

October 19, 2017

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATION
DEPARTMENT OF ADMINISTRATION

DIVISION OF PURCHASES BID NO. 7565515

RHODE ISLAND DEPARTMENT OF TRANSPORTATION

RHODE ISLAND CONTRACT NO.2017-CB-062

FEDERAL-AID PROJECT NO. FAP Nos: BHO-0012(003)

Central RI Bridges-Group 12

Cities/Towns of Charlestown, Coventry, Cranston, East Greenwich, Hopkinton, Providence, Richmond, Warwick,
West Greenwich, West Warwick and Westerly, Counties of Providence, Kent, and Washington.

CITY/TOWN OF

COUNTY OF

NOTICE TO PROSPECTIVE BIDDERS

ADDENDUM NO. 2 Prospective bidders and all concerned are hereby notified of the following changes in the Plans, Specifications, Proposal and Distribution of Quantities for this contract. These changes shall be incorporated in the Plans, Specifications, Proposal and Distribution of Quantities, and shall become an integral part of the Contract Documents.

A. Distribution of Quantities

1. Item Code 800.9901 Furnish, Fabricate, Install and Remove Temporary Working Platform
Delete Index 1, Index 2, Index 3, and Page 6 of 32 on their entirety and replace with Index 1 (R-1), Index 2 (R-1), Index 3 (R-1), and Page 6 of 32 (R-1) attached to this Addendum No. 2. The quantity for Item Code 800.9901 has been revised.

B. Specification Change/Addition

1. Item Code 800.9901 Furnish, Fabricate, Install and Remove Temporary Working Platform
Delete Page JS-13 in its entirety and replace it with revised Page JS-13 (R-1) attached to this Addendum No. 2. The specification has been revised.
2. Item Code 803.9901 Remove and Dispose Existing Deck Joint
Delete Page JS-15 in its entirety and replace it with revised Page JS-15 (R-1) attached to this Addendum No. 2. The specification has been revised.
3. Item Code 808.9901 Bridge 26 Fiber Wrap Floor Beam
Delete pages JS-16 through JS-20 in their entirety and replace it with revised Pages JS-16 (R-1) through JS-20 (R-1) attached to this Addendum No. 2. The specification has been revised.

4. Item Code 817.9901 Concrete Grout Filled Fabric Bags

Delete Pages JS-30, JS-32, and JS-33 in their entirety and replace it with revised Pages JS-30 (R-1), JS-32 (R-1), and JS-33 (R-1) attached to this Addendum No. 2. The specification has been revised.

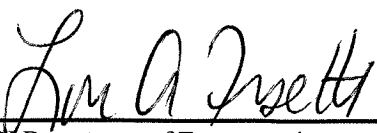
5. Item Code 817.9902 Cementitious Grout for Underwater Repair

Delete Pages JS-34 through JS-36 in their entirety and replace it with revised Pages JS-34 (R-1) through JS-36 (R-1) attached to this Addendum No. 2. The specification has been revised.

C. Drawings/Plans - Change/Addition

1. Floorbeam "H" Repair (Natick Bridge No. 26)

Delete Sheet 20 in its entirety and replace it with revised Sheet 20 (R-1) attached to this Addendum No. 2. The sheet has been revised.



