

FEBRUARY 2023
REPLACEMENT OF LAKE AVENUE
CULVERT OVER CUSSGUTTER BROOK
STATE PROJECT NUMBER 000-000

BRISTOL, CT

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NOTE: THIS INDEX HAS BEEN PREPARED FOR THE CONVENIENCE OF THOSE USING THIS CONTRACT WITH THE SOLE EXPRESS PURPOSE OF LOCATING QUICKLY THE INFORMATION CONTAINED HEREIN; AND NO CLAIMS SHALL ARISE DUE TO OMISSIONS, ADDITIONS, DELETIONS, ETC., AS THIS INDEX SHALL NOT BE CONSIDERED PART OF THE CONTRACT.

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DATE
STATE PROJECT NO. 000-000

Replacement of Lake Avenue Culvert Over Cussgutter Brook

City of Bristol

The State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818, 2020, as revised by the Supplemental Specifications dated January 2022 (otherwise referred to collectively as "ConnDOT Form 818") is hereby made part of this contract, as modified by the Special Provisions contained herein. Form 818 is available at the following DOT website link <http://www.ct.gov/dot/cwp/view.asp?a=3609&q=430362>. The current edition of the State of Connecticut Department of Transportation's "Construction Contract Bidding and Award Manual" ("Manual"), is hereby made part of this contract. If the provisions of this Manual conflict with provisions of other Department documents (not including statutes or regulations), the provisions of the Manual will govern. The Manual is available at the following DOT website link <http://www.ct.gov/dot/cwp/view.asp?a=2288&q=259258>. The Special Provisions relate in particular to the Replacement of Lake Avenue Culvert over Cussgutter Brook in the City of Bristol.

CONTRACT TIME AND LIQUIDATED DAMAGES

One Hundred Ninety One (191) calendar days will be allowed for completion of the work on this Contract and the liquidated damages charge to apply will be one thousand one hundred Dollars (\$1,100) per calendar day.

NOTICE TO CONTRACTOR – SITE CLEANLINESS

The Contractor is hereby notified that all areas utilized for construction activities including all onsite and offsite facilities shall be maintained so as to be free of rubbish, trash and deleterious construction debris at all times. The use of covered and secured trash receptacles is required. All receptacles will be regularly emptied and maintained.

There will be no direct payment for maintaining the site cleanliness of the construction areas under the contract.

NOTICE TO CONTRACTOR - PROCUREMENT OF MATERIALS

Upon award, the Contractor shall proceed with shop drawings, working drawings, procurement of materials, and all other submittals required to complete the work in accordance with the contract documents.

NOTICE TO CONTRACTOR - M.04 - BITUMINOUS CONCRETE
MATERIALS ADDITIONAL REQUIREMENTS

The Contractor is hereby notified that as of the January 2022 Supplemental Specifications, Section M.04 of the Standard Specifications in Form 818 has been revised as follows:

1. Added requirement that asphalt binder suppliers must
 1. participate in the National transportation Product Evaluation Program (NTPEP), Asphalt Binder Suppliers (ABS) program;
 2. review the sources Quality System Manual and on-site audit report from the NTPEP by the Department, and;
 3. submit monthly split samples to the Division of Materials testing (DMT) for each grade of binder currently or potentially supplied to Department projects.

See Section M.04 for more information.

NOTICE TO CONTRACTOR – PRECAST/PRESTRESSED PORTLAND CEMENT CONCRETE (PRC) MIX CLASSIFICATIONS

SECTIONS 5.14 and M.14 MIX CLASSIFICATIONS

Sections 5.14 *Prefabricated Concrete Structural Components* and M.14 *Prefabricated Concrete Members* have been revised as of the January 2022 supplements to Form 818 and should be thoroughly reviewed. The Precast/Prestressed Portland Cement Concrete Mix Classification Table is provided below. These classes of concrete should only appear within Prefabricated (Precast/Prestressed) items.

Table M.14-1 Precast/Prestressed Portland Cement Concrete Mix Classes

Class	28-day Strength (psi)	Resistivity (kΩ-cm) at 56 days AASHTO T 358	Entrained Air
PRC04060	4,000	NA	6.0 +/- 1.5%
PRC04062	4,000	29	6.0 +/- 1.5%
PRC05060	5,000	NA	5.0 +/- 1.5%
PRC05062	5,000	29	5.0 +/- 1.5%
PRC06060	6,000	NA	5.0 +/- 1.5%
PRC06062	6,000	29	5.0 +/- 1.5%
PRC08060	8,000	NA	5.0 +/- 1.5%
PRC08062	8,000	29	5.0 +/- 1.5%
PRC10060	10,000	NA	4.0 +/- 1.5%
PRC10062	10,000	29	4.0 +/- 1.5%

PRCXYZ() PRC=Precast/Prestressed Concrete

XXX = 28-day strength (x100 psi) Y=Stone size (No. 6 = No. 67)

Z= (0=no resistivity requirement, 2=resistivity requirement)

NOTICE TO CONTRACTOR - PERMITS/PERMIT APPLICATIONS

The Contractor is hereby notified that all permits and permit applications contained herein shall be made a part of this Contract, and that the Contractor shall be bound to comply with all requirements of such permits and permit applications as though the Contractor were the permittee. If at the time the permit is received its contents differ from that which is outlined in the application, the permit shall govern. Should the permit be received after the receipt of bids and the permit requirements significantly change the character of the work, adjustment will be made to the contract in accordance with the appropriate articles in Section 1.04. The requirements and conditions set forth in the permit and permit applications shall be binding on the Contractor just as any other specification would be. In the case of a conflict between a provision of the environmental permit or permit application and another provision in the contract documents, the former shall govern.

**NOTICE TO CONTRACTOR – VERIFICATION OF PLAN DIMENSIONS
AND FIELD MEASUREMENTS**

The Contractor is responsible for verifying all dimensions before any work is begun. Dimensions of the existing structures shown on the plans are for general reference only; they are not guaranteed. The Contractor shall take all field measurements necessary to assure proper fit of the finished work and shall assume full responsibility for their accuracy. When shop drawings and/or working drawings based on field measurements are submitted for approval and/or review, the field measurements shall also be submitted for reference by the reviewer.

In the field, the Contractor shall examine and verify all existing and given conditions and dimensions with those shown on the plans. If field conditions and dimensions differ from those shown on the plans, the Contractor shall use the field conditions and dimensions and make the appropriate changes to those shown on the plans as approved by the Engineer. All field conditions and dimensions shall be so noted on the drawings submitted for approval.

There shall be no claim made against the City by the Contractor for work pertaining to modifications required by any difference between actual field conditions and those shown by the details and dimensions on the contract plans. The Contractor will be paid at the unit price bid for the actual quantities of materials used or for the work performed, as indicated by the various items in the contract.

NOTICE TO CONTRACTOR – AS-BUILT PLANS

A complete set of prints shall be maintained at the site at all times and the Contractor shall be responsible for having clearly, neatly, accurately and promptly recorded thereon, as the work is performed, the as-built record of the contract work. Principal dimensions, elevations and such other data as required shall be recorded for all work.

The marked-up prints will be inspected weekly by the Owner and shall be corrected immediately if found either inaccurate or incomplete.

At the completion of the project, complete as-built maps showing all improvements shall be prepared and Certified Plans shall be on reproducible 3-mil mylar and shall be submitted to the Owner for final inspection and comment. At a minimum, the plans shall show the following:

1. North Arrow
2. Benchmark – Indicate elevation, datum used, with exact location and description noted.
3. Location, size and material of all underground utilities including sanitary sewers, drainage, water, electric, telephone, gas transmission mains, shall be shown with depth indicated at intervals of not more than 500'. Location of manholes, catch basins, end wall, wyes, tees, risers, etc. shall be noted.
4. Scale shall be noted.
5. Date construction was completed (month and year only), and date of finished As-Built map shall be indicated.
6. Revisions shall be noted and redated.
7. As-Built pipe grade in percent shall be shown as well as invert elevations at every structure.
8. The name of the Professional Engineer or Surveyor shall be shown on said plan with the plan sealed by the Professional.
9. Houses or other structures shall be located and noted on the plan along with corresponding house numbers or lot numbers, if available.
10. Location, size and depth of all utilities entering homes shall be shown.
11. All drainage outfalls shall be profiled for a distance of not less than 50' from the outlet structures.

The Contractor shall correct, amplify, and do all other work as may be required by the Owner to complete the drawings in a manner satisfactory to the Owner.

This work shall be performed on a continuing basis and shall be included in the general cost of the work. No separate payment will be made for As-Built Drawings. This information will be used by the Municipality and may serve as public information.

NOTICE TO CONTRACTOR – WORK AROUND EXISTING UTILITIES

The Contractor is hereby advised that care shall be taken throughout the project when working around existing utilities.

Placement of heavy equipment and materials, or the traversing of heavy equipment and materials over existing underground utilities when during periods of reduced cover, such as formation of subgrade, shall be restricted. Equipment and materials used during these operations shall be reviewed and approved by the Engineer. The Contractor shall be responsible for any damage to the utilities and surrounding area as a result of the Contractor's actions.

All work occurring near existing overhead utilities shall be coordinated with the utility owner.

NOTICE TO CONTRACTOR – PROTECTION OF EXISTING UTILITIES

Existing utilities shall be maintained during construction except as specifically stated herein and/or noted on the plans and as coordinated with the utilities. The Contractor shall verify the location of underground and overhead utilities. Construction work within the vicinity of utilities shall be performed in accordance with current safety regulations.

The Contractor shall notify "Call Before You Dig", telephone 1-800-922-4455 for the location of public utility, in accordance with Section 16-345 of the Regulations of the Department of Utility Control.

Representatives of the various utility companies shall be provided access to the work, by the Contractor.

Contractors are cautioned that it is their responsibility to verify locations, conditions, and field dimensions of all existing features, as actual conditions may differ from the information shown on the plans or contained elsewhere in the specifications.

The Contractor shall notify the Engineer prior to the start of work. The Contractor shall allow the Engineer complete access to the work.

