MARCH 9, 2020

REHABILITATION OF BRIDGE NO'S. 01218 & 04180
I-84 EB/WB OVER HOUSATONIC RIVER

FEDERAL AID PROJECT NO. 1096(111)

STATE PROJECT NO. 0096-0201

TOWNS OF NEWTOWN & SOUTHBURY

ADDENDUM NO. 1

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. 5, 7, 8, 9, 13, 15, 19, 21, 22, 23, 26, 28, 29, 31, 32, 34, 35, 36, 38, 47, 48

SPECIAL PROVISIONS

NEW SPECIAL PROVISION

The following Special Provision is hereby added to the Contract:

- ITEM NO. 0601897A REMOVAL OF GRAFFITI

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 – WORK ON OR ABOVE FIRSTLIGHT HYDRO GENERATING COMPANY PROPERTY
- ITEM NO. 0202593A - ACCESS ROAD (SITE NO. 1)
- ITEM NO. 0202594A - ACCESS ROAD (SITE NO. 2)
- ITEM NO. 0210016A - WATER QUALITY SWALE
- ITEM NO. 0511831A - BRIDGE SCUPPER – TYPE A
- ITEM NO. 0511832A - BRIDGE SCUPPER – TYPE B
- ITEM NO. 0512010A -6" PIPE FOR BRIDGE DRAINAGE
- ITEM NO. 0521007A - ELASTOMERIC BEARINGS
- ITEM NO. 0522178A - CONSTRUCT CONCRETE KEEPER BLOCKS
- ITEM NO. 0522410A - POT, SPHERICAL OR DISC BEARINGS (300 KIPS)

- ITEM NO. 0522440A - POT, SPHERICAL OR DISC BEARINGS (900 KIPS)
- ITEM NO. 0522442A - POT, SPHERICAL OR DISC BEARINGS (950 KIPS)
- ITEM NO. 0601954A - EPOXY INJECTION CRACK REPAIR
- ITEM NO. 0969053A - CONTRACTOR QUALITY CONTROL PROGRAM LEVEL 2
- ITEM NO. 1018013A - TEMPORARY WATERWAY CONSTRUCTION MARKERS

DELETED SPECIAL PROVISION

The following Special Provision is hereby deleted in its entirety (See Note below):

- ITEM NO. 0020762A – SEDIMENT HANDLING

Note: The special provision entitled "Item No. 0020762A – Sediment Handling" was inadvertently duplicated. Delete the second version located on pages 189 thru 194 of the specification package.

CONTRACT ITEMS

NEW CONTRACT ITEMS

ITEM NO.	DESCRIPTION	UNIT	QUANTITY
0406171	HMA SO.5	TON	670
0601897A	REMOVAL OF GRAFFITI	SF	1,100

REVISED CONTRACT ITEMS

ITEM NO.	DESCRIPTION	ORIGINAL QUANTITY	REVISED QUANTITY
0406159	PMA SO.5	6,070 TON	13,180 TON
0406236	MATERIAL TACK COAT	6,550 GAL	9,910 GAL
0406275	FINE MILLING OF BITUMINOUS CONCRETE PAVEMENT (0" TO 4")	21,400 SY	65,500 SY
0601064	ABUTMENT AND WALL CONCRETE	1,106 CY	1,097 CY
0601120	BRIDGE DECK CONCRETE (SIP FORMS)	3,260 CY	3,300 CY
0601121	PARAPET CONCRETE	4,183 LF	3,419 LF
0601123	APPROACH SLAB COCNRETE	220 CY	200 CY
0822002	RELOCATED TEMPORARY PRECAST CONCRETE BARRIER CURB	12,400 LF	18,095 LF

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

02.01.A1

03.02.A1
03.06.A1
03.07.A1

04.01.01.A1
04.01.03.A1
04.01.05.A1
04.01.06.A1
04.01.07.A1
04.01.08.A1
04.01.09.A1
04.01.10.A1
04.01.11.A1
04.01.12.A1
04.01.13.A1
04.01.14.A1
04.01.15.A1
04.01.16.A1
04.01.17.A1
04.01.18.A1
04.01.19.A1
04.01.20.A1
04.01.21.A1
04.01.22.A1
04.01.24.A1
04.01.28.A1
04.01.29.A1
04.01.30.A1
04.01.31.A1
04.01.33.A1
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04.01.43.A1
04.01.45.A1
04.01.47.A1
04.02.01.A1
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04.02.46.A1
04.02.48.A1

05.02.A1
05.06.A1
05.07.A1
05.08.A1
05.09.A1
05.10.A1
05.11.A1
05.12.A1
05.13.A1
05.17.A1
05.18.A1
05.19.A1

05.20.A1	07.02.A1	07.06.A1
05.29.A1	07.03.A1	07.09.A1
	07.04.A1	

The Detailed Estimate Sheets do not reflect these changes.

The Bid Proposal Form has been revised to 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.

NOTICE TO CONTRACTOR – WORK ON OR ABOVE FIRSTLIGHT HYDRO GENERATING COMPANY PROPERTY

The Contractor is hereby notified that some of the work to be accomplished under this contract is to be performed on or above property owned by FirstLight Hydro Generating Company (FirstLight). A written agreement is in place between the Connecticut Department of Transportation and FirstLight which grants the reasonable use of the property to reconstruct the bridge and associated drainage ways as defined on the Exhibits A and B attached hereto.

Prior to any work on or access to FirstLight property, the Contractor shall enter into a temporary License Agreement with FirstLight. There is a fee for this Agreement if the Contractor requests uses of the FirstLight property that are beyond the permitted uses defined in the License Agreement. Refer to the attached "License Agreement" sample. The Contractor shall not commence construction activities on FirstLight property until the License Agreement is fully executed. The Agreement and related correspondence should be directed to:

FirstLight Hydro Generating Company
Attention: Stuart Piermarini
P.O. Box 5002
New Milford, CT 06776

In addition to entering into a Temporary License Agreement, the Contractor shall add FirstLight as "additional insured" to his liability insurance policy.

DRAFT

LICENSE AGREEMENT

This License Agreement ("License Agreement") is made this _____ day of _____, 201__ (the "Effective Date") by and between FirstLight Hydro Generating Company, a Connecticut company having an address at 143 West Street Ext., Suite E, New Milford, Connecticut, 06776 ("Licensor") and the State of Connecticut Commissioner of Transportation's Contractor named:_____ ("Licensee").

WHEREAS, Licensor is the license holder for the FERC Project No. 2576 and record owner of certain real property in Southbury and Newtown, Connecticut, more particularly described herein (the "Property").

WHEREAS, the Licensee intends to reconstruct CT Route 84 Bridges, Bridge Nos. 01218 & 04180, which is adjacent to the Property, and seeks to access the Property in order to complete activities associated with its reconstruction efforts under Project No. 96-201 and the Licensor agrees to permit such limited access.

WHEREAS, the Licensor is authorized to grant licenses for the limited purposes set forth herein under Article 413(b)(1) and (b)(3) of its License for FERC Project No. 2576.

NOW THEREFORE, in consideration of the mutual promises, covenants, undertakings, and other consideration set forth in this License Agreement, Licensor and Licensee hereby agree as follows:

1. **GRANT OF LICENSE**. Licensor hereby grants to Licensee a license to use, access, and/or modify the Property identified in Section 3 in accordance with the terms set forth in Section 4 of this License Agreement.

2. **TERM.** This License Agreement commences as of the Effective Date and shall automatically terminate, without notice on the earlier of the conclusion of the Licensee's reconstruction project period ("Termination Date"), unless Licensee notifies Licensor, in writing, of the completion of the Permitted Uses prior to the Termination Date.

3. **PROPERTY.** The Property consists of certain parcels of land located east and west of the shorelines adjacent to the CT Route 84 Bridges, Bridge Nos. 01218 & 04180 in Southbury and Newtown and identified as the shaded parcel on Exhibit A and the marked area on Exhibit B (Exhibits A and B attached hereto).

4. **PERMITTED USES.** This License Agreement is for the specific purpose of granting the Licensee the reasonable use of the 250' wide easement Property solely in the following manner: Gain access to the CT Route 84 Bridges, stage construction equipment and materials to support the State of Connecticut's Project Number: 96-201. (the "Licensed Use"). Licensee shall have no other right to use, modify or alter the Property beyond those described in this Section 4. Licensee shall have no right to commence Licensed Use until License Agreement is fully executed

ADDENDUM NO. 1

5. **FEES AND CHARGES.** Licensor has preliminarily determined to waive a fee for the Licensees until such time when it is determined if an additional laydown, parking or other uses are needed on the Licensors lands. If additional uses are needed the Licensee shall be required to pay a license fee of $2,000/Acre and the total payment of the fee by Licensee to Licensor is a condition precedent to issuance of the License Agreement.

If Applicable payment should be directed to:

FirstLight Hydro Generating Company
Attention: Land Management Department
P.O. Box 5002
New Milford, CT 06776

6. **PROHIBITED USES.** Licensee is expressly prohibited from conducting any activity or engaging in any action other than what is specifically described in Section 4 of this License Agreement.

7. **LICENSOR RIGHTS.** The Licensor shall have right to access the Property at any time without prior notice to the Licensee. The Licensor shall also have the right to suspend the Licensed Use upon reasonable concern that the activities occurring on the Property do not comply with the terms of this License Agreement. In the case of a suspension, the Licensor will promptly inform the Licensee of the non-compliant activity and the Licensor shall have five (5) days in which to cure the non-compliant activity. In no way will the suspension be considered lifted unless and until the Licensor inspects the Property and is satisfied that the non-compliant activity is ended and the Property restored.

8. **CONDITION OF PROPERTY.** The Licensee shall remove all personal property and personal structures from the Property on or before the expiration of this License Agreement. Any of personal property or personal structures not specifically authorized herein that remain on the Property after the effective date of termination shall be disposed of by Licensor and the costs of removal shall be incurred solely by Licensee. Licensee shall reimburse this Licensor for the expenses of such disposal within thirty (30) days from the date Licensor notices Licensee of such expenses. Upon termination, Licensee must restore the Property to a condition satisfactory to Licensor. Licensor shall notify Licensee by written letter ("Notice") of any and all unsatisfactory issues with respect to the Property as a result of the Licensee's activities within ten (10) days of the expiration of this License Agreement or if Licensor has notice that the License Use has been completed. If Licensee fails to rectify the unsatisfactory conditions identified in the Notice within sixty (60) days of the date of the Notice, Licensor has the right to exercise all remedies in law or equity to restore the Property to satisfactory condition, at the sole expense of the Licensee.

9. **HAZARDOUS MATERIALS OR POLLUTANTS.** The use and/or storage of hazardous materials or pollutants are strictly prohibited. Licensee shall not store any

ADDENDUM NO. 1

pollutants on the Property. Licensee is solely responsible for any and all fees, expenses, or fines related to any pollution caused by their actions or inactions.

10. **NO TRANSFER OR ASSIGNMENT.** This License Agreement is an exclusive license granted only to the Licensee. This License Agreement shall apply solely to the Property and the Licensee identified above and Licensee may not assign, or otherwise transfer this License Agreement to any other person or parcel of land.

11. **INSPECTION OF THE PROPERTY.** Licensee acknowledges that it has inspected the Property and has determined that it is suitable for the proposed activity contemplated under this License Agreement. The Licensee has not relied on any written or oral representation of the Licensor concerning the Property (including, but not limited to, dimensions, soil conditions, environmental conditions, municipal restrictions, or uses by adjoining or third parties).

12. **LICENSOR'S USE OF THE PROPERTY.** The Licensor shall, at all times, retain the right to access the property for whatever reason.

13. **NO WARRANTIES.** Licensor makes no warranties, express or implied, to Licensee regarding the condition of Licensor property or any improvements thereon and hereby expressly disclaims any such warranties.

14. **SEVERABILITY.** If any provision of this License Agreement or its application will be invalid, illegal or unenforceable in any respect, the validity, legality and enforceability of all other applications of that provision, and of all other provisions and applications hereof, will not in any way be affected or impaired. If any court shall determine that any provision of this License Agreement is in any way unenforceable, such provision shall be reduced to whatever extent is necessary to make such provision enforceable.

15. **NOTICES.** All notices permitted or required to be made shall be addressed as follows:

As to Licensee:
Name: _____
Street: _____
Town: _____ State: _____
Zip: _____ Phone: _____
Email: _____

As to Licensor:
FirstLight Hydro Generating Company
P.O. Box 5002
New Milford, CT 06776

16. **ENTIRE AGREEMENT.** This License Agreement represents the entire agreement of the parties hereto with respect to the subject matter hereof and supersedes all prior or contemporaneous written or oral agreements, negotiations, correspondence, undertakings and communications between such parties respecting such subject matter.

17. **INSURANCE.** Being that the State of Connecticut has sovereign immunity and is immune from liability and suit without the State's consent and the State cannot be held liable in a legal action for any damage or injury it may cause or for the cost of any good, service, or benefit it may have received. However, the Licensee as a contractor and/or its subcontractors must obtain insurance coverage naming Licensor as an additional insured at a minimum the

a. As long as this License is in effect, and as a condition to obtaining access to and use of Licensors lands:

b. Comprehensive General Liability insurance, including broad form property damage liability, with limits of at least $1,000,000 per occurrence/per aggregate for bodily injury and $1,000,000 per occurrence/per aggregate for property damage.

All insurance policies required to be maintained by Permittee pursuant to this Permit shall: (i) name FirstLight Hydro Generating Company, its directors, officers, employees and affiliates as additional insureds with respect to any and all third party bodily injury and/or property damage; (ii) require that thirty (30) days written notice be given to FirstLight prior to any cancellation or material change in any insurance policy; and (iii) provide a waiver of subrogation.

18. **COMPLIANCE WITH LAWS.** Licensee shall comply with all applicable state or federal laws, codes or ordinances of any description including, sanitation, health, and environmental laws and shall promptly remedy any breach of same when conducting any activities related to this License Agreement.

19. **GOVERNING LAW.** This Agreement is governed under the laws of the State of Connecticut.

20. **AMENDMENT; WAIVER.** No amendment to this License Agreement shall be enforceable unless in writing and signed by the party against whom enforcement is sought. No waiver or failure to insist upon strict compliance with any obligation, covenant, agreement or condition of this License Agreement shall operate as a waiver of, or an estoppel with respect to, any subsequent or other failure.