RI Department of Transportation
Administrator, Division of Project Management

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| Item No. | Item Code | Description | UM | Qty. | Pay Code | Seq. No. |
|----------|-----------|--|----|-----------------------------|----------|------------------|
| 021 | 800.9901 | Cont. REMOVE TEMPORARY WORKING PLATFORM | | | | |
| | | PROJECT WIDE | | | | |
| | | BRIDGE NO. 199 | | 5,277.00 | 0014 | 01 |
| | | BRIDGE NO. 26 | | 6,985.00 | 0014 | 01 |
| | | BRIDGE NO. 27 | | 6,199.00 | 0014 | 01 |
| | | BRIDGE NO. 28 | | 5,556.00 | 0014 | 01 |
| | | | | Item 800.9901 Total: | | 24,017.00 |
| 022 | 803.0500 | TEMPORARY DECK UNDERSIDE AND SIDE PROTECTIVE SHIELDING | SF | | | |
| | | PROJECT WIDE | | | | |
| | | BRIDGE NO. 421 | | 48.00 | 0014 | 01 |
| | | BRIDGE NO. 423 | | 248.00 | 0014 | 01 |
| | | BRIDGE NO. 920 | | 1,520.00 | 0014 | 01 |
| | | | | Item 803.0500 Total: | | 1,816.00 |
| 023 | 803.9901 | REMOVE AND DISPOSE EXISTING DECK JOINT | LS | | | |
| | | PROJECT WIDE | | | | |
| | | BRIDGE NO. 270 | | 1.00 | 0014 | 01 |
| | | | | Item 803.9901 Total: | | 1.00 |
| 024 | 803.9902 | REMOVE AND DISPOSE HAND RAIL | LF | | | |
| | | PROJECT WIDE | | | | |
| | | BRIDGE NO. 47 | | 47.00 | 0014 | 01 |
| | | | | Item 803.9902 Total: | | 47.00 |
| 025 | 807.0350 | POINTING & GROUTING MASONRY | LF | | | |
| | | PROJECT WIDE | | | | |
| | | BRIDGE NO. 28 | | 46.00 | 0014 | 01 |
| | | BRIDGE NO. 36 | | 80.00 | 0014 | 01 |
| | | | | Item 807.0350 Total: | | 126.00 |

access, repairs to shield, locating rebars, removal and disposal of protective shield and all other incidentals required to finish the work, complete and accepted by the Engineer.

The assumed area of work platform required is the full bridge width plus 5 feet outside each fascia multiplied by the span length measured face of abutment to face of abutment. Any vertical portions of the work platform shall be incidental to the costs of the platform.

the Engineer would endanger the stability of the structure to remain or cause a hazard to vehicular or pedestrian traffic, will not be allowed. Concrete removal along the phase lines shall be performed in a manner such that portions of the structure to remain are in no way damaged and a neat sawcut line meeting the dimensions on the plans is produced.

All removed materials shall be taken from the site to an approved destination as the work progresses. Storing or burying of material/debris on site shall not be permitted.

Existing reinforcement, designated to remain in place, shall be cut and bent as shown on the plans. The Contractor shall not be allowed to place power tools in direct contact with the reinforcing steel to remain.

Note: The Contractor should be aware of the existence of electrical wiring within conduits in portions of the concrete safety walk/parapet to be removed. Prior to commencement of any removal work, the Contractor shall verify that all such electrical services are inactive.

METHOD OF MEASUREMENT: This item will not be measured for payment.

BASIS OF PAYMENT: "Remove & Dispose Existing Deck Joint", shall be paid for at the contract "Lump Sum" price as listed in the Proposal. The price so stated shall constitute full compensation for all labor, materials, equipment, access, protection of persons and environment and all other incidentals required to finish the work, as described above and elsewhere in the Contract Documents, complete in place and accepted by the Engineer.

Any item not covered in these Special Provisions, but shown on the plans, shall be included in the Contract Lump Sum Price for this item.

CODE 808.9901

BRIDGE 26 FIBER WRAP FLOOR BEAM

DESCRIPTION: This work shall consist of preparing the concrete surfaces and furnishing and placing Fiber Reinforced Polymer (FRP) wrap materials to the Floor beam "H" at Bridge No. 002601, as shown on plans. The fiber wrap system shall serve to provide shear strengthening and protect the cracked concrete from moisture. Also included in this item of work is the testing and inspecting the FRP wrap surfaces in accordance with the provisions this specification. The removal and disposal floor beam mounted pipe support and installation of the new gas pipe support shall be included in this item.

MATERIALS: The intent of the FRP wrap is to provide shear strengthening, and to act as a protective barrier to the floor beam. The glass FRP composite system must be a proprietary system consisting of all associated fiber reinforcement and polymer adhesive/resins. All FRP materials shall be provided by one Manufacturer.

| PROPERTY | Unidirectional Carbon Composite System Requirement | ASTM TEST METHOD |
|---|---|-------------------------|
| Ultimate Tensile Strength in primary fiber direction, min. | 60,000 psi | D 3039 |
| Ultimate Breaking Load in primary fiber direction, min. | 2,900 lb/in width | D 3039 |
| Elongation (%): Minimum Maximum | 1.5 4.0 | D 3039 |
| Tensile Modulus, min. | 3,000 ksi | D 3039 |
| Stiffness in primary fiber direction based on the unit width of one-layer of cured FRP system. Modulus times measured area (E x A). | 150 kips/inch | D 3039 |
| Corresponding Thickness per layer, | 0.05 inches | N/A |

Protective Coating for the FRP system shall be an Ultraviolet Light (UV) protective coating that is certified by the FRP system supplier. The color of the protective coating shall match the color of the concrete of the floor beam.