The Contractor shall be liable for all damages or claims received or sustained by any persons, corporations or property in consequence of damage to the existing utilities, their appurtenances, or other facilities caused directly or indirectly by the operations of the Contractor.

Any damage to any existing private and public utility, as a result of the Contractors operations, shall be repaired to the utilities and Engineer's satisfaction at no cost to the State or the Utilities, including all materials, labor, etc., required to complete the repairs.

The Contractor's attention is directed to the requirements of Section 1.07.13 – "Contractor's Responsibilities for Adjacent Property and Services".

Prior to opening an excavation, effort shall be made to determine whether underground installations, i.e., water, sanitary, gas, electric ducts, communication ducts, etc., will be encountered and, if so, where such underground installations are located. When the excavation approaches the estimated location of such an installation, the exact location shall be determined by careful probing or hand digging, and when it is uncovered, proper supports shall be provided for the existing installation. Utility companies shall be contacted and advised of proposed work prior to the start of actual excavation, as noted above.

The following company and representative shall be contacted by the Contractor to coordinate the protection of their utilities on this project 30 days prior to the start of any work on this project involving their utilities:

Mr. Robert Longo
Superintendent
**City of Bristol Water and Sewer
Department**

119 Riverside Avenue-P.O. Box 58
Bristol, CT 06010
Tel. 860-582-7431 ex 12
Email: robertlongo@bristolct.gov
CC: johnvontell@bristolct.gov;
mikelynych@bristolct.gov

Mr. Eric Clark
Operations Manager
**Lightower Fiber Networks I, LLC dba
Crown Castle Fiber**

1781 Highland Avenue, Suite 102
Cheshire, CT 06410
Tel. 203-649-3904
Email: eric.clark@crowncastle.com

Mr. Chad Raetz
Construction Manager CT/NY
Comcast of Connecticut, Inc
222 New Park Drive
Berlin, CT 06037
Tel. 413-642-8582
Email: chad_raetz@cable.comcast.com
CC: michael_prevost@cable.comcast.com

Mr. Eric Johnson
Engr Iv Spec-Ntwk Eng & Ops
**MCI metro Access Transmission Services
LLC**
85 High St
Pawtucket, RI 02860
Tel. 401-727-9558
Email: eric.c.johnson@verizon.com

Ms. Susan Bellion
Project Siting Specialist
**The Connecticut Light and Power Company
dba Eversource Energy - Electric
Distribution**

56 Prospect Street
Hartford, CT 06103
Tel. 860-728-4628
Email: susan.bellion@eversource.com

Ms. Lynne DeLucia
Manager – Engineering & Construction
**The Southern New England Telephone
Company dba Frontier Communications of
Connecticut**

1441 North Colony Road
Meriden, CT 06450-4101
Tel. 203-238-5000
Email: lynne.m.delucia@ftr.com

Mr. John Gavaletz
Project/Program Manager
Cellco Partnership dba Verizon Wireless
20 Alexander Drive
Wallingford, CT 06492
Tel. 203 741 7232
Email: john.gavaletz@verizonwireless.com

NOTICE TO CONTRACTOR – TIME OF YEAR RESTRICTIONS

The Contractor is hereby notified of the following time of year restrictions:

In-Water Work

The Contractor is hereby alerted to the time of year restrictions imposed by the Environmental Permits contained elsewhere in this contract.

Unconfined, in-stream work, not including installation and removal of cofferdams, is limited to the low flow period, June 1 to September 30, unless the agencies require a different resource-driven time of year restriction.

In-water work is prohibited from April 1 to May 30 unless it occurs behind a cofferdam (see above).

In non-tidal streams, controls shall only be installed and removed during the approved window for work (June 1 – March 31) and must not encroach >25% of the stream width measured from OHW during the prohibited work window.

The Contractor should consider the above restriction when scheduling work in order to complete the project in the allotted number of calendar days.

SECTION 1.08 - PROSECUTION AND PROGRESS

Article 1.08.03 - Prosecution of Work - Add the following:

STAGE CONSTRUCTION

The Contractor shall construct the project in stages in accordance with the Maintenance and Protection of Traffic, Staging, and Water Handling Plans contained within the project plans.

The contractor shall not be permitted to interrupt traffic for any continuous period of time until both of the following conditions are satisfied:

1. The Contractor has secured all of the required approvals from the Engineer, and
2. The Contractor has, as much as practical, all of the required materials needed on the site or readily available for that construction which requires the interruption of traffic.

There are four suggested construction phases noted on the contract plans. Additional substages may be required. Major elements of work shall be performed as noted in the Contract Plans. The Contractor shall plan and perform other activities accordingly and shall perform simultaneous activities wherever possible.

Replace 1.08.04 – “Limitations of Operations” with the following:

Article 1.08.04 - Limitation of Operations

The Contractor shall plan and perform the Project work in such a manner and in such sequence as will cause as little interference as is practicable with vehicular traffic. The Contractor shall cooperate with any utilities involved in or affected by the Project operations and shall schedule its operations in accordance with Article 1.05.06.

The Contractor shall give the Engineer 14 days’ advance written notice of any proposed changes in Project activities that will alter vehicular traffic patterns, causing lane shifts, temporary closure of a lane, or lane reductions, or any other alteration of traffic patterns affecting usage of such a transportation facility by the traveling public. Additionally, the Contractor shall give the Engineer 28 days’ advance written notice of any proposed changes in Project activities that will alter vehicular traffic patterns causing long term closure of a lane, closure of a roadway, traffic stoppages, or weekend traffic shifts affecting the usage of such transportation facility by the traveling public. Failure of the Contractor to provide such timely notice will subject the Contractor to stop work orders until such required time has elapsed from either the Contractor’s giving of the relevant notice or the City or Town’s discovery of the pertinent alteration of traffic conditions.

The Contractor is hereby notified that two (2) de-energization windows with durations of six (6) hours each, not to occur within a single twenty-four (24) hour duration, will be allowed for the installation of cofferdam system or temporary support of excavation. Additionally, two (2) de-energization windows with durations of six (6) hours each, not to occur within a single twenty-four (24) hour duration, will be allowed for removal of the cofferdam system or temporary support of excavation. The Contractor shall give the Engineer and Eversource Utility 30 days’ advance

written notice of construction work which will require de-energizing of overhead power utility. This will provide City and Town opportunity to notify residents of power outage and will provide utility company with ability to adequately organize personnel required to perform de-energizing.

The Contractor shall maintain access to adjacent properties throughout construction.

TIME RESTRICTIONS

The Contractor shall not perform any work that will interfere with traffic operations during the below State observed Legal Holidays and Legal Holiday Periods.

A. On the following State observed Legal Holidays:

New Year's Day	Labor Day
Good Friday	Thanksgiving Day
Memorial Day	Christmas Day
Independence Day	

B. During the following Legal Holiday Periods:

- i. When an above Legal Holiday is celebrated on a Sunday or Monday: From 6:00 a.m. the immediately preceding Friday to 6:00 a.m. the immediately following Tuesday.
- ii. When an above Legal Holiday is celebrated on a Tuesday, Wednesday, or Thursday: From 6:00 a.m. the day before to 6:00 a.m. the day after, except Thanksgiving (see below for Thanksgiving specific restrictions).
- iii. When an above Legal Holiday is celebrated on a Friday or Saturday: From 6:00 a.m. the immediately preceding Thursday to 6:00 a.m. the immediately following Monday.
- iv. Thanksgiving: From 6:00 a.m. the Wednesday before to 6:00 a.m. the Monday after.

During all other times:

The Contractor shall adhere to the additional restrictions noted in the sections to follow.

LAKE AVENUE

The Contractor will not be permitted to perform any work that will interfere with the existing Lake Avenue operations except as noted below.

The Contractor will be allowed to halt traffic on Lake Avenue for a period not to exceed ten (10) minutes on Monday through Friday between 9:00 a.m. and 3:00 p.m. The Contractor shall ensure all queued traffic is allowed to disperse prior to initiating subsequent short closures.

One-way alternating traffic shall not be performed Monday through Friday between 7:00 a.m. and 9:00 a.m. & between 3:00 p.m. and 6:00 p.m.

The Contractor shall not be allowed to perform any work between 6:00 p.m. and 7:00 a.m. each day.

The Contractor shall not perform any work on Saturday and Sunday. Should the Contractor require work on Saturday or Sunday for reasons of recovering time due to weather delays or other, the

Contractor is required to obtain written approval from the City and Town prior to activities performed.

SECTION 8.22 - TEMPORARY TRAFFIC BARRIER

Section 8.22 is hereby replaced with the following:

8.22.01—Description: Work under this item shall consist of furnishing, installing, relocating and removing temporary traffic barrier.

8.22.02—Materials: The precast concrete materials for temporary traffic barrier shall meet the requirements of Article 8.21.02 except that reinforcing steel does not need to be galvanized.

Any temporary precast concrete barrier curb that was fabricated after March 24, 2021, that does not, at a minimum, meet AASHTO MASH (TL-3) is not allowed to be used as temporary traffic barrier. The condition of all precast concrete temporary traffic barrier must meet the “acceptable” or “marginal” definitions in the ATSSA “Quality Guidelines for Temporary Traffic Control Devices and Features.”

An alternate to the temporary traffic barrier shown on the plans may be requested. The alternate temporary traffic barrier must be documented to meet the minimum crash performance for MASH (TL-3) and its dynamic deflection distance must not exceed the values indicated on the plans for the type of temporary traffic barrier proposed.

The delineator shall be fabricated of aluminum, steel, plastic, or of a material approved by the Engineer. The retroreflective sheeting shall be Type IV, Type V, or Type IX as specified in Article M.18.09. Delineator fastening hardware or adhesive shall be suitable for the purpose intended.

The connection rod and anchors shall be manufactured in accordance with AASHTO M 314, Grade 55. Threads shall be UNC Series as specified in ANSI B1.1 and shall have Class 2A threaded tolerances before galvanizing.

Plain steel washers shall be manufactured in accordance with ANSI B18.22.

Heavy hex nuts shall be Grade A, manufactured in accordance with AASHTO M 291.

