



**STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION**



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March 12, 2015

Subject: Project No. 42-304, 42-305, 42-310 & 42-316

F.A.P. Nos. 1042(124), 1042(125), 0032(193), & 1042(126)

Replacement of Bridge No. 02374 over I-84, Rehabilitation of Bridge No. 02375 over I-84 Eastbound and I-84 Connector, Rehabilitation of Bridge No. 02368A Route 2 Westbound over I-84 and, Rehabilitation of Bridge No. 02376 I-84 over I-84 East bound in the Town of East Hartford.

NOTICE TO CONTRACTORS:

This is to notify all concerned and especially the prospective bidders that the bid opening for the subject project has been previously postponed One (1) Week from **March 11, 2015** to **March 18, 2015** at 2:00 P.M. in the Conference Room of the Department of Transportation Administration Building, 2800 Berlin Turnpike, Newington, Connecticut.

Addendum No. 2 is attached and can also be obtained on the Statewide Contracting Portal at http://www.biznet.ct.gov/scp_search/BidResults.aspx?groupid=64

This addendum is necessary to revise contract documents.

Bid Proposal Forms (0042-0304.EBS file and amendment file 0042-0304.00# if applicable) are available for those bidders that have received approval from the Department to bid on the subject project.

Pre-Bid Questions and Answers: Questions pertaining to DOT advertised construction projects must be presented through the CTDOT Pre-Bid Q and A Website. The Department cannot guarantee that all questions will be answered prior to the bid date. **PLEASE NOTE - at 12:01 am, the day before the bid, the subject project(s) being bid will be removed from the Q and A Website, Projects Advertised Section, at which time questions can no longer be submitted through the Q and A Website. At this time, the Q and A for those projects will be considered final, unless otherwise stated and/or the bid is postponed to a future date and time to allow for further questions and answers to be posted.**

Philip J. Melchionne

For: Gregory D. Straka
Contracts Manager
Division of Contracts Administration

MARCH 11, 2015

REHABILITATION OF BRIDGE NO'S. 02374, 02375, 02368A AND 02376
I-84 AND ROUTE 2 INTERCHANGE

FEDERAL AID PROJECT NO'S. 1042(124), 1042(125), 0032(193) AND 1042(126)
STATE PROJECT NO'S. 0042-0304, 0042-0305, 0042-0310 AND 0042-0316

CITY OF EAST HARTFORD

ADDENDUM NO. 2

This Addendum addresses the following questions and answers contained on the "CT DOT QUESTIONS AND ANSWERS WEBSITE FOR ADVERTISED CONSTRUCTION PROJECTS":

Question and Answer No's 1 thru 23.

Question and Answer No. 7 was addressed in Addendum No. 1

SPECIAL PROVISIONS

NEW SPECIAL PROVISIONS

The following Special Provisions are hereby added to the Contract:

- **ITEM NO. 0503420A – REMOVAL OF CONCRETE DECK (BRIDGE)**
- **ITEM NO. 0503904A – JACKING FOR BEARING REPLACEMENT**
- **ITEM NO. 0512113A – 8" PIPE FOR BRIDGE DRAINAGE (FIBERGLASS)**
- **ITEM NO. 0601032A – ROADWAY PARAPET WALL**
- **ITEM NO. 0601039A – MODIFY BRIDGE PARAPET**
- **ITEM NO. 0601044A – BRIDGE PARAPET CAP**
- **ITEM NO. 0601188A – FULL DEPTH PATCH (CLASS "F" CONCRETE)**
- **ITEM NO. 0603082A – STRUCTURAL STEEL REPAIRS (SITE NO. 2)**
- **ITEM NO. 0603591A – STRUCTURAL STEEL – MISCELLANEOUS**

REVISED SPECIAL PROVISIONS

The following Special Provisions are hereby deleted in their entirety and replaced with the attached like-named Special Provisions:

- ITEM NO. 0601118A – BRIDGE DECK CONCRETE
- ITEM NO. 0602971A – DEBRIS SHIELD
- ITEM NO. 0712010A – REINFORCED SOIL SLOPE

DELETED SPECIAL PROVISION

The following Special Provision is hereby deleted in its entirety:

- ITEM NO. 0707200A - GEOGRID

CONTRACT ITEMS

NEW CONTRACT ITEM

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>UNIT</u>	<u>QUANTITY</u>
<u>0702341</u>	<u>TEST PILE (STEEL HP 12 X 84 – 90’ LONG)</u>	<u>EA</u>	<u>4</u>

REVISED CONTRACT ITEM

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ORIGINAL QUANTITY</u>	<u>REVISED QUANTITY</u>
<u>0714050A</u>	<u>TEMPORARY EARTH RETAINING SYSTEM</u>	<u>16, 117 SF</u>	<u>18, 445 SF</u>

DELETED CONTRACT ITEM

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ORIGINAL QUANTITY</u>	<u>REVISED QUANTITY</u>
<u>0707200A</u>	<u>GEOGRID</u>	<u>2,500 SY</u>	<u>0</u>

PLANS

REVISED PLANS

The following Plan Sheets are hereby deleted and replaced with the like-numbered Plan Sheets:

01.02.01

01.04.02

01.04.15

01.04.19

01.04.21

04.02.01

04.04.34

04.04.35

04.04.36

04.04.37

04.04.77

04.04.92

The Detailed Estimate Sheets do not reflect these changes.

The Bid Proposal Form has been revised to reflect these changes.

The Federal Wage Rates dated January 30, 2015 are hereby deleted and replaced with the attached Federal Wage Rates dated February 13, 2015.

The foregoing is hereby made a part of the contract.

ITEM #0503420A – REMOVAL OF CONCRETE DECK (BRIDGE)

Description: Work under this item shall consist of the saw cutting, removal and satisfactory disposal of the concrete deck and approach slabs as shown on the plans and where directed by the Engineer. Work under this item shall conform to the requirements of Section 5.03, supplemented and amended as follows.

Construction Methods: The Contractor shall take care as to not damage the existing portions of the deck and approach slabs that are to remain, including the preservation of the existing reinforcement as shown on the plans and where directed by the Engineer. Those areas damaged by the Contractor shall be repaired by him, in a manner suitable to the Engineer, at no expense to the State.

The Contractor shall take adequate measures to prevent concrete debris from falling or being ejected to any area beyond the work zone or onto any adjacent roadway. All debris shall be promptly cleaned up and removed from the site. All material removed shall be satisfactorily disposed of by the Contractor.

Method of Measurement: This work will be measured for payment by the actual area in square yards of top surface of concrete bridge deck and approach slab removed and disposed of by the Contractor.

Basis of Payment: This work will be paid for at the contract unit price per square yard for “Removal of Concrete Deck (Bridge)” complete, which price shall include saw cutting and removal and satisfactory disposal of concrete, all equipment, tools, labor and work incidental thereto.

Pay Item

Removal of Concrete Deck (Bridge)

Pay Unit

S.Y.

ITEM #0503904A – JACKING FOR BEARING REPLACEMENT

Description: Work under this item shall consist of jacking the existing superstructure members the minimum amount necessary to replace existing bearings.

Materials: Use of any material capable of carrying anticipated loads is permitted. The Engineer will inspect all materials before use. The Contractor shall replace any material that does not pass the Engineer's inspection.

Construction Methods: Before jacking the superstructure members the Contractor shall coordinate with all relevant utility companies and the Department, and implement protection of any utility services.

Wherever arc gouging, flame cutting, or welding will be used, existing lead paint must first be removed. See the applicable painting special provision.

Welding details, procedures and testing methods shall conform to the latest ANSI/AASHTO/AWS D1.5: Bridge Welding Code, unless otherwise noted.

The Contractor shall submit working drawings, design computations and catalog cuts for review in accordance with Article 1.05.02. A Professional Engineer licensed in the State of Connecticut shall seal the working drawings and the design calculations. Each page of the working drawings shall have the seal of the Professional Engineer. Only the first page of the design calculations need have the seal of the Professional Engineer. No work shall begin until acceptance of the drawings and design has been obtained from the Engineer.

The jacking design shall conform to the following specifications:

- 1) 2012 AASHTO LRFD Bridge Design Specifications with Interim Revisions
- 2) The latest AASHTO Temporary Works
- 3) The Manual of Steel Construction (AISC)
- 4) Design Manual for Engineered Wood Construction.