SUBMITTALS: The Contractor shall submit the design calculations, working drawings, supporting details for approval, which shall include details for the placement of FRP, to obtain a

watertight closure so there are no gaps in the protection. The working drawings shall include the method of installation.

Design the composite system per ACI 440.2R-08 and ICC ES AC125 design criteria, to achieve the structural performance shown on this specification. Calculations shall conform to requirements set forth in both ACI 440.2R-08 and the ICC ES AC125 and be based on the design modulus and associated area of the composite to be installed. Design values must be lower than the calculated mean determined from the test results received from the ASTM D3039 field test specimens. All submittals shall be stamped by a Professional Engineer, licensed and registered to practice in the State of Rhode Island.

The Fiber Reinforced Polymer (FRP) system shall be design for the shear capacity of 130^{kips} for the floor beam.

WORKING DRAWINGS: The working drawings shall contain lay out plans showing fabric panel layouts and placement for all faces, details of the concrete preparation; dry sheet, fabric or winding thickness; installed thickness of the composite system; fiber volume; details of joints, laps, drip loops, end treatments, corner treatments, floor beam, plan for curing, if required; methods for fabrication of test samples, and all information required for the proper construction of the system.

Working drawings shall include the precautions that are necessary to protect workers and the public from hazardous materials that may be present or generated during composite construction. Measures to be taken in case of an exothermic reaction shall also be specified.

The working drawings shall also include the material supplier's name, material safety data sheets and commercial material designation for all materials used. The following properties for the resin shall be included with the working drawings: mix ratio by weight and volume, pot life, shelf life, resin gel time at proposed air temperatures, mixing and application temperature ranges. Any environmental conditions (temperature, humidity, etc.) and curing procedures required for installation shall be noted on the working drawings. All materials shall be certified by the responsible manufacturer or supplier.

CONSTRUCTION METHODS: The FRP wrap material shall be applied to the floor beam, where shown on the plans.

The gas main pipe support shall be removed from Floorbeam H to perform concrete and fiber wrap repairs. A temporary support shall be installed 2 feet from the existing floor beam to allow for the existing support removal and concrete work to be performed. When the work is complete a new support shall be installed back on Floorbeam H and the temporary support removed. The following are the associated responsibilities for the gas main support:

- National Grid shall supply all temporary and final permanent materials for the gas

adjustments.

- The gas pipe support installation and removal will need to be performed by a National Grid approved gas piping contractor hired by the bridge contractor.
- The supply and installation of the anchors within the bridge concrete deck and angle attachment at the deck for the temporary support will be the responsibility of the bridge contractor.
- The reinstallation of the angle support on Floorbeam H and gas support mounting holes will be the responsibility of the bridge contractor.
- A National Grid inspector must be on site during the gas support installations.

Deteriorated concrete shall be repaired in accordance with Section 817 and as noted on the plans.

The storage and handling and application of materials for the FRP composite work shall be in accordance with the manufacturer's recommendations. Materials shall be protected from dirt, moisture, chemicals, extreme temperatures and physical damage.

Concrete surfaces to receive an application of FRP material shall be prepared by blast cleaning to remove all loose material, dirt and debris. Concrete corners shall be rounded by forming to a radius of one inch.

The surface to receive the FRP composite shall be free from fins, sharp edges and protrusions that may cause punctures, voids or depressions behind the installed FRP composite or that, in the judgement of the Engineer, will damage the fibers. Voids or depressions are defined as volume greater than 1/2 inch in diameter by 1/4-inch-deep when measured with a 12-inch-long, straight edge placed on the structural member surface. Existing uneven surfaces to receive FRP composite, including voids or depressions shall be filled with compatible epoxy filler or made smooth by grinding the concrete.