Licensor - FirstLight Hydro Generating Co

_____ Date: _____

FirstLight Power Resources Services LLC

Licensee – State of Connecticut – Department of Transportation

_____ Date: _____

Representative of Contractor

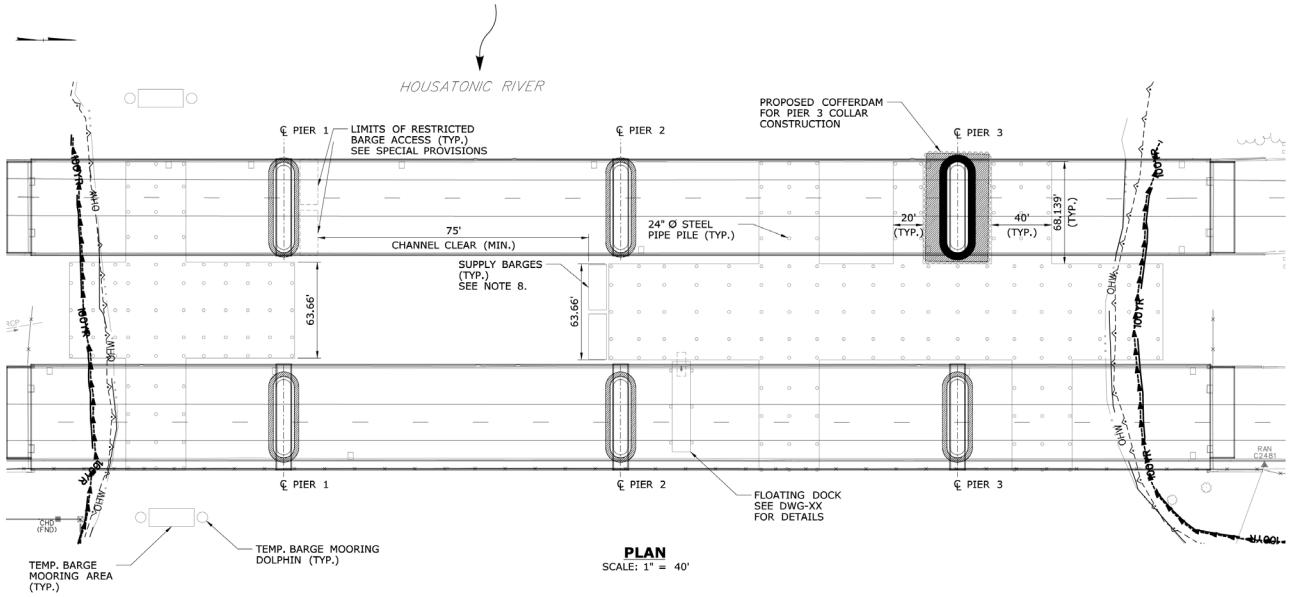
ADDENDUM NO. 1

EXHIBIT A – LICENSE AREA

ADDENDUM NO. 1

EXHIBIT B – ENTIRE PROJECT AERIAL

ADDENDUM NO. 1



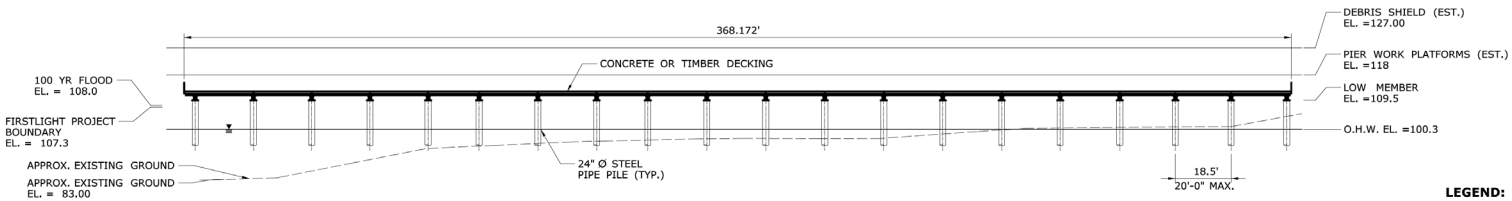
PLAN
SCALE: 1" = 40'

NOTES:

1. TEMPORARY TRESTLE AND FALSEWORK SHALL BE DESIGNED BY THE CONTRACTOR IN ACCORDANCE WITH THE AASHTO GUIDE DESIGN SPECIFCATIONS FOR BRIDGE TEMPORARY WORKS 1ST EDITION, 1995 WITH LATEST REVISIONS TO SUIT THE MEANS AND METHODS USED FOR CONSTRUCTION.
2. TEMPORARY PILES INSTALLED IN THE VICINITY OF THE EXISTING BRIDGE FOUNDATIONS SHALL BE LOCATED TO AVOID POTENTIAL CONFLICTS WITH EXISTING PILES AND OTHER OBSTRUCTIONS.
3. FOR TEMPORARY TRESTLE DETAILS SEE DWG S-XX.
4. THE DESIGN AND CONSTRUCTION OF TEMPORARY WORK TRESTLE, CRANE MATS, FLOATING DOCKS SHALL BE PAID FOR UNDER ITEM NO. 0100600 "CONSTRUCTION ACCESS". SEE SPECIAL PROVISIONS.
5. CONSTRUCTION OF TEMPORARY TRESTLE SHALL BE PERFORMED FROM BARGES AND OTHER FLOATED PLATFORMS.
6. THE INFORMATION SHOWN ON THIS DRAWING, INCLUDING (AS APPLICABLE) SIZES OF MEMBERS. THE SEQUENCE OF CONSTRUCTION , AND ERECTION PROCEDURES CONVEYS THE ASSUMPTIONS MADE BY THE DESIGNER IN DESIGNING THE STRUCTURE, AND IS FOR INFORMATIONAL USE ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SELECTING THE MEANS AND METHODS FOR CONSTRUCTION. THE CONTRACTOR SHALL BE ALSO SUBMIT INFORMATION INCLUDING DESIGN CALCULATIONS, CONSTRUCTION SCHEMATICS, AND CONSTRUCTION SEQUENCES AND PROCEDURES TO THE ENGINEER FOR REVIEW.
7. CONTRACTOR IS HEREBY NOTIFIED THAT ALL TEMPORARY WORKS AND EQUIPMENT SHALL MEET THE REQUIREMENTS OF APPLICABLE U.S. COAST GUARD AND CT DEEP BOATING REGULATIONS AND THE REQUIREMENTS OF THE BOAT SAFETY PLAN. SEE DWG - XX FOR BOAT SAFETY PLAN.
8. BARGES DOCKED OR ANCHORED AT TRESTLE IN SPAN 2 SHALL NOT EXCEED 60' X 100'. MINIMUM CLEAR CHANNEL AS INDICATED ON THE PLANS SHALL BE MAINTAINED AT ALL TIMES UNLESS OTHERWISE APPORVED BY THE ENGINEER.

PROPOSED TRESTLE CONSTRUCTION SEQUENCE:

1. BEGIN TRESTLE PILE CONSTRUCTION STARTING AT THE RIVER BANK AND WORKING INTO THE RIVER. INITIAL PILE CONSTRUCTION SHALL BE COMPLETED FROM THE RIVER BANK WITH EQUIPMENT OUTSIDE OF THE WETLAND AND FLOOD BOUNDARIES.
2. CONSTRUCT PRIMARY WORK PLATFORM BETWEEN BRIDGE NO. 04180 AND BRIDGE NO. 01218 TO THE LIMITS SHOWN.
3. CONSTRUCT WORK PLATFORMS ADJACENT TO PIER 3 WB AND UNDER SPAN 1, SPAN 3, AND SPAN 4 FROM PRIMARY WORK PLATFORM.



ELEVATION
SCALE: 1" = 20'

LEGEND:

- TEMPORARY IMPACT
- PERMANENT IMPACT
- 100YR – EXISTING 100-YEAR FLOOD (CALCULATED)
- OHW – ORDINARY HIGH WATER
- FIRSTLIGHT PROJECT BOUNDRY
- STATE/FEDERAL WETLANDS
- SEDIMENTATION CONTROL SYSTEM (SCS)

TRESTLE DESIGN CRITERIA:

1. ASSUMED DESIGN CRANE: TEREX MODEL HC 285 - 285 TON LIFT CRANE
   CRAWLER TRACK LENGTH = 30'-5/8"
   CRAWLER TRACK WIDTH = 4'-0"
   OUT TO OUT WIDTH = 25'-11¾"
2. CRANE ON TRESTLE (WITH BOOM, COUNTERWEIGHTS AND A 40 KIPS HOIST LOAD) = 303 KIP

PERMITTING CRITERIA:

1. ASSUMED PERMITTED AFFECTED AREA: 4900 SF
   PERMANENT IMPACTS: 1443 SF
   TEMPORARY IMPACTS: 3457 SF
2. TOTAL NUMBER OF PILES:
   2'Ø PIPE PILES = 237
   DOLPHINS = 4

PRELIMINARY DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 9/28/2018

DESIGNER/DRAFTER: JPM
CHECKED BY: JS
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\SB_MSTL_0096_0201_TEMP TRESTLE PLAN.dgn

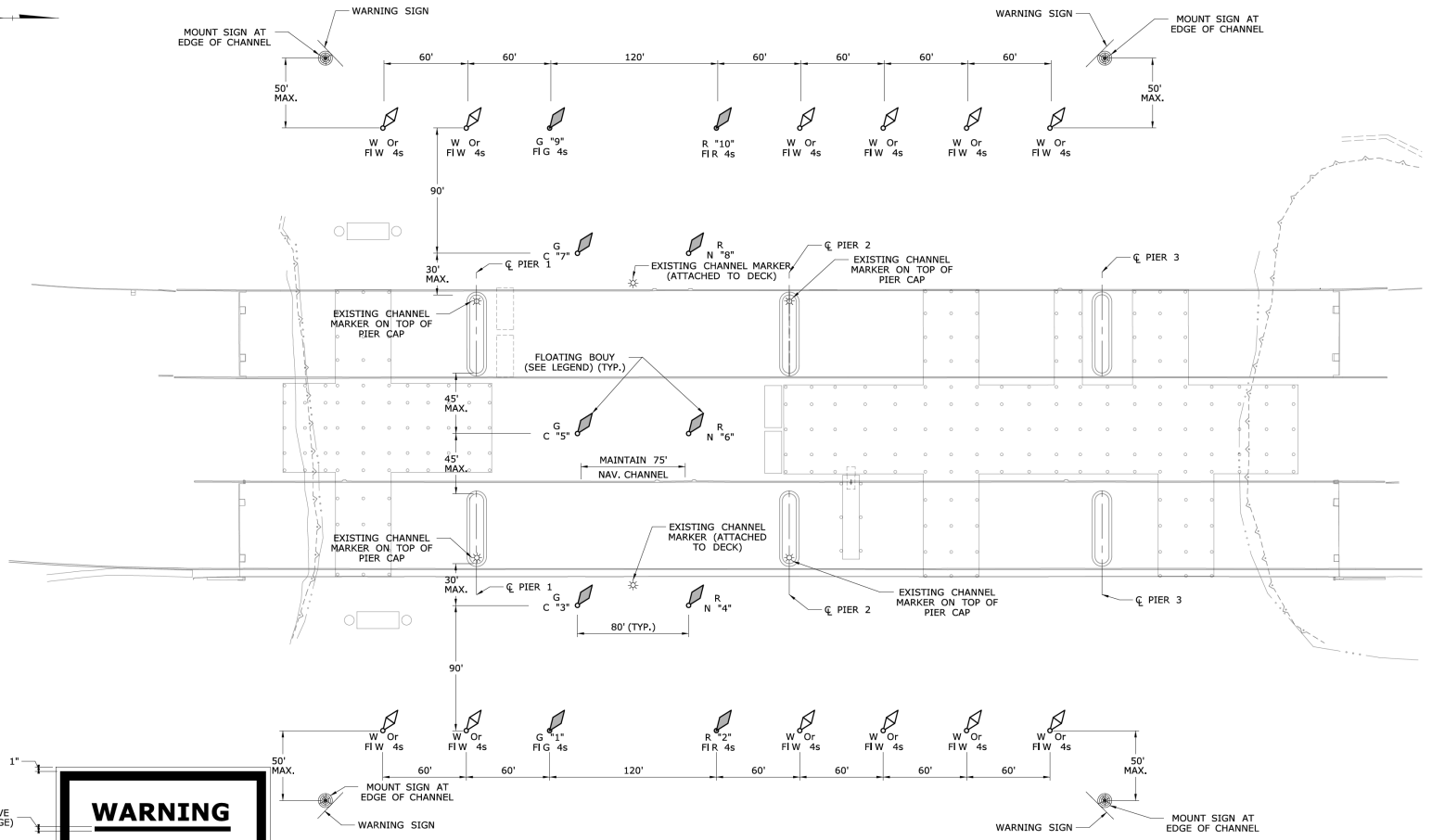
SIGNATURE/ BLOCK:

Louis Berger
55 CAPITAL BOULEVARD
ROCKY HILL, CT 06067

PROJECT TITLE:
REHABILITATION OF BRIDGE NOs 01218 & 04180 - I-84 EB/WB OVER HOUSATONIC RIVER

TOWN: **NEWTOWN/SOUTHBURY**
PROJECT NO. **96-201**
DRAWING NO. **STR-30**
SHEET NO.
DRAWING TITLE: **TEMPORARY TRESTLE PLAN AND ELEVATION**

ADDENDUM NO. 1



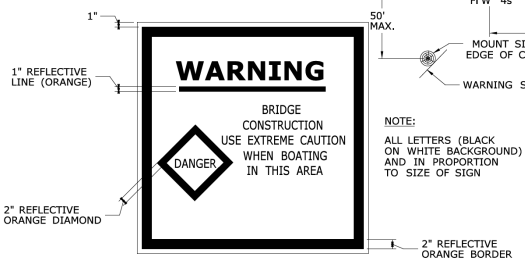
BOAT SAFETY PLAN
SCALE: 1" = 40'

NOTES:

1. ALL TEMPORARY WORKS AND EQUIPMENT SHALL MEET THE REQUIREMENTS OF THE US COAST GUARD AND CT DEEP BOATING.
2. ALL WORK AND MATERIALS REQUIRED TO ESTABLISH, MAINTAIN AND REMOVE BUOYS, SIGNS, LIGHTS AND CHANNEL MARKERS AS SHOWN ON THE BOAT SAFETY PLAN OR OTHERWISE REQUIRED BY THE COAST GUARD, DEEP BOATING OR THE ENGINEER SHALL BE INCLUDED AND PAID FOR UNDER ITEM NUMBER 0100600 "CONSTRUCTION ACCESS". SEE SPECIAL PROVISIONS.