The design computations shall include, but not be limited to, the following:

- 1) Material designations and material lists.
- 2) Capacities for all structural members and components. Include appropriate reductions in capacities and loads when materials that are not new or undamaged are used in the construction of the temporary jacking system.
- 3) Soil or pavement bearing capacities, if applicable.
- 4) Computed lifting loads based on AASHTO standard distribution including impact, for the design loads.

- 5) Anticipated design loads and stresses on structural members and components.
- 6) References for all design equations.

The working drawings shall include, but not be limited to, the following:

- 1) General Notes.
- 2) Model number and capacity for each jack. The jack shall have a rated capacity at least 1.5 times the anticipated lifting load. The jacks shall be designed to support all dead loads and live loads. Each jack shall have its rated capacity clearly shown on the attached manufacturer's name plate. The Contractor shall use hydraulically operated jacks that are equipped with a mechanical lock off device.
- 3) Schematic diagram showing the jacks, hoses, pumps, gages and any other jacking equipment. The Contractor shall provide a table equating the hydraulic pressure to the force in the jack so that the Engineer can monitor the pressure gages or other load measuring devices during the jacking process. Use of jacks individually employed or joined to operate collectively is permitted.
- 4) Maximum anticipated lifting load for each jacking point location.
- 5) Anticipated lift at each jacking point location.
- 6) Jacking procedures outlining the complete sequence of operations to be followed when jacking, supporting, and lowering the beam ends.
- 7) A Plan showing the layout of the jacking point locations and the details of the bracing and supporting members. The plans shall show all connections detailed.
- 8) Details of proposed modifications to the existing structure necessary to accomplish this jacking and the methods of restoration, including modifications and restoration due to temporary scaffolding configurations. When the jacking operation is no longer required, the Contractor shall remove all modifications to the bridge unless the Engineer permits the modifications to remain. The Contractor shall remove the welds by grinding or "arc" gouging without damaging the base metal that is to remain.

When arc gouging a minimum of 1/8" of weld metal shall be left in place and the remaining weld metal shall be removed by grinding. Welders who perform arc gouging shall be SMAW certified. Fire resistant tarps shall be used as required to protect property below.

- 9) A Plan showing proposed locations of temporary scaffolding for jacking location access, including minimum height over road, where applicable, and minimum horizontal clearance from roadway gutterline. Metal beam rail systems or concrete barrier shall also be located relative to the roadway gutterline.

The acceptance of design calculations and working drawings shall not serve to relieve the Contractor of any responsibility for the safety of the work or the successful completion of the work.

The Contractor shall field verify all working drawing dimensions before fabricating any materials. The jacking system, once installed, shall not prohibit the Contractor from performing any work required by the contract plans.

If part of the jacking system (falsework bents, etc.) is placed adjacent to vehicular traffic then the Contractor shall protect the jacking system from potential vehicular collision. Jacking systems at locations where there is a pier between the jacking system and adjacent traffic does not need to be protected. At locations where there is metal beam rail between the jacking system and adjacent traffic, the deflection clear zone of the beam rail shall be evaluated by the Engineer to determine if the jacking system is adequately protected. The Contractor shall submit to the Engineer for approval the method of protection. If a protection system is not provided and the Engineer believes that there is a potential for vehicular collision between adjacent traffic and jacking system then the Contractor shall protect the jacking system as ordered by the Engineer.

The Contractor's jacking system shall at no time apply any bearing pressure to any buried utilities unless approved otherwise by the utility owner.

Jacking against the concrete deck is not permitted.

Drilling and grouting anchors to the face of the pier is not permitted without the permission of the Engineer.

One week before jacking the superstructure member's the Engineer shall the Office of Oversize / Over Weight Permits at (860) 594-2878 and inform the office when the superstructure members will be jacked and the duration of jacking operations.

While jacking the superstructure members the Contractor shall set the jack level and jack all beams of a bearing line simultaneously to a minimum amount necessary to complete work. At no time shall the jacking exceed 1/4 inch. The differential lift between adjacent beams shall not exceed 1/8 inch at any time during the jacking or lowering of the beams.

When the beams are jacked to the minimum amount necessary, the jacks shall be locked off and the hydraulic pressure released.

At no point shall the lifting force at any jacking point exceed the maximum lifting load specified in the design computations.

During jacking operations the Contractor shall carefully inspect and maintain the jacking system.

After work requiring jacking have been installed and accepted by the Engineer, the Contractor shall lower the beam ends until all loads are carried by the bearings.

The Contractor shall promptly remove and dispose of the equipment and materials. The Contractor shall restore the area to its original condition and to the satisfaction of the Engineer. The Contractor is responsible for any damage caused to any part of the structure, utilities, pavement below, or vehicular traffic as a result of the work required by this special provision.

The Contractor shall repair and/or replace any such damage to the satisfaction of the Engineer at no cost to the State.

Method of Measurement: This work will be measured for payment by the number of bearings replaced using jacking. Each bearing shall only be counted once.

Basis of Payment: This work will be paid for at the contract unit priced per each for "Jacking for Bearing Replacement," complete and accepted, which price shall include the design, installation and removal of the jacking system, associated modifications and removal of the same from the superstructure, protection of existing utilities, protection of the jacking system and all materials, tools, equipment, labor and work incidental thereto.

Pay Item

Jacking for Bearing Replacement

Pay Unit

EA

ITEM #0512113A - 8" PIPE FOR BRIDGE DRAINAGE (FIBERGLASS)

Description: This item shall consist of furnishing and installing the fiberglass pipe, fittings including reducers, expansion joints, wyes, cleanouts, hangers, supports, inlets, slotted outlet covers, protective shielding and appurtenances, for drainage of bridge deck to the lines and grades designated on the plans, or as directed by the Engineer.

Materials: All fiberglass components of the bridge drainage piping system shall be supplied by a single manufacturer.

The fiberglass pipe shall be Reinforced Thermosetting Resin Pipe (RTRP) which shall satisfy the requirements of ASTM Specification D 2996 RTRP-11AA-1111. The pipe shall qualify for a 10 ksi minimum short term rupture strength hoop tensile stress.

Pipe joints shall be bell-and-spigot or flanged as shown on the plans.

Fittings including wyes, cleanouts, reducers, and other types of manufactured elbows shall have a smooth interior with a minimum centerline radius of one and one half (1-1/2) times the pipe diameter. Cleanout end caps, inlets, and slotted outlet covers shall be fiberglass and shall attach to the cleanout pipe fitting using a flanged connection with a minimum of 4 bolts and a sealing gasket.

All fittings shall be static rated at 100 psi with a safety factor of three (3) times the static rating, in accordance with ASTM D1599.

The adhesive to be used for joining pipe segments shall consist of epoxy resin and a hardener curing agent having a minimum pot life of 15 minutes at 80°F which when fully cured develops the strength capacity of the pipe, in accordance with the manufacturer's recommendations.

The color of all fiberglass piping components shall be "concrete-gray". The Contractor shall submit a color sample to the Engineer for approval. A U.V. inhibitor shall be incorporated in the epoxy resin.

Pipe Supports: Structural steel for pipe support members, clamps, hangers, junction box supports, anchorage plates, and shims shall conform to the requirements of ASTM A709M, Grade 250 and shall be galvanized after fabrication to meet the requirements of ASTM A123M.

Threaded rods, anchor bolts, bolts and nuts shall conform to the requirements of ASTM A449M, A563M-Grade DH, A194M-Grade 2H or F436M as applicable. All hardware shall be hot dip galvanized in accordance with ASTM A153M or A123M as applicable.

Welding required for fabrication of the pipe supports shall be in accordance with the current AWS specifications.

Anchorage System: Pipe supports shall be connected to concrete with stainless steel anchors selected from the Connecticut Department of Transportation approved products list, and shall be installed per manufacturer's instructions and recommendations. Threaded concrete inserts shall

be compatible with the galvanized steel threaded rods and designed to develop pullout and shear loads exceeding the required working loads as shown on the plans.

The Contractor may propose chemical anchor systems as a substitution for the concrete inserts. Anchoring systems are subject to the approval of the Engineer and shall exceed the working load requirements shown on the plans and shall be of non-corrosive materials suitable for the application. Chemical anchors and testing shall be in accordance with Section M.03.01-15 of the Standard Specifications.