Submit a list of completed surface bonded FRP composite strengthening projects completed with the manufacturer's FRP system in the past 3 years. The list should include at a minimum 5 projects with proposed FRP system, the dates of work, description and amount of work performed.

The FRP composite system shall be installed by certified applicator with written consent from manufacturer that the contractor has been trained. The certified applicator shall prove a minimum of 3 years experience in performing retrofits using FRP systems and submit a list of no fewer than 5 successful installations.

An experienced technical representative employed by the manufacturer of the FRP composite material that has experience in at least 5 different projects of installations of the system used, shall be present during all phases of the preparation and placement and shall observe all

aspects of the operation. After installation is completed, the representative shall certify to the Engineer in writing that the FRP composite material was installed in accordance with the manufacturer's requirements.

The FRP composite materials shall be installed by the Contractor in accordance with the working drawings and procedures approved by the Engineer. The completed and properly cured FRP composite shall be coated with paint of the type and thickness specified by the manufacturer to provide ultraviolet protection and match the color of adjacent concrete. Details of the paint system are to be shown on the working drawings.

DAILY INSPECTION: Daily inspection shall be performed by the Contractor, as part of quality control. Daily inspection shall include date and time of work, including any repair; ambient and concrete surface temperatures; relative humidity; general weather conditions; surface dryness per ACI 503.4; surface preparation and surface profile using International Concrete Repair Institute surface profile chips; qualitative description of surface cleanliness; type of auxiliary heat source, if any; hairline crack width less than 1/16" not injected with epoxy; fiber of procured laminate batch numbers and their locations in the structure; batch numbers, mixture ratios, mixing, times, and qualitative descriptions of the appearance of all mixed resin, primers, putties, saturants, adhesives, and coating; observations of the progress of the cure of resins; conformance with installation procedures; location and size of any delaminations or air void; and the general progress of work. The Engineer may also choose to perform inspections, with safe access provided by the Contractor, at no additional cost to the State.

INSPECTION FOR DEBONDING AND FULL SATURATION OF FABRIC: After at least 24 hours for the initial curing of the resin and as part of the Contractors QC duties, the Contractor shall perform a visual inspection and an acoustic tap test (with a ball peen hammer) of the surface shall be performed for any swelling, bubbles, voids, or delaminations. If an air pocket is suspected, an acoustic tap test (light tap) shall be carried out with a ball peen hammer to identify delaminated areas by sound, with at least one per 1 sq. ft. Defects smaller than ¼ inch in diameter shall require no corrective action. Defects larger than 1/4 inch in diameter shall be repaired. No excessive force shall be used when performing a sounding test. Any damage resulting from sounding tests shall be repaired at no additional cost to the State.

Adhesion per ASTM D4541 shall be performed to ensure that adequate adhesion is achieved. An appropriate adhesion strength shall be provided by the Manufacturer's Design Engineer. The frequency of the tests shall be one per batch. The location should be as provided by the Manufacturer's Design Engineer so as not to compromise the integrity of the repair. An area adjacent to the repair, not required for the structural repair, may be treated with the FRP for use as a test site.

All surfaces shall be examined for any indication that the fabric is not completely saturated. All locations that are not properly saturated will be repaired. All repairs shall be in accordance

with the manufacturer's guidelines and with the approval of the Engineer.

ACCEPTANCE: The Contractor shall prepare a set of test samples that shall be placed in the cover of a 4-ounce sample can and cured directly with the FRP application in the field. The cover shall be kept horizontal to maintain a level exposed surface of the resin. The Contractor shall also provide samples of the components from the materials on site. The reference samples will be mixed and cured by the RIDOT at laboratory conditions. After the specified curing time, the test samples will be tested for hardness and matched against the reference samples.

METHOD OF MEASUREMENT: "Bridge 26 Fiber Wrap Floor Beam" will be measured by the "Lump Sum" for completion of all work specified to the satisfaction of the Engineer.

BASIS OF PAYMENT: The accepted quantity of "Bridge 26 Fiber Wrap Floor Beam" shall be paid for at the contract unit price bid per "Lump Sum" as listed in the Proposal. The payment constitutes full compensation for all labor, tools, materials equipment, field measurements, shop drawings, fabrication, storage, installation, temporary angle section and temporary anchors, permanent angle attachment and permanent anchors and all incidental items necessary to satisfactorily perform the work as described herein and as shown on the Contract Drawings.