BUOY LEGEND:

- G "X" Fl G 4s — GREEN LIGHTED BUOY NUMBER "X" FLASHING GREEN LIGHT AT 4 SEC INTERVAL
- G C "X" — GREEN CAN BUOY NUMBER "X"
- R "X" Fl R 4s — RED LIGHTED BUOY NUMBER "X" FLASHING GREEN LIGHT AT 4 SEC INTERVAL
- R N "4" — RED NUN BUOY NUMBER "X"
- W Or Fl W 4s — ORANGE AND WHITE EXCLUSION BUOY FLASHING WHITE LIGHT AT 4 SEC INTERVAL



"WARNING" SIGN 48" x 48"
SCALE: 1" = 1'

NOTE:
ALL LETTERS (BLACK ON WHITE BACKGROUND) AND IN PROPORTION TO SIZE OF SIGN

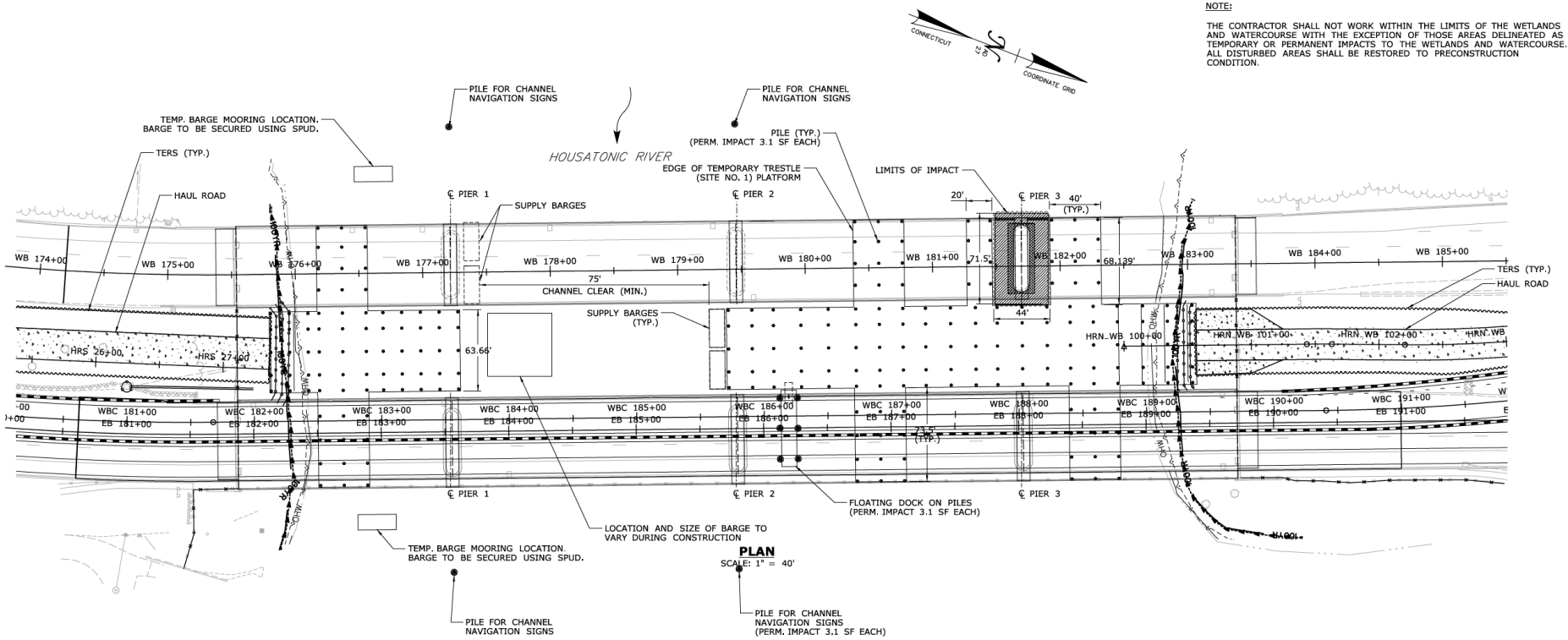
PRELIMINARY DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.	THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED. Plotted Date: 9/27/2018	DESIGNER/DRAFTER: MEB; CHECKED BY: JPM; SCALE AS NOTED	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION; Filename: ...\SB-MSTL-0096-0201-BOAT SAFETY PLAN 1.dgn	SIGNATURE/BLOCK: 55 CAPITAL BOULEVARD ROCKY HILL, CT 06067	PROJECT TITLE: REHABILITATION OF BRIDGE NOs 01218 & 04180 - I-84 EB/WB OVER HOUSATONIC RIVER	TOWN: NEWTOWN/SOUTHBURY; DRAWING TITLE: BOAT SAFETY PLAN	PROJECT NO. 96-201; DRAWING NO. STR-30; SHEET NO.

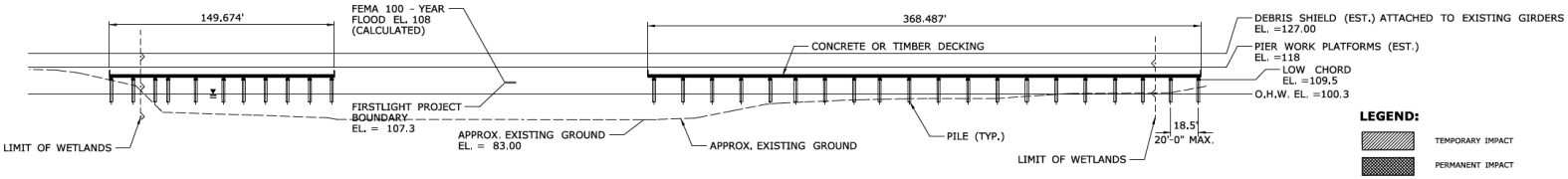
ADDENDUM NO. 1

NOTE:

THE CONTRACTOR SHALL NOT WORK WITHIN THE LIMITS OF THE WETLANDS AND WATERCOURSE WITH THE EXCEPTION OF THOSE AREAS DELINEATED AS TEMPORARY OR PERMANENT IMPACTS TO THE WETLANDS AND WATERCOURSE. ALL DISTURBED AREAS SHALL BE RESTORED TO PRECONSTRUCTION CONDITION.



PLAN
SCALE: 1" = 40'



ELEVATION
SCALE: 1" = 40'

100 YEAR FLOODPLAIN IMPACT TABLE, CUT AND FILL INFORMATION

VOLUME IMPACTS	
EXCAVATION IN FEMA FLOODPLAIN	FILL IN FEMA FLOODPLAIN
740 CY	830 CY

LEGEND:

- TEMPORARY IMPACT
- PERMANENT IMPACT
- 100YR – FEMA 100-YEAR FLOOD (CALCULATED)
- OHW – ORDINARY HIGH WATER
- FIRSTLIGHT PROJECT BOUNDRY
- STATE/FEDERAL WETLANDS
- SEDIMENTATION CONTROL SYSTEM (SCS)
- TEMPORARY EARTH RETAINING SYSTEM (TERS)

ENVIRONMENTAL PERMIT PLANS
PLAN DATE: 9/24/2019

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 9/24/2019

DESIGNER/DRAFTER: AJM
CHECKED BY: JPM
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSFORMATION

Filename: ...\SB_MSTL_0096_0201_PMT-05.dgn

SIGNATURE/BLOCK

LOUIS BERGER US
A WSP COMPANY
55 CAPITAL BOULEVARD
ROCKY HILL, CT 06067

PROJECT TITLE:
REHABILITATION OF BRIDGE NOs 01218 & 04180- I-84 EB/WB OVER HOUSATONIC RIVER

TOWN: **NEWTOWN/SOUTHBURY**
PROJECT NO. **96-201**
DRAWING NO. **PMT-05**
DRAWING TITLE: **100 YEAR FLOOD IMPACT PLAN**
SHEET NO.

ADDENDUM NO. 1

ADDENDUM NO. 1

ITEM #0202593A – ACCESS ROAD (SITE NO. 1)
ITEM #0202594A – ACCESS ROAD (SITE NO. 2)

Description: Work under this item shall consist of constructing temporary construction access to the areas around Bridge Nos. 01218 and 04180 at the location(s) shown on the plans for the purpose of demolishing and constructing the bridges as shown on the plans. The work involved in removing, reconfiguring, or adjusting any temporary construction access and restoring the area to its original condition shall be included as part of this item. Excavated earth from within these areas must remain on state property until reused to restore area.

Materials: A variety of materials will be necessary to construct the temporary access roads; including processed aggregate, geotextile, temporary earth retaining systems, anti-tracking pads, metal beam guiderail and associated infrastructure, three wood rail fence, single swing gate, and temporary drainage infrastructure, as shown on the plans. The preparation for the temporary access road, as well as the removal and restoration, will include the sedimentation control systems, tree protection, furnishing and placing top soil, and turf establishment.

The materials shall be as noted on the plans and shall meet the requirements of pertinent Form 817 specifications or shall be of a quality acceptable to the Engineer.

Geotextile Fabric:
Geotextile Fabric shall be a fabric that is on the "Qualified Product List for Connecticut Department of Transportation" and listed under Separation, category high survival.

Construction Methods: The Contractor shall prepare the site using the sediment and erosion control measures as shown on the plans. This work shall include the installation, maintenance, and removal of the controls as deemed necessary by the Engineer.

The composition of the temporary access road shall be gravel overlain over a geotextile fabric, as shown on the plans. Geotextile fabric shall be used for the separation of dissimilar materials. The placement of the geotextile fabric shall conform to the manufacturer's recommendations.

The Contractor shall maintain a maximum of 2:1 slopes and ensure that slopes greater than or equal to this are stabilized using stone slope protection, erosion control matting, or temporary earth retaining systems, as shown on the plans or at the direction of the Engineer. Alternative TERS, such as soil nail walls or soldier-pile and lagging walls, should be considered based on subsurface conditions and project constraints. The Contractor shall be responsible for selection and final design of temporary earth retaining systems used as part of this item. This item shall also include anti-tracking pads at all egress locations as shown and detailed on the plans. There may be other locations on the project where anti-tracking pads shall be needed and shall be paid for by the square yard.

The Contractor shall remove any existing metal beam guide rail that impedes access to the temporary access road.

Excavated earth from within this area is not classified as clean, therefore it must remain on state property until it is restored upon completion of the project. The temporary stockpile area or another area approved by the Engineer shall be used for storage of all excavated earth pertaining to the access roads.

Clearing and grubbing and tree trimming will be required for the temporary access road. Any tree shown to be within the cut/fill limits of each site are to be removed under the direction of the Engineer.

After the temporary access road is no longer required, all materials used for its construction shall be completely removed except as noted on the plans to remain. Disturbed areas beneath and around the temporary construction access shall be restored to their original grade and condition as depicted on the plans.

Submittals:

Working drawings showing the layout of the proposed access road, including but not limited to all temporary support of excavations, tie in points to existing alignments, and locations of traffic protection devices, shall be submitted to the Engineer no later than 21 days prior to the start of work.

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

Basis of Payment: This work will be paid for at the contract Lump Sum price for "Temporary Access Road (Site No. X)", which price shall include all work defined herein and necessary for the planning, design, construction, maintenance, removal and restoration of the temporary construction access roads and all materials, equipment, tools and labor incidental thereto.

PAY ITEM	PAY UNIT
Access Road (Site No. 1)	L.S.
Access Road (Site No. 2)	L.S.

ITEM #0210016A — WATER QUALITY SWALE

Description: Work under this Item shall consist of unclassified and trench excavation, furnishing and placing topsoil, turf establishment, placing permeable soil, filter fabric, placing 3/8" crushed stone, placing check dams, installing underdrain and underdrain outlets to the depths and within the area(s) shown on the plans.

Materials:

Topsoil: Topsoil shall conform to the requirements of Section M.13.01-1.

Turf Establishment: Turf establishment shall conform to the requirements of Article 9.50.02.s.

3/8" Crushed Stone: Crushed stone shall conform to the requirements of Subarticle M.08.03. This material shall conform to the gradation requirements for size No. 8 under Section M.01.01.

Filter Fabric: Filter fabric shall conform to the requirements of Subarticle M.08.01-19 for a subsurface drainage geotextile - Class A application.

Permeable Soil: Permeable soil shall be a uniform mixture of 70-85% sand, 10-20% silt and 0-10% clay. The contractor shall provide a Certified Test Report in accordance with Article 1.06.07 from a soil testing laboratory that compares the soil mix to this specification.

Underdrain: Underdrain and underdrain outlets shall conform to the requirements of Article M.08.01.

Construction Methods:

Water quality swales shall be constructed to the dimensions and grades as shown on the plans.

Excavation shall be performed in accordance with the applicable sections of Form 817. All excavated material shall remain on site. Surplus material shall be spread out and graded as directed by the Engineer.

Topsoil: Topsoil shall be installed per Article 9.44.03.

Turf Establishment: Turf establishment shall be installed per Article 9.50.03.

Filter Fabric: Filter fabric shall be installed per Article 7.55.03.

Permeable Soil: Permeable soil shall be placed in lifts not to exceed 15 inches in depth, with each layer compacted before the addition of the next layer. The required depth to which permeable soil is to be placed is to be the depth as shown on the plans after compaction and settlement of the material has taken place.

Underdrain: Underdrain shall be installed per Article 07.51.03. Underdrain shall be placed with the perforations at the bottom of the pipe and placed on a 3 inch bed of 3/8 inch crushed stone that has been tamped true to grade. After the pipe has been installed, 3/8 inch crushed stone shall be placed carefully around and over the pipe to a height of 6 inches above the top of the pipe and wrapped in filter fabric.

Method of Measurement:
This work will be measured for payment as the actual volume of material, in cubic yards, measured in-place within the footprint of the water quality swale and as accepted by the Engineer. No deduction in volume shall be made for the installed pipes.

Basis of Payment:
Payment for the work will be made at the contract unit price, per cubic yard, for "Water Quality Swale" which price shall include all excavation, turf establishment, topsoil, 3/8 inch crushed stone, check dams, filter fabric, permeable soil, underdrain, outlets for underdrain, and grading required for water quality swale installation, and all materials, equipment, tools, labor and work incidental thereto.

There will be no measurement and separate payment for excavated material transported on site and graded into its final configuration.

Pay Item	Pay Unit
Water Quality Swale	c.y.

ITEM #0511831A – BRIDGE SCUPPER – TYPE A
ITEM #0511832A – BRIDGE SCUPPER – TYPE B

Description:

This work shall consist of furnishing and installing scuppers, hoppers and grates, and downspout systems for bridge drainage as shown on the plans.

Materials:

Steel for the scupper frames, grates, and miscellaneous attachment materials including plates and angle irons shall conform to ASTM A709, Grade 50 or stronger, shall be hot dip galvanized in accordance with ASTM A153 and shall be manufactured in accordance with the plans. The lock down bolts shall be stainless steel conforming to AISI Type 304. Studs shall conform to the requirements of M.06.02-4. U-Bolts and nuts shall conform to ASTM A276 Type 304. The caulking shall be silicone sealant conforming to ASTM C920 Type S, Grade NS, Class 40 or Federal Specifications TT-S-001543A (COM-NBS) Class A and TT-S-00230C (COM-NBS) Class A.

Bolts for attaching plates to existing girder/beam webs shall conform to ASTM F3125 Grade A325 and shall be hot dip galvanized in accordance with ASTM A153.

The hoppers shall be custom molded reinforced polyester chemical-resistant fiberglass as shown on the plans.

The resin shall be corrosion resistant and shall be evaluated as a laminate by test or previous service to be acceptable for the environment. The resins used shall not contain fillers except as required for viscosity control or fire retardance. Up to 5% by weight of the isotropic agent, which will not interfere with visual inspection, may be added to the resin for viscosity control. Resin may contain pigments and dyes if authorization for their use is obtained from the Department. Antimony compounds or other fire retardant agents shall be added as required for improved fire resistance. The resin shall be protected by an ultra-violet absorbing system consistent with good practice.

The reinforcing material shall be a commercial grade of glass fiber having a coupling agent which will provide a suitable bond between the glass reinforcement and the resin. The glass and resin shall be applied in proper quantities to achieve maximum strength. However, the glass fiber shall be not less than 25% by weight. The laminate shall have a minimum ultimate tensile strength of 12 ksi, a minimum flexural strength of 20 ksi, and a minimum tangent flexural modulus of elasticity of 800 ksi. The material used as reinforcing on the surface exposed to chemical attack shall be a commercial grade chemical resistant glass having a coupling agent.

