

DECEMBER 13, 2019
REHABILITATION OF MULTIPLE BRIDGES ROUTE 2A
FEDERAL AID PROJECT NOS. 0032(199) & 0032(200)
STATE PROJECT NOS. 113-107 AND 113-108
TOWN OF PRESTON

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 Nos. 1 and 3.

SPECIAL PROVISIONS
NEW SPECIAL PROVISION

The following Special Provision is hereby added to the Contract:

- ITEM NO. 0207150A – LIGHTWEIGHT FILL

REVISED SPECIAL PROVISIONS

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

- NOTICE TO CONTRACTOR – ENVIRONMENTAL PERMIT RESTRICTIONS
- NOTICE TO CONTRACTOR – EXCLUSION OF DRIVEN PILES AND SHEET PILES
- ITEM NO. 0601075A – SUBSTRUCTURE REPAIRS WITH ULTRA HIGH PERFORMANCE CONCRETE

CONTRACT ITEMS
NEW CONTRACT ITEM

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>UNIT</u>	<u>QUANTITY</u>
0207150A	LIGHTWEIGHT FILL	C.Y.	290

REVISED CONTRACT ITEMS

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ORIGINAL QUANTITY</u>	<u>REVISED QUANTITY</u>
0202000	EARTH EXCAVATION	1142 C.Y.	1418 C.Y.
0202100	ROCK EXCAVATION	36 C.Y.	50 C.Y.
0203000	STRUCTURE EXCAVATION – EARTH (COMPLETE)	833 C.Y.	862 C.Y.
0216000	PERVIOUS STRUCTURE BACKFILL	293 C.Y.	269 C.Y.

PLANS

NEW PLANS

The following Plan Sheets are hereby added to the Contract:

- DRAWING NO. S-19 (SHEET NO. 01.05.19.A2)
- DRAWING NO. S-20 (SHEET NO. 01.05.20.A2)
- DRAWING NO. S-21 (SHEET NO. 01.05.21.A2)
- DRAWING NO. S-22 (SHEET NO. 01.05.22.A2)
- DRAWING NO. S-23 (SHEET NO. 01.05.23.A2)
- DRAWING NO. S-24 (SHEET NO. 01.05.24.A2)
- DRAWING NO. S-07-1A (SHEET NO. 02.03.07-1.A2)

REVISED PLANS

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

- DRAWING NO. REV-1 (SHEET NO. 01.02.01.A2)
- DRAWING NO. MDS-01 (SHEET NO. 01.04.02.A2)
- DRAWING NO. S-02 (SHEET NO. 01.05.02.A2)
- DRAWING NO. S-14 (SHEET NO. 01.05.14.A2)
- DRAWING NO. S-07 (SHEET NO. 02.03.07.A2)

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

The Detailed Estimate Sheets do not reflect these changes.

There will be no change in the number of calendar days due to this Addendum.

The foregoing is hereby made a part of the contract.

ITEM #0207150A – LIGHTWEIGHT FILL**Description:**

Work shall consist of furnishing and placement of lightweight fill in the formation of embankments or as backfill in front of and behind structures. This work shall be performed as hereinafter specified, to the dimensions indicated on the plans, or as directed by the Engineer.

Materials:

Lightweight fill shall be a rotary kiln expanded shale aggregate meeting the requirements of ASTM C 330. No by-product slags, cinders or by-products of coal combustion shall be permitted. The aggregate shall consist of tough, durable, non-corrosive particles with the following gradation:

<u>Square Mesh Sieves</u>	<u>Percent Passing by Weight</u>
1"	100
3/4"	90 - 100
3/8"	10-50
No. 4	0

The dry loose unit weight shall be less than 50 pcf. The lightweight aggregate supplier shall submit verification of an in-place compacted total unit weight (by methods defined in AASHTO T99) of less than 60 pcf. For purposes of this specification, the total unit weight is defined as the maximum dry density multiplied by one plus the moisture content (as a decimal). For example, if the maximum dry density is 45 pcf and the moisture content is 9%, the total unit weight is 49 pcf).

