utility padlocks for safety installation and removal of the utility meter.

M.15.09 METER SOCKETS. Meter sockets shall be provided at all service pedestals, traffic signal controllers, intersection control beacons and counter stations. Meter sockets for all of the above applications shall be 5-terminal duncan type and meet all requirements of the local utility company. Meter sockets for traffic signal controllers and service pedestals shall include a manual by-pass.

The line side of the service conductors shall be encased in a watertight PVC conduit within the service enclosure or signal cabinet.

M.15.10 POLE LINE HARDWARE. All miscellaneous pole line hardware required to complete the project as planned shall be standard material manufactured for pole line construction. All metal parts shall be hot-dipped galvanized.

In addition to the above, whenever secondary racks are required they shall be as classified "Heavy Service Secondary Rack" by the EEI-NEMA, and shall have a minimum spacing of 12 inches between the insulators. Each rack shall be secured to the pole by not less than one through bolt and one lag bolt.

All pole hardware, bolts, plate rods, hangers, clips, wire guards and pole bands shall be hot-dipped galvanized in conformance with the requirements of ASTM A153.

M.15.11 METALS. Metals for light standards, poles, bases and hardware shall conform to the same specifications as set forth in **Subsection M.16.04.3** except that design stresses may conform with CE Paper 3341 for 6061-T6 aluminum as it may be modified by subsequent AASHTO publications.

M.15.12 MESSENGER CABLE, FITTINGS. Messenger cable shall be wire steel strand messenger cable conforming to ASTM A475, extra-high-strength grade, Class A galvanized, unless otherwise noted on the Plans.

M.15.13 TRAFFIC SIGNAL CONTROLLER UNITS AND CONTROLLER CABINETS.

M.15.13.1 16-Phase Controller Units.

a. General. Controller units shall be completely digital solid-state capable of a minimum of sixteen phases which, when connected to traffic detectors or other means of actuation or a combination thereof, shall operate the electrical traffic signal system at one or more intersections. The controller unit (CU) shall communicate with the malfunction management unit (MMU) via port 1.

The controller unit shall be a Type A1 configuration conforming to Section 3 of the latest edition of the NEMA Standards Publication TS-2, Traffic Controller Assemblies. The CU shall utilize an input/output interface conforming to Subsection 3.3.1 of the NEMA TS-2 Standards for all input/output functions with the back panel terminals and facilities, the malfunction management unit, traffic detector rack(s) and auxiliary devices.

1. Controller Display. Controller units shall utilize liquid crystal displays and be internally illuminated for night viewing. The display shall consist of a minimum of four lines of text with a minimum of 40 characters per line. As a minimum, the model number and software version level shall be displayed.

2. Controller Security Codes. The controller unit shall provide for a user-specified code entry before allowing any data to be altered. All parameters may, however, be viewed without entering a valid security code. Security code access shall be terminated at a fixed time after access was gained or a keystroke was made. The CU may have the ability via keyboard to disable security code access allowing for constant access to parameter changes.

3. Battery Backup. Controller units shall come with a backup for the real-time clock only. The backup system shall be capable of maintaining the real-time clock for a period of 30 days. All program timings are to be maintained in Electronically Erasable Programmable Read-Only Memory (EEPROM).

b. Functional Requirements. Local intersection controller units shall meet the following functional requirements:

1. Programming shall be accomplished by front-panel menu-driven keyboard entry.
2. Controller units shall provide a user programmable daylight savings time capability.
3. Controller units shall provide data uploading and downloading capability to both a remote central computer station and a direct link to a laptop computer. A minimum 25-foot laptop communications cable configured for the supplied equipment shall be provided in the controller cabinet.
4. Controller units shall have the capability of performing dynamic self-diagnostic testing per NEMA TS-2 Standards, Section 3.9.
5. Controller units and all auxiliary devices shall meet all environmental requirements as set forth in NEMA TS-2 Standards, Section 3.9.

c. Additional Requirements.