The laminate shall consist of an inner surface, an interior layer, and an exterior layer or laminate body. The composition of the inner surface and interior layer are intended to achieve optimum chemical resistance. The inner surface shall be free of cracks and crazing with a smooth finish and with an average of not over 2 pits per square foot, providing the pits are less than 1/8" diameter and not over .04" deep and are covered with sufficient resin to avoid exposure of inner surface fabric. Some waviness is permissible as long as the surface is smooth and free of pits. Between .01" and .02" of reinforced resin-rich surface shall be provided. This surface shall be reinforced with one ply of glass reinforcing matt.

The laminate shall be built to finished thickness in stages to minimize warping.

The laminate shall come to room temperature before successive plys are built up.

Barcol hardness, within 24 hours, shall be not less than the manufacturer recommends, when tested in accordance with ASTM D2583.

The color of the exterior surfaces of the hopper shall match the top coat color of the steel or as ordered by the Engineer. The Contractor shall submit a color sample to the Engineer for approval. A U.V. inhibitor shall be incorporated in the epoxy resin.

The Contractor shall furnish Certified Test Reports and Materials Certificates for each batch in conformance with the requirements set forth in Article 1.06.07.

Studs shall be welded to the frames in accordance with Article 5.08.03.

Steel frames and grates shall be hot-dip galvanized after fabrication in accordance with Article M.06.03.

Shop drawings for the frames and grates shall be submitted in accordance with Article 1.05.02. All manufacturing practices shall conform to Society of the Plastic Industries (SPI) standards.

A. Downspouts:

1. Pipe: Pipe shall be PVC Schedule 40 conforming to M.08.01-20.

2. Pipe Fittings: Pipe fittings (e.g. elbows, tees, couplings, etc.) shall be PVC Schedule 40 conforming to M.08.01-20 and shall have a smooth interior with a minimum centerline radius of one and one half (1-1/2) times the pipe diameter.

B. Pipe Brackets and Supports:

Pipe brackets and supports shall conform to the requirements of ASTM A575, Grade 1015 or 1020.

Anchors shall meet or exceed the requirement of U.S. Government, G.S.A. Specifications

No. AA 1922A.

Nuts and bolts shall conform to the requirements of ASTM F568 Class 4.6. Nuts and bolts shall be galvanized in accordance with Subsection 719-01, Type II.

Bolts and cap screws shall conform to the requirements of ASTM F568, Class 4.6.

Chemical anchors and testing shall be in accordance with Section M.03.07.

Construction Details:

A. Shop Drawings:

1. A plan and elevation with details showing all lengths, fittings, support and material designation needed to fabricate the scupper and downspouts.
2. Commercial items shall be identified by manufacturer, trade name and catalog number and shall indicate sufficient details.
3. The installation of welded studs shall also be shown in accordance with the requirements of Article 5.08.03.

Erection of Downspout Systems:

Runs of pipe shall be supported at spacing not greater than the lesser of those recommended by the manufacturer of the pipe or as shown on the bridge plans. Supports that have point contact or narrow supporting areas shall be avoided.

All pipe, fittings and expansion joints shall be handled and installed in accordance with guidelines and procedures recommended by the manufacturer of the material.

1. **Pipe Installation:** The pipe shall be laid true to line and grade as shown on the plans or as directed by the Engineer, with joints close and even, so that a true and even surface of invert will be made over the joints throughout its entire length. Pipe shall be installed so that the minimum slope shall not be less than 8%. Pipe shall be placed in accordance with the requirements of this specification unless special methods are called for on the plans or in the itemized proposal.

   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.

2. **Field Testing:** Prior to the acceptance of the structure by the Department, the downspout system shall be flushed out and tested by the Contractor, to insure that it is unobstructed and does not leak. Any obstruction in the downspout system preventing the free flow of drainage shall be removed to the complete satisfaction of the Engineer.

Method of Measurement:

This work will be measured for payment by the number of completed scuppers with attached downspouts completed and accepted.

Basis of Payment:

This work shall be paid for at the contract unit price, per each, for "Bridge Scupper – (Type)" which price shall include the cost of furnishing all labor, materials and equipment necessary to erect the scupper hopper, frame, grate, pipe, fittings, and pipe supports. The unit price bid per each shall also include the cost of furnishing and placing pipe hangers and brackets, couplings, and connections with girder.

Item	Pay Unit
Bridge Scupper – Type A	Each
Bridge Scupper – Type B	Each

ITEM #0512010A - 6" PIPE FOR BRIDGE DRAINAGE

Description:

This item shall consist of furnishing and installing polyvinyl chloride pipe and fittings for use as drains for the cleanout structure under the finger joints as shown on the plans or as ordered by the Engineer. The pipes begin in the floor of the cleanout structure and continue through the abutment stems, outletting on the embankment in front of the abutments.

Materials:

The pipe shall meet the requirements of M.08.01-20 PVC and shall be Schedule 40.

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. 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.

Installation of the drain pipes shall not result in damage to the abutment reinforcement. 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 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 top of the pipe through the cleanout structure floor to its terminus through the abutment stem.

Basis of Payment:

This work will be paid for at the contract unit price per linear foot of "6" Pipe for Bridge Drainage", complete in place, which price shall include all materials, fittings, equipment, tools, labor and work incidental thereto.

Pay Item	Pay Unit
6" Pipe for Bridge Drainage	l.f.

ITEM #0521007A – ELASTOMERIC BEARINGS

Description: Work under this item shall consist of furnishing and installing elastomeric bearings and all necessary materials and equipment to complete the work as shown on the plans.

Materials:
Elastomeric Bearings: The elastomer shall have a shear modulus between 0.130 and 0.200 ksi and a nominal hardness of 60 on the Shore A scale. It shall conform to the requirements of Section M.17.01.

The internal steel laminae shall conform to AASHTO M270, Grade 36 or approved equal. The laminae shall be sandblasted and cleaned of all surface coatings; rust and mill scale before bonding and shall be free of sharp edges and burrs.

The bearing shall be cast as a unit in a mold and shall be bonded and vulcanized under heat and pressure. The mold finish shall conform to standard shop practice.

Flash tolerance, finish and appearance shall meet the requirements of the latest edition of the Rubber Handbook, published by the Rubber Manufacturer's Association, Inc., RMA F3 and T.063.

The tests of the elastomer specified in Section 18.2 of AASHTO LRFD Bridge Construction Specifications shall be conducted on each lot of bearings. A shear modulus test shall be performed on each batch of material. (A lot consists of a single type of bearing of the same size, manufactured from the same batch of elastomer, submitted for inspection at the same time. A batch of elastomer is the quantity of elastomer prepared and compounded at one time).

In lieu of the low temperature crystallization test for each lot of bearings and a shear modulus test for each batch of material, the manufacturer may provide certificates from tests performed on identical formulations within the preceding year.

Every bearing shall be visually inspected for compliance with dimensional tolerance and for overall quality of manufacture. Buffing, cutting, or any other attempt to alter the size of the bearings to meet tolerances will not be permitted.

The elastomer shall meet the minimum requirements specified in Section M.17. The shear modulus of the material shall be tested at 73° F using the apparatus and procedure described in Annex A of ASTM D4014

The steel laminae shall develop minimum peel strength of 5.1 k/ft. as tested in accordance with ASTM D429 Method B.

Every bearing shall be tested as follows for a Short-Duration Compression Test:

1. The bearing shall be loaded in compression to 1.5 times the design load shown on the plans. The load shall be held constant for 5 minutes, removed and reapplied for another 5 minutes.

2. The bearing shall be carefully examined while under the second loading.

3. If the bulging pattern indicates laminate parallelism or layer thickness outside of specified tolerance, or poor laminate bond, the bearing shall be rejected. If there are three or more separate surface cracks greater than 3/32" wide and 3/32" deep, the bearing shall be rejected.

A Certified Test Report in accordance with Section 1.06.07 shall be required for the specified tests on the elastomer and for the specified short duration compression tests.

Each elastomeric bearing pad shall have embossed on it the following: the word "CONN", project number, manufacturer's identification code or symbol, and the month and year of manufacture. The bearing shall also have stenciled on it, with indelible ink, the lot number, bridge number, and the bearing number. The marking shall be placed on a side of the bearing that is visible after installation.

For structures requiring less than fifty (50) pads, one test pad shall be furnished. For structures requiring more than fifty (50) pads, one extra test pad shall be furnished for each additional fifty (50) pads or part thereof. If there are two or more types of pads in one structure, and only test pad is required, the test pad will be furnished for the type of which there are the greater numbers. All test pads shall be furnished without charge.

All of the pads on one structure shall be manufactured by the same firm.

The manufacturer shall furnish facilities for the test and inspection of the competed bearing in his plant or at the independent test facility and the inspectors shall be allowed free access to the manufacturer's plant and test facility.

The load plates shall conform to AASHTO M270, Grade 50W.

Swedge anchor bolts shall conform to requirements of ASTM F1554. The bolts, nuts, and washers shall be hot-dipped galvanized in accordance with ASTM 153.

Construction Methods: Before fabricating any materials, the Contractor shall submit shop drawings to the Engineer for approval in accordance with Subarticle 1.05.02-3. These drawings shall include but not be limited to the following information: the name of the manufacturer, complete details of the pads and pertinent material designations.

The bearing areas of the masonry upon which the elastomeric bearing pads are to be placed shall be carefully finished, by grinding if necessary, to a smooth, even level surface of the required elevation, and shall show no variations from a true plane greater than 1/16 inches over the entire area upon which the elastomeric bearing pads are to rest.

After delivery of the bearings to the job site, the bearings shall be stored such that they are kept clean and dry at all times.

There shall be uniform bearing between the elastomeric bearing pad and the concrete seat after application of full dead load, there shall be uniform deflection of the elastomeric bearing pad.

Welding of the structural steel adjacent to elastomeric bearing pads shall not be permitted.

The elastomeric bearings shall be installed when the ambient air temperature has been within the range of 40°F - 80°F for a period of at least two hours.

Method of Measurement: This work will be measured for payment by the number per each of elastomeric bearings, installed and accepted.

Basis of Payment: This work will be paid for at the contract unit price per each "Elastomeric Bearings", complete, in place, which price shall include furnishing and installing elastomeric bearing assemblies (including vulcanized load plates), and all materials, equipment, tools and labor incidental thereto.

The sole plates and filler plates (including bolts, nuts and washers for connection of girder with the bearing assembly) will be included in the contract unit price for "Structural Steel (Site No. X)".

Pay Item	Pay Unit
Elastomeric Bearings	EA

ITEM #0522178A – CONSTRUCT CONCRETE KEEPER BLOCKS

Description: This item shall consist of constructing concrete keeper blocks including the furnishing and placing of reinforcing steel, steel keeper plates, welded studs and concrete. This work shall be done as indicated on the plans, in accordance with these specifications, and as directed by the Engineer.

Materials:
The steel keeper plates shall conform to ASTM A36 steel.

Steel for welded studs shall conform to the requirements of Subarticle M.06.02-4.

Concrete shall be Class PCC04460 type conforming to Article M.03.

Reinforcement shall conform to ASTM A615, Grade 60.

The steel keeper plates shall be galvanized after fabrication and welding of the studs in accordance with ASTM A123.

Certification: A Materials Certificate and a Certified Test Report shall be required for the steel keeper plates in accordance with Article 1.06.07, certifying the conformance of these materials to the requirements stated herein.

All materials shall be approved by the Engineer before use.

Construction Methods:
The installation of the keeper blocks shall be done after the two adjacent elastomeric bearings have been installed.

The surface on which the concrete keeper is to be poured shall be intentionally roughened to a depth of 1/2 inch.

Fabrication and placement of reinforcing steel shall conform to the requirements of Article 6.02.03.

The installation of welded studs shall be in accordance with the requirements of Article 5.08.03. Mixing, placing, curing and finishing of the concrete shall be in accordance with Article 6.01.03.

The Contractor shall make test cylinders under the supervision of the representative of the Department. The dimensions, type of cylinder mold and number of cylinders shall be specified by the Engineer.

The Contractor, as directed by the Engineer, shall take adequate precautions to prevent any materials from dropping to the area below, which may result in damage to any existing construction or to adjoining property. Should any damage occur to the structure as a result of the Contractor's operations, the Contractor shall make repairs at his own expense. The repair work shall be approved in advance and shall be of a quality acceptable to the Engineer.

At no time during the Contractor's work will interruption in traffic carried by the structure be permitted solely as a result of constructing the keeper block.

Before fabricating any materials, the Contractor shall submit shop drawings to the Engineer to review in accordance with Article 1.05.02-3. These drawings shall include but not be limited to the following: Location and sizes of all reinforcing steel including splice lengths, steel plates and studs, material lists and material designations.

Method of Measurement:
This work will be measured for payment by the number of concrete keeper blocks, as described above, completed and accepted by the Engineer.

Basis of Payment:
This work will be paid for at the contract unit price each for "Construct Concrete Keeper Blocks", complete in place, which price shall include furnishing and placing reinforcing steel, steel keeper plates and welded studs, concrete, and all materials, equipment, tools and labor incidental thereto.

Pay Item	Pay Unit
Construct Concrete Keeper Blocks	EA

ITEM #0522410A - POT, SPHERICAL OR DISC BEARINGS (300 KIPS)
ITEM #0522440A - POT, SPHERICAL OR DISC BEARINGS (900 KIPS)
ITEM #0522442A - POT, SPHERICAL OR DISC BEARINGS (950 KIPS)

Description: The work covered by this specification shall consist of designing, furnishing, fabrication and installation of high-load multi-rotational bearings, including all materials located below the girder flange plate and above the supporting element, in accordance with the plans and specification. This work also includes attachment of the bearings assemblies to the girders and supporting elements via bolting, welding, and/or anchor rods. The high-load multi-rotational bearings may be of any type covered by this specification provided they are supplied by only one manufacturer. The bearing load capacity indicated in parentheses in the title of this special provision designates the service limit state maximum vertical design load.

Materials: All material used in the construction of bearings shall fully comply with the latest editions of the AASHTO LRFD Bridge Design Specifications Section 14 and of the AASHTO LRFD Construction Specifications Section 18, and as indicated below:

Steel: All steel, except steel for guide bars and shear-restriction pins and sleeves shall conform to ASTM A709, Grade 50W. Guide bars and shear-restriction devices shall be as detailed by the manufacturer, unless otherwise specified.

Stainless steel sliding surfaces shall conform to ASTM A 167 or A240 Type 304 with a surface finish of 20 micro-inches RMS or less. Welded stainless steel overlay shall be produced using Type 309L electrodes.

High Strength Bolts: High strength bolts, where required, shall conform to the requirements of ASTM F3125 Grade A325 (formerly ASTM A325) and shall conform to the requirements of M.6.02-3.

Anchor Rods: Anchor rods shall conform to the requirements ASTM F1554 Grade 105 (Fy 105 ksi), unless noted otherwise on the Plans. The anchor rods, nuts, washers, and couplers shall

be galvanized in accordance with ASTM 123 and ASTM 153. Where couplers are required per the plans, they shall be fabricated such that the anchor bolt and anchor rod cannot be threaded past the midpoint of the coupler.

Polytetraflouroethvlene (PTFE): PTFE sliding surfaces shall be made from virgin TFE resin in accordance with ASTM D4894.

Main sliding surface PTFE shall be unfilled, dimpled and lubricated. Dimples must have a minimum edge distance of 0.5" and conform to 1998 AASHTO LRFD, Section 14.7.2.