CODE 817.9901

CONCRETE GROUT FILLED FABRIC BAGS

DESCRIPTION: The work under this item shall consist of furnishing and installing custom fitted fabric tubes or bags and pumping concrete grout into these fabric tubes or bags at the specified locations and in accordance with the lines, grades, design and dimensions shown on the contract drawings and as specified herein, and as directed by the Engineer.

The work may be accomplished underwater or in the dry to fill voids or create forms under - bridge abutments.

If the work is performed underwater, the Contractor shall submit a recorded underwater video to the Engineer for review. The video should have clear images showing the underwater visual inspection. At a minimum, a full HD in a standard video format and codec (MPEG-2, MP4, etc.) stored in a flash drive should be used.

Debris removal necessary to allow installation of the bags shall be included in this item. This removal shall include any debris found within the void area under - footing which would interfere or prevent specified installation of bag, grout or fill material.

When the concrete grout filled fabric, bags are used as a form for grout or fine aggregate fill under a structure, work under this item shall include placement of sealable vent and fill tubes during the bag installation.

MATERIALS: Fabric Forms: The fabric forms shall be composed of synthetic yarns formed into a woven fabric. Yarns used in the manufacture of the fabric shall be composed of at least 85% by weight of polyamide. Forms shall be woven with a minimum of 50% textured yarns (by weight) to improve adhesion to fine aggregate concrete and to improve filtration. They shall be formed into a network such that the yarns retain dimensional stability relative to each other, including selvages. Each layer of fabric shall conform to the physical, mechanical and hydraulic requirements shown below. The fabric forms shall be free of defects or flaws which significantly affect their physical, mechanical, or hydraulic properties.

Fabric form material shall consist of two layers of woven fabric sewn together. The fabric should be of sufficiently tight weave to prevent loss of water and paste during curing of the grout. When filled with fine aggregate concrete they shall form a concrete armor unit with finished average unit dimensions as shown on the plans or as directed by the Engineer.

information about each fabric form delivered:

Manufacturer's name and current address; phone; e-mail address; contact person; full product name; style and product code number; form number(s); polymer types; and Manufacturer's certification statement.

Concrete Grout: Concrete grout shall comply with the following items:

- Portland Cement Type II.
- Grout Sand -Aggregate grading shall be reasonably consistent and shall not exceed the maximum size which can be conveniently handled with available pumping equipment.
- Admixtures
- Water

Concrete grout shall consist of a mixture of Portland cement, fine aggregate (sand) and water, so proportioned and mixed as to provide a pumpable grout. Pozzolan, grout fluidifier or pumping aid conforming to this Specification may be used at the option of the Contractor. The mix shall exhibit a compressive strength of 3500 psi at 28 days. The material shall be capable of being placed or cured underwater without dilution or segregation and to prevent washout of the Grout. The Contractor shall submit for Engineer's approval a mix design showing the mix proportions and results of two test breaks (AASHTO C109), performed by an independent, accredited, RIDOT approved testing lab.

CONSTRUCTION METHODS: Prior to commencing work, the Contractor shall submit a construction procedure and equipment list to the Engineer for his approval. No work shall begin until this approval is received.

Before placement of the custom fitted fabric bags, all loose material and debris shall be removed from the location of work under the structure and properly disposed of by the Contractor. Material removed shall be disposed of at a location acceptable to the Engineer, off the right-of-way.

The grout filled bags shall be placed where shown on the plans or where ordered by the Engineer. Bag size and placement shall ensure that the void under the structure is filled in its entirety, if so indicated, or that the bags provide a total enclosure extending from the stream bed to the underside of footing where the bags are to function as a form for separate grout or fill items. Bags shall be positioned to stagger joints between rows, and rows shall be anchored together with reinforcing rod dowels if indicated on the drawings.

The Contractor shall conduct the grout filling operation in a manner that will prevent the possibility of discharge of grout or cement into the water. Grout injection shall be performed in a manner that will avoid rupture of the fabric forms or the formation of cold joints. A cold joint is defined as one in which the pumping of the fine aggregate concrete into a given form

is discontinued or interrupted for an interval of forty-five or more minutes.