1. Controller Coordination and Pre-emption. The controller unit shall be capable of both coordinated operation and pre-emption operation in accordance with the NEMA TS-2 Standards, Section 3.

Given split and cycle timings, the controller unit shall provide a means of automatically calculating coordination yield points, permissive periods and force-offs.

2. Phase Designations. The phase data in the controller unit shall match the numbering scheme shown on the Plans and operate in the same sequence as shown in the Phase Sequence Diagram on the Plans. Changes to the phase numbering or phase sequence shown on the Plans must be approved by the Department's Traffic Design Unit before being implemented.

3. Programmable Field Hardware Documentation. Before the traffic signal is placed in operation, each programmable field hardware component shall be completely programmed by the Contractor to reflect timings or settings shown on the Plans. Programming is defined as user programmable keyboard entries or switch settings. Programmable field devices include, but are not limited to, controller units, closed loop system masters, malfunction management units, detector units, modems, radios, pre-emption devices, etc.

4. Controller Guarantee. The entire controller unit shall be warranted to be free from defects in workmanship and material for one year, or for the greater length of time common to trade practice, from the date of acceptance by the Engineer. Any defective parts are to be replaced free of charge. Manufacturers warranties shall become the property of the State at the time of acceptance.

M.15.13.2 Controller Cabinet.

a. General. Controller cabinets shall conform to Section 7 of the NEMA TS-2 Standards. The minimum size controller cabinet to be supplied shall be a size 6(P) cabinet, unless shown otherwise on the Plans. The cabinet finish shall be unpainted natural aluminum, degreased and free of scratches and blemishes. The traffic signal number shall be stenciled on the inside and outside of the cabinet door on State owned signals in 3-inch block letters.

b. Concrete Work Pad. In unpaved areas, a 48" x 30" x 4" concrete work pad shall be installed in front of the cabinet door. The pad shall be placed on 6 inches of gravel borrow subbase. The concrete shall be Class A concrete conforming to the requirements of **SECTION 601; PORTLAND CEMENT CONCRETE**, of these Specifications.

c. Shelves and Document Tray. Each cabinet shall be furnished with a minimum of two movable shelves suitable for placing the controller, MMU, detector racks, modems, radios or any other required equipment. A slide-out document tray shall be mounted below the bottom shelf. The tray shall be of sufficient size to hold cabinet wiring diagrams and two manuals. The tray shall operate by sliding out on nylon rollers or ball bearings and opening a hinged cover to remove documents. The closed cover shall provide a suitable support for resting documents or a laptop computer. All cables shall be tied away to allow the tray to be opened and closed smoothly without any obstructions.

d. Electrical Outlets. In addition to the requirements of the NEMA TS-2 Standards, Section 5.4.2.6, local controller cabinets shall be furnished with a GFI receptacle on the cabinet door and a duplex outlet within the body of the cabinet. Cabinets which are to contain a closed-loop system master

controller, a local controller and auxiliary communications equipment (radios or modems) shall have two duplex outlets in addition to the door mounted GFI receptacle.

e. Interior Lighting. In addition to the requirements for an incandescent fixture in NEMA TS-2 Standards, Section 5.4.2.7, cabinets shall be provided with a “goose neck” lamp having a flexible arm and utilizing a 25 watt R14 bulb (115VAC). The lamp shall be mounted at a location on the side panel approximately level with the load switch/terminal panel for concentrated illumination of this area. The lamp shall have its own on/off switch on the unit.

f. Controller Cabinet Documentation. Two sets of complete cabinet schematics and operating manuals for the controller unit, loop detector units, closed loop system master, modem and any other programmable field hardware supplied shall be included as part of the cabinet documentation.