The maximum soundness loss when tested with 5 cycles of magnesium sulfate shall be 10 percent (ASTM C 88). The maximum Los Angeles Abrasion loss when tested in accordance with ASTM C 131 (B grading) shall be 40 percent.

The lightweight aggregate producer shall submit verification that the angle of internal friction is equal to or greater than 40 degrees when measured in a triaxial compression test on a laboratory sample with a minimum diameter of 250 mm.

Construction Methods: When applicable and except where noted below, lightweight fill placement shall conform to the requirements of Sections 2.02.03 and 2.16.03 of the Standard Specifications, Form 817.

The lightweight fill shall be placed in layers of a thickness of 1.5 ft to a maximum of 2.0 ft. Each layer shall be compacted by the use of self-propelled vibratory compaction equipment with static mass (weight) less than 6,600 lbs. The minimum number of passes shall be two (2) and the maximum four (4). The actual lift thickness and exact number of passes shall be determined by the Engineer depending on the type of compaction equipment. The contractor shall take all

necessary precautions during construction activities in operations on or adjacent to the lightweight fill to ensure that the material is not over compacted. Construction equipment, other than for compaction, shall not be operated on the exposed lightweight fill.

Method of Measurement: Lightweight fill shall be measured in place after compaction.

Basis of Payment: This work will be paid for at the contract unit price per cubic yard for “Lightweight Fill”, complete in place, which price shall include all materials, transportation, tools, equipment and labor incidental thereto.

Pay Item	Pay Unit
Lightweight Fill	C.Y.

NOTICE TO CONTRACTOR – ENVIRONMENTAL PERMIT RESTRICTIONS

This Contract has been advertised for bid without the environmental permits being in place. A copy of the application for all required State environmental permits have been included in these specifications and are made a part of this Contract. No Physical work on the site shall commence until all permits are in place.

The requirements and special conditions set forth in the permits shall be binding on the Contractor. The Contractor shall abide to the construction staging plans and the water handling information provided. Any proposed changes that affect the special conditions of the permits or alters the information provided in the permit application will need to be approved by the Department and the Connecticut Department of Energy and Environmental Protection.

The Contractor is to predicate his bid proposal on the following time of year restriction:

- In-water work is prohibited from January 1 through June 30, inclusive.
- Cofferdams and bypass pipe are prohibited from January 1 through June 30, inclusive.
- Installation of temporary supports for the gas main located within the regulated areas, cannot begin until March 16, 2020 unless permits are in place prior to this date

Should the permit be received after the receipt of bids and the permit requirements significantly change the character of the work, adjustments will be made to the Contract in accordance with the appropriate Articles in Section 1.04.

NOTICE TO CONTRACTOR – EXCLUSION OF DRIVEN PILES AND SHEET PILES

The Contractor is alerted to the presence of organic and compressible soils and or cobbles and boulders in the project area and along Route 2A. The installation of the cofferdams, temporary gas main supports or Temporary Earth Retaining System (TERS) shall not disturb the organic soils. The use of driven piles or sheet piles as cofferdams, temporary gas main supports or TERS within the project area is not permitted. Reference the Geotechnical Engineering Reports, approved permits and the following special provisions for further information:

- Item 0204151A Handling Water
- Item 0716000A Temporary Earth Retaining System

ITEM #0601075A – SUBSTRUCTURE REPAIRS WITH ULTRA HIGH PERFORMANCE CONCRETE

Description: Work under this item shall consist of all materials, tools, equipment and labor necessary for the performance of all work to transport, mix, form, place, cure, grind and test Ultra-High Performance Concrete (UHPC) where required per plans. This item shall also include the surface preparation work required prior to the pouring of any UHPC facing material including the installation of a welded wire fabric into the facing material.

Materials: The materials for this work shall be as follows:

Ultra High Performance Concrete (UHPC): The UHPC shall be mixed on Site from pre-packaged components, pre-proportioned by the UHPC Supplier.