Non shrink grout filler material shall be in accordance with Section M.03.01-12.

Neoprene pads, 1/8" thick shall be bonded to all surfaces of steel pipe supports or hangers in direct contact with the fiberglass pipe. The neoprene shall conform to the requirements of ASTM D4637, Type II, Class SR. The adhesive bonding agent for attaching the neoprene to the pipe support clamp surface shall be "Quick Gel Instant Adhesive" manufactured by Loctite Corporation, Rocky Hill, Connecticut, or an approved equal recommended by the manufacturer of the neoprene.

High Strength Bolts shall conform to the requirements of ASTM A325M.

Hex nuts shall conform to ASTM A563M, Grade DH or ASTM A194M, Grade 2H. Washers shall conform to ASTM F436M.

High strength bolts including hex nuts and washers shall be mechanically galvanized in conformance with ASTM B695M, Class 50.

The caulking at the tower base outlet shall be silicone sealant conforming to ASTM C-920 Type S, Grade NS, Class 40 or Federal Specifications TT-S-001543A (COM-NBS) Class A and TT-S-00230C (COM-NBS) Class A.

The Contractor shall furnish a Certified Test Report and a Materials Certificate for the pipe joining adhesive, and all other fiberglass components of the piping system, in conformance with the requirements set forth in 1.06.07.

Construction Methods:

Shop Drawings: Before fabricating any materials, the Contractor shall take all field measurements necessary to assure proper fit of the finished work, and shall submit shop drawings to the Engineer for approval in accordance with Article 1.05.02-3. These drawings shall include, but not be limited to the following information:

- A. A layout plan and elevation showing all lengths, elevations, fittings, supports, cleanouts, expansion devices if required, appurtenances and material designations.
- B. Commercial items shall be identified by manufacturer, trade name and catalog number and shall indicate sufficient details.

C. Pipe supports and hangers and all other support devices shall be fully detailed.

D. All field measurements shall be submitted for reference.

Installation: The pipe shall be installed to the lines and grades shown on the plans and shall be securely attached to the structure.

The adhesive for joining pipes shall be mixed and applied in strict accordance with directions included in the adhesive kit, or as directed by the representatives of the manufacturer. The surfaces of the joint shall be coated with the adhesive immediately before joining adjacent lengths of pipe. After properly joining two adjacent sections, the pipe supports and clamps shall be properly tightened to hold the pipe in place.

Method of Measurement: This work will be measured for payment by the actual number of linear feet of pipe for bridge drainage of the size specified, completed and accepted, measured in place along the axis of the pipe through all fittings from the pipe connector at the scupper pan to it terminus at or below grade.

Basis of Payment: This work will be paid for at the contract unit price per linear foot of “8” Pipe for Bridge Drainage (Fiberglass)”, complete in place, which price shall include all materials including fiberglass pipe, cleanouts, inlets, slotted outlet covers, hoppers, protective shielding and supports, including hardware, all equipment, tools and labor incidental thereto.

Structural steel members and appurtenances detailed to support the pipe shall be considered incidental to the cost of the fiberglass pipe.

Pay Item

8” Pipe for Bridge Drainage (Fiberglass)

Pay Unit

L.F.

ITEM #0601032A – ROADWAY PARAPET WALL

Description: The work under this item includes the removal and reconstruction of the parapets where the parapets are being completely removed as shown on the plans. Work under this item shall conform to the requirements of Sections 6.01 and 6.02, supplemented and amended as follows.

Materials: The materials shall conform to the following requirements:

- 1) Class “F” Concrete: Sections 6.01 and M.03
- 2) Deformed Steel Bars (Epoxy Coated): Sections 6.02 and M.06.01.

Construction Methods: Existing roadway parapet walls shall be removed, existing concrete shall be prepared and parapets reconstructed to the limits shown in the plans.

Mixing, placing, curing, and finishing of the concrete shall be in accordance with Article 6.01. Any newly placed concrete having a hollow sound when sounded with a hammer shall be replaced by the Contractor at his expense by a method acceptable to the Engineer.

Method of Measurement: This work will be measured for payment by the linear foot (LF) of roadway parapet wall removed and reconstructed in place and accepted.

Basis of Payment: This work will be paid for at the contract unit price per linear foot (LF) for “Roadway Parapet Wall”, which price shall include the removal and reconstruction of the roadway parapet wall, complete in place, including furnishing, fabricating, transporting, storing, and all materials, equipment, tools, labor and work incidental thereto.

<u>Pay Item</u>	<u>Pay Unit</u>
Roadway Parapet Wall	LF

ITEM #0601039A – MODIFY BRIDGE PARAPET

Description: The work under this item shall consist of the modification of bridge parapets from a safety walk shape to a sloped curb as shown on the plans, and as directed by the Engineer. This item does not include the installation of the Bridge Parapet Cap, which shall be paid under Item 060144A. Work under this item shall conform to the requirements of Sections 6.01 and 6.02, supplemented and amended as follows.

Materials: The materials shall conform to the following requirements:

- 1) Class “F” Concrete: Sections 6.01 and M.03
- 2) Deformed Steel Bars (Epoxy Coated): Sections 6.02 and M.06.01.
- 3) The cementitious grout or chemical anchoring material shall be capable of resisting 125% of the yield strength of the rebar and shall be approved by the Engineer. The materials shall be from the Department's approved product list.

Construction Methods: The existing safety walk portion of the parapet shall be removed to the limits shown on the plans.

The parapets that require modifications shall be reconstructed as shown on the plans. Care shall be taken not to damage the portion of the parapet that is to remain in place.

Removal of the concrete shall be accomplished by pneumatic hammers approved by the Engineer. The weight of the pneumatic hammers shall not exceed 30 lb. Existing reinforcing, designated to remain in place, shall be cleaned of loose rust, concrete, and other foreign matter, and if required, cut and bent as shown on the plans and as directed by the Engineer.

Holes for the additional reinforcing shall be drilled into the concrete as shown on the plans. Drilling methods shall not cause spalling, cracking, or other damage to the existing concrete. The weight of the drill shall not exceed 20 lb. Those areas damaged by the Contractor shall be repaired by him, in a manner suitable to the Engineer, at no expense to the State. The hole diameter shall be as recommended by the Manufacturer of the chemical anchoring material for the specific diameter of the reinforcing steel bar.

Prior to drilling, a pachometer shall be used to locate and avoid existing steel. If other existing reinforcing bars are encountered during the drilling operation, the hole shall be relocated to clear the existing reinforcing as directed by the Engineer. Uncompleted holes shall be filled with grout and finished smooth to the contour of the surrounding concrete surface.

Fabrication and placement of reinforcing steel shall conform to the requirements of Article 6.02.

The reinforcing steel and the chemical anchoring material shall be installed in the holes prepared in accordance with the chemical anchoring material Manufacturer's recommendations.

The existing concrete surface to which the new concrete will bond shall be prepared as follows:

The cleaned concrete surface area to receive new concrete shall be wetted for a one hour period immediately prior to placement of the concrete. Any standing water shall be blown out with compressed air prior to application of concrete.

Mixing, placing, curing, and finishing of the concrete shall be in accordance with Article 6.01. Any newly placed concrete having a hollow sound when sounded with a hammer shall be replaced by the Contractor at his expense by a method acceptable to the Engineer.

In the roughened deck areas, adjacent to the gutterline, prepare the deck surface in accordance with the membrane specifications. The existing vertical faces of the parapet shall be protected during the pouring and finishing of the modified section to prevent concrete staining. Any staining or discoloration of existing concrete caused by the Contractor shall be cleaned at the Contractor's expense by a method acceptable to the Engineer.

Method of Measurement: This work will be measured for payment as the number of linear feet (LF) of modified bridge parapet, measured along the new gutterline, when completed and accepted.

Basis of Payment: This work will be paid for at the contract unit price per linear foot (LF) for "Modify Bridge Parapet", complete in place, which price shall include all materials, equipment, tools and labor incidental thereto.

<u>Pay Item</u>	<u>Pay Unit</u>
Modified Bridge Parapet	LF

ITEM #0601044A – BRIDGE PARAPET CAP

Description: The work under this item shall consist of the removal of the existing metal bridge rail and the construction of a cap on the existing and proposed bridge parapets as shown on the plans, and as directed by the Engineer. Work under this item shall conform to the requirements of Sections 1.20-1.08.03, 5.03, 6.01 and 6.02, supplemented and amended as follows.