Three hard copy sets of all programmed data shall be supplied to the Department at the time the controller is installed in the field. Each set shall be bound and covered. One set is to remain in the cabinet, one set is to be delivered to Traffic Design, and one set is to be delivered to Traffic Maintenance.

g. Controller Cabinet Service Switches. All cabinet switches shall be clearly labeled to indicate the switch’s function. Toggle switches shall indicate the state of each switch position.

1. Open Door Alarm. A pushbutton switch shall be installed on a bracket in the top right of the controller cabinet door. The output of the switch shall be connected to the alarm No. 1 input as defined by the NEMA TS-2 Standards, and record the opening of the cabinet door as a local alarm.

2. Police Door Switches. Police door switches shall have the following:

(a) An Auto/Manual switch that toggles between automatic operation and manual operation. During manual operation, an extendible hand-control pushbutton shall utilize Manual Control Enable and Interval Advance to control the intersection operation. The hand-control pushbutton shall be installed inside the police door. The hand control pushbutton shall be rugged in construction with a weatherproof covering over the cord’s pushbutton switch.

The auto/manual switch shall be connected to alarm No. 2 as defined by the NEMA TS-2 Standards. When the switch is placed in the manual position, it shall be recorded as a local alarm.

(b) A Signal/Flash switch that toggles between automatic and flashing operation. To insure the controller exits flash properly, the controller External Start input shall be active in the flash position and inactive in the signal (automatic) position. Activation of the Flash switch shall be recorded as a local alarm.

(c) A Signal/Off switch that toggles power on and off to the controller assembly and signals.

Each switch shall be permanently labeled to identify its function.

3. Main Door Switches. All cabinets shall be provided with the following switches on the main door. These switches shall be accessible only when the main door is open.

(a) Momentary pushbutton switches providing calls to vehicle phases 1 through 8, any concurrent or exclusive pedestrian phases, and calls to intersection pre-empt displays.

(b) A Timer On/Off toggle switch that turns power on/off to the controller only. The MMU and other cabinet equipment shall not be affected by this switch.

c) A three-position Modem Power switch on all controller assemblies containing modems. This switch shall be labeled “Modem Power” and perform the following functions:

- On - When in this switch position, constant power shall be supplied to the modem no matter what the user defined output is set for.
- Off - When in this switch position, no power shall be supplied to the modem no matter what the user defined output is set for.
- T.O.D. - When in this switch position, power shall be supplied to the modem as a function of the user-defined output controlled by time-of-day programming.

Each switch shall be permanently labeled to identify its function.

h. Controller Cabinet Terminal Strips. All terminal connections shall be marked with a number and, where appropriate, the corresponding NEMA function. All labels shall be silk screened or permanent labels.

i. Lightning Protection.

1. AC Service Protection. The traffic signal control assembly shall be equipped with surge protection installed at the power distribution panel. The surge protector shall be an EDCO ACP 340 filtering surge protector, or approved equal, and shall meet or exceed the following electrical specifications:

- (a) Peak Current; 20,000 amps (8x20 microseconds)
- (b) Clamp Voltage @ 20kA; 250 volts typ.
- (c) Response Time; voltage never exceeds 250 volts during surge
- (d) Operating Temperature; -40 to 85 degrees C.

2. Vehicle Loop Detector Protection. Surge protection shall be installed on each loop detector circuit. The surge protection shall be an EDCO SRA6LCA vehicle loop detection surge protection device, or approved equal. The device shall be configured with the type of mounting which best accommodates the type of loop detector lead-in terminal block supplied. It shall meet or exceed the following specifications:

- (a) Peak Surge Current
Differential Mode; 400 amps (8x20 microseconds).
Common Mode; 1000 amps (8x20 microseconds).
- (b) Estimated Occurrences; 500 @ 200 amps.
- (c) Response Time; 40 nanoseconds.
- (d) Input Capacitance; 35 picofarads.
- (e) Operating Temperature; -40 to 85 degrees C.

(f) Clamp Voltage @ 400 amps differential mode; 30 volts max.