Connection loop bars shall be bent from smooth bars that meet the requirements of ASTM A36.

Steel tube for the connection key shall meet the requirements of ASTM A500, Grade B or C.

Steel plate shall be AASHTO M270 Grade 36 or 50.

Adhesive bonding material shall meet the requirements of Article 6.10.02.

Non-shrink, non-staining grout shall meet the requirements of Article M.03.05.

Membrane waterproofing (cold liquid elastomeric) shall be selected from the Qualified Products List and shall be able to be applied by brush.

8.22.03—Construction Methods:

1. Submittals:

- a. When used temporary traffic barrier is furnished, the Contractor shall provide documentation stating where the material originated, the Department project for which it was produced, the casting dates, and certification that the barrier meets the Contract requirements.
- b. When an alternative temporary traffic barrier is requested, the Contractor shall submit to the Engineer a Materials Certificate, in accordance with Article 1.06.07, and a copy of the Federal-aid eligibility letter issued to the manufacturer documenting that the device complies with the minimum requirements of MASH (TL-3).

- c. Submit Materials Certificates for the steel plate, connection rods, anchors and non-shrink, non-staining grout.
 - d. A Materials Certificate for the membrane waterproofing (cold liquid elastomeric) shall be submitted to the Engineer, in accordance with Article 1.06.07, along with the manufacturer's written installation instructions for application of the membrane when repair of deck membrane is required after removal of anchors.
 - e. Submit Product Data for the selected adhesive bonding material, in accordance with Article 6.10.03-A.
2. **Precast Unit:** Concrete temporary traffic barrier units shall be precast in accordance with the pertinent requirements of Article 8.21.03, except the penetrating sealer protective compound need not be applied to the precast unit.
3. **Installation & Removal:** Temporary traffic barrier units shall be placed as shown on the plans or as directed by the Engineer, on a firm even surface to produce a smooth continuous length of barrier.

Any damaged material shall be removed and replaced by the Contractor at their expense. The Contractor shall maintain the condition and alignment of the temporary traffic barrier during all stages of construction.

The Contractor shall relocate the temporary traffic barrier and its appurtenances to locations within the Project limits when shown on the plans or as ordered by the Engineer. When the temporary traffic barrier is no longer required, it shall be removed completely from the Project and shall remain the property of the Contractor.

Any holes in concrete decks created for anchoring shall be filled with non-shrink, non-staining grout up to the concrete surface after barrier removal. Anchors secured to the deck using adhesive bonding material shall be cut flush with the concrete surface when no longer needed. If the temporary traffic barrier is set on a bituminous wearing surface on top of the concrete deck and the existing membrane is to remain, a six-inch diameter pavement core shall be drilled around each anchor to the top of deck to remove the wearing surface and to provide access to cut off the anchor or fill the hole in the deck. All loose or poorly adhering membrane and other materials that could adversely affect the bond of the membrane to the deck shall be removed from the concrete surface. Cold liquid elastomeric membrane shall be brush-applied to the exposed concrete surface in accordance with the accepted installation instructions submitted by the manufacturer. The minimum thickness of membrane shall be 80 mils which shall be measured using a wet film gage. After the membrane is cured in accordance with the manufacturer's written recommendations, the core hole shall be filled using a bituminous concrete mixture at a minimum temperature of 240°F containing the same or smaller nominal maximum aggregate size and compacted with a hand compactor or other mechanical means to the maximum compaction possible. The bituminous concrete shall be compacted to 1/8 inch above the finished pavement.

4. **Delineator:** The delineator shall be installed in the center on top of all barriers on the roadway and those installed within 8 feet from the edge of road, and at the locations designated on the plans. They shall be fastened by adhesive or hardware and must be maintained in good condition at all times. The color of the delineator shall match the color of the adjacent pavement marking edge line.

DE-7 (One Way White) delineators shall be used when the barriers are on the right side of traffic or dividing traffic in the same direction.

DE-7A (One Way Yellow) delineators shall be used when the barriers are on the left side of traffic.

DE-7B (Two Way Yellow) delineators shall be used when the barriers divide opposing traffic lanes.

DE-7D (Two Way White) delineators shall be used when the barriers are installed in an alternating one-way traffic operation.

Spacing of delineators on temporary traffic barriers shall be as specified on Traffic Standard Sheet TR-1205_01.

5. **Connection:** Nuts for the connection rod pin and loop connection shall be turned until the washer is drawn up against the connection loop. The connection loops must not be bent in the tightening process. For ease in removing the nuts, the threads may be waxed. Connection keys shall be installed as shown on the Plans
6. **Anchoring:** Anchoring temporary traffic barrier shall be with adhesive bonding material, thru-bolting, or pinning as shown on the plans, except only threaded inserts shall be used on new prestressed concrete members and shall be cast into the deck in locations that accommodate the stage construction. Shop drawings for the new prestressed concrete members shall reflect the use of inserts. Drilling into prestressed concrete members is not permitted. Installation of anchors with adhesive bonding material shall be in accordance with Article 6.10.03.

The terminal units of temporary barrier curb shall be 20 feet in length and shall be anchored with pins on both sides as shown on the plans.

Method of Measurement: This work will be measured for payment along the centerline of the top of the temporary traffic barrier and will be the actual number of linear feet of temporary traffic barrier furnished, installed and accepted.

Relocated temporary traffic barrier will be measured along the centerline of the top of the barrier each time the barrier has been satisfactorily relocated as directed by the Engineer, including to and from the storage area. Storage of barrier will not be measured for payment. Relocation of temporary traffic barrier for access to the work area, or for the convenience of the Contractor, shall be considered incidental to Maintenance and Protection of Traffic and will not be measured for payment.

The terminal units will not be measured separately. Their length will be included in the length of temporary traffic barrier installed.

Delineators will not be measured for payment.

Anchoring materials, filling of holes, cutting off adhesive bonded anchors, coring, furnishing and applying waterproofing membrane and filling in core holes with bituminous concrete will not be measured for payment.

Basis of Payment: This work will be paid for at the Contract unit price per linear foot for "Temporary Traffic Barrier" or "Temporary Traffic Barrier (Type)," complete in place, which price shall include all furnishing, transportation, initial installation, final removal, storage, materials, reinforcing steel, connecting rods, anchoring materials, equipment, tools and labor incidental thereto. Each temporary traffic barrier will be paid for once regardless of the number of times it is used on the Project. Any temporary traffic barrier that become lost, damaged or defaced shall be replaced by the Contractor at no cost to the State.

The relocation of the temporary traffic barrier will be paid for at the Contract unit price per linear foot for "Relocated Temporary Traffic Barrier" or "Relocated Temporary Traffic Barrier (Type)," which price shall include all transportation, installation, removal, materials, equipment , tools, storage and labor incidental thereto.

Pay Item	Pay Unit
Temporary Traffic Barrier	l.f.
Temporary Traffic Barrier (Pinned)	l.f.
Temporary Traffic Barrier (Bolted)	l.f.
Relocated Temporary Traffic Barrier	l.f.
Relocated Temporary Traffic Barrier (Pinned)	l.f.
Relocated Temporary Traffic Barrier (Bolted)	l.f.

ITEM #0202216A – EXCAVATION AND REUSE OF EXISTING CHANNEL BOTTOM MATERIAL

Description: This work shall consist of excavating existing channel bottom material in areas where the channel bottom is to be disturbed and regraded to create a work area for a bridge, culvert, articulated concrete block placement or cofferdam installation. This item shall also include the stockpiling and protecting of the excavated material on the Site, subsequent placement of the stockpiled material in the channel, and the removal and proper disposal of all unused and unacceptable material.

Materials: The material for this item shall consist of the existing naturally-formed rocks, cobbles, gravel, soils and clean natural sediments from within the channel.

Any material excavated from ledge (bedrock) formations or broken from larger boulders will not be accepted. Broken concrete will not be accepted.

Construction Methods: The Contractor shall submit for the Engineer's approval a proposed location for stockpiling material. The proposed location shall be upland where disruption to the stream channel or impact to wetland areas caused by moving the excavated channel bottom material to and from the stockpile are minimized during the placement of material. The Contractor shall prepare the area approved by the Engineer, suitable in size and location for stockpiling the existing channel bottom material.

The stockpile shall be located where it can remain undisturbed for the duration of the stream channel construction and shall be protected using sedimentation control measures. The stockpile area shall be cleared and cleaned adequately to prevent mixing with underlying soil or other materials, including the use of a separation barrier such as: structural fabric, polyethylene sheeting, or similar. The stockpile area shall be adequately covered to protect the excavated channel bottom material from erosion by rain or other forces.

After clearing and grubbing, the Engineer will identify the limits of the exposed channel bottom material to be excavated under this item. The Engineer will identify the bottom limit of excavation, an amount up to but not exceeding 24 inches in depth, based upon visual inspection of the channel bottom material, unless otherwise specified in the Contract. After the limits of excavation have been determined, the Contractor shall excavate the channel bottom material, separate from any other roadway, structure, channel or unsuitable material excavation in the area. After the channel bottom material, and approved supplemental streambed channel material if needed, has been placed in the stockpile area, no other excavated or off-Site material shall be placed in the stockpile.

The stockpiled channel bottom material shall be placed at the designated location(s) to the required thickness as shown on the plans, denoted on the permit application, or as directed by the Engineer. Equipment and placement techniques shall prevent integration with the surrounding material and shall keep the channel bottom material relatively homogenous. Channel material shall be placed in a manner that replicates the original condition of the channel prior to excavation.

The Contractor shall perform all containment, diversion, or other separation of the channel flow when placing the channel bottom material to minimize sediment transport downstream.

The disposal of any surplus or unsuitable material shall be in accordance with Section 2.02. Restore the stockpile area as directed by the Engineer.

If it is agreed by the Engineer that there is an insufficient quantity of excavated channel bottom material within the Project limits, the Contractor shall obtain Supplemental Streambed Channel Material as specified under that item.

Method of Measurement: This work will be measured for payment by the number of cubic yards of channel bottom material excavated, stockpiled, maintained, and accepted, including disposal of unacceptable and surplus materials.