Guide bar surface PTFE shall be pigmented, filled or unfilled.

Sealing Ring: Sealing rings shall be made of brass, round in cross section, and shall conform to Federal Specification QQB626, composition 22, half hard.

Lubricant (Pot Bearing Disc): Lubricant for pot bearing discs shall be a silicone compound conforming to MIL-5-8660, or an equal approved by the Engineer.

Prefabricated Pads: Prefabricated pads shall be 1/8 inch thick and shall conform to the requirements of M.12.01.

Non-Shrink Grout: The non-shrink grout shall conform to the requirements of M.03.05 and shall be flowable type capable of being pumped with a positive displacement pump through an opening 1/8 inch in diameter.

Material Certification: The Contractor shall provide a Certified Test Report and Materials Certificate for the following materials in accordance with the requirements of Article 1.06.07:

Elastomer disk
PTFE Sheets
High strength bolts
Zinc silicate
Prefabricated Pads
Non-Shrink Grout

The Engineer shall reserve the right to request any additional certifications at no additional cost to the State.

The Contractor shall provide a Materials Certificate for steel and lubricant for elastomeric discs (pot bearing) in accordance with requirements of Article 1.06.07.

Construction Methods:

Design: High load multi-rotational bridge bearings shall be pot, disc or spherical bearings designed for the strength and service limit state design loads and rotations shown on the plans. The design and fabrication of high load multi-rotational bridge bearing shall comply with the latest editions of the AASHTO LRFD Bridge Design Specifications Section 14, and the AASHTO LRFD Construction Specifications Section 18, and as specified herein:

Design calculations and detailed working drawings for the bearings shall be sealed by a Professional Engineer, licensed in the State of Connecticut, and submitted to the Engineer for review, in accordance with the requirements of Article 1.05.02. The drawings shall include, but not be limited to, the following:

A. Plan view and section elevations, providing all fabrication dimensions and required surface finishes.
B. All ASTM, AASHTO, and other material designations.
C. Bearing design capacity for load, translation, and rotation at strength and service limits states.
D. A Schedule of all bearing offsets if required by the project.
E. A warning note shall be inserted on all pot bearing shop plans or working drawings on which field welding is required that no welding current shall be permitted to pass between pot and piston components.

The design calculations shall be complete, verifying conformance of the bearing to provisions of this specification.

General Requirements: Multi-Rotational bearings shall be designed to accommodate the loads, forces, rotations, and movements specified in the bearing schedule. Particular care shall be taken that all components of the bearings provide adequately for the horizontal loads and forces specified.

Maximum design stresses for all bearing components shall not exceed the allowable design stresses of the latest editions of the AASHTO LRFD Bridge Design Specifications Section 14 and the applicable sections of this specification.

Minimum horizontal load capacity for fixed and guided bearings shall be as specified on the contract plans but in no case less than 15% of the vertical dead load shown on the plans. Expansion bearings shall be designed for additional movement capacity, in each direction, beyond the design movement indicated on the plans. The additional movement capacity shall be 10% of the design movement or 1 inch, whichever is greater. Spacing between the guides of the bearing do not require this additional movement capacity.

Where shown on the plans, an auxiliary plate shall be provided for all bearings as noted in the specification herein. The auxiliary plate shall be designed to fit between the bearing proper and the masonry plate. The auxiliary plate shall be engaged with the bearing proper by means of a properly designed shop weld, or by a ”saucer-like" machined recess to snugly fit the base of the bearing. The purpose of the auxiliary plate is the following:

a. to provide a means of field installation adjustment and sufficient horizontal restraint for the base of the bearing proper without a field weld directly to the bearing where access is often difficult

b. to simplify the future removal and replacement of the bearing assembly in the event maintenance is required

c. to reduce the possibility of heat damage to critical bearing components during field welding installation

Bearing shall be designed so that all rotational and sliding elements can be replaced with a minimum lifting not to exceed 0.5 inch.

All specified machined surface finish tolerances shall be verified using a calibrated profilometer provided by the Contractor and approved by the Engineer.

Overall bearing height if different from that shown on the contract plans shall be accompanied by the necessary adjustment in the bearing pad elevation. Overall bearing height shall be not more than 0.25 inches greater than, nor zero (0) inches less than detail dimension provided on the fabrication working drawings.

Welding shall conform to the requirements of AWS D 1.1 Structural Welding Code and shall comply with the latest edition of the AASHTO LRFD Bridge Design and Construction Specification Requirements.

Bearing Requirements:

The pot shall be machined from a single solid piece of steel. The pot inside diameter (Dp) shall be the same as the elastomeric disc.

No coating shall be applied to the inside surface of the pot to be in contact with the elastomeric disc, except silicone lubricant required for the lubrication.

The disc shall be lubricated with a silicone compound conforming to the requirements of MIL-5-8660 or other approved equal.

Pistons shall have the lower corner chamfered at 45 degrees for a maximum depth equal to 1.7 times the diameter of the sealing ring where the seal will seat wholly within the piston thickness (above elastomeric disc), and 1.2 times the diameter where it extends into the elastomeric disc.

Rings shall be rolled into a circle from round rod cut according to the LRFD Bridge Design Specifications and brazed or soldered to form a ring. The brazing or soldering process shall be adequate to fully develop the tensile strength of the rod. The ring shall fit the pot snugly (ANSI Class LC1, Standard Fit) so that it is in full contact with the pot wall and the top of the elastomer when installed. Tensile stress in the ring as a result of elongation at maximum bearing design rotation and maximum vertical and horizontal design loads shall not exceed 0.55 x Fy.

Silicone lubricant shall be applied to all surfaces in contact with the ring during assembly.

Spherical Bearings Requirements:

The radius of the spherical element concave PTFE surface shall be determined such that the resulting geometry of the bearing is capable of withstanding the greatest ratio of horizontal load to vertical load under all loading conditions to prevent unseating of the concave element.

The concave surface shall face down whenever possible.

PTFE fabric in the free-state shall be a minimum of 0.08 in. thick when measured in accordance with ASTM D1777.

Minimum center thickness of spherical surfaces shall be 0.75 inch.

The edge thickness of the convex element shall be a minimum of 0.75 inch for bearings directly on concrete or 0.5 inch for bearings directly on steel.

Disc Bearing Requirements:

Steel contact surface for elastomeric disc: Inside surfaces facing the elastomeric disc shall receive a commercial shot blast finish in accordance with SSPC SP-6.

Non-Rotational Bearing Element Requirements:

PTFE: Maximum contact stresses on the PTFE at the service limit state shall comply with AASHTO LRFD Bridge Design Specifications Table 14.7.2.4-1.

Stainless Steel: The stainless steel surface shall cover the mating surface in all operating positions plus one inch in each direction of movement.

Stainless steel sheet shall be seal-welded around the entire perimeter using techniques which ensure it remains in contact with the backing plate.

Guide Bars and Guide Keys:

Central Guide keys may be made integral by machining from the solid. Where a separate key or guide bar is used they shall be fitted in a keyway slot machined to give a press bit and bolted or welded to resist overturning. Guide bars may be made integral by machining from the solid or fabricated from bars welded, bolted, and or recessed at the manufacturing option.

Guide bars and central guide keys shall be designed for the specified horizontal forces, but not for less than 15% of the vertical capacity of the bearing.

The sum of clearances between guided surfaces shall not exceed 1/8 inch. Net contact area between guiding surfaces must remain constant throughout all operating positions.

All guide bars and guide keys shall be self-aligning and shall bear on elements of suitable size and strength to resist lateral forces indicated on the plans (i.e., guides in pot bearings must bear against piston components; guides in spherical bearings must bear against unfixed spherical components.)

Guiding directly between fixed bearing components shall not be permitted. Stainless steel and PTFE are required on guiding surfaces. The compressive stress on PTFE shall not exceed the following average bearing stresses:

		Unfilled PTFE	Filled
PTFE	All loads except seismic loads	3,500 psi	3,500 psi

(PTFE on guiding surfaces need not be designed for seismic loading.)

Edge load pressure due to all loads and rotation (except seismic) shall not exceed 5,000 ksi for filled or unfilled PTFE.

PTFE on guiding surfaces shall be 3/16 inch minimum thickness, epoxy bonded into a square edged recess 3/32 inch deep in the substrate. In addition, the PTFE shall be mechanically fastened by a minimum of two screws into the substrate, located at a distance equal to twice the nominal screw diameter from the end of the PTFE strip. The top of the screws shall be recessed an amount not less than the minimum of one half the PTFE relief.

Travel Stops: Travel stops if detailed on the plans shall be capable of resisting the horizontal forces specified. The stops shall be set at 150% of the longitudinal movement or as directed on the plans.

Top Plate, Sole Plate, Auxiliary Plate, and Masonry Plate Requirements:

Where top plates, sole plates, and masonry plates bear on concrete the concrete bearing stress on the loaded area shall not exceed the limits specified in latest editions of the AASHTO LRFD Bridge Design Specifications.

Top or sole plates, if necessary, shall be beveled where they bear on steel to such that the lower surface of the top plate is level in the transverse and longitudinal directions when the bridge is open to traffic.

Special consideration shall be given to the design of top and sole plates (or plate to which sliding elements are attached) to assure that any bending forces imparted during field installation do not deflect the sliding surfaces. (The top or sole plate, for example, may be subject to extreme bending forces during a retrofit installation as a result of vertical load conditions prior to the completion of field welding.)

The top, sole, or masonry plates shall be shop welded to the bearing proper, unless otherwise noted on the plans. Auxiliary plates, where required, shall be located between the bearing proper and the masonry plate. The auxiliary plate shall be shop welded to the bearing proper, or shall have a "saucer-like" recess which shall snugly fit and restrain the bearing, and have adequate capacity to resist all required design forces. All field welds required for the anchoring of the lower bearing unit shall be limited to the interface between the masonry plate and auxiliary plate.

The top, sole, auxiliary, or masonry plates shall be designed for all required shear and bending forces in accordance with the latest editions of the AASHTO LRFD Bridge Design Specifications. If a recess is machined for the bearing or guide bars, it shall be not less than 1/2 inch in depth. The recessed surface on which the bearing proper will bear shall be machined to a

tolerance equal to 0.0005 x the diameter or width or recess. The minimum thickness of the auxiliary plate after machining of the recess shall be 1 inch.

Unless otherwise approved by the Engineer, the auxiliary and sole plates shall extend a minimum of 1 inch beyond the plan limit of the pot (or lower spherical element); bearing travel stops; or other bearing components in all plan directions, to provide access for required field welds.

Testing Requirements:

Sampling and testing shall be performed on bearings as specified in the latest AASHTO LRFD Bridge Construction Specifications Section 18.1.5 with the exception of the Long Deterioration Test, to ensure the requirements of the specification have been met. All tests described in the aforementioned Section 18.1.5 shall be performed in accordance with specified requirements therein and as specified herein.

Tests shall be performed on randomly selected samples from the production bearings. One bearing per "lot" shall be tested. One lot shall not exceed a single contract or project quantity. One lot shall not exceed 25 bearings. A lot shall consist of those bearings of the same type within a "Load Category". Bearing types shall be fixed type bearings or expansion type bearings. Guided and non-guided expansion bearings will be considered a single type.

One load category shall consist of bearings of differing vertical load capacity within a load range as outlines below:

- For bearings less than or equal to a service limit state load capacity of 1000 kips, the Load Category shall be based on a range of 500 kips.

- For bearings greater than a service limit state load capacity of 1000 kips but less than or equal to 3000 kips capacity, the Load Category shall be based on range of 1000 kips.

- For bearings in excess of 3000 kips capacity the Load Capacity shall be based on a range of 2000 kips.

Long-Term Deterioration Test: This test shall be performed on at least one expansion bearing, manufactured for the project, with a rated service limit state load capacity of 300 Kips or higher. The test does not have to be performed if documentation is submitted demonstrating a Long-Term Deterioration Test has been successfully performed and accepted on another Connecticut Department of Transportation project, for a bearing of equal or greater capacity, and of the same type and material properties to be supplied for the current project. The successful Long-Term Deterioration Test must have been completed within one year of the current project advertising date.

Only bearings from lots from which test specimens have passed all the above requirements will be approved for use in the structure.

Bearings with capabilities that exceed the manufacturer's testing capacity shall be tested at an approved testing laboratory. If suitable test equipment is not available in the United States, alternative testing/inspection procedures will be agreed between the Engineer and the manufacturer.

Shipping and Packing:

Bearing assemblies shall be securely fixed together as units so that they may be shipped to the job site and stored without relative movement of the bearing parts or disassembly at any time. Bearings shall be wrapped in moisture resistant and dust resistant material to protect against shipping and job site conditions.

Care shall be taken to ensure that bearings at the job site are stored in a dry sheltered area free from dirt or dust until installation.

When bearings are to be inspected on site, they shall be inspected within one week of arrival and may not be disassembled except under the supervision of the manufacturer or his representative or with the written approval of the manufacturer. Following inspection, the wrapping shall be reapplied and the bearings kept clean until installation.

Removal of top plates of bearings for separate attachment to the structure is not permitted except under the direct supervision of the manufacturer and by approval of the Engineer.

Installation Requirements:

Bearings shall be evenly supported over their upper and lower surfaces under all erection and service conditions.

Bearings shall be lifted only by their underside or specially designed lifting lugs.

When installing bearings, extreme care shall be exercised to protect bearing surfaces from damage and contamination.

The bearing assembly shall be aligned with the superstructure as shown on the plans. On guided bearings, special care must be taken to properly align the guiding mechanism with the designated expansion direction of the structure as shown on the plans.

Bearing straps or retaining clamps shall be left in place as long as possible to ensure parts of bearings are not inadvertently displaced relative to each other. Care must be taken to remove straps or clamps before any normal structural movement takes place.

Offsets of upper and lower bearing parts shall be set as required by the plans to compensate for load deflection, temperature movement, and elastic shortening and creep of post-tensioned concrete superstructure as the case may be.

Bearings installed on a concrete substructure shall be installed over a preformed fabric pad, or shall bear upon non-shrink grout, as indicated on the plans.

Bearings shall be installed over a prefabricated pad on a concrete bearing pad. The concrete bearing pad surface shall be prepared to the correct elevation and finished to the following flatness tolerance:

For bearings seats up to 3.1 in. in length or width: +0.06 in
For bearings seats over 3.1 in. but less than 4.5 in.: +0.09in.
Bearing seats over 4.5 in.: +0.125 in
There shall be no projecting irregularities exceeding 0.03 in.
Bearings seats shall be level within 1:200 slopes.

The masonry plate shall be installed level to within 1:200 slopes. The anchor rod protrusions above the masonry plate surface shall be cut off with the annulus filled with non-shrink epoxy grout that shall be installed in accordance with the manufacturers written recommendations.

The mating surface with the superstructure shall be a plane surface to within a slope of 1:200.

Following alignment of the bearing components, the bearing shall be field welded or bolted in position as shown on the plans. Welding procedures shall be established by the Contractor to restrict the maximum temperature of the bonded PTFE surfaces to 300° F and maximum temperature of the elastomer (Polyether-urethane, Neoprene or Natural Rubber) to 250°F. Temperatures shall be determined by temperature indicating wax pencils or other suitable means.