(g) Clamp Voltage @ 1000 amps common mode; 40 volts max.

j. Radio Interference Suppressors. Each cabinet shall be equipped with a radio interference suppressor meeting the requirements of Section 5.4 of the NEMA TS-2 Standards.

k. Cabinet Wiring. As a minimum, cabinets shall be wired in accordance with the NEMA TS-2 Standards, Section 5, Terminals and Facilities, as it applies to Type 1, Configuration 3 cabinets, unless otherwise specified in these Specifications. Any power supplies must be shielded with a non-conductive material to prevent accidental contact. Sealers or compounds that are not non-conductive will not be accepted.

A panel shall be provided suitable for terminating: A minimum of 16 loop lead-ins, Rack Power and Ground, Detector Call Terminations, and Phase 2, 4, 6, and 8 pedestrian pushbuttons.

l. Detector Racks. The cabinet shall provide for a minimum of 16 channels of detection, fully wired for all channels.

Detector channels shall be assigned as shown on the Loop Detector Diagram included on the Plans.

All loop detector units shall be rack mounted. Detector units and racks shall conform to the NEMA TS-2 Standards, Sections 2, 5, and 6. Racks shall be of metal construction, providing top and bottom guides for all slots. Racks shall be bolted to the top shelf of the cabinet using wing nuts to simplify their removal. Where an emergency vehicle priority system is being installed, auxiliary rack positions may be used instead of a separate rack to accommodate the selector modules.

The Contractor shall supply and install on the upper left-hand corner of the back of the cabinet door a laminated intersection graphic and table depicting the traffic detector relay channel assignments. The diagram shall be a graphic of the intersection oriented similar to the Plans showing the locations of each loop detector. The diagram shall, at a minimum, include detector numbers, street names, north arrow (oriented similar to Plans), and controller cabinet location. The assignment information shall be included in a table, which shall include, at a minimum, approach name, detector number, terminal numbers, detector rack slot number, relay number, relay channel number, and the phase associated with each detector.

All detector unit delay and extension timings called for on the Plans shall be programmed in the controller unit, not in the detector unit.

m. Load Switches and Flash Transfer Relays. In addition to the requirements of the NEMA TS-2 Standards, Section 6, Auxiliary Devices, all load switches shall utilize optically isolated, encapsulated modular solid state relays. Discrete components on circuit boards will not be accepted. Load switch indicator lights shall be LED type and wired on the input side of the device.

The field electrical loading for flash operation shall be wired through the transfer relays such that the load on the 2-circuit flasher is as balanced as possible within the limitations of the signal phasing.

Controller cabinets shall be furnished with a full complement of load switches and flash transfer relays. This requires a load switch and a flash transfer relay for each back panel position, even if the position is not used.

n. Malfunction Management Unit (MMU). The MMU shall conform to the requirements of Section 4 of the NEMA TS-2 Standards.

o. Master or Local Modem. Provisions for a telephone connection in the cabinet shall be provided at all master controller locations and at selected local controllers as specified on the Plans. At these locations a shelf mounted modem shall be supplied. The modem shall provide a full duplex operation using a 2-wire, dial-up telephone line, and comply with Part 66, FCC Docket 19528. The modem shall support the communications rate of the system software and synchronous and asynchronous data transfer.

The modem shall be wired such that it is capable of being powered down and powered up via a user-defined controller output to automatically reset the modem. The user-defined output shall utilize an interface relay in controlling power to the modem. The user-defined output shall be initially programmed to be on at all times except for a one-minute interval starting at 1:00 a.m. each day.

Originate Manual or Auto Answer operating modes shall be provided. The modem shall provide an Auto Disconnect function that will disconnect the modem due to lack of carrier after 18 seconds. The front diagnostic L.E.D.s shall display, at a minimum, the operational status of the following:

Modem Ready	Terminal Ready	Receive Data	Send Data
Off Hook	Carrier Detect	Auto Answer	High Speed

The modem reset shall be controlled by a switch on the cabinet door as described in **Subsection M.15.13.2; Para. g.3(c)**.