The Engineer will delineate the horizontal pay limit prior to the start of excavation. The vertical pay limit will be measured from the top of the existing channel bottom to the bottom of excavation required specifically for the stockpiling of channel bottom material.

Any material excavated beyond the approved horizontal pay limits or deeper than the depth of channel bottom material identified and approved by the Engineer will not be measured for payment under this item. Should such additional excavation be required to complete the Contract work, it will be measured for payment separately under the applicable pay items.

Basis of Payment: Payment for this work will be made at the Contract unit price per cubic yard for "Excavation and Reuse of Existing Channel Bottom Material." The price shall include all materials, equipment, tools and labor incidental to the preparation of the stockpile area, excavation of channel bottom, hauling of the material to the stockpile, and separation of any rock ledge or concrete debris, storing, and protecting (including but not limited to sedimentation controls and covering of excavated material).

Payment for clearing and grubbing of the approved stockpile area will be included in the item "Clearing and Grubbing."

Payment for the removal and proper disposal of all unused and unacceptable material will be in accordance with Article 1.09.04 – Extra and Cost-Plus Work.

Payment for supplemental streambed channel material will be included in the item "Supplemental Streambed Channel Material." If no item appears in the proposal, the work will be in accordance with Article 1.09.04 – Extra and Cost-Plus Work.

Payment for all containment, diversion or other separation of stream flow from the excavation of channel bottom material will be included in the item "Cofferdam and Dewatering" or special provision for "Handling Water."

Excavation of material not identified by the Engineer for stockpiling and reuse in accordance with this specification will be paid in accordance with Section 2.02.

Pay Item

Excavation and Reuse of Existing Channel Bottom Material

Pay Unit

C.Y.

ITEM #0202217A – SUPPLEMENTAL STREAMBED CHANNEL MATERIAL

Description: This work shall consist of procuring, transporting and placing supplemental streambed channel material meeting the visual inspection requirements herein, along stream bank/channel improvement locations as shown on the plans or denoted on the Project's permit applications. This work shall also include any necessary temporary protection and stockpiling of the supplemental streambed channel material on the Site and removal and proper disposal of all unused material.

Materials: When a sufficient quantity of material is not available from the existing streambed channel within the permitted footprint of the Site, the Contractor shall furnish visually inspected and accepted supplemental streambed channel material from an off-Site source.

The supplemental streambed channel material for this item shall be consistent with the existing naturally-formed cobbles and rocks, gravel, and clean natural sediments found within the existing channel. Rock excavated from ledge (bedrock) formations, broken from larger boulders, broken concrete or angular material will not be accepted. Rock larger than 12 inches in diameter will not be accepted. Silts and clays will not be accepted.

The visual inspection of the supplemental streambed channel material shall be performed by the Engineer at the off-Site source prior to delivery of material to the Site. The Contractor shall notify the Engineer at least 10 working days in advance of the need for inspection of proposed off-Site material.

Construction Methods: At the start of construction, the Contractor shall prepare an area, approved by the Engineer, suitable in size and location for stockpiling the supplemental streambed channel bottom material. The Contractor shall select an upland location where disruption to the stream channel or impact to wetland areas caused by moving the supplemental streambed channel bottom material to and from the stockpile are minimized during the placement of material. The stockpile shall be located where it can remain undisturbed for the duration of the stream channel construction and shall be protected using sedimentation control measures.

The stockpile area shall be cleared and cleaned adequately to prevent mixing with underlying soil or other materials, including the use of structural fabric if required. The stockpile area shall be adequately covered to protect the supplemental streambed channel material from erosion by rain or other forces. After the supplemental streambed channel material and the excavated channel bottom material to be reused have been placed in the stockpile areas, no other excavated or off-Site material shall be placed in the stockpiles.

The reused and supplemental streambed channel material shall be placed at the designated location(s) to the required thickness as shown on the plans or denoted on the permit application, or as directed by the Engineer. Equipment and placement techniques shall prevent integration with the surrounding material and shall keep the channel bottom material relatively homogenous. Reused and supplemental streambed channel material shall be placed in a manner that replicates the original condition of the channel prior to excavation.

The Contractor shall perform all containment, diversion, or other separation of the channel flow when placing the reused and supplemental streambed channel material to minimize sediment transport downstream.

The disposal of any surplus or unsuitable material shall be in accordance with Section 2.02. Restore the stockpile area as directed by the Engineer.

Method of Measurement: Work under this item shall be measured for payment as provided under Article 1.09.04 – Extra and Cost-Plus Work.

The sum of money shown on the estimate and in the itemized proposal as “Estimated Cost” for this work will be considered the price bid even though payment will be made only for actual work performed. The estimated cost figure is not to be altered in any manner by the bidder. Should the bidder alter the amount shown, the altered figures will be disregarded and the original price will be used to determine the total amount bid for the Contract.

Basis of Payment: This work will be paid for under Article 1.09.04 – Extra and Cost-Plus Work.

Payment for clearing and grubbing of the approved stockpile area will be included in the item “Clearing and Grubbing.”

Payment for excavation and reuse of existing channel bottom material will be included in the item “Excavation and Reuse of Existing Channel Bottom Material.”

Payment for all containment, diversion or other separation of stream flow from the excavation of channel bottom material will be included in the item “Cofferdam and Dewatering” or special provision for "Handling Water."

<u>Pay Item</u>	<u>Pay Unit</u>
Supplemental Streambed Channel Material	EST.

ITEM #0202452A – TEST PIT

Description:

Test pits shall be performed for determining the location of the existing 6” sewer force main, which is shown on the survey but was unable to be located during design investigations. The Contractor is required to locate the 6” sewer force main prior to removal of the existing culvert structure. This work shall consist of the removal and satisfactory disposal of all materials, the removal of which is necessary for the proper completion of the work, at the locations shown on the plans or as ordered, and backfilling, all in accordance with these specifications.

Utility facilities related to the existing 6” force main to be located shall include pipes, conduits, service connections, structures, tanks, utility appurtenances, and any miscellaneous items directed by the Engineer such as telltales/markers on the existing pipes, etc. The record sewer drawings are provided for information only.

Construction Methods:

Test pits shall be made in conformity with the requirements of the plans or as ordered by the Engineer. The Contractor shall furnish and employ such shores, braces, pumps, etc., as may be necessary for the protection of property, proper completion of the work and the safety of the public and employees of the Contractor and the Department. All bracing, etc., shall be removed when no longer required for the construction or safety of the work.

Wherever portions of existing full-depth bituminous concrete pavement are to be removed in conjunction with test pits, they shall be removed to neat lines. Where the limits of the areas in which such bituminous pavement is to be removed are adjacent to existing bituminous concrete pavement that is to remain in place, the limits shall be cut by a method approved by the Engineer. Test pit excavations shall have neat, clean-cut, and vertical sides; hand-digging shall be employed when required by the Engineer. Sawcut shall be performed where necessary and as directed by the Engineer.

Dig test pits so as to ensure that underground utilities or structures are not damaged. It shall be the Contractor’s sole responsibility for any damages incurred during excavation operations. Any damages shall be repaired or replaced by the Contractor to the satisfaction as directed by the Engineer at the Contractor’s own expense.

The Contractor shall perform field surveys to establish the horizontal and vertical location and to document the type and size of the utilities at each test pit. The work shall be performed in accordance with the requirements of Section 9.80, Construction Staking. The Contractor shall furnish the Engineer copies of all test pit data.

After each test pit is completed, the Contractor shall notify the Engineer. The test pit(s) shall not be backfilled until directed by the Engineer. Protect each pit with steel plates, other coverings,

fences, barriers, or other appropriate materials as deemed necessary. Compact backfill materials 95% to the sub-grade elevation or as otherwise directed.

When backfilling is required, the material used shall be of a quality satisfactory to the Engineer and shall be free from large or frozen lumps, wood and other extraneous material. All backfill placed below subgrade shall be placed in layers of not more than 6 inches in depth after compaction and shall be thoroughly compacted by means of mechanical rammers or vibrators or by pneumatic tampers. Hand tampers shall be used only upon written permission of the Engineer. Unless otherwise ordered by the Engineer, the backfill shall be brought to the surface of the surrounding ground or subgrade and neatly graded.

The surface of test pit areas shall be restored to a condition equal or better than original as approved by the Engineer. Test pits throughout the project area are to be completed prior to beginning subsurface construction activities.

All suitable material removed in making the excavation shall be used for backfill if required. All surplus or unsuitable material shall be removed and disposed of as directed. Should additional material be required for backfilling, it may be obtained from the Project excavation or from borrow pits, gravel pits, or elsewhere as the Engineer may direct.

It shall be agreed that the Contractor entered into this contract with full knowledge that in any work involving excavation, operation in public highways or adjacent to other developments, obstacles, difficulties, unforeseen soil or groundwater conditions, etc., may be encountered, and that the Contractor has included in the bid and contract obligations the assumptions of the risks and costs to which such obstacles, etc., may be present.

Method of Measurement:

Test pits for determining the location of the existing 6” sewer force main will be measured as each excavated, backfilled, surveyed, documented and accepted. There will be no separate measurement for mobilization and demobilization associated with this item.

Basis of Payment:

Test Pits for determining the location of the existing 6” sewer force main will be paid for at the contract unit price each complete in place and accepted, which price shall include all materials, equipment, tools, surveys, and labor incidental thereto.

The price shall also include backfilling, patching roadways and sidewalks in kind, restoration of the ground where required and the disposal of surplus material. No additional payment will be made for shoring, bracing, pumping, and bailing or for material or equipment necessary for the satisfactory completion of the work.

Pay Item
Test Pit

Pay Unit
EA.

INSERT UTILITY INFORMATION

ITEM #0204151A - HANDLING WATER

Description: Work under this item shall consist of designing, furnishing, installing, maintaining, removing and disposing of a temporary water handling system. This may include water-handling-cofferdams (temporary barriers), bypass pipes, bypass pumps/hoses, temporary energy dissipation, sumps, drainage channels, and equipment and work necessary for dewatering.