Welding current shall at no time be permitted to pass through the piston/pot assembly.

Particular care shall be exercised to mask and protect the PTFE and polished stainless steel surfaces.

The Contractor shall repair any damage to bearing finishes following installation at no cost to the State as directed by the Engineer.

A continuous bead of silicone, 1/4 inch thick, shall be applied along the interface between auxiliary plate and the bearing proper following completion of metallizing where the bearing proper is retained by a recessed opening in the auxiliary plate.

Method of Measurement: This work will be measured for payment by the number of each pot, spherical or disc bearing of the load capacity indicated, fabricated, installed, and accepted.

Basis of Payment: This work will be paid for at the contract unit price for "Pot, Spherical or Disc Bearings" of the load capacity indicated, complete in place, which price shall include the design, all materials, fabrication, testing (including extra bearings if required for testing), attachment to girders and anchorage assembly, equipment and labor incidental thereto. It also shall include the installation, including the masonry plate, grout or pad, and all materials, tools and labor incidental thereto.

ITEM #0601897A – REMOVAL OF GRAFFITI

Description:
Work under this item shall consist of surface preparation, and collection of associated debris from the removal of graffiti from surfaces of the abutments as shown on the plans, as directed by the Engineer and in accordance with these specifications.

Any damage resulting from surface preparations, containment and/or overspray from paint operations shall be repaired by the Contractor at no cost to the State.

The surfaces to be cleaned under this special provision are based on the information contained in the plans.

Materials: All materials and equipment shall be subject to the Engineer's approval before any work can begin.

Power Wash
The power wash shall consist of a soluble, abrasive blast media. Blast media shall be a large crystal sodium bicarbonate or a magnesium sulfate based media. Solubility of the media in the water shall be 8.6 g/100 ml.

The equipment with the media shall be a soluble media injector type power washer. The Contractor shall submit catalog cuts or other documentation for all equipment proposed for use in this work.

Solvent Wash

The cleaning compound shall be a blend of an organic solvent or emulsifiers and surfactants. It shall be a bio-degradable water-based mixture developed from non-toxic and non-corrosive substances. This may be a soybean solution or other, satisfactory to the Engineer. Mineral spirits are also acceptable for this usage.

The cleaner shall lift graffiti from the substrate surface and emulsify and dissolve the paint constituents; pigments; oils; binders and fillers. The material used shall not damage or mar the substrate. Acceptance of the cleaning compound will be based on the manufacturer's certification that the material conforms to the requirements of this specification.

Some acceptable solvents include the following:

- 3M Citrus Base Cleaner manufactured by 3M Adhesives, Coatings and Sealers Division, St. Paul, Minnesota 55144
- Enviro-Solutions Paint Stripper & Graffiti Remover by Enviro-Solutions Ltd., Barre, VT 05641
- Graffiti Remover by SOYsolv, 6154N CR33, Tiffin, OH 44883
- Taginator by Equipment Trade Service, 20 E. Winona Ave., Norwood, PA 19074
- Mineral Spirits

Construction Methods:

The Contractor may use one or more of the following methods for removal of graffiti:

- Solvent Wash
- Power Wash

Equipment: All equipment used in surface preparation and removal of debris, such as hoses, hoppers, recycling and vacuum machines that the Contractor brings to the site, shall be clean and free of any prior debris.

Spray equipment, brushes and rollers used in application of coatings shall be sized sufficiently and be in proper working order to accomplish the work according to the manufacturer's written recommendations.

Solvent Wash Operation:
A wet, non-abrasive cleanser is recommended. This cleanser shall not contain strong solvents or alcohols.

Cleanse the surface of loose dirt particles with clean water.

Use a soft sponge or brush to wash the graffitied surface with detergent and water. Avoid scrubbing the surface unnecessarily. After the cleaner has been used, apply a steady stream of water on the cleaned surface to wash the dirt particles away. Allow to dry.

The Contractor shall supply the instructions of the cleaning procedure, to the Engineer, at least two weeks prior to starting this work. Graffiti Removal material shall be applied to surfaces as per the manufacturer's instructions. Graffiti Removal material shall not be applied to silk screen processed areas.

After the solvent is applied, the surfaces shall then be wiped with a non-abrasive material. The wiped surfaces shall then be rinsed with a water wash. The cleanliness of the surfaces is subject to the approval by the Engineer.

After rinsing, the Contractor shall repeat the cleaning process in areas where graffiti is still visible. If the second cleaning process fails to remove the graffiti to the Engineer's satisfaction, the equipment and methods used by the Contractor will again be subject to review and approval by the Engineer. Use the Power Wash if the Solvent Wash is not successful in removing the graffiti.

Power Wash Operation:

All graffitied surfaces shall be cleaned with a soluble, abrasive blasting media applied with a soluble media injector at 3,000 psi, 5 gallons per minute or a compressed air delivery system at 100 psi, 35 gallons per second, whichever is satisfactory to the Engineer. No particulate matter of any nature shall be permitted to remain on the cleaned surface. After cleaning, the surface shall be rinsed with tapwater applied with a power washer at 1000psi. All visible media shall be removed from the surface.

After rinsing, the Contractor shall repeat the cleaning process in areas where graffiti or paint is still visible. If the second cleaning process fails to remove the graffiti or paint to the Engineer's satisfaction, the equipment and methods used by the Contractor will again be subject to review and approved by the Engineer. Cleaned surfaces shall bear no evidence of graffiti paint layers.

Method of Measurement: This work will be measured by the number of square feet, measured to the nearest square foot, of surface area that graffiti is removed or painted over, in accordance with this specification.

Basis of Payment: The unit price per square foot shall include the cost of furnishing all labor, materials and equipment necessary to complete the work. Required containment and/or disposal is incidental to the work. No direct payment will be made for the cost of storage or hauling the paint and other materials to and from the bridge site, but the cost thereof shall be included in the square foot price as noted above.

Pay Item	Pay Unit
Removal of Graffiti	s.f.

ITEM #0601954A – EPOXY INJECTION CRACK REPAIR

Description: Work under this item shall consist of surveying the existing concrete substructure, locating all cracks to be repaired, and repairing the cracked concrete with a two-component modified epoxy resin system injected into the cracked concrete under low pressure using continuous positive displacement metering and mixing equipment as directed in accordance with these specifications.

This item shall also include providing of a safe access to the structure for the delineation of the repair locations and review of the performed repair work. The Contractor shall not perform any repair work without prior approval of the Engineer for location, limits and types of repairs.

Materials:

The modified epoxy resin shall be a pre-qualified epoxy resin (See Appendix A). A Materials Certificate and a Certified Test Report in accordance with Article 1.06.07 shall accompany each batch or lot of the material delivered to the job site, to verify the epoxy resin's conformance with the manufacturer's supplied infrared spectroscopy test results.

A batch of each component will be defined as that quantity of material that has been subjected to the same unit chemical or physical mixing process intended to make the final product substantially uniform.

Each component shall be packaged in steel containers not larger than 5 gallons in volume. The containers shall have lug type crimp lids with ring seals, shall be new, not less than 0.024-inch nominal thickness, and shall be well sealed to prevent leakage. If a lining is used in the container, it shall be of such character as to resist any action by the components. Each container shall be clearly labeled with the designation (component A or B), manufacturer's name and date of manufacturer, batch number and the following warning:

CAUTION: This material will cause severe dermatitis if it is allowed to come in contact with the skin or eyes. Use gloves and protective creams on the hands. Should this material contact the skin, wash thoroughly with soap and water. Do not attempt to remove this material from the skin with solvents. If any material gets in the eyes, flush for 10 minutes with water and secure immediate medical attention.

Any material, which shows evidence of crystallization or a permanent increase in viscosity or settling of pigments that cannot be readily dispersed with a paddle, shall not be used.

Construction Methods:

A survey shall be undertaken by the Contractor on the area designated to be repaired, under the direction and to the satisfaction of the Engineer, to determine the exact limits and location of the area to be repaired under this item.

At the time of mixing, components A and B and the substrate temperature shall be between 50° and

85° Fahrenheit, unless the material has been pre-qualified at a temperature less than 75° Fahrenheit, in which case this lesser temperature shall govern the use of the material. Any heating of the adhesive components shall be done by application of indirect heat. Immediately prior to filling the tanks of the mixing equipment, each component shall be thoroughly stirred with a paddle. Separate paddles shall be used to stir each component.

Cracks less than 1/8" in width shall not be repaired under this item unless directed by the Engineer.

Prior to sealing, the crack shall be cleaned of dust, silt and any other material, which would impair proper bonding. Cleaning shall be done with compressed air jets free of oil or by vacuum cleaning with an industrial vacuum cleaner.

Injection ports shall be inserted in the cracks at intervals not less than the thickness of the concrete being injected. At the end of a crack or at a point where the thickness of the crack becomes less than 20 mils, the first port shall be half the distance from this point. The Contractor may use either surface injection ports or insertable injection ports as recommended by the manufacturer of the epoxy.

Drilling of the injection ports shall be done with a hollow drill bit to which vacuum is applied with and industrial vacuum cleaner. The drill shall not contact any steel reinforcing or pre-stressing strands or ducts. A pachometer shall be used to locate the embedded steel.

Spacing of the ports shall be such that the injected adhesive will substantially fill the crack without excessive waste. If necessary to meet this this requirement, the spacing of the ports shall be revised as approved by the Engineer as the injection process progresses. The surface of the crack between ports shall be sealed with tape or other temporary surface sealant, which can retain the epoxy adhesive in the crack during pressure injection and shall remain in places until the epoxy has hardened. Sealant tape and/or temporary surface sealant shall also be removed, and any spillage of epoxy shall also be removed.

Epoxy adhesive shall be pumped into the cracks through the injection ports. The pump, hose, injection gun and appurtenances shall properly proportion and mix the epoxy and shall be capable of injecting the epoxy at a sufficient rate and pressure to completely fill all designated cracks. A suitable gasket shall be used on the head of the injection gun to prevent the adhesive from running down the face of the concrete. Pumping pressure shall be kept as low as practicable.

The temperature of the concrete shall not be less than 50° F at the time epoxy is injected, unless the epoxy has been pre-qualified at a lower temperature as hereinbefore provided, in which case the lower temperature shall govern.

For a crack with uniform thickness, the epoxy adhesive shall be forced into the first port at one end of the crack until adhesive runs in substantial quantity from the next adjacent port. The first port shall then be sealed, and injection started at the next port. Injection shall then continue from port to port in this manner until the crack is fully injected.

Cracks with non-uniform thickness shall have the epoxy adhesive forced into the port at the widest

separation in the crack until adhesive runs in substantial quantity from the two adjacent ports. The first port shall then be sealed, and injection started at the adjacent port corresponding to the shortest length of the crack. Injection shall then continue from port to port in this manner until the short side of the crack is fully injected. Then, beginning with the port to port until the crack is fully injected. For slanting or vertical cracks, pumping shall start at the lower end of the crack. Where approximately vertical and horizontal cracks intersect, the vertical crack below the intersection shall be injected first. The ports shall be sealed by removing the fitting, filling the void with epoxy and covering with tape or surface sealant.

Before starting injection work and at 2-hour intervals during injection work when requested by the Engineer, a 3-fluid ounce sample of mixed epoxy shall be taken from the injection gun. Should these samples show any evidence of improper proportioning or mixing, injection work shall be suspended until the equipment or procedures are corrected.

Samples obtained above shall be used directly, without further stirring, to make test pieces for the Slant Shear Strength on Dry Concrete. One test piece shall be made at the beginning, middle and end of daily operations. The sample shall be allowed to cure for 7 days in the "Concrete Cylinder Curing Box." On the 7th day, the samples shall be removed to the laboratory and test in accordance with the requirements for Slant Shear Strength (see Appendix A, attached).

Each sample shall be numbered consecutively and dated (with a waterproof marker) and it shall be noted which sample represents which part of the structure.

Technical Advisor: The Contractor shall obtain the services of a Technical Advisor who is employed by the manufacturer of the epoxy resin. The Technical Advisor shall assist the Engineer and the Contractor in the correct use of the injection resin. The Advisor shall be a qualified representative approved by the Engineer and shall be at the site of the work when the work begins in connection with the epoxy injection and at such other times as the Engineer may request until completion of this item.

Method of Measurement:
Epoxy Injection Crack Repair shall be measured by the actual number of linear feet of cracks injected and sealed with epoxy and accepted by the Engineer.

Where cracks are designated for injection on opposite sides of a concrete member and the epoxy adhesive injected on one side penetrates through the members to completely fill the crack on the opposite side, payment will be made for the cracks on both sides as though injection had been performed on both sides, except that no payment will be made for such cracks on the opposite side that were not designated by the Engineer for injection. No payment will be made for such cracks on the opposite side that are smaller than 20 mils.

Where a crack designated for injection extends around the corner of a concrete member, the length of crack on both faces will be measured for payment.

Providing a safe access for delineation and inspection of the performed repairs will not be measured for payment.

Basis of Payment:
"Epoxy Injection Crack Repair" will be paid for at the Contract unit price per linear foot, complete in place, which price shall include providing scaffolding or other access for the Engineer's inspection and delineation, services of a qualified technical advisor, surface preparation and all materials, equipment, tools, labor and clean-up incidental thereto.

Pay Item	**Pay Unit**
Epoxy Injection Crack Repair	l.f.

APPENDIX A

Prequalification Procedure

The Prequalification Procedure shall consist of the following test procedure on the mixed epoxy resin at a temperature of 77° unless the Contractor desires to use the material at a lower temperature than 50°F, in which case the lower temperature shall be used to condition the material and test pieces.

Test:	**Viscosity**
Requirements:	900 centipoise max. @ 20°F (±2°F) 4000 centipoise max. @ any temperature
Test Method:	ASTM D 2393

Test:	**Gel Time (Pot Life)**
Requirement:	4 to 60 minutes

Test Method:

A. Apparatus
   1. Unwaxed paper cups, 8 oz., 2 1/4 inches at base (Dixie Cup No. 4338 or equivalent).
   2. Wooden tongue depressor with ends cut square (Puritan No. 705 or equivalent).
   3. Stainless steel spatula with blade 6" x 1" and with end cut square.
   4. Stopwatch, 1 second or smaller divisions.
   5. Balance, 0.1-gram divisions.

B. Test Procedure
   1. Condition both A and B components to required temperature (±2°F).
   2. Measure proper volumes of well-mixed components A and B into an 8-oz. unwaxed cup to yield total mass of 60 grams (±2.0 grams).
   3. Start stopwatch immediately and mix components for 60 seconds, stirring with a wooden tongue decompressor taking care to scrape the sides and bottom of the cup periodically.
   4. Place the sample at the required temperature (±2°F) on a wooden bench top which is free of excessive drafts.
   5. Probe the mixture once with the tongue depressor every 30 seconds starting 4 minutes from the time of mixing.
   6. The time at which a soft stringy mass forms in the cup is the gel time.