The modem shall include an easily accessible on/off switch operating with power supplied from a controller cabinet duplex outlet. The modem shall have an operating temperature range of -34°C (-30°F) to +74°C (+165°F). Care should be exercised in the organization and construction of the controller cabinet to insure that the opening and closing of the cabinet door does not interfere with the modem's power cable.

p. Bus Interface Unit (BIU). The BIU furnished shall be of the latest manufacture and meet all requirements of Section 8 of the NEMA TS-2 Standards.

M.15.14 DETECTOR RELAYS - LOOP. All detector units shall be rack mounted and meet the provisions of Subsection 6.5; Inductive Loop Detectors of the NEMA Standard Publication No. TS-2, Traffic Controller Assemblies. All delay and extension settings shall be set in the controller unless otherwise directed on the Plans and/or as directed by the Engineer.

M.15.15 VEHICULAR SIGNAL HEADS. Signal heads shall conform to the requirements of the Equipment Standard of the Institute of Transportation Engineers, latest edition. All vehicular signal heads shall be Light Emitting Diode (L.E.D.) Traffic Signal Modules. They shall be 12 inches (300 mm) in diameter, unless otherwise indicated on the Plans.

The L.E.D. signal module shall conform to the requirements of the Purchase Specifications of the Institute of Transportation Engineers, latest edition, for Light Emitting Diode (L.E.D.) Traffic Signal Modules.

An independent laboratory shall certify that the L.E.D. signal module complies with Section 6; Quality Assurance, of the above referenced ITE L.E.D. Purchase Specification.

All L.E.D. lamps shall have a UV stabilized clear lens.

All L.E.D. signal modules shall be warranted against material defects, workmanship and loss of luminous intensity, for a period of 60 months from the time the units are placed in service.

Lamps shall have a minimum of 144 L.E.D.s (light emitting diodes). The lamps shall be wired with parallel circuits, such that one burned out L.E.D. will not affect more than 5 percent of the total circuit.

A filtered power supply engineered to electrically protect the L.E.D.s and maintain a safe and reliable operation shall be provided. In-Line Fusing with a maximum rating of 2 amps shall be provided in the power lead to minimize the effect and repair cost of an extreme over voltage situation or other failure mode. All signals shall be capable of flash operation with no restrictions or degradation of performance.

Lamps shall be provided with 40-inch pigtails. Wires shall be terminated with a crimp style female quick slide 1/4-inch spade lug (16-14 wire size). Lamps shall have color coded 16 AWG wires for identification of heads as follows:

Red L.E.D.	Red with White neutral
Yellow L.E.D.	Yellow with White neutral
Green L.E.D.	Green with White neutral

All modules supplied to be retrofit into existing signal heads shall include a new gasket.

The L.E.D. signal module shall be a single, self-contained device, not requiring on-site assembly for installation into a signal housing. The module shall have a permanent UP ARROW for correctly orienting the module in the signal housing. The manufacturer's name, trademark, serial number and any other necessary identification shall be permanently marked on the backside of the module.

The maximum wattage for a 12-inch (300 mm) ball shall be 25 watts. The maximum wattage for a 12-inch (300 mm) arrow shall be 14 watts.

Red and green arrows, and green/yellow dual indication arrows shall consist of two rows of L.E.D.s. The lamps shall be in parallel circuits such that one burned-out L.E.D. will not affect more than 5 percent of the total circuit.

M.15.16 PEDESTRIAN SIGNAL HEADS. The signals covered under this subsection consist of L.E.D. modules displaying alternating international "HAND" and "WALKING MAN" symbols contained within a weatherproof housing.