Concrete pumping equipment shall be capable of delivering up to 671 cubic ft/hr.

If the fabric grout filled bags are used as a form, placement of required injection and vent pipes shall be accomplished during bag installation. These pipes shall be positioned to ensure that the enclosed volume can be filled and the enclosed water displaced. A 1.2 m maximum spacing of the vent/fill pipes is recommended.

Abutting form units, if placed laterally, may be installed immediately after placement of the preceding units.

METHOD OF MEASUREMENT: "Concrete Grout Filled Fabric Bags" will be measured per "cubic feet" of concrete grout actually placed into production and used to fill the fabric bags.

Basis of Payment: "Concrete Grout Filled Fabric Bags" will be paid for at the contract unit bid price per "cubic feet" installed and accepted, as designated in the proposal shall include full compensation for all and all labor, materials filter bags and equipment necessary to complete the work, including underwater video system..

Payment will be made for the cubic feet of grout introduced into the pumping system even though some of it will be used for delivery purposes and not necessarily incorporated in the work. Stoppages attributable to the Contractor shall be the Contractor's responsibility and the cost of the material required to refill the discharge system shall be borne by the Contractor.

CODE 817.9902

CEMENTITIOUS GROUT FOR UNDERWATER REPAIR

DESCRIPTION: The work shall consist of furnishing all equipment, materials, labor and performing all operations required for the underwater repair locations of cementitious shrink grouts at the specified locations and in accordance with the lines, grades, design and dimensions shown on the contract drawings and as specified herein, and as directed by the Engineer. The repairs shall be performed in phases with water diverted away from the repair locations.

MATERIALS: Non-shrink cementitious grout shall be pre-packaged, cement- based grout requiring only the addition of potable water. The manufacturer shall be ISO 9001 certified and have at least 10 years experience in the manufacture of precision cement-based grouts. The manufacturer shall offer technical services and provide a representative at the jobsite for product training prior to product installation upon five days advance notice.

The grout material shall meet all the following typical performance criteria when cured at 73°F:

| | |
|---|--------------|
| Early Height Change, ASTM C 827 | 0.0 to 4.0% |
| Hardened Height Change, ASTM C 1090 | Up to 0.3% |
| Compressive Strength, ASTM C 109 7 Days | 5600 psi |
| Bond Strength, ASTM C 882 28 Days | 30 minutes |
| Working Time | 30 minutes |
| Application Temperature | 40°F to 90°F |
| Material Temperature | 40°F to 90°F |

Meets performance requirements of ASTM C 1107

Clearances:

No placement thicknesses should be less than one inch. For depths greater than six inches, Aggregate Extension.

Aggregate Extension

For pours greater than six inches in depth, the grout should be extended by the addition of clean, damp coarse aggregate according to the following guidelines:

| <u>Depth of Pour (Inches)</u> | <u>Typical Extension (Percentage by wt.)</u> |
|-------------------------------|--|
| 6 + to 9 | 35%-50% |
| 9 + to 12 | 50%-60% |
| 12 + to 18 | 60%-80% |

Coarse aggregate shall be clean and washed and conform to the requirements of ASTM C 3

Existing Concrete Surfaces:

Completely remove all loose, delaminated and weak concrete, oil, grease, laitance and other contaminants. Prepare concrete using acceptable mechanical means and concrete cleaners or degreasers as necessary to obtain clean, sound and rough concrete surfaces exposing coarse aggregate.

Where surfaces are not underwater or are in tidal zones, pre-soak concrete surfaces thoroughly with potable water to ensure a proper saturated condition. Concrete shall be saturated and free of standing water at time of placement.

Mortar shall be mixed thoroughly to achieve desired consistency. The amount of water, mixed mortar and aggregate extension shall be per the manufacturer's recommendation. All transport of mixed material should be by appropriate means.

Formwork shall be constructed of rigid nonabsorbent materials, securely anchored, watertight and strong enough to resist forces developed during grout placement. An appropriate bottom seal shall be established where required. Formwork shall have sufficient ports installed when grout is to be pumped in place.