Materials: The materials shall conform to the following requirements:

- 1) Class “F” Concrete: Sections 6.01 and M.03
- 2) Deformed Steel Bars (Epoxy Coated): Sections 6.02 and M.06.01.
- 3) The cementitious grout or chemical anchoring material shall be capable of resisting 125% of the yield strength of the rebar and shall be approved by the Engineer. The materials shall be from the Department's approved product list.

Construction Methods: The existing metal bridge rail shall be removed as shown on the plans.

The existing bridge mounted metal beam rail shall not be removed until the work zone is adequately protected from intrusion of vehicles as approved by the Engineer in the field. Under no circumstances shall blunt ends of parapets be left exposed without adequate protection.

All components of the metal beam rail systems shall be disassembled and completely removed, with the exception of the embedded anchor bolts which may remain. All removed components shall be delivered to the State for salvage if directed by the Engineer or shall be properly disposed of off-site. Care shall be taken so as not to damage the surfaces that the metal beam rail was attached to and so as not to damage any components to be salvaged for the State.

The modified parapet cap shall be constructed as shown on the plans.

Holes for the additional reinforcing shall be drilled into the concrete as shown on the plans. Drilling methods shall not cause spalling, cracking, or other damage to the existing concrete. The weight of the drill shall not exceed 20 lb. Those areas damaged by the Contractor shall be repaired by him, in a manner suitable to the Engineer, at no expense to the State. The hole diameter shall be as recommended by the Manufacturer of the chemical anchoring material for the specific diameter of the reinforcing steel bar.

Prior to drilling, a pachometer shall be used to locate and avoid existing steel. If other existing reinforcing bars are encountered during the drilling operation, the hole shall be relocated to clear the existing reinforcing as directed by the Engineer. Uncompleted holes shall be filled with grout and finished smooth to the contour of the surrounding concrete surface.

Fabrication and placement of reinforcing steel shall conform to the requirements of Article 6.02.

The reinforcing steel and the chemical anchoring material shall be installed in the holes prepared in accordance with the chemical anchoring material Manufacturer's recommendations.

The existing concrete surface to which the new concrete will bond shall be prepared as follows:

The cleaned concrete surface area to receive new concrete shall be wetted for a one hour period immediately prior to placement of the concrete. Any standing water shall be blown out with compressed air prior to application of concrete.

Mixing, placing, curing, and finishing of the concrete shall be in accordance with Article 6.01. Any newly placed concrete having a hollow sound when sounded with a hammer shall be replaced by the Contractor at his expense by a method acceptable to the Engineer.

Method of Measurement: This work will be measured for payment as the number of linear feet (LF) of bridge parapet cap, measured along the new gutterline, when completed and accepted.

Basis of Payment: This work will be paid for at the contract unit price per linear foot (LF) for “Bridge Parapet Cap”, complete in place, which price shall include removal and delivery to salvage or disposal of the existing bridge rail and construction of the modified parapet cap and all materials, equipment, tools and labor incidental thereto.

<u>Pay Item</u>	<u>Pay Unit</u>
Bridge Parapet Cap	LF

ITEM #0601118A –BRIDGE DECK CONCRETE

Work under this item shall conform to the pertinent requirements of Section 6.01 supplemented and amended as follows:

Description: *Add the following:*

Where indicated in the plans, the Contractor shall submit for review and acceptance a concrete mix design to be used at the locations indicated on the contract drawings in accordance with the contract specifications. This mix design shall produce a concrete that is high performance fiber reinforced concrete that is workable at the placement and offers resistance to shrinkage cracking.

The mix design is to be submitted 15 days prior to the first trial batch.

The concrete shall be composed of Portland cement (Type 1), fine and coarse aggregates, poly-vinyl-alcohol fibers, and water, high range water reducer (HRWR), Ground Granulated Blast Furnace Slag (GGBFS) up to 30% of the Portland cement, micro silica up to 10% by weight of cement, and retarder admixtures are optional.

The Contractor shall work closely with the BDC manufacturer and their technical representative to ensure design criteria are met.

Materials: *Add the following:*

Materials for Bridge Deck Concrete (BDC) shall conform to the requirements of Article M.03.01 amended as follows:

Coarse Aggregate: The mix shall be designed utilizing a nominal maximum size of No. 6 aggregate and shall also contain poly-vinyl-alcohol fibers.

Admixtures:

Microsilica may be allowed up to 10% by weight of cement

Fibers to be used shall be manufactured of poly-vinyl-alcohol (PVA) with a fiber diameter of 1.5 mils and a length between 0.3 inch and 0.5 inch. The surface of the fiber shall be oiled by the manufacturer with 1.2% (by weight) hydrophobic oiling compound along the length of the fiber. Fiber strength shall be a minimum of 232 ksi with a tensile elastic modulus of at least 5,800 ksi.

Water Reducing, High Range Admixture: Water reducing, high range admixture (superplasticizer) complying with ASTM C 494, Type F or G, ASTM C 1017, Type 1 or 2. In addition, the selected water reducing-high range admixtures should be comprised of a polycarboxylate chemical composition.

Retarding admixture shall comply with ASTM C 494, Type D and M.03.01.09

Neoprene Pads: Shall conform to M.03 of the Standard Specifications, or approved equal.

Table

Minimum Strength of BDC Material	7 day	14 day	28 day
Compressive	3200 psi	4000 psi	4500 psi
Flexural Performance Test (ASTM C1609)	500 psi	500 psi	500 psi

Trial Batch: The Contractor shall appoint a technical representative capable of making adjustments to the batching and mixing of BDC material. This representative must be familiar with the mixing, batching and placement of BDC material. The technical representative will designate a batching sequence of BDC material to ensure uniform fiber dispersion, and homogeneity of the material. The batching sequence must be reviewed and accepted by the Engineer. The technical representative shall be present at the trial batch and at the first placement of BDC material to make recommendations and adjustments.

A 4 c.y. trial batch shall be mixed and placed at the mix plant or as designated by the Engineer a minimum of 28 working days prior to full production. The Engineer must be notified of the time of the trial batch mix a minimum of 48 hours prior to batching. Quality assurance specimens shall be cast from this trial batch according to Article 6.01.03 of the Standard Specifications, and a Certified Test Report, prepared by an independent Laboratory, shall be furnished by the Contractor to validate the early age hardened properties of the BDC mixture.

The trial batch shall be prepared following the adjusted mix design and with the same materials that will be used in the BDC link slab mixture. For the trial batch to be considered successful, the concrete must be produced consistently, present a workable product, provide even fiber dispersion through a mixture rheology, upon similar placement conditions that is anticipated for the structure. The 7 and 14 day compressive and tensile strengths, and uniaxial tensile strain capacity must meet the requirements of this special provision as demonstrated by the Certified Test Report furnished by the Contractor.

Other concrete mixes that meet or exceed the minimum requirements specified in the Table shall also be acceptable for use under this item.

If a trial batch does not meet these requirements additional trial batches shall be repeated at no additional cost to the Department.

Construction Methods:

Construction Methods for this work shall conform to the requirements of Article 6.01.03, amended as follows:

The Contractor shall install temporary bulkheads in the bridge deck slab, where indicated on the plans, to define the limits of the Bridge Deck Concrete. Reinforcement shall pass through the temporary bulkheads. The bulkheads shall be removed after curing of the Concrete.

Prior to placement of the BDC all interfaces shall be wetted with a uniform spray application of water so that the surfaces are moist at the time of placement, with no standing water. Water collecting in depressed areas of the forms shall be blown out with clean, oil free, compressed air.

Sidewalk, curb or barriers shall not be cast on the bridge deck until the BDC has received a minimum of two (2) days continuous wet cure cycles. Heavy equipment is not allowed on the bridge deck until it has attained the 28 day strength listed in Table 2. Sidewalks, curbs and parapets within the link-slab span shall be cast of BDC material.

Neoprene Pads: Shall be placed on top of girder flanges, in accordance with the plans.

Method of Measurement: *Add the following:*

Bridge Deck Concrete shall be measured for payment by the actual volume in cubic yards of bridge deck concrete, complete and accepted, within the limits shown on the plans or as ordered by the Engineer.