L.E.D. signal module shall be a self-contained device, not requiring on-site assembly for installation. L.E.D. signal modules shall be manufactured to fit in standard 12-inch signal housings as a

retrofit replacement for existing signal lamps. All hardware, including screws, washers, nuts and bolts, shall be stainless steel and all other components shall be corrosion resistant. All components shall be readily accessible when the door is open.

The L.E.D. signal module shall consist of a double message overlay combining the "HAND" and "WALKING MAN" symbols. The symbols shall be formed by arranging the L.E.D.s to form a full overlay of each symbol.

The L.E.D. signal module shall conform to the requirements of the Purchase Specification of the Institute of Transportation Engineers, latest edition, for Light Emitting Diode (L.E.D.) Pedestrian Traffic Signal Modules.

M.15.17 PEDESTRIAN PUSHBUTTON DETECTOR. Pedestrian pushbutton assemblies shall be ADA compatible and shall consist of a round or rectangular cast aluminum enclosure free of voids, pits, dents, excessive foundry grinding marks, and other exterior blemishes. The housing shall come with holes in the bottom and back tapped to accept a ½-inch NPT thread plug. The bottom hole shall be supplied with a threaded plug. The back hole shall be supplied with a non-thread plastic plug or equal.

All pedestrian pushbutton assemblies shall include a sign with an arrow indicating the direction of the crossing associated with the pushbutton. The sign shall also provide detailed instruction, both text and graphic, describing the meaning of each of the pedestrian signal indications.

M.15.18 PAINT COLORS. "Federal Yellow" shall conform to the color standards approved and contained in the "Manual for Signs and Pavement Marking of the National System of Interstate and Defense Highways," standard Interstate colors.

M.15.19 ITEMS REQUIRING A MATERIALS CERTIFICATE AND A CERTIFICATE OF COMPLIANCE. For the following items a Materials Certificate and a Certificate of Compliance will be required confirming their conformance to the requirements set forth in the Special Provisions and/or Plans.

1. Electrical Conduit
2. Stainless Steel Bolts and Nuts
3. Lamps and Luminaires
4. Ballasts (both multiple and series)
5. Conductors

Remove **Subsection M.17.01; Glass Beads – Dual Gradation**, pages M-89 & M-90 of the RI Standard Specifications for Road and Bridge Construction in its entirety and replace with the following.

M.17.01

GLASS BEADS – DUAL GRADATION

M.17.01 GLASS BEADS - DUAL GRADATION.

M.17.01.1 Scope. This Specification covers the requirements for glass beads which are to be dropped onto white and yellow pavement marking material to produce a highly weather and-wear resistant reflectorized traffic marking.

M.17.01.2 Detailed Requirements.

a. Reflective Glass Spheres. The glass spheres shall be transparent, clean, smooth and spherically shaped, free of milkiness, pits, or excessive air bubbles, manufactured with virgin or recycled glass cullet, meet AASHTO M247, and conform to the following specific requirements:

1. Coatings. The spheres shall be coated to enhance their embedment characteristics to the binder. They shall show no tendency to absorb moisture in storage and shall remain free of clusters and hard lumps.

2. Quality Assurance. The spheres shall be segregated into maximum lots of 2,500 pounds and lot numbers shall be stamped onto each. Each lot shall be tested for gradation, rounds and coating and a Certificate of Compliance stating such will accompany each lot.

3. Gradation. The glass spheres shall meet the following gradation requirements when tested in accordance with ASTM D1214:

Sieve Size Passing	Type I	Sieve Size	Type II
	Percent Passing		Percent
10	100	20	95-100
12	95-100	30	80-95
14	80-95	50	9-42
16	10-40	80	0-10
18	0-5	--	----
20	0-2	--	----

4. Roundness. The glass spheres shall have a minimum of 80 percent rounds per screen for the two highest sieve quantities for Types I and II, and no more than 3 percent angular particles per screen for the Type I gradation. The remaining fractions shall typically be no less than 75 percent rounds as tested according to ASTM D1155, Procedure A.