Components: The following materials shall be as recommended by the UHPC Supplier:

- (a) Fine Aggregate
- (b) Cementitious Material and any replacement materials, such as silica fume
- (c) Steel Fibers (must be in accordance with Article 1.06.01)
- (d) Liquid Admixtures (such as super plasticizers or accelerators)

Water: Water for mixing shall meet the requirements of M.03.01-4 and the temperature at mixing shall be per UHPC Supplier recommendations for use in the UHPC mix.

Mix Design: The Contractor shall submit a mix design that meets the following criteria:

Table 1: UHPC Material Properties (after 28 days or as noted)		
Description	Test Method	Acceptance Criteria
Compressive Strength	ASTM C39 (as modified by ASTM C1856)	≥ 14 ksi at 4 days ≥ 20 ksi at 28 days
Shrinkage	ASTM C157 (initial reading after set)	≤ 800 micro-strain
Chloride Ion Penetrability	ASTM C1202	≤ 250 coulombs
Freeze-Thaw Resistance	ASTM C666 Procedure A (300 cycles)	Relative Dynamic Modulus of Elasticity, RDM > 95%
Flow	ASTM C1437 (as modified by ASTM C1856)	7 to 10 inches

Packaging: The fine aggregate and cementitious material must be premixed and proportioned in bags or supersacks, in accordance with the approved mix design, and shall be identified by batch or lot number.

Welded wire fabric shall be 4.5 vertical x 3.5 horizontal minimum. It shall be commercial galvanized or hot dipped galvanized (2.0 oz/SF per AASHTO M-111).

Construction Methods:

1. Contractor Submittals:

- (a) Mix Design, including proportions of each component, water-to-cementitious materials ratio, mixing time, set time, compressive strength properties of the mix at ages of 2, 4, 7, 14, and 28 days, and Certified Test Reports addressing the material properties in Table 1, shall be submitted to the Engineer for approval at least 90 days in advance of the first UHPC placement.
- (b) UHPC Supplier and Technical Representatives: The Contractor shall obtain the services of a Supplier experienced in designing, mixing, placing, curing and testing of UHPC. Technical representatives shall be certified or recognized by the UHPC Supplier in the mixing, and placing of UHPC in similar installations. The Supplier and Technical Representatives submittal shall be submitted to the Engineer for approval at least 90 days in advance of the first UHPC placement and shall include the following:
- i. Name and location of Supplier.
 - ii. Name of UHPC product and a list of bridge projects it was utilized on. For each bridge listed, provide a location, description, date of completion of work, the project owner's name, and the name, title and current contact information of a project owner representative.
 - iii. Identification of the potential Technical Representatives (minimum three).
 - iv. UHPC Supplier certification demonstrating that the Technical Representatives are qualified to oversee the UHPC operations.
 - v. Work experience of the Technical Representatives: For each Technical Representative, submit a list of projects they attended that included UHPC mixing and placing operations. For each project, provide a location, description, date of completion of work, the project owner's name, and contact information of a project owner representative.
- (c) Construction Work Plan: The Contractor shall submit a Construction Work Plan to the Engineer for review and comment at least 90 days in advance of the first UHPC placement, which shall include the following elements:
- i. Formwork
 1. Proposed formwork materials
 2. Procedure for installing, sealing and maintaining watertight formwork
 3. Procedure and schedule for installing top forms, chimneys and head pails
 4. Planned bulkhead locations
 5. Removal of formwork including tools and access to underside of deck
 - ii. Surface preparation
 1. Procedure to confirm existing concrete surfaces to be in contact with the UHPC are roughened and have exposed aggregate finish with average amplitude of 1/4 inch
 2. Procedures, including source of water, for ensuring saturated surface dry (SSD) connection interfaces prior to UHPC placement
 - iii. Mixing
 1. Storage plan for UHPC components
 2. Mixers and mixing setup including the type and number of mixers, mixing location, water source, and contingency plan if a mixer malfunctions
 3. Description of equipment for weighing UHPC components
 4. Procedure for controlling UHPC mix temperatures including methods of storing ice