Basis of Payment: *Add the following:*

Bridge Deck Concrete: This material will be paid for at the contract unit price per cubic yard for "Bridge Deck Concrete," complete in place, which price shall include the furnishing, installing and removing all temporary bulkheads, all materials, equipment, tools, labor and work incidental thereto, including, test batches, including placement equipment, heating, and all costs associated with the technical representative.

Pay Item

Bridge Deck Concrete

Pay Unit

c.y.

ITEM #0601188A - FULL DEPTH PATCH (CLASS "F" CONCRETE)

Description: Work under this item shall consist of the saw cutting concrete, removal of all deteriorated concrete for the full depth of the deck slab, preparation of existing surfaces, furnishing and installing deformed steel bars, and reconstructing the slab with new concrete, where directed by the Engineer and as hereinafter specified.

Materials: The materials shall conform to the following requirements:

- 1) High Early Strength Concrete – The high early strength concrete shall conform to one of the following:
 - a) The Contractor shall design and submit to the Engineer for approval a high early strength concrete mix. This mix shall be air-entrained, and shall be composed of Portland cement, fine and coarse aggregates, approved admixtures and additives, and water. The mix shall contain between 4 and 7 percent-entrained air, and shall attain a 6-hour compressive strength of 2,500 psi. Additionally, the mix shall contain shrinkage compensating additives such that there will be no separation of the patched area from the parent concrete. This shrinkage-compensating additive shall be utilized so as to produce expansion in the high early strength concrete of no more than 3 percent.
 - b) In lieu of the above high early strength concrete mix, the Contractor may propose the use of a proprietary type mix that will meet the same physical requirements as those stated above. The Contractor shall submit sufficient manufacturer's documentation to confirm the product meets the required percentages of each component to be utilized.
- 2) Regardless of the type of high early strength concrete proposed by the Contractor, substantive data that demonstrates the ability of the material to meet the specification requirements shall be submitted with the proposed mix design at least two weeks prior to its use.
- 3) Deformed Steel Bars (Epoxy Coated): Section 6.02.

Construction Methods: Construction methods shall conform to the following requirements:

- 1) Inspection of the Structural Slab: Before any existing concrete is removed from the structural slab, the Contractor will provide the Engineer clear access to the bridge deck. During this time, the Engineer will perform an inspection of the structural slab and designate areas where concrete removal will be required. Due to the nature of the operations, the inspection can be performed only after some existing materials, notably overlays and waterproofing systems, have first been removed from the structural slab. It shall be the responsibility of the Contractor to arrange the construction schedule so that the required operations may be performed without causing delay to the work.

No operations will be performed by the Engineer until after the following construction work has been completed:

- a) The existing bituminous overlay or concrete wearing course, if present, has been removed.

- b) The existing waterproofing system, if present, has been removed.

Note: The removal of those materials will be paid for under other applicable items.

It shall be the responsibility of the Contractor to inform the Engineer, in writing, of the date that a structure will be available for inspection operations. Notification shall be given to the Engineer at least seven (7) days prior to the date that the area in question will be in a condition acceptable to the Engineer.

The Contractor is hereby informed that the following time period will be necessary to perform the required inspection operations:

One working day with suitable weather conditions per each six thousand square feet, or portion thereof, of structural slab area.

The Contractor will not be allowed to do any further work to the exposed structural slab, until all necessary inspection operations have been performed, unless given permission by the Engineer.

The Contractor will include any costs related to the allowance for this inspection in the general cost of the work.

- 2) Removal of Deteriorated Concrete: All deteriorated concrete shall be removed within the limits shown on the plans and where ordered by the Engineer. The lateral limits of each area to be repaired will be delineated by the Engineer and suitably marked. Where several areas to be repaired are very close together, the Engineer may combine these individual patches into a large area. The outlines of each such area shall first be cut to a depth of one-half (1/2) inch with an approved power-saw capable of making straight cuts. In the event that reinforcing steel is encountered within the upper 1/2 inch depth during sawing operations, the depth of saw-cut shall immediately be adjusted to a shallower depth so as not to damage the steel bars. If so directed by the Engineer, saw cutting shall again be carried down to the 1/2 inch depth at other locations of repair provided reinforcing steel is not again encountered. Where over-breakage occurs resulting in a featheredge, the featheredge shall be squared up to a vertical edge in a manner to be approved by the Engineer. Where sawing is impractical, the areas shall be outlined by chisel or other approved means resulting in a cut square to the surface.

The removal of concrete shall be by hydro-demolition or pneumatic hammer methods and shall be governed by the applicable requirements set forth in the special provision Item "Partial Depth Patch" and as directed by the Engineer.

The Contractor shall take adequate measures to prevent concrete debris from falling to any area below the structure and onto adjacent roadway lanes. All debris shall be promptly cleaned up and removed from the site. All material removed shall be satisfactorily disposed of by the Contractor.

Where existing reinforcing steel is damaged or has insufficient cover as determined by the Engineer, it shall be cut out and replaced with new reinforcing steel the same size, with a minimum length for lap splices as indicated on the plans or as directed by the Engineer.

- 3) Surface Preparation: Sound existing reinforcing steel which is in the proper position in the slab shall be left in place and cleaned of all concrete. The smaller fragments shall be removed with hand tools or by water blast cleaning.

The newly exposed reinforcing steel and concrete faces shall be cleaned of loose or powder-like rust, oil solvent, grease, dirt, dust, bitumen, loose particles, and foreign matter just prior to patching, to the satisfaction of the Engineer.

Forms shall conform to the pertinent requirements of Article 6.01.03-3.

The cleaned concrete surface area to receive patching material shall be wetted for a one hour period immediately prior to placement of the concrete patch. Any standing water shall be blown out with compressed air prior to application of binding grout and patch material.

After wetting of the deck patch area to receive patching, and removal of the standing water, cement binding grout shall be scrubbed into the existing concrete bonding surface with stiff bristled brushes. All bonding surfaces in the patch area shall receive a coating of bonding grout within a time period not to exceed five (5) minutes prior to placement of the concrete patch material.

- 4) Mixing, Placing, and Finishing: Mixing and placing concrete shall be done in accordance with the applicable portions of Article 6.01.03. Mixing and placing shall not be executed unless the ambient temperature is above 40 degrees F. and rising.

The concrete mix shall be properly placed to insure complete contact around all reinforcing steel and against existing concrete at patch edges and compacted to a level slightly above the surrounding deck surface. Vibrators of the appropriate size shall be used for all consolidation of the concrete, regardless of the size of the patch area, with no hand tamping or rodding allowed.

Concrete may be moved horizontally with the aid of hand tools, but not with the use of vibrators. Excessive vibration shall be avoided.

Vibrating plates or vibrating screed shall be used on the surface of all patches for strike off and consolidation. After the concrete has been spread evenly and compacted to a level slightly above the adjacent concrete surface, the vibrating plate or screed shall be drawn over the surface at a uniform speed without stopping, in order to finish the surface smooth and even with adjacent concrete. The surface shall be float finished. Finishing operations shall be completed before initial set takes place.

- 5) Curing: Immediately after finishing of the patch area, a sheet of 4 mil polyethylene shall be placed over the repair area, in conjunction with insulating curing material. This material shall be a minimum of 2-inch thick closed cell extruded polystyrene insulation board that conforms with the requirements of ASTM C578. It shall have a minimum certified R-value of ten (10).

The insulating material shall extend a minimum of 12 inches beyond the limits of the patch area, and shall be kept in intimate contact with the surrounding payment surface to prevent lifting of the material. It shall be weighted down with sandbags that weight at least 15 pounds each. The sandbags shall be placed a minimum of two (2) feet on center

Cured patches, having a hollow sound when chain dragged or tapped (indicating delamination), shall be replaced by the Contractor at his expense until a patch acceptable to the Engineer is in place.

- 6) Tolerances of Finished Patch Surfaces: The surface profile of the patched area shall not vary more than one-eighth inch in a distance of 10 feet, when a 10 foot long straightedge is placed on the surface at any angle relative to the centerline of the bridge. Humps in the patch that exceed the one-eighth inch tolerance shall be ground down by approved machinery. Sags or depressions in the surface of the patch area that exceed one-eighth inch tolerance as determined by the Engineer shall be repaired by removal of the concrete in the depression to a depth of one inch and repaired in the previously described manner.
- 7) Testing: The Contractor shall form, cure and test all concrete test cylinders under supervision of a representative of the Department. The dimensions, type of cylinder mold, number of cylinders, and method of curing shall be as directed by the Engineer.