5. Refractive Index. The glass spheres shall have a refractive index of 1.50 to 1.52.

6. Silica Content. The silica content of the glass spheres shall not be less than 60 percent.

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7. Packaging. Reflective glass spheres shall be shipped in moisture resistant bags. Each bag shall be marked with the name and address of the manufacturer, the name and net weight of the material, batch or lot number, and shall include a certified test report stating that they meet the above test requirements.

8. Toxicity Characteristics. Glass spheres shall contain no more than 75 ppm of Arsenic, 100 ppm of Lead, and/or 100 ppm of Antimony when determined by EPA Methods 6010B and 3052.

Revise **Subsection M.17.04; Epoxy Resin Pavement Markings**, page M-95 of the RI Standard Specifications for Road and Bridge Construction as follows.

M.17.04

EPOXY RESIN PAVEMENT MARKINGS

- **Replace Subsection M.17.04.1a, paragraph (2) with the following.**

2. Composition. The overall Paint Composition shall be left to the discretion of the manufacturer, but shall meet the following requirements.

White:	Titanium Dioxide	20 ±2 percent, by weight
	ASTM D476 Type II/III	
	Epoxy Resin	80 ±2 percent, by weight
Yellow (lead-free):	Titanium Dioxide	15 ±3 percent, by weight
	ASTM D476 Type II/III	
	Epoxy Resin	73 - 82 percent, by weight
	Organic Yellow	6 – 9 percent, by weight

Revise **Section M.18; Landscaping Materials**, page M-97 of the RI Standard Specifications for Road and Bridge Construction as follows.

SECTION M.18

LANDSCAPING MATERIALS

- **Replace Subsection M.18.01; Loam in its entirety with the following.**

M.18.01 LOAM. The material to be furnished shall consist of screened loose, friable, fine sandy loam or sandy loam, as defined by the USDA's Soil Conservation Service in the Soil Survey Manual issued in 1993, free of subsoil, refuse, stumps, roots, rocks, cobbles, stones, brush, noxious weeds, litter and other materials which are larger than ½-inch in any dimension and which will prevent the formation of a suitable seed bed. Organic matter shall constitute not less than 5 percent nor more than 20 percent of the loam as determined by loss-on-ignition of oven dried samples that have been drawn by the Engineer, unless otherwise specified or directed. The loam shall have an acidity range of 5.5 pH to 7.6 pH. The Contractor shall notify the Department of the intended source of loam to be employed at least two weeks prior to the intended time of use to allow time for sampling.

Loam shall conform to all applicable specification requirements prior to its final placement on the project. The practice of culling deleterious or out of specification material after placement and/or grading in-place will not be allowed.

- **Replace Subsection M.18.02; Plantable Soil in its entirety with the following.**

M.18.02 PLANTABLE SOIL. The material to be furnished shall consist of loose, friable topsoil free of refuse, brush, stumps, roots, rocks, cobbles, stones, noxious weeds, litter, and other materials which are longer than 1 inch in any dimension and which will prevent the formation of a suitable seed bed. Organic matter shall constitute not less than 4 percent nor more than 20 percent of the Plantable Soil as determined by loss-on-ignition of oven dried samples that have been drawn by the Engineer, unless otherwise specified or directed. The Plantable Soil shall have an acidity range of approximately 5.5 pH to 7.5 pH.

The composition of Plantable Soil can also be arrived at by thoroughly mixing a suitable organic soil with a suitable subsoil. The resulting mix shall be a homogeneous material free from hard lumps, other materials specified above and be capable of supporting plant growth. This soil mixture must meet the above specified requirements for organic matter content and pH. The Contractor shall notify the Department of the intended source of Plantable Soil to be employed at least two weeks prior to the intended time of use to allow for sampling.

Plantable Soil shall conform to all applicable specification requirements prior to its final placement on the project. The practice of culling deleterious or out of specification material after placement and/or grading in-place will not be allowed.