- 5. Sample batch identification sheet to be used during UHPC production
- iv. Placement
 - 1. Placement sequence and schedule including all planned bulkheads
 - 2. Equipment for transportation and placement of UHPC
 - 3. Contingency plan if placement operations are interrupted by weather, equipment malfunctions or other issues
- v. Protection and Curing
 - 1. Procedure to protect formwork from live loads during curing
 - 2. Cold weather protection plan, if required
- vi. Grinding
 - 1. Proposed equipment
 - 2. Method of collecting and disposing of debris
- vii. Trial placement plan, outlining procedures to be followed and a dimensioned drawing showing the proposed UHPC placement of a representative pour
- (d) Contractor Quality Control:
 - i. Quality Control Plan, including equipment list, testing setup, sampling methods, frequency and types of tests at least 90 days in advance of the first placement of UHPC.
 - ii. The proposed format for test reporting (or an example test report) shall be provided for the Engineer's review and comment at least 90 days in advance of the first placement of UHPC.
 - iii. The name and location of the Contractor's proposed AASHTO accredited testing laboratory shall be provided to the Engineer at least 90 days in advance of the first placement of UHPC.
 - iv. Reports of test results shall be provided to the Engineer within 7 days of each test.

2. Pre-Placement Meeting: The Contractor shall arrange a pre-placement meeting to be held on Site after the approval of all submittals, and at least 7 days in advance of the trial placement. The meeting shall be attended by the UHPC Supplier's Technical Representatives, the Contractor's staff, any subcontractors involved in the work operation, and representatives from the Department. The objective of the meeting will be to review the Project plans, Contractor's Construction Work Plan and to review the procedures for mixing, placing, curing and testing of the UHPC, as well as the specifics of the trial placement.

3. Trial Placement: The Contractor shall construct a cast-in-place trial placement at the Site (or a location approved by the Engineer), based on Pre-Placement meeting discussions, and as recommended by the UHPC Supplier.

The trial placement shall be a representation of the proposed pour and replicate the form pressure created by the plastic UHPC. Following placement and minimum 14 day cure of the UHPC, the Contractor shall cut the hardened trial placement transversely at two locations to allow for visual inspection of the concrete interface and material bond. The Contractor shall make the completed trial placement cut sections available for review and approval by the Engineer a minimum of 28 days prior to placement of the final UHPC.

The Contractor shall perform flow tests during trial placement casting to determine the

duration that the plastic UHPC will remain workable. The flow tests shall be in accordance with ASTM C1437 (using modifications described in ASTM C1856) and the mix temperature shall be maintained between 50°F and 85°F as determined using ASTM C1064.

The Contractor shall perform the following workability procedure during the casting of trial placement:

- (a) Take initial samples prior to the start of the discharge of plastic UHPC and perform the flow tests. Record the time of sampling and initial flow value.
- (b) Measure the UHPC and ambient temperatures.
- (c) Continue sampling at 10-minute intervals and determine the flow of each sample, until flow measure is below 4 inches.
- (d) Plot the flow versus time for the duration of the test. From the plot of flow-time curve, determine the flow time at 8 inches, which is considered the mixture cutoff time.

The Contractor shall perform a Time of Setting test of UHPC during trial placement in accordance with ASTM C191 (as modified by ASTM C1856).

The Contractor shall cast five sets of 3 cylinders, in accordance with ASTM C1856, during trial placement for determination of compressive strength and test them in accordance with ASTM C39 (as modified by ASTM C1856) at 2, 4, 14, and 28 days.