The Contractor shall provide and maintain a portable compressive testing machine, on site, for the purpose of testing all compressive strength cylinders. All testing shall be in accordance with the requirements of ASTM C39. NOTE: This compressive testing machine shall be calibrated in accordance with the provisions of Section 5, ASTM C39.

- 8) Time Schedule: Traffic will not be allowed on any areas where the Contractor has placed and finished concrete until the material has properly cured as specified, and has developed the required strength of 2,500 psi as determined by the compressive strength test, or until the Engineer authorizes its opening to traffic.

All work shall proceed as required by the "Maintenance and Protection of Traffic" and "Prosecution and Progress" specifications elsewhere within the contract documents.

Method of Measurement: This work will be measured for payment by the actual volume in cubic yards of replacement concrete, complete in place and accepted. No deduction will be made for the volume of reinforcing steel. Removal of concrete will not be measured for payment.

Basis of Payment: This work will be paid for at the contract unit price per cubic yard for "Full Depth Patch (Class "F" Concrete)" complete in place, which price shall include sawcutting and removal of concrete, surface preparation of concrete and reinforcing steel, furnishing and installing deformed steel bars, concrete placement, all equipment, tools, labor and work incidental thereto.

<u>Pay Item</u>	<u>Pay Unit</u>
Full Depth Patch (Class F Concrete)	C.Y.

ITEM #0602971A – DEBRIS SHIELD

Work under this item shall conform to the requirements of Section 9.71 supplemented and amended as follows:

Article 5.03.01 – Description: Add the following:

Description: Work under this item shall include designing, furnishing, installing, and removing protective shielding on the underside of the bridge to prevent unexpected fall of debris.

Working drawings and design calculations for the temporary shielding shall be submitted in accordance with the requirements of Article 1.05.02(a). The working drawings and design calculations shall be prepared, sealed and signed by a Professional Engineer, licensed in the State of Connecticut. The furnishing of such plans shall not serve to relieve the contractor of any part of his responsibility for the safety of the work or for the successful completion of the project. The debris shield shall not be installed at an elevation lower than the posted clearance height of 14’-9”.

Construction Methods: All work shall proceed as directed by and to the satisfaction of the Engineer in accordance with the details shown on the plans and the requirements of the "Maintenance and Protection of Traffic" special provision and the "Prosecution and Progress", contained elsewhere in these Specifications.

The debris shield shall not result in damage to any permanent construction (new or existing) or to adjoining property. If any damage does occur it shall be repaired by the Contractor to the satisfaction of the Engineer at no additional expense to the State.

The Contractor shall prepare and submit working drawings, computations, and written procedures for the debris shield to the Engineer for review. Acceptance of the Contractor's plans shall not be considered as relieving the Contractor of any responsibility.

Method of Measurement: This work, being paid for on a lump sum basis, will not be measured for payment.

Basis of Payment: This work will be paid for at the contract lump sum price for "Debris Shield", which price shall include the design, installation and removal of the debris shield, and all equipment, tools and labor incidental thereto.

<u>Pay Item</u>	<u>Pay Unit</u>
Debris Shield	L.S.

ITEM #0603082A – STRUCTURAL STEEL REPAIRS (SITE NO. 2)

Description: The work under this item is for the superstructure steel repairs as shown on the plans, exclusive of the steel keeper plates. Work under this item includes the preparation of the existing steel including the removal of portions of the existing ½” connection plates if required and drilling holes for the attachment of the repair, and the materials, fabrication, and installation of structural steel repairs in accordance with the plans, and as directed by the Engineer. Work under this item shall conform to the requirements of Section 6.03, supplemented and amended as follows.

Materials: All structural steel shapes and plates shall conform to AASHTO M270 Grade 50.

All bolts used in the structural steel repairs shall be A325 H.S. bolts.

Paint for shop painting of repair steel under this item shall be furnished by the same coating manufacturer selected for field painting under Item 0603729A. For the Carboline coating system, the shop primer shall be Carbocoat 115; for the Sherwin Williams coating system the shop primer shall be Copoxy Shop Primer.

Qualification of Shop Painting Firm: All shop painting of structural steel must be performed by and in an enclosed shop that is certified by the SSPC Painting Contractor Certification Program QP-3, entitled “Standard Procedure for Evaluating Qualifications of Shop Painting Contractors” in the enclosed shop category, or that holds an AISC Quality Certificate with a “Sophisticated Paint Endorsement” in the enclosed shop category. They shall be fully certified, including endorsements, for the duration of the time they are performing the surface preparation and coating application. A copy of the subject certification shall be provided to the Engineer prior to commencing any surface preparation or coating application.

The Contractor or Shop shall provide at least one Quality Control (QC) Inspector for the duration of the shop application to provide Quality Control. The QC Inspector must be a National Association of Corrosion Engineers (NACE) Coating Inspector Certificated with Peer Review. The QC Inspector shall verbally inform the Engineer on a daily basis, of the progress and any corrective actions performed on the coating work. The QC Inspector shall be present during all cleaning and coating operations.

Construction Methods: The contractor shall field verify web section losses after the beam ends have been cleaned and before the steel web repair plates have been ordered. If the section losses differ than those noted in the 2013 routine inspection report, the engineer shall be immediately notified to evaluate if alternate repair details are required.

The contractor shall remove any portions of the existing ½” connection plates required to obtain proper fitup of the steel web repair plates.

The contractor shall remove all loose paint, debris and corrosion from the area of the existing web where the plates are to be attached. This removal of loose paint, debris and corrosion from existing steel will be paid under item 0603729A, Localized Paint Removal and Field Painting of Existing Steel.

Surface Preparation for Shop-Applied Primer: The following shall be performed prior to abrasive blast cleaning of steel members:

1. All corners and edges shall be rounded to a 1/16-inch radius or chamfered to a 1/16-inch chamfer.
2. All fins, slivers and tears shall be removed and ground smooth.
3. All rough surfaces shall be ground smooth.
4. Flame cut edges shall be ground over their entire surface such that any hardened surface layer is removed, and subsequent abrasive blast cleaning produces the specified surface profile depth.

Immediately before abrasive blast cleaning in the shop all steel members shall be solvent cleaned in accordance with SSPC-SP1 - "Solvent Cleaning."

Abrasive blast cleaning in the shop shall be performed in accordance with SSPC-SP 10 - "Near White Blast Cleaning" using a production line shot and grit blast machine or by air blast. The abrasive working mix shall be maintained such that the final surface profile is within the range specified elsewhere in this specification.

The QC Inspector for shop painting shall test the abrasive for oil, grease or dirt contamination in accordance with the requirements of ASTM D7393 and document the test results. Contaminated abrasive shall not be used to blast clean steel surfaces. The blast machine shall be cleared of all contaminated abrasive and then solvent cleaned thoroughly in accordance with SSPC-SP 1 "Solvent Cleaning". New uncontaminated abrasive shall be added. Abrasive shall be tested for contaminants in accordance with the requirements of ASTM D7393 prior to the start of blast cleaning operations and at least every four hours during the blast cleaning operations.

No surface preparation or coating shall be done when the relative humidity is at or above 80 percent or when the surface temperature of the steel is less than five (5) degrees Fahrenheit above the dewpoint temperature as determined by a surface thermometer and an electric or sling psychrometer.

Surface Profile for Shop-Applied Primer: The steel surface profile shall be 1 to 3 mils. Each piece shall have the surface profile measured at a minimum of three locations on one piece at the beginning of abrasive blast operations and at least every four hours and at the end of abrasive blast cleaning operations. This measurement shall be performed with both coarse (0.8-2.0 mils) and extra coarse (1.5-4.5 mils) replica tape. During this measurement, special attention shall be given to areas that may have been shielded from the blast wheels, such as the corners of stiffeners and connection plates. The impressed tapes shall be filed in the NACE Coating Inspector's Log Book. Note: When measuring the profile on the tape, 2 mils shall be subtracted (non-compressible mylar thickness) from the micrometer reading as indicated on each piece of tape.