A temporary water handling system redirects surface water beyond, through, or around the limits of construction to allow work to be done in the dry.

Materials: The materials required for this work shall be as shown on the plans, on the accepted working drawings, or as ordered by the Engineer.

Construction Methods: The Contractor shall prepare and submit written procedures for handling water. Working drawings, in accordance with Article 1.05.02, shall also be prepared and submitted.

The Contractor shall consider stream conditions and water elevations associated with the Site to determine the type of temporary water handling system required to redirect water away from work being performed. The system shall be designed to be compatible with the stage construction and Maintenance and Protection of Traffic, as indicated in the Contract, and shall conform to Section 1.10.

The Contractor shall be responsible for maintenance of the water handling system. If the system becomes damaged or displaced during construction, the system shall be corrected as required.

Unless otherwise provided or directed, all temporary water handling system components shall be removed and disposed of in an acceptable manner when no longer required.

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

Basis of Payment: This work will be paid for at the Contract lump sum price for “Handling Water” complete and accepted, which price shall include designing (including submittals and working drawings), furnishing, installing, maintaining, removing, and disposing of all temporary water handling system components as are necessary for completion of the work. This price shall include all materials, equipment, tools, labor and work incidental thereto.

A schedule of values for payment shall be submitted to the Engineer for review and comment.

Pay Item
Handling Water

Pay Unit
L.S.

ITEM #0219001A – SEDIMENTATION CONTROL SYSTEM

Article 2.19.02 – Materials *change all instances of “hay bales”, “hay bale system”, or “hay” to “straw bales”, “straw bale system”, or “straw”, as appropriate, and add the following:*

Straw shall be weed-free.

Straw/mulch wattles shall be made of natural fiber rolls with a diameter of 12” (± 10%) and a minimum density of 4.5 pounds per linear foot. Both ends shall be secured shut.

Wooden stakes shall consist of a strong durable wood species without knots or flaws.

Article 2.19.03 – Construction Methods *change all instances of “hay bales”, “hay bale system”, or “hay” to “straw bales”, “straw bale system”, or “straw”, as appropriate, and add the following:*

Wattles shall be installed along the contour. A shallow depression trench 3 to 5 inches deep should be formed, and the natural fiber roll placed into the trench. Soils placed on the uphill side of the wattles should be foot tamped into place. Wattles are to be anchored with 2" x 2" wooded stakes 18 to 24 inches in length. These shall be placed roughly every 10 feet along the length of the wattle. Stakes shall be driven in perpendicular to the slope.

ITEM #0219011A – SEDIMENT CONTROL SYSTEM AT CATCH BASIN

Description:

This work shall consist of furnishing, installing, cleaning, maintaining, replacing, and removing sediment control system at catch basins at the locations and as shown on plans and as directed by the engineer.

Materials

Sack shall be manufactured from a specially designed woven polypropylene geotextile sewn by a double needle machine, using a high strength nylon thread. Sack shall be manufactured by one of the following or an approved equal:

Siltsack®

Terrafix Geosynthetics Inc.:
Website: www.terrafixgeo.com

Dandy Sack™

Dandy Products Inc.
P.O. Box 1980
Westerville, Ohio 43086
Phone: 800-591-2284
Fax: 740-881-2791
Email: dlc@dandyproducts.com
Website: www.dandyproducts.com

FLeXstorm Inlet Filters

Inlet & Pipe Protection
24137 W. 111th St - Unit A
Naperville, IL 60564
Telephone: (866) 287-8655
Fax: (630) 355-3477

The sack shall be manufactured to fit the opening of the catch basin or drop inlet. Sack shall have the following features: two dump straps attached at the bottom to facilitate the emptying of sack and lifting loops as an integral part of the system to be used to lift sack from the basin. The sack shall have a restraint cord approximately halfway up the sack to keep the sides away from the catch basin walls, this cord is also a visual means of indicating when the sack should be emptied. Once the strap is covered with sediment, the sack shall be emptied, cleaned and placed back into the basin.

Construction Methods:

Installation, removal, and maintenance shall be per manufacturer instructions and recommendations.

Method of Measurement:

Sediment Control System at Catch Basin will be measured as each installed, maintained, accepted, and removed. There will be no separate measurement for maintenance or replacement associated with this item.

Basis of Payment:

Sediment Control System at Catch Basin will be paid for at the contract unit price each complete in place and accepted, which price shall include all maintenance throughout construction, materials, equipment, tools, and labor incidental thereto.

Pay Item

Sediment Control System at Catch Basin

Pay Unit

EA.

ITEM #0406999A - ASPHALT ADJUSTMENT COST

Description: The Asphalt Adjustment Cost will be based on the variance in price for the performance-graded binder component of Hot Mix Asphalt (HMA), Polymer Modified Asphalt (PMA), Ultra-Thin Bonded HMA (UTB-HMA), Ultra-Thin Bonded PMA (UTB-PMA) and Asphalt Rubber Chip Seal treatments completed and accepted during the Contract.

The Asphalt Price is available on the Department of Transportation website at:
<http://www.ct.gov/dot/asphaltadjustment>

Construction Methods:

An asphalt adjustment will be applied only if all the following conditions are met per mixture:

I. For HMA and PMA mixtures:

- a. The HMA or PMA mixture for which the adjustment would be applied is listed as a Contract item with a pay unit of tons.
- b. ***The total quantity for all HMA and PMA mixtures in the Contract or individual purchase order (Department of Administrative Service contract awards) exceeds 1000 tons or the Project duration is greater than 6 months.***
- c. The difference between the posted *Asphalt Base Price* and *Asphalt Period Price* varies by more than \$5.00 per ton.

II. For UTB-HMA and UTB-PMA mixtures:

- a. The UTB-HMA or UTB-PMA mixture for which the adjustment would be applied is listed as a Contract item.
- b. ***The total quantity for the UTB-HMA or UTB-PMA mixture in the Contract exceeds:***
i.800 tons if the UTB-HMA or UTB-PMA item has a pay unit of tons,
ii.30,000 square yards if the UTB-HMA or UTB-PMA item has a pay unit of square yards,
or
iii.the Project duration is greater than 6 months.

Note: The quantity of UTB-HMA or UTB-PMA measured in tons shall be determined from the material documentation requirements set forth in the UTB-HMA or UTB-PMA item specification.

- c. The difference between the posted *Asphalt Base Price* and *Asphalt Period Price* varies by more than \$5.00 per ton.
- d. No Asphalt Adjustment Cost will be applied to the liquid emulsion that is specified as part of the UTB-HMA or UTB-PMA mixture system.

III. For Asphalt Rubber Chip Seal treatments:

- a. The Asphalt Rubber Chip Seal treatment for which the adjustment would be applied is listed as a Contract item.
- b. ***The total quantity for the Asphalt Rubber Chip Seal treatment in the Contract exceeds 30,000 square yards or the Project duration is greater than 6 months.***

Note: The quantity of asphalt binder measured in tons used for the Asphalt Rubber Chip Seal treatment shall be determined from the material documentation requirements

set forth in the Asphalt Rubber Chip Seal item specification. The Asphalt Adjustment Cost will also be applied to the asphalt binder used to pre-coat the cover aggregate as part of the Asphalt Rubber Chip Seal and will be considered as a portion of the total tons of binder for the treatment. The additional quantity of binder measured in tons will be determined based on a percentage of the cover aggregate weight per the requirements set forth in the Asphalt Rubber Chip Seal item specification.

- c. The difference between the posted *Asphalt Base Price* and *Asphalt Period Price* varies by more than \$5.00 per ton.

IV. Regardless of the binder used in all HMA, PMA, UTB-HMA and UTB-PMA mixtures or Asphalt Rubber Chip Seal treatments, the Asphalt Adjustment Cost will be based on PG 64-22.

The Connecticut Department of Transportation (CTDOT) will post on its website, the average per ton selling price (asphalt price) of the performance-graded binder. The average is based on the high and low selling price published in the most recent available issue of the **Asphalt Weekly Monitor**® furnished by Poten & Partners, Inc. under the “East Coast Market – New England, New Haven, Connecticut area,” F.O.B. manufacturer’s terminal.

The selling price furnished from the Asphalt Weekly Monitor ® is based on United States dollars per standard ton (US\$/ST).

Method of Measurement:

A.

$$\text{Formula A: HMA} \times [\text{PG}\%/100] \times [(\text{Period Price} - \text{Base Price})] = \$ \underline{\hspace{2cm}}$$

Where:

- **HMA:**
 1. For HMA, PMA, UTB-HMA and UTB-PMA mixtures with pay units of tons:
The quantity in tons of accepted HMA, PMA, UTB-HMA or UTB-PMA mixture measured and accepted for payment.
 2. For UTB-HMA and UTB-PMA mixtures with pay units of square yards:
The quantity of UTB-HMA and UTB-PMA mixture delivered, placed, and accepted for payment, calculated in tons as reported according to the Material Documentation provision of the UTB-HMA and UTB-PMA specification.
- **Asphalt Base Price:** The asphalt price posted on the CTDOT website 28 days before the actual bid opening posted.
- **Asphalt Period Price:** The asphalt price posted on the CTDOT website during the period the HMA, PMA, UTB-HMA and UTB-PMA mixture was placed.
- **PG% (Performance-Graded Binder percentage):**
 1. For HMA or PMA mixes:
 - PG% = 4.5 for HMA S1 and PMA S1
 - PG% = 5.0 for HMA S0.5 and PMA S0.5
 - PG% = 6.0 for HMA S0.375, PMA S0.375, HMA S0.25 and PMA S0.25
 2. For UTB-HMA and UTB-PMA mixes:
 - PG% = Design % PGB (Performance Graded Binder) in the approved job mix formula, expressed as a percentage to the tenth place (e.g. 5.1%)

B. For Asphalt Rubber Chip Seal:

Formula B: Total Tons x [(Period Price - Base Price)] = \$ _____

Where:

- **Total tons:** The tons of asphalt binder for each lot of asphalt rubber produced, as reported according to the Testing and Certification article of the specification for Asphalt Rubber Chip Seal, and the tonnage of binder used to coat the cover aggregate calculated as follows: 0.6% x tons of cover aggregate.
- **Asphalt Base Price:** The asphalt price posted on the CTDOT website 28 days before the actual bid opening posted.
- **Asphalt Period Price:** The asphalt price posted on the CTDOT website during the period the Asphalt Rubber Chip Seal mixture was placed.