4. **Safety:** The Contractor shall make UHPC material safety data sheets (MSDS) available and shall provide a safety briefing to all on-site personnel prior to UHPC placement. Proper personal protective equipment shall be used (including but not limited to goggles, dust masks, and respirators) as recommended by the UHPC supplier and as required by the MSDS based on proximity to specific operations.
5. **Storage:** The Contractor shall assure the proper storage of dry premixed components, steel fibers and admixtures as recommended by the Supplier and the following:
 - (a) All dry premixed components shall be stored on raised pallets, with vapor barrier between the pallets and the ground surface to prevent moisture ingress, and shall be covered thoroughly.
 - (b) Steel fibers shall be stored with the same protection as the dry premixed components and rusted fibers shall not be used in mixing.
 - (c) Liquid admixtures shall be stored in sealed containers above freezing temperatures and shall be protected from direct sunlight.
6. **Existing Substructure Concrete:** The contractor shall prepare the existing substructure concrete surface to be refaced prior to UHPC placement.
 - (a) Deteriorated concrete that is ready to spall as shown in the plans or as directed by the Engineer shall be removed prior to the installation of the formwork or placement of UHPC. It is not required to remove excess material to expose existing reinforcing bars during this process.
 - (b) A galvanized welded wire fabric mesh adhered to the concrete anchors shall cover all surfaces to be enclosed with the UHPC facing.
 - (c) If shown in the plans, rebar anchors shall be drilled and grouted in the existing concrete faces to adhere the facing material to the existing concrete. This work shall

be paid for separately under the item “Drilling Holes and Grouting Dowels”.

- 7. Formwork:** Formwork shall be non-absorbing, watertight and of sufficient rigidity and strength to safely support all loads imposed. All formwork bracing shall be external to the form. The use of form ties passing through the UHPC is prohibited. The Contractor shall form the UHPC locations to be overfilled according to the Plans.

Top forms, chimneys, and head pails shall be used, according to UHPC Supplier recommendations, to achieve the desired profile and confirm that the formwork is completely full. Formwork removal shall not begin until the compressive strength has reached 12 ksi.

- 8. Surface Preparation:** The Contractor shall confirm that existing concrete surfaces to be in contact with the UHPC are roughened and have exposed aggregate with an average amplitude of 1/4 inch. The Contractor shall pre-wet the existing concrete surfaces for at least 4 hours prior to placement of UHPC to confirm that a saturated surface dry (SSD) condition has been reached. During the pre-wetting operation, the Contractor shall check the formwork for leaks and shall seal any formwork that is not watertight. Just prior to placement of the UHPC, the Contractor shall air blast the forms to remove dirt, debris and standing water.

- 9. Technical Representatives:** The Contractor shall arrange for two approved Supplier’s Technical Representatives to be on Site for the duration of the UHPC mixing and placement operations. One representative shall remain with the mixing operations and the other representative shall remain with the placement operations. Mixing or placement shall not begin until the Supplier’s representatives are on-Site and have checked in with the Engineer.

- 10. Mixing:** In accordance with the approved Mix Design, the UHPC components shall be pre-weighed using a calibrated scale prior to the commencement of mixing. The Contractor shall provide a minimum of three portable mixing units for mixing of the UHPC. Mixing equipment that is not provided by the Supplier must be reviewed by the Supplier for adequacy. The Contractor shall keep the temperature of the UHPC below 85°F during mixing. Ice may be added to the mix as recommended by the Supplier’s representative. Should the ambient temperature fall below 50°F, the batching water shall be heated to maintain the mix temperature between 50 and 85°F.

- 11. Placement:** Place UHPC material in accordance with the approved placement sequence. Confirm that the form is completely filled with UHPC material during concrete placement. If the formwork exhibits evidence of leakage at any location, the Contractor shall take remedial measures necessary to stop further leakage. The UHPC shall not be internally vibrated but where 2 successive batches meet, agitate the point of intersection with a rod. Cold weather placement procedures are required when the ambient temperature falls below 50°F.

- 12. Curing:** Curing and cold weather protection shall be per Supplier recommendations and the following: Cover the UHPC and keep formwork in place until the Contractor’s testing confirms that it has achieved a minimum compressive strength of 12 ksi. Prevent construction or traffic live loads from traveling over the UHPC until the Contractor’s testing confirms that it has achieved a minimum compressive strength of 14 ksi.