A surface profile correction factor shall be measured in accordance with SSPC-PA 2 section 2.2.4 with a "Type 2" magnetic film thickness gage.

Conventional spray equipment with mechanical agitators shall be used for prime coat application.

All storage, mixing, thinning, application and curing techniques and methods shall be accomplished in strict accordance with the printed material data sheets and application instructions published by the respective coating material manufacturer.

Surfaces shall be painted with the specified prime coat material before the end of the same work shift that they were blast cleaned and before any visible rust back occurs. Applied coatings shall not have runs, sags, holidays, pinholes or discontinuities.

The dry film thickness shall be within the range specified in the manufacturer's printed literature for the specified coating system. Dry film thickness shall be measured in accordance with SSPC-PA 2.

Areas Requiring Special Treatment: All steel surfaces shall receive the one-coat shop applied primer as specified, except the following particular area types which shall be treated as follows:

1. All steel surfaces within four (4) inches of field welds shall receive only a single mist coating of primer at 0.5 - 1.5 mils dry film thickness.
2. Top surfaces of top flanges that will be in contact with concrete shall receive only a single mist coating of primer at 0.5 - 1.5 mils dry film thickness.
3. Edges and shop welds shall be locally hand-stripped with a brush in the longitudinal direction with an additional coat of the primer prior to shipment. The application of the striping materials shall be in accordance with the coatings manufacturer's written instructions. The striping material shall be a contrasting color to distinguish it from the primer.

Protection of Primed Structural Steel: All prime coated and cured assemblies shall be protected from handling and shipping damage with the prudent use of padded slings, dunnage, separators and tie downs. Loading procedures and sequences shall be designed to protect all coated surfaces.

Using the fabricated web plates as templates, the contractor shall drill holes in web of existing stringers necessary to attach web plates and angles. Contractor shall not use a cutting torch. The contractor shall install steel web repair plates and angles as specified in the drawings.

Field touch-up painting with the primer shall be undertaken by the Contractor for the repair of coated surfaces damaged during shipment and/or construction, as directed by the Engineer. Bolts, nuts, washers and surrounding areas shall receive brush applications of primer paint after final tensioning. Careful attention shall be given to bolted connections to insure that all bolts, nuts and washers are fully coated and that no gaps are left unfilled and uncoated. Touch-up shall adhere to the manufacturer's recommendations.

Final topcoat field painting of the repair steel and portions of the stringers as indicated on the drawings shall be paid under item 0603729A.

Method of Measurement: This work will be measured for payment by the hundred weight (CWT) of "Structural Steel Repairs".

Basis of Payment: This work will be paid for at the contract unit price per hundred weight (CWT) for "Structural Steel Repairs (Site No. 2)", which price shall include structural steel, complete in place, which price shall include furnishing, fabricating, transporting, storing, all welding and weld inspection, and all materials, equipment, tools, labor and work incidental thereto.

Pay Item
Structural Steel Repairs (Site No. 2)

Pay Unit
C.W.T.

ITEM #0603591A – STRUCTURAL STEEL – MISCELLANEOUS

Description: The work under this item is for the 1” thick vertical keeper plates with headed anchors. Work under this item includes materials, fabrication and installation of the plates for the keeper blocks. Work under this item shall conform to the requirements of Section 6.03, supplemented and amended as follows

Materials: Steel keeper plates shall conform to AASHTO M270 Grade 50.

Construction Methods: Steel keeper plates shall be fabricated as shown on the plans. After the studs have been welded, the plates shall be hot-dip galvanized in accordance with the applicable requirements of ASTM A123. The steel keeper plate assemblies shall be installed as shown on the plans.

Method of Measurement: This work will be measured for payment by the hundred weight (CWT) of keeper plates installed.

Basis of Payment: This work will be paid for at the contract unit price per hundred weight (CWT) for “Structural Steel - Miscellaneous”, which price shall include the steel keeper plates, complete in place, which price shall include furnishing, fabricating, galvanizing, transporting, storing, and all materials, equipment, tools, labor and work incidental thereto.

Pay Item
Structural Steel - Miscellaneous

Pay Unit
C.W.T.

ITEM #0712010A - REINFORCED SOIL SLOPE

Description: This work shall consist of furnishing material for and constructing a reinforced soil slope, reinforced with geosynthetic soil reinforcement, in accordance with these specifications and in reasonable close conformity to the lines, grades, and dimensions shown on the plans or as directed by the Engineer.

Materials: Materials shall conform to the following requirements

1 - Geosynthetic Reinforcement Material - The geosynthetic reinforcement shall consist of a geogrid or geotextile that can develop sufficient mechanical interaction with the surrounding soil or rock. The geosynthetic reinforcement structure shall be dimensionally stable, able to retain its geometry under construction stresses, and shall have high resistance to damage during construction, to ultraviolet degradation, and to all forms of chemical and biological degradation encountered in the soil being reinforced. The permeability of the geosynthetic reinforcement shall be greater than the permeability of the reinforced fill soil.

Geogrid used as geosynthetic reinforcement shall be a regular network of integrally connected polymer tensile elements consisting of either polypropylene (PP), polyethylene (HDPE), or polyester (PET). The geogrid shall have certified properties as shown in Table 1.

Geotextile used as geosynthetic reinforcement may be woven or nonwoven but no "slit-film" woven fabrics will be permitted. The geotextile shall have certified properties as shown in Table 2. All property values represent Minimum Average Roll Value (MARV) in the weakest principal direction and shall meet or exceed the values stated below.

The Contractor shall submit a manufacturer's certification that the geosynthetic supplied meets the requirements as shown in the respective table, measured in full accordance with all test methods and standards specified, as set forth in these specifications, and in conformance with Article 1.06.07.

The geosynthetic reinforcement shall be manufactured with a high degree of quality control. The Manufacturer is responsible for establishing and maintaining a quality control (QC) program to ensure compliance with the requirements of the specification. The purpose of the QC testing program is to verify that the geosynthetic reinforcement being supplied to the project is representative of the material used for performance testing and approval by the department.

Conformance testing shall be performed as part of the manufacturing process and may vary for each type of product. As a minimum, the following index tests shall be considered as applicable for an acceptable QA/QC program: Wide Width Tensile (ASTM D-4595 for geotextiles and ASTM D-6637 for geogrids); Specific Gravity (HDPE only, ASTM D-1505); Melt Flow Index (HDPE and PP only, ASTM D-1238); Intrinsic Viscosity (PET only, ASTM D-4603); Carboxyl End Group (PET only, ASTM D-2455); and Single Rib Tensile (Geogrid only, ASTM D-6637). Sampling and conformance testing shall be in accordance with ASTM D-4354. Conformance testing procedures shall be established as noted in the specification. Geosynthetic product acceptance shall be based on ASTM D-4759.

The quality control certificate shall include roll number and identification, sampling procedures, and results of control test (including a description of test methods used).

Table 1

Geogrid Type	Property	Test Method	Criteria
All Polymers	Long Term Allowable Tensile Strength (T_{all})	GRI:GG4, where $T_{all} = T_{ult} / (RF_{CR} * RF_{ID} * RF_D)$	Min. 1000 lbs./ft. (Machine Direction) Min. 220lbs./ft. (Cross-machine Direction)
Polyester	Geogrid Rib Tensile Strength (T_{ult})	ASTM D6637	Min. 2420 lbs./ft.
Polypropylene	Geogrid Rib Tensile Strength (T_{ult})	ASTM D6637	Min. 4840 lbs./ft.
Polyethylene	Geogrid Rib Tensile Strength (T_{ult})	ASTM D6637	Min. 3025 lbs./ft.
Polyester	Creep Reduction Factor (RF_{CR})	ASTM D 5262	Min. 2.0
Polypropylene	Creep Reduction Factor (RF_{CR})	ASTM D 5262	Min. 4.0
Polyethylene	Creep Reduction Factor (RF_{CR})	ASTM D 5262	Min. 2.5
All Polymers	Installation Damage Reduction Factor (RF_{ID})	ASTM D 5818	Min. 1.1
Polyester	Durability Reduction Factor (RF_D)	Hydrolysis Degradation Testing (extrapolated to 100yrs)	Min. 1.1
Polypropylene and Polyethylene	Durability Reduction Factor (RF_D)	Oxidation Degradation Testing (extrapolated to 100yrs)	Min. 1.1

Table 2

Property	Test Method	Elongation	
		<50% ^A	≥50% ^A
Grab Strength -lbs	ASTM D4632	315	202
Sewn Seam Strength ^B -lbs	ASTM D4632	283	182
Tear Strength -lbs	ASTM D4533	112	79
Puncture Strength - lbs	ASTM D6241	618	433
Ultimate Strength (T _{ult}) -lbs/ft	ASTM D4595	Min. 2530	
Long Term Allowable Tensile Strength (T _{all}) - lbs/ft	FHWA ^C	Min. 1000	

^A As determined in accordance with ASTM D4632. The strengths specified in the columns labeled “<50%” and “≥50%” refer to the elongation at which the geotextile material was tested. For example; if a fabric is tested at 15% elongation, then it must meet or exceed the minimum strength shown in the “<50%” column. Submittals must include the percent elongation at which the material was tested.