Test:	**Slant Shear Strength of Wet Concrete**
Requirements:	1700 psi min. after 7 days of cure in air at the required temperature (±2°F)
Test:	**Slant Shear Strength of Dry Concrete**
Requirements:	4500 psi min. after 7 days of cure in air at the required temperature (±2°F)
Test:	**Slant Shear Strength**

A. Materials

1. Ottawa sand, ASTM C109
2. Portland cement, Type II
3. Water

B. Apparatus

1. Suitable mold to make diagonal concrete mortar blocks with a square base with 2-inch sides and having one diagonal face 2" x 4" starting 3/4 inch above the base. The diagonal faces of two such blocks are bonded together producing a block of dimensions 2" x 2" x 5".
2. Block made from the following composition:

- Ottawa sand, ASTM C109	30.1 lbs
- Portland cement, Type II	12.1 lbs
- Water	4.8 lbs

Cure blocks 28 days in a fog room. Dry and lightly sand blast diagonal faces.

3. Suitable test press.

C. Test Procedure

Condition the components for 4 hours at the required temperature (±2°F). Without entrapping air, stir the separate components for 30 seconds and place the proper volumes of each component on a plate and mix with a spatula for 60 seconds. Apply a coat approximately 0.010-inch-thick to each diagonal surface. Place 4 1/8-inch square pieces of shim stock 0.012 ich thick on one block to control final film thickness. Before pressing the coated surfaces together, leave the blocks so that the coated surfaces are horizontal until the epoxy reacts slightly to prevent excessive flow. Press diagonal surfaces of each block together by hand and remove excess epoxy adhesive.

Align the blocks so that the ends and sides are square and form a block 2” x 2” x 5”. Use blocks of wood or metal against each 2” x 2” end, to keep diagonal faces from slipping until epoxy hardens.
After the required cure time, apply a suitable capping compound to each of the 2” x 2” bases, and test by applying a compression load with a universal test Machine or other suitable testing apparatus at the rate of 5000 lbs./min. until failure.

Report results in pounds per square inch.

$$= \frac{load\ in\ pounds}{4}$$

For wet shear strength, soak another set of blocks in water for 24 hours at the required temperature (±2°F). Remove and wipe off excess water. Prepare, cure, and test sample according to above test procedure.

Test:	**Tensile Strength**
Requirements:	4500 psi Min.
Test:	**Elongation**
Requirements:	15% Max.
Test Method:	Tensile Strength and Elongation

A. Apparatus

1. Leveling table about 12” x 8” with removable rim 1/4-inch thick by 1/2-inch wide.
2. Mylar or similar plastic sheeting 0.004-inches thick.
3. Air circulation oven capable of maintaining 158°F (±3°F).
4. Cutting die, Figure I
5. Thickness gauge, 1/8-inch.
6. Release agent, non-silicone type.

B. Procedure

1. Place Mylar sheet on leveling table.
2. Coat inside edge and bottom of rim with the release agent and secure to table with screws.
3. Level the table.
4. Mix sufficient volume of well-mixed component A and well mixed component B in the proper volumes so as to be able to form a layer 1/8 inch deep when placed inside the ring on the leveling table.
5. Introduce as few bubbles as possible during mixing.

6. Flush surface of epoxy with a heat gun or Bunsen burner to remove air bubbles on surface Repeat if necessary.
7. Allow the specimen to cure for 18 hours at the required temperature (±2°F).
8. Remove specimen from table and strip off Mylar sheet. Cure specimen for 5 hours at 158°F (±3°F).
9. Allow specimen to cool to the required temperature and cut specimens using cutting die shown in Figure I.
10. Proceed as specified in ASTM D 638, using 0.2-inches/minute test rate and 1-inch gauge length.

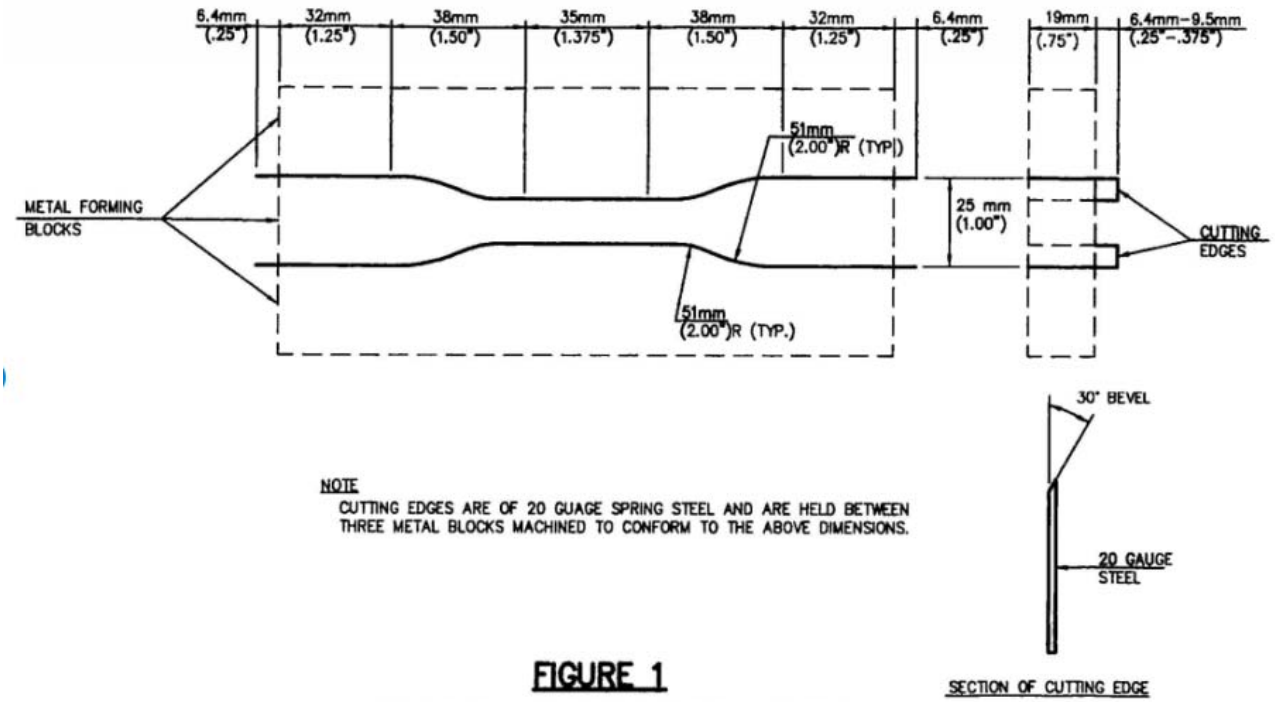
Test:	**Infrared Spectroscopy**
Requirement:	Infrared Spectroscopy Tests shall be obtained of Components A and B.
Test Method:	Recording Spectrophotometer

A. Apparatus

1. Perkin-Elmer Model 137-B Infracord Spectrophotometer, automatic recording system from 2.5 microns to 15 microns with a two-speed recorder or similar. Comparable results can be obtained with similar resolution.
2. Disk holder for a one-inch diameter disk.
3. Two sodium chloride crystal disks one-inch in diameter.
4. Sorvall SS-3 Automatic Superspeed Centrifuge or equivalent, which is able to separate the liquid and solid phases of the epoxy components without previous dilution with solvents.

B. Procedure

1. Place about 15 grams of component A into a stainless-steel centrifuge table.
2. Counterbalance with component B is a second centrifuge tube.
3. Centrifuge the two components at 17000 rpm until there is a supernatant liquid layer present in each tube. This takes 20 to 30 minutes.
4. Place a drop of component A liquid layer on a sodium chloride disk.
5. Place another sodium chloride disk over the drop, rotate, and press down until the liquid has flowed into a uniform layer of proper thickness between the two sodium chloride disks.
6. Place the disks in the holder and run an absorption curve with the infrared spectrophotometer.
7. More or less liquid may be used between the disks so to produce a maximum absorption of 0.7 to 1.0 for the strongest absorption point on the curve.
8. Clean the disks with toluene and dry.
9. Repeat steps 4 through 8 with the liquid layer from component B.
10. Record each curve in order that they may be used for comparison purposes with lots of material delivered to the job site.



NOTE
CUTTING EDGES ARE OF 20 GUAGE SPRING STEEL AND ARE HELD BETWEEN THREE METAL BLOCKS MACHINED TO CONFORM TO THE ABOVE DIMENSIONS.

FIGURE 1

CUTTING DIE FOR TENSILE TEST

N.T.S.

ITEM #0969053A - CONTRACTOR QUALITY CONTROL PROGRAM LEVEL 2

Description: The Contractor shall establish, maintain, and implement a written Project-specific Quality Control (QC) Program tailored to the complexity and scope of the work. This Program shall detail the programmatic documentation of the Contractor's processes for delivering the level of construction quality required by the Contract.

The written QC Program shall provide a comprehensive description of the planning, monitoring and reporting program the Contractor shall implement to ensure and document the quality of the work as it progresses.

The QC Program shall address, as a minimum, the following elements: Organization; Document Control; Design Control; Procurement Control; Control of Subcontractors, Fabricators and Suppliers; Inspection; Special Process Control; Non-Conformance Resolution; Records; and Reporting.

The QC Program shall identify and list critical and routine work categories, which shall be used to differentiate the level of reporting, inspection and attention throughout the process.

The QC Program shall include a method to identify and resolve any deviations from the Contract while maintaining the Project schedule. The QC Program shall include a method to prevent recurring deviations once identified and resolved.

The Contractor shall modify the QC Program as needed to meet the requirements of this specification. The QC Program shall be recognized as a dynamic document, subject to revisions and amendments, as required, in response to actual Site conditions, work methods, and to address deviations encountered and corrected throughout the Project.

The Contractor shall furnish the services of a dedicated (sole responsibility), full-time, on-Site Quality Control Manager (QCM) for the Project. The QCM shall report directly to upper management and shall have the authority to issue stop work orders.

When the Contractor's schedule dictates simultaneous work operations, the Contractor is responsible for supplementing the QCM with additional QC personnel (independent of trade staff) to meet the requirements of this specification.

The additional Contractor Quality Control requirements described herein shall be used in conjunction with the Department's Standard Specifications Form 817. The QC Program is neither intended to relieve the Contractor from its responsibility under the Contract, nor to replace the external inspections of the work carried out by the Engineer.

The minimum lump sum bid for this item shall be **$800,000 (Eight Hundred Thousand Dollars)**. Failure of the Contractor to bid at least the minimum amount will result in the Department adjusting the Contractor's bid to the minimum bid amount for this item.

Construction Methods:

Submittals

(1) QCM: Within thirty (30) days of Contract award, the Contractor shall submit, in writing, the name of their proposed QCM with a resume of their qualifications, submitted in accordance with the requirements listed below, for concurrence by the Department. The QCM shall not be changed without prior written notification to the Department.

The submittal shall outline the credentials of the proposed QCM, who shall be an individual with a bachelor's degree in Engineering and demonstrated construction experience. This shall include at least 10 years of experience in any combination of the following areas:

- Field inspection experience
- Construction experience relevant to the type of work and the scope of the Project
- Previous experience as a Quality Control professional

The submittal shall also include documented certification or training in quality control principles (NETTCP Quality Assurance Technologist or approved equal) and two (2) letters of recommendation from previous clients.

(2) QC Program: Within forty-five (45) days of Contract award, the Contractor, with direct input from the QCM, shall prepare and submit to the Department, for review and approval, a written QC Program, including the Elements listed below, and in accordance with all requirements of this specification.

Sample forms and reports intended to be used to assure compliance with this specification shall be included in the initial submittal of the QC Program. Sample forms and reports shall include, but are not limited to:

- Sample document control tracking form
- Sample design control tracking form (for Contractor design-build items)
- Sample shop drawing/working drawing review
- Sample material receiving inspection report
- Sample inspection forms for critical work categories
- Sample special process control forms
- Sample non-conformance report
- Sample daily and monthly reports

The Contractor's QCM, Project Manager and a representative of their upper management shall sign the final QC Program submission and any revisions or amendments thereto. Any revisions or amendments made to the QC Program shall be submitted in writing to the Engineer for acceptance.

Subcontractors, fabricators and suppliers involved in critical work categories, as defined in the QC Program, shall have their own work-item specific QC Plan which shall be included as an addendum to the Contractor's QC Program, and shall comply with all conditions of this item.

(3) Additional QC Personnel: When additional QC personnel are required due to simultaneous work operations, the Contractor shall provide resume(s) of qualifications of the proposed personnel at least thirty (30) days in advance of the work. All additional QC personnel utilized for inspecting, sampling, and testing of materials shall be certified by NETTCP (or another entity acceptable to the Department) in the appropriate designation for the work or materials being inspected, sampled, or tested. These individual(s) shall also have demonstrated construction experience of at least 5 years in any combination of the following areas:

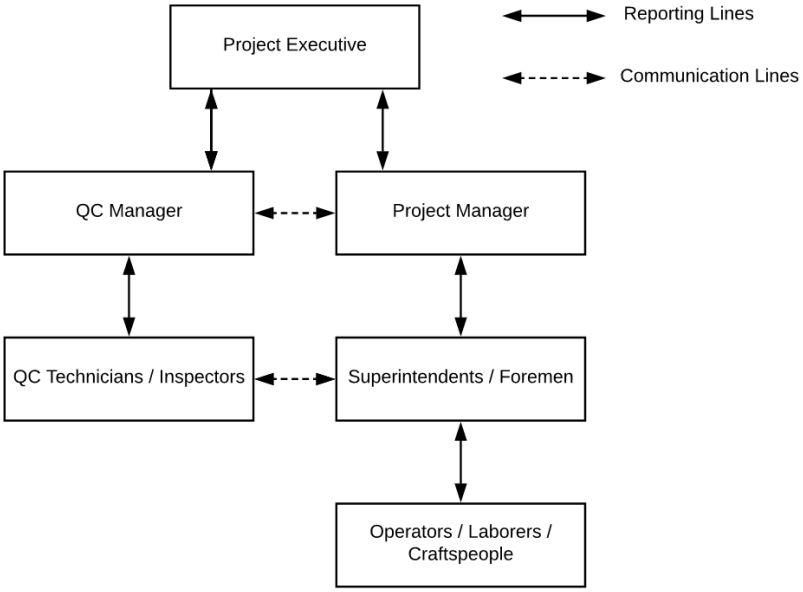
- Field inspection experience
- Construction experience relevant to the type of work and the scope of the Project
- Previous experience as a Quality Control professional

(4) Laboratories: All laboratories performing QC testing of Project Produced Materials shall be qualified through either the AASHTO Accreditation Program (AAP) or the NETTCP Laboratory Qualification Program. The Contractor shall provide laboratory proof of qualification at least thirty (30) days in advance of the work.

(5) Reports: The Contractor shall be required to produce and submit to the Engineer daily and monthly inspection reports as described in the Reporting Element of this specification.

Elements of the Contractor Quality Control Program:

1. Organization: This Element shall describe the Contractor's organization, including reporting relationships within and external to the Contractor's organization. The name of the QCM shall be clearly stated and this individual shall be responsible to upper management and have the authority to stop work. An organizational chart shall be included to graphically depict the Contractor's organizational structure and major reporting lines and relationships. The organizational chart shall clearly show the hierarchy between the QCM, upper management and additional QC personnel; and a narrative shall follow which shall define the roles, duties and responsibilities of each person in the implementation of the QC Program and in the resolution of QC issues. This Element shall also include the resumes of all QC personnel.