13. Surface Finishing: Immediately after removal of formwork, if required, areas of UHPC overfill or surface irregularities due to formwork joints, etc. shall be removed using grinding equipment to be flush with the proposed UHPC surface as shown in the plans. The grinding equipment shall be equipped with an on-board wet vacuum attachment capable of removing the debris and residue from the grinding process. The Contractor shall be responsible for proper disposal of the debris. A separate finishing operation of the entire UHPC surface, directly in contact with the formwork, is not required.

14. Contractor QC requirements:

- (a) Batch identification: For each batch of UHPC, record the date and time, amounts of water and ice, and admixtures used.
- (b) Flow tests: The Contractor shall conduct one flow test per batch of UHPC in accordance with ASTM C1437 (as modified by ASTM C1856) to verify workability and time of setting. The flow shall be 7 to 10 inches.
- (c) Mix temperature checks: The Contractor shall conduct one temperature check per batch of UHPC in accordance with ASTM C1064. The temperature of the mix at discharge shall be between 50 and 85°F.
- (d) Compressive strength cylinder specimens: A minimum of 12 cylinders, 3 inches x 6 inches shall be cast for each day's production. One set (3 cylinders) shall be cast at the beginning and one set at the end of the day's production. Two intermediate sets of cylinders shall be cast from the middle portion of the day's production.

All sets shall be cured initially in the field and shipped to the Contractor's AASHTO accredited testing lab for final curing, preparation of test specimens in accordance with ASTM C1856, and testing.

All cylinders shall be cured using the same method of curing used in the field. The temperature during curing shall be controlled to represent field conditions. The compressive strength of three cylinders shall be tested at 2, 4, 14, and 28 days after casting. The compressive strength shall be measured using ASTM C39 (as modified by ASTM C1856). The minimum compressive strength shall be 14 ksi at 4 days and 20 ksi at 28 days. Failure to meet the minimum at any point requires immediate notification to the Engineer and a written corrective action plan to be submitted to the Engineer for approval.

- (e) Pull out tests: The Contractor shall cast 6 cylinders 12 inches diameter and 7 1/2 inches deep. Each cylinder shall have one 32-inch-long reinforcing bar cast in the center of the circular face. The axis of the bar shall be perpendicular to the formed surface. Three (3) of the castings shall have #6 bars embedded 5 inches deep, and three (3) of the castings shall have #4 bars embedded 3 inches deep. These cylinders shall be kept wet for four (4) days then delivered to the Contractor's AASHTO accredited testing lab for testing using a continuous rate of loading until failure in accordance with the tensile test requirements of ASTM E488. The test shall be performed as soon as practical after the corresponding compressive strength samples reach 14 ksi. The samples pass if the bars yield without the UHPC failing and without the bars pulling out of the UHPC. Failure to meet these requirements requires immediate notification to the Engineer and a written corrective action plan to be submitted to the Engineer for approval.

- (f) As-built records: The Contractor shall track and show the placement locations of UHPC production by day. A PDF copy of the records shall be submitted to the Engineer on a weekly basis.

Results of all the laboratory tests, conducted by the Contractor’s AASHTO accredited testing lab, shall be submitted to the Engineer for review. Testing frequency shall be as needed to maintain control of the operation.

Method of Measurement: The volume of UHPC will be calculated in cubic feet based on the nominal dimensions shown on the plans. No volume adjustments will be made for cast-in-place tolerances, or for embedded components such as reinforcing steel or shear studs.

Basis of Payment: This work will be paid for at the Contract unit price per cubic foot for “Substructure Repairs with Ultra High Performance Concrete,” complete and accepted in place, which price shall include all materials, equipment, tools and labor incidental thereto.

Preparation of the mix design, trial mixes and Work Plan; transporting and mixing UHPC; formwork, testing, placing, curing and grinding, existing substructure concrete preparation, as well as the services of the Supplier’s Technical Representatives shall be included in the Contract unit price.

Pay Item	Pay Unit
Substructure Repairs With Ultra High Performance Concrete	c.f.