The Asphalt Adjustment Cost shall not be considered as a changed condition in the Contract as result of this provision since all bidders are notified before submission of bids.

Basis of Payment: The "Asphalt Adjustment Cost" will be calculated using the applicable formula(s) indicated above. A payment will be made for an increase in costs. A deduction from monies due the Contractor will be made for a decrease in costs.

The sum of money shown on the Estimate and in the itemized proposal as "Estimated Cost" for this item will be considered the bid price although the adjustment will be made as described above. The estimated cost figure is not to be altered in any manner by the bidder. If the bidder should alter the amount shown, the altered figure will be disregarded and the original cost figure will be used to determine the amount of the bid for the Contract.

Pay Item	Pay Unit
Asphalt Adjustment Cost	est.

ITEM #0601085A – 15'-0" X 5'-6" PRECAST CONCRETE BOX CULVERT

Description: Work under this item consists of designing, furnishing and installing a precast concrete box culvert(s) as shown on the plans and as ordered by the Engineer. This item also includes all hardware, inserts, dowels for connections, reinforcing steel and joint materials as shown on the plans.

Materials:

- The concrete mix design shall meet the requirements of M.03.02, Class PCC05562, and shall be submitted to the Engineer.
- All reinforcing steel, including dowel bar mechanical connectors, shall be galvanized and shall meet the requirements of M.06.01.
- All threaded concrete inserts, lifting fixtures, and miscellaneous hardware cast into precast concrete components shall be galvanized in accordance with ASTM A153 or ASTM B695 Grade 50. All portions of the lifting and seating devices shall be recessed from the finished concrete surface.
- Non-shrink grout shall meet the requirements of M.03.05 and be suitable for submerged applications.
- Gaskets shall meet the requirements of ASTM D1056, C1677 or C990.
- Geotextiles shall be the "Separation (High Survivability)" type and shall be selected from the Department's Qualified Product List.

Construction Methods:

- 1. Design and Load Rating:** The concrete box culvert shall be designed by a licensed professional engineer in the State of Connecticut in accordance with AASHTO LRFD Bridge Design Specifications, 2020, 9th edition, and the contract documents. The precast elements shall be capable of resisting vehicular impact loads transmitted from the bridge parapet, in accordance with AASHTO MASH criteria for design loads for TL-3 barrier supplemented by CTDOT Bridge Design Manual Revised 12/19.
- 2. Designer's Liability Insurance:** The Designer of the precast concrete box culvert shall secure and maintain at no direct cost to the Town, a Professional Liability Insurance Policy for errors and omissions as specified in Section 1.05.02.

The Designer shall supply the certificate of this insurance to the Town prior to submitting working drawings. The Designer's insurance company shall be licensed to do business in the State of Connecticut.

- 3. Submittals:** All submittals shall include a title sheet with the following:
 - Project number, town and crossing.
 - Bridge number, when shown on the plans.
 - Design code, as applicable.
 - Contact information for fabricator – contact information shall include name and address of the fabricator and the name of contact person with phone number and email address.

- (a) **Design Computations and Load Rating Submittals:** Prior to fabrication, the Contractor shall submit working drawings and design computations for the box culvert to the Engineer for review in accordance with Article 1.05.02. An individual, independently packaged set of working drawings and computations, with all details and documents necessary for fabrication and erection shall be prepared and submitted for the box culvert. The working drawings and computations shall be prepared in Customary U.S. units. These computations shall be stamped by a Professional Engineer licensed in Connecticut and who is covered by the insurance noted elsewhere in this special provision. The designer must have designed at least three precast concrete culverts similar to the culvert associated with this project within the last five years.

The design of the concrete box culvert shall be designed in accordance with the Design Codes and Design Live Loads as stated on the contract drawings, including requirements set by AASHTO LRFD Bridge Design Specifications, 2020, 9th edition and CTDOT Bridge Design manual, Revised 12/19.

Design, legal and permit load ratings for the precast concrete box culvert shall be submitted in summary form along with computations substantiating the load ratings. The analysis shall be performed using the Load and Resistance Factor Rating (LRFR) Method described in the AASHTO Manual for Bridge Evaluation (AASHTO MBE), with latest interims and CTDOT bridge Load Rating Manual, Revised March 2018. Live load ratings shall be performed utilizing the latest version of AASHTOWare Bridge Rating and Design (formerly Virtis) software. NO SUBSTITUTIONS WILL BE ALLOWED.

The precast concrete box culvert shall be designed to satisfy the Minimum Acceptable Rating Factors for each Design, Legal, and Permit loading, for Strength and Service Limit States.

No fabrication shall commence on the precast concrete until the design computations are reviewed by the Engineer.

- (b) **Working Drawings – Precast Concrete Components:** Before fabrication, the Contractor shall submit working drawings to the engineer for approval in accordance with Article 1.05.02(2). These drawings shall include complete details of the methods, materials and equipment the Contractor proposes to use.

Working drawings for the precast concrete box culvert shall include but not be limited to the following:

- Layout plan of precast concrete box culvert
- Plans and cross-sections showing length, width, height and thickness of walls and slabs.
- Type, size, location and spacing of steel reinforcing and inserts for anchoring threaded deformed steel bars. Bending diagrams, material lists and catalog cuts for inserts shall be provided.

- Type, size and location of lifting holes and seating fixtures. All fixtures (inserts, etc.) cast permanently into the sections shall be recessed a minimum of 3/4". No more than four lifting holes or fixtures shall be located in each section.
- Location and size of all holes cast for grouting deformed steel bars or other reasons as noted on the plans.
- Complete details of the joints between precast sections.
- Material designations

Working drawings for all culvert sections shall be stamped by a Professional Engineer licensed in the State of Connecticut who is covered by the insurance noted elsewhere in this special provision. Each sheet of the working drawings shall be stamped.

No fabrication is to commence on the precast concrete culvert until the working drawings are approved by the Engineer.

- (c) **Working Drawings - Lifting and Seating Devices :** Prior to fabrication, the Contractor shall submit working drawings and supporting computations for the embedded lifting and seating devices required for the handling and installation of the precast concrete components at each box culvert location to the Engineer for review in accordance with 1.05.02. Prior to applying load to the embedded devices, the concrete shall attain the minimum concrete compressive strength associated with the safe working load of the device.
- (d) **Working Drawings - Installation of Precast Concrete Components:** Prior to installation of the precast concrete components, the Contractor shall submit working drawings and supporting computations for the lifting and placement of the precast concrete components, to the Engineer for review in accordance with 1.05.02. Cranes shall be operated in accordance with the Connecticut Department of Public Safety regulations. The Contractor shall be responsible for verifying the weight of each lift. The working drawing submittal shall include, but not be limited to the following:
- Plan of the work area showing all structures, roads, railroad tracks, Federal and State regulated areas as depicted on the plans, overhead and subsurface utilities, property lines, or any other information relative to erection. No picks shall be allowed over vehicular, pedestrian, railway or vessel traffic.
 - A detailed narrative describing the lifting and installation sequence.
 - Manufacturer's data sheet for the crane(s) including the load/capacity chart. The capacity of the crane shall be adequate for the total lift/pick load including rigging, spreaders and other materials. In the area of railroads and navigable waterways, the capacity shall be as required by the regulatory authorities.
 - Manufacturer's data sheets and product data sheets for all rigging (slings, spreader bars, blocks, etc.), lifting devices, and other connecting equipment and hardware listing the number, type, size, arrangement and capacity of each.
 - Location of each crane for each pick.
 - Crane support measures, including any support beneath the outriggers such as bearing pads, crane mats, planking or special decking, or other means to transfer the crane's total weight (including the lifted load) into the earth or structure beneath it.

- Delivery location of each component.
- Boom length and the lift and setting radius for each pick (or maximum lift radius).
- Pick point location(s) on each component.
- Lifting weight of each component including rigging (clamps, spreader beams, etc.)

(e) **Product Data – Field Installed Materials:** Prior to installation of the precast concrete components, the Contractor shall submit product data for field installed materials, such as non-shrink grout, geotextile, etc., not addressed in other submissions to the Engineer for review in accordance with 1.05.02.

4. Fabrication and Manufacture: The fabrication and manufacture of the precast concrete components shall meet the requirements of M.08.02-4 as supplemented by the following:

- (a) **Reinforcing Steel:** Reinforcing steel shall be fabricated and installed in accordance with Articles 6.02.03-2 through 6.02.03-5. The welding of reinforcement is not permitted.
- (b) **Test Cylinders:** During the casting of the components, the Contractor shall cast a minimum of four 4 inch × 6 inch test cylinders in accordance with AASHTO T23 during each production run. Cylinders shall be cured under the requirements of ASTM C31 and shall be used to confirm that the concrete meets the requirements of M.03.02.
- (c) **Placing Concrete:** Concrete shall not be deposited in the forms until the Contractor has inspected the reinforcing steel, including all other embedded components, and has documented such inspection.

Concrete shall not be deposited into the forms when the ambient temperature is below 40°F or above 100°F, unless adequate heating or cooling procedures have been previously approved by the Engineer. The concrete temperature shall be 60°F to 90°F at the time of placement.

Truck-mixed or transit-mixed concrete will not be allowed.

Production during the winter season, from November 15 to March 15 inclusive, will be permitted only on beds located in a completely enclosed structure of suitable size and dimension that provides a controlled atmosphere for the protection of the casting operation and the product.

Outside concreting operations will not be permitted during rainfall unless the operation is completely under cover.

The concrete shall be vibrated internally, or externally, or both, as needed to provide adequate flow and consolidation of the concrete. The vibration shall be provided in such a manner as to avoid displacement of reinforcing steel, forms, or other components. There shall be no interruption in the placement of concrete. Concrete shall be placed and vibrated sufficiently to produce a surface free from imperfections such as honeycombing, segregation, cracking, or checking.