2. Document Control: This Element shall describe the methods used by the Contractor and the QCM to control the use of the various design documents, shop drawings, procedures, etc. to assure that only the most current, accepted documents are used and are distributed to the individuals performing the work. The process to recall documents which have been superseded or revised shall be addressed. This Element shall identify the submittals that are required by the Contract, the system used to track these submittals and their current status.

A submittal status update spreadsheet shall be submitted with each monthly report, in accordance with the Reporting Element.

3. Design Control: This Element shall describe how the Contractor and the QCM control any design process (i.e. working and shop drawings) for which it is responsible. This shall include the selection of design input data, checking for correctness, completeness, compatibility and format, and reviewing and approving design output documents prior to submission to the

Department. This Element shall provide guidance as to how the QCM or other personnel shall indicate that documents have been reviewed by the Contractor prior to submission, and that Department comments have been adequately addressed prior to any required resubmissions.

4. Procurement Control: This Element shall describe the methods used by the Contractor and the QCM to assure that all materials and specialized equipment provided for the work are as specified. Included shall be guidelines for documenting that purchase documents have been reviewed to assure that correct details have been ordered, including specification, grade, type, color, Buy America or other aspects as required by the Contract.

This Element shall describe receiving inspection activities to be performed, and documentation required to confirm that the correct material or equipment has been delivered. A list of items requiring Materials Certificates and/or Certified Test Reports shall be developed by the Contractor and included in this Element. The Contractor shall prepare a "Material Receiving Inspection Report" which shall include records of inspections performed and reviews of material test reports or other documentation required by the Contract. It shall also include copies of Materials Certificates and/or Certified Test Reports for all these items.

As a minimum, receiving inspections shall be performed on the following materials:

- Materials requiring a Materials Certificate or Certified Test Report
- Source-Controlled Materials (not inspected at the manufacturing plant)
- Job-Controlled Materials (other than concrete, bituminous and soils)

Following a receiving inspection, a copy of the "Material Receiving Inspection Report," along with associated documents, shall be submitted to the Engineer.

5. Control of Subcontractors, Fabricators and Suppliers: Subcontractors, fabricators and suppliers involved in critical work categories, as defined in 6(a) herein, shall develop their own QC Plan to be added as an addendum to the Contractor's QC Program, which shall comply with all conditions of this item. The Contractor shall be responsible for reporting on QC activities performed by or for subcontractors, fabricators and suppliers.

It is the Contractor's responsibility to notify all subcontractors, fabricators, and suppliers of the requirements of the Contract. This Element shall describe the methods used by the Contractor and the QCM to assure that all the applicable requirements of the Contract are passed on to the subcontractors, fabricators and suppliers. This Element shall include the methods used by the Contractor and the QCM to monitor and control the quality of the work performed by subcontractors, fabricators and suppliers, and to obtain the required quality records.

This Element shall also describe how the Contractor will ensure that:

- The Engineer receives advance notice of:
  - The source of supply
  - The location of fabrication, including component parts
  - The schedule of fabrication, including the date of beginning of fabrication and the date the material is to be delivered to the Project
- Material fabricated specifically for the Project will be inspected and approved prior to being shipped or incorporated into the work
- Properly documented mill test reports are furnished by suppliers
- Subcontractors are approved prior to performing any work for or on the Project
- Consider adding additional bullets at QC FDP Meeting

6. Inspection: This Element shall describe how the Contractor and the QCM will assure that the specified quality of materials and workmanship will be achieved. The Contractor's QC

Program is not related to any inspection carried out by the Engineer. Inspection will include the identification and tracking of the quality characteristics (metrics) used to verify that the level of quality of materials and workmanship conforms to the requirements of the Contract.

The QC Program shall identify the reporting requirements for each item based on its work category, and these reporting requirements will be approved by the Engineer. The work categories will be identified as **critical** or **routine**.

(a) Critical Work Categories: For this Project, critical work categories shall include, but are not limited to the following:

- Construction Staking
- Maintenance & Protection of Traffic
- Earthwork
- Subbase and Base Material
- Hot Mix Asphalt
- Drainage
- Bridge Demolition
- Earth Retaining Systems
- Geotechnical (Foundations, Piles, Drilled Shafts)
- Reinforcing Steel
- Structural Steel
- Structural Concrete
- Electrical
- Landscaping
- Sign Support Foundation
- Environmental Compliance
- Permit Compliance

The QCM shall be familiar with all aspects of work related to critical work categories and no work shall be performed on these categories without the prior knowledge of the QCM. The QC Program shall define specific means and methods that shall be employed to minimize, identify, resolve and prevent recurrence of deviations from the Contract in regards to materials or workmanship for each of the critical work categories listed.

The QC Program shall identify hold points in the critical work categories beyond which work operations cannot proceed until the QCM and the Engineer have inspected the work in place and releases the hold.

When simultaneous critical work categories are required by the Contractor's schedule, additional QC personnel shall be required.

This Element shall describe the system(s) used to assure that all materials and workmanship for critical work categories are in conformance with the Contract, including but not limited to:

- visual inspection of the work, including frequency and hold points
- materials to be tested
- tests to be conducted
- frequency of testing
- locations of sampling
- checks

- intermittent or continuous inspections
- inspections of completed work
- or a combination of above methods

Quality control reporting forms shall be developed to document the work performed by the QCM and QC personnel, on each of these critical work categories. The forms shall be signed by Contractor supervisory field personnel, the QCM and QC personnel (if applicable), to document conformance of the work being performed. All work performed by the QCM and QC personnel on these critical work categories shall be documented and included in the QCM's daily and monthly reports.

(b) Routine Work Categories: All other work categories not covered by 6(a) will be defined as routine work categories and the general provisions of this specification shall apply.

7. Special Process Control: This Element shall describe the measures to be used to assure that any special processes (such as, but not limited to, welding, high-strength bolting, nondestructive examination, critical coatings, surveys, and control of critical tolerances) shall be controlled by procedures that are described in and comply with the Contractor's approved QC Program. The recording of results shall properly document that processes are in conformance with the Contract. In addition, this Element shall describe the methods used to verify, document and track any pre-qualification of the processes, personnel and equipment where required by the Contract.

8. Non-Conformance Resolution: This Element shall describe the protocol(s) for correcting any material or workmanship found not to be in compliance with the Contract, the reporting requirements for documenting any non-compliance, subsequent corrective measures and issue resolution.

(a) Contractor-Issued Non-Conformance Reports: This Element shall outline the Contractor's use of self-issued non-conformance reports to document actions taken to identify, resolve and prevent recurring deviations. The non-conformance reports shall include signatures of the responsible persons for each process of the corrective action taken. Upon resolution of a non-conformance issue, the QC Program shall be revised to identify preventive measures that shall be taken to prevent similar deviations. Contractor supervisory field personnel involved in the work shall be informed of any changes implemented to avoid recurrence of deviations.

(b) Engineer-Issued Non-Compliance Notices (NCN): Non-compliance notices (NCNs) issued by the Engineer shall also be an indication of non-conformance and shall be addressed according to 1.05.11 and resolved to the satisfaction of the Engineer. Upon resolution, the QC Program shall be revised to identify preventive measures that shall be taken to prevent similar deviations. Contractor supervisory field personnel involved in the work shall be informed of any changes implemented to avoid recurrence of deviations.

9. Records: This Element shall describe how various records generated by the Contractor are originated, maintained, received, filed, protected and authenticated. Quality Control records required for submittal to the Engineer shall be described. This Element shall outline the Contractor's procedure for retaining records for a period of 3 years after acceptance of the Contract.

10. Reporting: QC Inspection Reports: The Contractor shall be required to produce and submit to the Engineer daily and monthly inspection reports in accordance with all requirements

of this specification. The QC Program shall clearly define the information that shall be provided as part of the daily and monthly reports.

(a) Daily Reports: Daily reports shall include documentation of all activities, including inspection, material testing, and any work associated with the Elements of this specification, performed by the QCM and other QC personnel. The location of any forms relative to this specification shall be referenced in the daily reports.

For any week that a non-conformance report is issued, either by the Contractor or the Engineer, actions taken to resolve the non-conformance report shall be summarized and included with the submission of the daily reports. Updates on the status of the non-conformance shall continue in each submission of daily reports until the non-conformance issue is resolved. Once resolved, the next submission of daily reports shall document that supervisory field personnel involved in the work have been informed of any changes to be implemented to avoid recurrence of deviations. Any revisions or amendments made to the QC Program, once submitted and accepted by the Engineer, shall be documented in the next submission of daily reports.

Daily reports shall be submitted (as a package) to the Engineer by 12 PM on the Tuesday following the week of the inspection reports, or as agreed to by the Engineer. Except as otherwise authorized by the Engineer, submissions after that time will be considered late.

(b) Monthly Reports: Monthly reports shall include a summary of the work performed, including QC activities, in the previous month and also a one (1) month "look ahead" schedule with expected QC efforts and procedures for critical and routine work categories. Monthly reports shall also include a submittal status update spreadsheet.

Monthly reports shall be submitted to the Engineer by the fifth (5th) business day each month. Except as otherwise authorized by the Engineer, monthly submissions after that time will be considered late.

(c) Quality Assurance/Quality Control (QA/QC) Meetings: Meetings shall be held specific to the QC Program. The Contractor shall, at minimum, be represented by the QCM and shall meet with the Engineer every other week, or more frequently at the Engineer's request, to review reporting and all work related to this specification.

Method of Measurement: Within forty-five (45) calendar days of the award of the Contract, the Contractor shall submit to the Engineer for approval a schedule of values of its lump sum bid price for this item detailing the following:

1. The development costs to prepare the written QC Program. Development costs shall be ten percent (10%) of the total cost of the item.
2. The cost per-month to provide the services of the QC Program, including the QCM, QC activities, necessary QC personnel, preparing and submitting daily and monthly reports, and all other requirements of this specification. A per-month cost will be derived by taking the lump sum bid price, subtracting the development cost to prepare the written QC Program, and dividing the remainder by the number of Contract months remaining from the date of submission of the written QC Program.

Basis of Payment: This item will be paid for at the Contract lump sum price for "Contractor Quality Control Program Level 2" complete, which price shall include all submittals, QC

Program revisions and amendments, inspections, monitoring, daily logs, reports, meetings, records, and all materials, equipment, labor and work incidental thereto.

Upon approval of the schedule of values by the Engineer, payments for work performed will be made as follows:

1. Upon acceptance of the written QC Program, the lump sum development cost from the payment schedule will be approved for payment.
2. Upon acceptable completion of the services of the QC Program for the month, the per-month cost will be approved for payment.

The Engineer reserves the right to apply the following reductions to the monthly payment portion, which cannot be recovered and will result in a reduction in the lump sum amount, should the Contractor fail to meet the requirements of this specification:

1. QC staff: A five percent (5%) reduction to the monthly payment will be applied for each day that acceptable QC services are not provided. The total reduction for any calendar month will not exceed the monthly payment for the item.
2. Reports: A five percent (5%) reduction to the monthly payment will be applied for each day that the required reports have been submitted late, up to a maximum of fifty percent (50%) of the monthly payment per report. This five percent (5%) reduction will apply to each independent report (each package of daily reports, described in 9(a) above, submitted on a weekly basis is considered one independent report). The total reduction for any calendar month will not exceed the monthly payment for the item.
3. QA/QC Meetings: A twenty-five percent (25%) reduction to the monthly payment will be applied for each bi-weekly QA/QC meeting not attended by the QCM. The total reduction for any calendar month will not exceed the monthly payment for the item.

Should the Contractor fail to continuously provide an acceptable QC Program, as required by this specification, the Engineer may withhold the entire monthly estimate until such time as all requirements are met.

Should the Contractor fail to comply with the QCM requirements of this specification, the QCM shall be replaced at the Engineer's request.

Only one monthly payment will be made for each calendar month regardless of the number of personnel required to complete the specified work.

Pay Item	Pay Unit
Contractor Quality Control Program Level 2	l.s.

ITEM #1018013A – TEMPORARY WATERWAY CONSTRUCTION MARKERS

Description: Work under this item shall consist of furnishing, establishing, constructing, maintaining, and removing all applicable signage and beacons necessary to maintain the safe navigation of the designated channel, to establish a safe work zone on the waterway and to temporarily close the designated channel. Also included in this item are any modification to the temporary waterway construction markers necessary due to stage construction in the areas around Bridge Nos. 01218 and 04180 as a result of demolition/construction activities. This work includes the driving and removal of piles needed to support any beacons and the preparation of any waterway boat safety and closure plans required for the construction and demolition of Bridge Nos. 01218 and 04180. Navigation lights required to mark the positions of the Contractor's equipment, the work trestle, and sheeting enclosures are included under this item.

This item also includes fabrication, setting and maintenance of temporary vertical clearance signs for marine traffic.

Materials:

Signage:
All reflective sheeting shall meet the requirements of Section M18.09 of the Form 817.

Lighting:
All temporary lighting on beacons shall be new LED lights rated for marine environments as recommended by the manufacturer. All temporary lights shall be rated IP68 and shall be equipped with an integral photocell that will all for dusk to dawn operation. Temporary lighting shall be placed to illuminate vertical clearance signs. Lighting shall be capable of illuminating beacons to a minimum surface value of 5 footcandles.

Navigation lights to mark the position of the Contractor's equipment, the work trestle, and any other vessel or obstruction shall meet U.S. Coast Guard requirements (33 CFR).

Construction Methods: The Contractor prior to the start of any work on, in, or above the waterway shall establish the required work zone as shown on the plans or as directed by the Engineer. The Contractor shall submit 90 days prior to the establishment of the work zone a Boat Safety Plan identifying any temporary work in the vicinity of the waterway, proposed staging of any work that will affect the boating public or use of the waterway, durations of the proposed work zone and locations of beacons (signs). The Contractor shall maintain a minimum of a 75' wide channel at all times unless prior written permission is granted from the Engineer. The Contractor shall submit a Closure Plan to the Engineer a minimum of 30 days prior to the establishment of the channel closure. Channel closures shall only be permitted Monday – Friday between May 1st and October 1st. All navigation lights shall remain on at all times. Any piles used for support of signage and/or beacons shall be removed. Piles that can't be removed shall be cut off 2' below the mudline.

Vertical Clearance Signs:

Temporary vertical clearance signs are to be fabricated, installed and maintained during the duration of the project. These signs shall be illuminated to a minimum surface value of 5 footcandles. Signs are to meet the requirements of the U.S. Coast Guard and regulatory agencies and be approved by the Engineer prior to fabrication. Signs are to be placed at the center of the navigable channel such that one sign is visible to upstream traffic and the other is visible to down-steam traffic. Relocation of and resetting of this sign to indicate the correct available vertical clearance during the course of construction is included within this work. If approved by the Engineer, the existing/permanent vertical clearance sign(s) may be used to meet this signage requirement.

Method of Measurement: This work, which is to be paid on a Lump Sum basis, shall not be measured for payment.

Basis of Payment: This work will be paid for at the contract Lump Sum price for "Temporary Waterway Construction Markers", which price shall include all work defined herein and necessary for the furnishing, establishing, constructing, maintaining, and removing all applicable signs and beacons, needed to establish, maintain and temporarily close the designated navigation channel, and all materials, equipment, tools and labor incidental thereto. The preparation of the Boat Safety Plan and any required Closure Plans shall also be included in this item.

PAY ITEM	PAY UNIT
Temporary Waterway Construction Markers	L.S.