All formwork to be subsequently removed shall be coated with a form release agent compatible with the grout. Care shall be taken not to contaminate grouting surfaces where bond is required.

All procedure, equipment, schedule and other elements as need, covering each case as required, shall be submitted for Engineer's approval.

CONSTRUCTION METHOD: The type and size of pump and discharge line used are dependent on the parameters of each installation. Contact the pump and grout manufacturers for recommendations. The proposed pumping equipment and procedures shall be submitted for approval.

The grout shall be mixed to a consistency that will not segregate while pumping.

The mix should not have aggregate larger than #4 stone.

The work shall be performed per the manufacturer's recommendations.

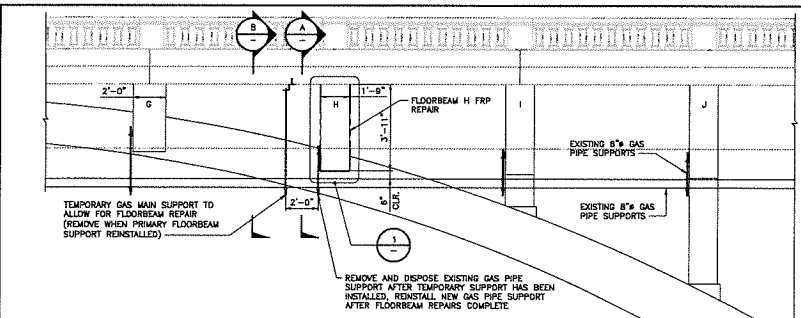
Place the grout after 20 minutes of mixing. Continuous grout flow is required and the grout should be pumped through a flexible tube to the lowest point.

METHOD OF MEASUREMENT: "Cementitious Grout for Underwater Repair" will be measured per "cubic feet" of concrete grout actually placed.

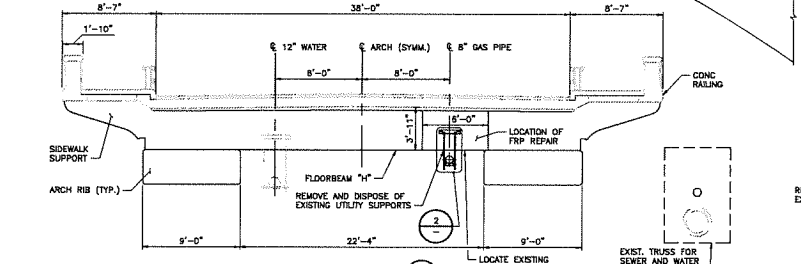
BASIS OF PAYMENT: "Cementitious Grout for Underwater Repair" will be paid for at the contract unit bid price per "cubic feet" installed and accepted, as designated in the proposal shall include full compensation for all and all labor, materials and equipment necessary to complete the work.

Payment will be made for the cubic feet of grout introduced into the pumping system even though some of it will be used for delivery purposes and not necessarily incorporated in the work. Stoppages attributable to the Contractor shall be the Contractor's responsibility and the cost of the material required to refill the discharge system shall be borne by the Contractor.

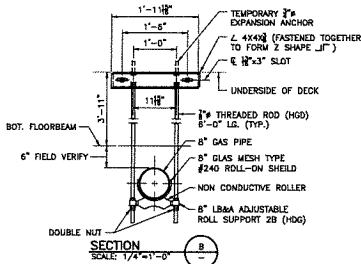
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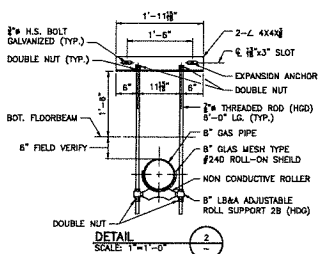
WEST ELEVATION AT FLOORBEAM "H"
SCALE: 3/8"=1'-0"



SECTION
SCALE: 1/4"=1'-0"



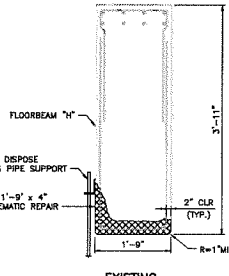
SECTION
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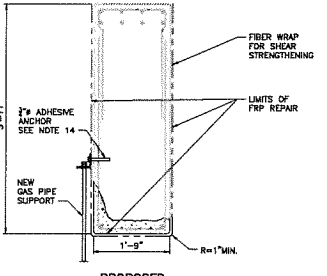
DETAIL
SCALE: 1"=1'-0"