Any deficiencies noted in the components may be cause for rejection.

- (d) **Finishing:** All fins, runs, or mortar shall be removed from the concrete surfaces which will remain exposed. Form marks on exposed surfaces shall be smoothed by grinding. All exposed, outside concrete surfaces shall be given a grout clean-down finish in accordance with 6.01.03-10.
 - (e) **Handling and Storage:** Any precast concrete components damaged during storage, transportation or handling shall be repaired or replaced by the Contractor, at its own expense, as directed by the Engineer.
 - (f) **Repairs:** The Contractor shall submit to the Engineer, for review, any proposed methods or materials to be used in the repair of precast concrete components or defective surfaces. Precast concrete components with defective area greater than 10% as determined by the Engineer will be rejected.
- 5. Fabrication Tolerances:** Tolerances of forming precast concrete box sections shall be as follows:
- (a) **Internal Dimensions:** The internal dimensions shall be within 1% of the design dimensions or within 1 1/2 inches, whichever is less.
 - (b) **Roof, Floor and Wall Thickness:** The roof, floor and wall thickness shall be within 1/4 inch of the thicknesses shown in the design.
 - (c) **Laying Length of Opposite Surfaces:** Variations in laying lengths of two opposite surfaces of the box section shall be less than 1/8 inch/foot of internal span up to 3/4 inch maximum.
 - (d) **Length of Section:** The length of a section shall not vary from the designed length by more than 1/2 inch in any box section.
- 6. Pre-assembly of Box Sections:** Box sections shall conform to all dimensions within tolerances specified herein. Adjacent sections shall be assembled without a gasket at the manufacturing plant to ensure that all tolerances are met prior to shipping. All sections that will be joined with mechanical connectors shall be pre-assembled, complete with fasteners, to confirm alignment. The Department shall be given at least 2 working days' notice to inspect and evaluate the sections prior to shipping.
- 7. Installation:** The installation of the precast concrete box sections and components shall be in accordance with the plans and the following:
- (a) The installation of the precast concrete box sections shall proceed as required by the sequence of construction, stage construction plans, and the special provisions entitled "Prosecution and Progress" and "Maintenance and Protection of Traffic."
 - (b) Prior to installing the inlet and outlet end box culvert sections, a bed of non-shrink grout shall be placed on the cut-off walls. The end box culvert sections shall be connected to the cut-off wall using galvanized dowels installed in cast or drilled holes and bonded with non-shrink grout.
 - (c) All box culvert lap joints shall be sealed with rubber gaskets and must provide a silt-tight fit. A positive means, through the use of seating devices, shall be used for pulling each

section against the adjacent section to assure a silt-tight joint. The gasket shall be uniformly compressed to a minimum of 1/2 of its uncompressed width. The joint opening between adjacent seated sections on all interior surfaces of the culvert shall be uniform and match the width shown on the plans. The interior surfaces on either side of the lap joints of the adjacent seated sections shall form a smooth and continuous plane, free from irregularities.

- (d) After its installation, any box section, as determined by the Engineer, not acceptable in vertical or horizontal alignment for any reason, including but not limited to settlement, displacement, excess camber or misfit, shall be removed by the Contractor and correctly installed, as directed by the Engineer and at the Contractor's expense.
- (e) The lap joints on the exterior of the roof and the interior of the floor and the lap joints on the interior and exterior of the walls (full height on each side) shall be filled with non-shrink grout after seating the sections. The exposed portions of the lap joints within the haunches or fillets on the interior of the culvert sections shall also be filled with non-shrink grout. The non-shrink grout shall be finished smooth and flush with the adjacent concrete surface.

All portions of the lifting and seating devices that extend to or beyond the finished concrete surface shall be removed. All fixtures or holes cast into the sections for lifting or seating shall be completely filled with non-shrink grout and finished smooth and flush with the adjacent concrete surface.

The surface preparation, mixing, placing, curing, and finishing of the non-shrink grout shall follow the written instructions provided by the manufacturer of the grout. The Contractor shall furnish the Engineer with copies of the instructions.

Prior to the passage of flowing water over the with non-shrink grout, the non-shrink grout shall attain a minimum compressive strength of 3,000 psi.

- (f) Geotextile shall be placed on the exterior surface of the roof and walls of the culvert over the lap joints between the culvert sections. The geotextile shall extend 12 inches to each side of the joint and shall be attached to the culvert with silicone caulk.

8. Erection Tolerances: The Contractor shall be responsible for ensuring the overall length of the box culvert meets the layout requirements on the plans within all acceptable tolerances as specified in the contract.

Method of Measurement: The work for the precast concrete box culvert will not be measured for payment but will be paid for by the linear foot of precast concrete box culvert as dimensioned on the plans along each box culvert cell, completed and accepted.

Basis of Payment: The work for the precast concrete box culvert will be paid for at the Contract unit price per linear foot for "(Size) Precast Concrete Box Culvert," completed in place

and accepted, which price shall include all equipment, materials, tools and labor incidental to the manufacture, shipping, repair and installation of the precast concrete box culvert. The contract unit price shall also include the costs of preparing and furnishing design computations, load rating, working drawings, final drawings and erection drawings.

Pay Item	Pay Unit
(Size) Precast Concrete Box Culvert	l.f.

ITEM #0606004A – RELOCATE MASONRY PEDESTAL WITH LIGHTING

Description: Work under this item shall consist of relocating existing masonry pedestals with lighting as shown on the plans and ordered by the Engineer. If any existing pedestals are damaged in any way during construction they shall be replaced in kind, as approved by the Engineer, at no cost to the City of Bristol.

Materials: The relocated masonry pedestal shall be placed on 12” of granular fill. Granular fill shall meet the requirements of M.02.01.

If any existing pedestals are damaged, the pedestals shall be replaced in kind and materials shall match existing conditions, as approved by the Engineer.

Construction Methods:

Existing Conditions

Prior to the start of work, the contractor shall take field measurements and photos of the existing masonry pedestals to confirm existing conditions including but not limited to pedestal width, depth, and height, average stone size, stone protrusion from grout, etc. If any pedestals are damaged during construction, the existing conditions survey shall be used to develop proposed details to replace in kind, as approved by the Engineer and at no cost to the City of Bristol.

Submittals

The Contractor shall submit the following to the Engineer for review:

1. Relocation procedure for existing masonry pedestals.
2. If any pedestals are damaged during construction, the Contractor shall submit proposed details to replace in kind, including but not limited to samples for masonry stone block, mortar, electrical wiring, conduit, fixtures, and pedestal dimensions and installation procedures.

Other

Power outages required during construction for lighting fixtures shall be coordinated through the City of Bristol with the Town of Southington, and with the property owner at 2727 Mount Vernon Road, Southington, CT.

Method of Measurement: The work for relocating masonry pedestal with lighting, being paid on a lump sum basis, will not be measured for payment.

Basis of Payment: This work will be paid for at the Contract lump sum price for “Relocate Masonry Pedestal with Lighting” complete and accepted, which price shall include relocation of the existing masonry pedestals as noted on the plans. This price shall include all materials, equipment, tools, labor and work incidental thereto.

If any existing pedestals are damaged in any way during construction, they shall be replaced in kind, as approved by the Engineer, at no cost to the City of Bristol.

<u>Pay Item</u>	<u>Pay Unit</u>
Relocate Masonry Pedestal with Lighting	L.S.

ITEM #0707009A - MEMBRANE WATERPROOFING (COLD LIQUID ELASTOMERIC)

Description: Work under this item consists of furnishing and installing a seamless elastomeric waterproofing membrane system applied to a concrete or steel surface as shown on the plans, in accordance with this specification and as directed by the Engineer. Work shall also include conditioning of the surface to be coated and all quality-control testing noted herein.

The completed membrane system shall be comprised of a primer coat, two layers of the membrane coating (minimum total thickness of 80 mil and maximum total thickness not to exceed 120 mil), an additional 40 mil membrane layer with aggregate broadcast into the material while still wet, reinforcing material at deck panel joints and two applications of asphalt emulsion (tack coat) at a rate of 0.05-0.07 gal/s.y. each, allowing the first application to break prior to applying the second.

Materials: The Contractor shall select a waterproofing membrane system from the Department's current Qualified Product List (QPL) for Spray-Applied Membrane Waterproofing System. All materials incorporated in the works shall meet the Manufacturer's specification for the chosen system. The Engineer will reject any system that is not on the QPL.

Reinforcing material shall be as recommended by the manufacturer.

Materials Certificate: The Contractor shall submit to the Engineer a Materials Certificate for the primer, membrane and aggregate in accordance with the requirements of Article 1.06.07.

Construction Methods: At least 30 days prior to installation of the membrane system, the Contractor shall submit to the Engineer a Site-specific Installation Plan that includes the manufacturer's recommended procedure for preparing the deck surface, pre-treatment or preparing at cracks and gaps, treatment at curbs, vertical surfaces or discontinuities, applying the primer and membrane, placing of aggregated coat and all Quality Control (QC Plan) testing operations to be performed during the membrane system's installation. Procedures shall also include recommended repairs of system non-compliant issues identified during application. The system shall be applied to the prepared area(s) as defined or shown in the plans, strictly in accordance with the Installation Plan.

A technical representative, in the direct employ of the manufacturer, shall be present on-Site immediately prior to and during application of the membrane. The representative shall inspect and approve the surface prior to priming, and provide guidance on the handling, mixing and addition of components and observe application of the primer and membrane. The technical representative shall perform all required QC testing and remain on the Project site until the membrane has fully cured.

All QC testing, including verbal direction or observations at the time of installation, shall be recorded and submitted to the Engineer for inclusion in the Project records. The QC testing data

shall be received by the Department's project personnel prior to any paving over the finished membrane, or within 24 hours following completion of any staged portion of the work.