^B When sewn seams are required.

^C The Long Term Allowable Tensile Strength shall be determined by applying appropriate reduction factors to the Ultimate Tensile Strength of the geotextile to account for installation damage, survivability, creep, durability and degradation. A 100-year design life shall be used in determining the long term allowable tensile strength. The FHWA methodology (FHWA NHI-00-043 (Elias et al., 2001)) shall be used for this computation. Proposed strength and reduction factors are subject to approval. Minimum durability reduction factor is 1.15. Minimum installation damage factor is 1.10. The creep reduction factor should be developed from creep tests performed in accordance with ASTM D5262 and is subject to the minimums presented in Table 1 for the respective material.

2 - Compacted Granular Fill - Compacted Granular Fill shall conform to the requirements of Article M.02.01.

3 - Turf Establishment with Erosion Control Matting - The materials for this work shall conform to the requirements of Article M.13. The Erosion Control Matting shall be Class 1, Type D. Anchors for the Erosion Control Matting shall be a 9 gage-U Shaped Staple, with a minimum dimension of 12"x1"x12".

Construction Methods: The Contractor shall insure that during all periods of shipment and storage, the geosynthetic material is protected from mud, dirt, all deleterious materials that might become affixed to it, and temperatures greater than 140°F. Follow manufacturer's recommendations with regards to protection from direct sunlight. At the time of installation, the geosynthetic shall be free of any defects, including, but not limited to tears, punctures, flaws, deterioration, or any damage due to manufacture, transportation, and storage.

All areas beneath the installation area for the geosynthetic reinforcement shall be properly prepared as detailed on the plans, specified within this specification, or as directed by the Engineer. All excavation required for construction of the slope shall conform to Article 2.02. Subgrade surfaces shall be level. The subgrade surface shall also be free from deleterious materials, loose soil, topsoil, organic soils, frozen soil, or any other unsuitable material. Prior to placement of geosynthetic reinforcement, subgrade shall be proof-rolled to provide a uniform and firm surface. Any soft areas, as determined by the Engineer, shall be excavated and replaced with suitable compacted soils. The foundation surface shall be inspected and approved by the Engineer prior to placement of geosynthetic and Compacted Granular Fill. Benching the backcut into competent soil shall be performed as shown on the plans or as directed by the Engineer and in conformance with Subarticle 2.02-5, paragraph 3, so as to ensure stability.

The geosynthetic shall be installed in accordance with the plans, specifications, and manufacturer's recommendation. The geosynthetic reinforcement shall be placed within the layers of the Compacted Granular Fill as shown on the plans, or as directed by the Engineer.

The primary geosynthetic reinforcement shall be placed in continuous, longitudinal strips in the direction of main reinforcement. The secondary geosynthetic reinforcement may be placed with the cross-machine (weak) direction placed perpendicular to the roadway. If the Contractor is unable to complete a required length with a single continuous length of geogrid, a joint may be made with the Engineer's approval. Only one joint per length of geogrid shall be allowed. This joint shall be made for the full width of the strip by using a similar material with similar strength. Joints in geogrid reinforcement shall be pulled and held taut during placement of Compacted Granular Fill. The minimum length of geogrid placed shall be 6 feet. For primary geogrids, joints shall not be placed within 6 feet of the slope face. Adjacent, overlying, and underlying rolls of geogrid shall not have a joint within 6 feet of each other. Joints shall not be permitted with geotextiles.

Horizontal coverage of less than 100% shall not be allowed. Adjacent strips of geosynthetic need not be overlapped as long as 100% coverage is maintained.

Place only that amount of geosynthetic reinforcement required for immediately pending work to prevent undue damage. After a layer of geosynthetic reinforcement has been placed, the next succeeding layer of soil shall be placed and compacted as appropriate. After the specified

soil layer has been placed, the next geogrid reinforcing layer shall be installed. The process shall be repeated for each subsequent layer of geogrid reinforcement and soil.

Geosynthetic reinforcement shall be placed to lay flat and pulled tight prior to backfilling. After a layer of geosynthetic reinforcement has been placed, suitable means, such as pins or small piles of soil, shall be used to hold the geosynthetic reinforcement in position until the subsequent soil layer can be placed.

During construction, the surface of the fill should be kept approximately horizontal. Geosynthetic reinforcement shall be placed directly on the Compacted Granular Fill surface. Geosynthetic reinforcements are to be placed within 3 inches of the design elevation view unless otherwise directed by the Engineer. The Contractor shall verify correct orientation of the geosynthetic reinforcement.

Compacted Granular Fill shall be placed and compacted as specified in Article 2.14, with the following amendments. The Contractor shall be allowed a maximum lift of 12 inches. In addition, the Compacted Granular Fill shall be placed, spread, and compacted in such a manner to minimize the development of wrinkles and/or displacement of the geosynthetic reinforcement. The Compacted Granular Fill shall be graded away from the slope crest and rolled at the end of each work day to prevent ponding of water or erosion on the surface of the reinforced soil mass.

Tracked construction equipment shall not be operated directly upon the geosynthetic reinforcement. A minimum fill thickness of 6 inches is required prior to operation of tracked vehicles over the geosynthetic reinforcement. Turning of tracked vehicles should be kept to a minimum to prevent tracks from displacing the fill and the geosynthetic reinforcement.

The Engineer may allow rubber tired equipment to pass over the geosynthetic reinforcement at speeds less than 10mph. Sudden braking and sharp turning shall be avoided.

Turf Establishment with Erosion Control Matting shall be placed as specified in Article 9.50. Seeding and/or mulch shall be placed prior to placement of Erosion Control Matting. The Turf Establishment with Erosion Control Matting shall be performed immediately upon completion of each 5 foot vertical section of geosynthetic reinforcement and Compacted Granular Fill. Anchors shall be placed and spaced such that there is 1 anchor per 2 square feet of matting. The Erosion Control Matting shall be placed horizontal along the face of the slope with the upper matting overlapping the lower matting by 12". Anchors shall be placed in the center of the overlap with 1 foot spacing.

The Contractor shall begin construction of the reinforced soil slope no earlier than March 15th, and have the reinforced slope constructed, seeded, and Erosion Control Matting installed by October 15th of the same calendar year. Out of season seeding will not be permitted.

The Contractor shall construct and maintain the temporary soil berm as shown on the plans. The temporary soil berm shall be placed immediately upon completion of the placement of all the geogrid reinforcement and Compacted Granular Fill. It shall remain in place and be maintained by the Contractor until placement of the pavement and barrier curb on top of the slope, as shown on the plans, has been completed.

Method of Measurement: This work will be paid for on a lump sum basis and will not be measured for payment.

Basis of Payment: This work will be paid for at the contract lump sum price for “Reinforced Soil Slope”, complete in place, which price shall include all work shown within the pay limits shown on the contract drawings for the reinforced soil slope including but not limited to the following: supply and installation of Geosynthetic reinforcement; Compacted Granular Fill; Turf Establishment with Erosion Control Matting; temporary soil berm and outlet; and earth excavation. The price shall also include all tools, labor, equipment, and material incidental thereto. If boulders in excess of 1 cubic yard are encountered in the excavation, the boulder(s) shall be removed and paid for in accordance with Article 2.02, “Rock Excavation”.

Pay Item	Pay Unit
Reinforced Soil Slope	L. S.