NOTES

1. ALL OUTSIDE CORNERS OF FIBER WRAP SHALL BE FORMED WITH OR GROUND TO A 1" MINIMUM RADIUS.
2. DESIGN AND DETAILS AS SHOWN ARE CONCEPTUAL. THE FINAL DESIGN OF THE FRP SYSTEM SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
3. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS PRIOR TO COMMENCING WORK.
4. ALL WORK SHALL CONFORM TO SPECIAL PROVISION ITEM CODE 808.9501 BRIDGE 28 FIBER WRAP FLOOR BEAM AND NOTED HEREIN.
5. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR THE DESIGN OF THE FRP SYSTEM TO ACHIEVE THE MINIMUM SHEAR STRENGTHENING (STRENGTH) OF 130 KIP FOR THE SPANDREL CAP. THE DESIGN SHALL BE PREPARED AND STAMPED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF RHODE ISLAND AND SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL PRIOR TO PROCEEDING WITH THE WORK.
6. FRP ANCHORAGE FOR SHEAR STRENGTHENING MAY BE PROVIDED BY MECHANICAL ANCHORS. ANCHORAGE SHALL BE PROVIDED SO AS TO AVOID ALL STEEL REINFORCEMENT BY BEING SHALLOWER THAN THE CLEAR COVER. LOCATION AND TYPE OF ANCHORS TO BE DETERMINED BY THE CONTRACTOR AND SUBMITTED FOR APPROVAL BY ENGINEER PRIOR TO STARTING WORK.
7. FIBER WRAP SHEAR STRENGTHENING DESIGN SHALL BE BASED ON FOLLOWING MATERIAL PROPERTIES:
CONCRETE FOR SPANDREL CAP $f_c=2.0$ KSI
STIRRUPS REINFORCING YIELD STRENGTH= 30 KSI.
8. CONCRETE REPAIR SHALL BE PAID FOR UNDER ITEM CODE 817.2100 REPAIRS TO STRUCTURAL CONCRETE MASONRY (PNEUMATIC MORTAR).
9. REMOVAL AND DISPOSAL OF THE EXISTING GAS SUPPORTS, IN ADDITION THE INSTALLATION OF THE PROPOSED GAS SUPPORTS SHALL BE PAID FOR UNDER ITEM CODE 808.9501 BRIDGE 28 FIBER WRAP FLOOR BEAM.
10. GAS MAIN SUPPORT INSTALLATION AND REMOVAL SHALL BE PERFORMED BY A NATIONAL GRID APPROVED GAS PIPING CONTRACTOR HIRED BY THE BRIDGE CONTRACTOR.
11. ALL MATERIAL FOR THE GAS MAIN SUPPORTS WILL BE SUPPLIED BY NATIONAL GRID.
12. THE REQUIRED BRIDGE DECK ANCHORS FOR THE TEMPORARY GAS SUPPORT SHALL BE SUPPLIED AND INSTALLED BY THE BRIDGE CONTRACTOR.
13. MOUNTING THE ANGLE SUPPORT FOR THE GAS PROPOSED (FINAL) INSTALLATION AND DRILLING OF MOUNTING HOLES SHALL BE SUPPLIED AND INSTALLED BY THE BRIDGE CONTRACTOR.
14. MINIMUM EMBEDMENT OF EACH ANCHOR SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATION TO DEVELOP MINIMUM REQUIRED CAPACITY OF 6000 LBS SHEAR.



EXISTING



PROPOSED

DETAIL
SCALE: 1"=1'-0"

LEGEND

Denotes areas of concrete to be repaired by pneumatic method

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RHODE ISLAND
DEPARTMENT OF TRANSPORTATION
CENTRAL GROUP 12
BRIDGE PRESERVATION
STATEWIDE
WARWICK RHODE ISLAND
FLOORBEAM "H" REPAIR
NATICK BRIDGE NO 28
CHECKED BY: _____ DATE: _____ SCALE: _____
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3 Cedar Street
Suite 400
Providence, RI 02903
401.723.8100