1. **Applicator Approval:** The Contractor's membrane Applicator shall be fully trained and licensed by the membrane manufacturer and shall have successfully completed at least three spray membrane projects in the past five years. The Contractor shall furnish references from those projects, including names of contact persons and the names, addresses and phone numbers of persons who supervised the projects. This information shall be submitted to the Engineer prior to the submittal of the Installation Plan. The Engineer shall have sole authority to determine the adequacy and compliance of the submitted information. Inadequate proof of ability to perform the work will be grounds to reject proposed applicators.

2. **Job Conditions:**

(a) **Environmental Requirements:** Air and substrate temperatures shall be between 32°F and 104°F and the substrate shall be above the dew point. Outside of this range, the Manufacturer shall be consulted.

The Applicator shall be provided with adequate disposal facilities for nonhazardous waste generated during installation of the membrane system. The applicator shall follow safety instructions regarding respirators and safety equipment.

(b) **Safety Requirements:** All open flames and spark producing equipment shall be removed from the work area prior to commencement of application.

"No Smoking" signs shall be visibly posted at the Site during application of the membrane waterproofing.

Personnel not involved in membrane application shall be kept out of the work area.

3. **Delivery, Storage and Handling:**

(a) **Packaging and Shipping:** All components of the membrane system shall be delivered to the Site in the Manufacturer's packaging, clearly identified with the product type and batch number.

(b) **Storage and Protection:** The Applicator shall be provided with a storage area for all components. The area shall be cool, dry and out of direct sunlight and shall be in accordance with the Manufacturer's recommendations and relevant health and safety regulations.

Copies of Material Safety Data Sheets (MSDS) for all components shall be kept on Site for review by the Engineer or other personnel.

- (c) Shelf Life - Membrane Components: Packaging of all membrane components shall include a shelf life date sealed by the Manufacturer. No membrane components whose shelf life has expired shall be used.

4. Surface Preparation:

- (a) Protection: The Applicator shall be responsible for the protection of equipment and adjacent areas from over spray or other contamination. Parapets and bridge joints shall be masked prior to application of the materials.
- (b) Surface Preparation: Sharp peaks and discontinuities shall be ground smooth. Any peak greater than ¼ inch above the surface profile of the prepared substrate shall be ground to the surrounding elevation. Any valley or minor surface deterioration of ½ inch or greater shall also be repaired. The extent and location of surface patches require the approval of the Engineer before the membrane system is applied.

Surfaces shall be free of oil, grease, curing compounds, loose particles, moss, algae, growth, laitance, friable matter, dirt, bituminous products, and previous waterproofing materials. If required, degreasing shall be done by detergent washing in accordance with ASTM D4258.

The surface shall be abrasively cleaned, in accordance with ASTM D4259, to provide a sound substrate free from laitance.

Voids, honeycombed areas, and blow holes on vertical surfaces shall be repaired as indicated in the Installation Plan.

All steel components to receive membrane waterproofing shall be blast cleaned in accordance with SSPC SP6 and shall be coated with the membrane waterproofing system within the same work shift.

5. Inspection and Testing: Prior to priming of the surface, the Engineer, Applicator and Manufacturer's technical representative shall inspect and approve the prepared substrate.

- (a) Random tests for deck moisture content shall be conducted on the substrate by the Contractor at the Site using a "Sovereign Portable Electronic Moisture Master Meter," a "Tramex CMEXpertII Concrete Moisture Meter" or approved equal. The minimum frequency shall be one test per 1000 s.f. but not less than three tests per shift for each contiguous section worked on during that shift. Additional tests may be required if atmospheric conditions change and retesting of the substrate moisture content is warranted.

The membrane system shall not be installed on substrate with a moisture content greater than 6%, or at a moisture content above the amount recommended by the system's Manufacturer, whichever is less.

- (b) Random tests for adequate tensile bond strength shall be conducted by the Contractor on the substrate using an adhesion tester in accordance with the requirements of ASTM D4541. The minimum frequency shall be one test per 5,000 s.f. but not less than three adhesion tests per shift for each contiguous section worked on during that shift. The locations of the pull tests shall be at least a distance from each other equal to or greater than 1/3 of the width or length (whichever is greater) of the area being worked in that section. The location of the pull tests shall be located in accordance with ASTM D3665 or a statistically-based procedure of stratified random sampling approved by the Engineer.

Adequate surface preparation will be indicated by tensile bond strengths of primer to the substrate greater than or equal to 150 psi or failure in a concrete surface and greater than or equal to 300 psi for steel surfaces.

If the tensile bond strength is lower than the minimum specified, the Engineer may request additional substrate preparation. Any primer not adequately applied shall be removed and new primer applied at the Contractor's expense, as directed by Engineer.

- (c) Grouted joints, materials that the membrane cannot bond to, and cracks or discontinuities that cannot be bridged over by the membrane material shall be covered by a reinforcing material recommended by the membrane system's Manufacturer prior to application of membrane layers as approved or directed by the Engineer.

6. Application:

- (a) The System shall be applied in the following distinct steps as follows:
 - 1) Substrate preparation
 - 2) Priming
 - 3) Reinforcing material application over grouted joints, cracks, etc.
 - 4) Membrane application (minimum 2 layers)
 - 5) Membrane with aggregate
- (b) Immediately prior to the application of any components of the System, the surface shall be adequately dry (see Section 5(a) of this specification) and any remaining dust or loose particles shall be removed using clean, dry, oil-free compressed air or industrial vacuum.
- (c) Where the area to be treated is bound by a vertical surface (e.g. curb or wall), the membrane system shall be continued up the vertical, if shown on the plans or directed by the Engineer.
- (d) The handling, mixing and addition of components shall be performed in a safe manner to achieve the desired results, in accordance with the Manufacturer's recommendations or as approved or directed by the Engineer.

- (e) A neat finish with well defined boundaries and straight edges shall be provided by the Applicator.
- (f) Primer: The primer shall consist of one coat with an overall coverage rate of 125 to 175 s.f./gal unless otherwise recommended in the Manufacturer's written instructions.

All components shall be measured and mixed in accordance with the Manufacturer's recommendations.

The primer shall be spray applied using a single component spray system approved for use by the Manufacturer. If required by Site conditions and allowed by the manufacturer brush, squeegee or roller application will be allowed.

The primer shall be allowed to cure tack-free for a minimum of 30 minutes or as required by the Manufacturer's instructions, whichever time is greater, prior to application of the first lift of waterproofing membrane.

Porous concrete (brick) may require a second coat of primer should the first coat be absorbed.

- (g) Membrane and Reinforcing Material: Application of the membrane on the primed surface shall not commence until the primer is cured as described in Section 6(f) of this specification and the adhesion pull tests are completed in accordance with Section 5(b) of this specification.

The waterproofing membrane shall consist of two coats for a total dry film thickness of a minimum 80 mils but not to exceed 120 mils. Adjacent coats shall be of a contrasting color to aid in Quality Assurance and inspection. Any reinforcing material shall be applied immediately before the first coat of membrane in accordance with the Manufacturer's recommendations.

The membrane shall be comprised of Components A and B and a hardener powder which is to be added to Component B in accordance with the Manufacturer's recommendations.

The substrate shall be coated in a methodical manner.

Thickness checks: For each layer, checks for wet film thickness using a gauge pin or standard comb-type thickness gauge shall be carried out once every 100 s.f. Where rapid set time of the membrane does not allow for wet film thickness checks, ultrasonic testing (steel surfaces only), calibrated point-penetrating (destructive) testing, in-situ sampling (cutout of small sections for measuring thicknesses), or other methods approved by the Engineer shall be employed for determination of dry film

thickness. The measured thickness of each and every individual test of the membrane shall be greater than or equal to the required thickness.

Bond Strength: Random tests for adequate tensile bond strength shall be conducted on the membrane in accordance with the requirements of ASTM D4541. The minimum test frequency shall be one test per 5,000 s.f. but no less than three adhesion tests per bridge. Adequate adhesion will be indicated by tensile bond strengths of the membrane to the substrate of greater than or equal to 150 psi or failure in a concrete surface, and greater than or equal to 300 psi for steel surfaces.

Repair the membrane system following destructive testing and correct any deficiencies in the membrane system or substrate noted during QC testing in accordance with the Manufacturer's recommendations to the satisfaction of the Engineer at no additional cost to the State.

- (h) **Repairs:** If an area is left untreated or the membrane becomes damaged, a patch repair shall be carried out to restore the integrity of the system. The damaged areas shall be cut back to sound materials and wiped with solvent (e.g. acetone) up to a width of at least four inches on the periphery, removing any contaminants unless otherwise recommended by the Manufacturer. The substrate shall be primed as necessary, followed by the membrane layers. A continuous layer shall be obtained over the substrate with a four-inch overlap onto existing membrane.

Where the membrane is to be joined to existing cured material, the new application shall overlap the existing by at least four inches. Cleaning and surface preparation on areas to be lapped shall be as recommended in the Manufacturer's written instructions.

- (i) **Aggregated Finish:**
 - 1) Apply an additional 40 mil thick layer of the membrane material immediately followed by an aggregate coating, before the membrane cures, at a rate to fully cover the coated area to a point where no membrane material is visible. The membrane and aggregate shall be fully integrated after the aggregate has been applied and the membrane cured.
 - 2) Localized areas not fully coated shall be touched-up with additional membrane and aggregate as needed.
 - 3) Using motorized mechanical sweepers or a vacuum sweeper apparatus, remove all loose and excess aggregate from the surface to the satisfaction of the Engineer and dispose of properly after application prior to allowing traffic onto finished surface or application of tack coat. Any areas not fully coated after sweeping shall be touched up with additional membrane and aggregate as needed.
7. **Final Review:** The Engineer and the Applicator shall jointly review the area(s) over which the completed system has been installed. Any irregularities or other criteria that do not meet the requirements of the Engineer shall be addressed at this time.

Method of Measurement: This item shall be measured by the number of square yards of waterproofed surface completed and accepted.

Basis of Payment: This item will be paid for at the Contract unit price per square yard of “Membrane Waterproofing (Cold Liquid Elastomeric),” complete and accepted in place, which price shall include all surface preparation, furnishing, storing and applying the system, technical representative and Quality Control testing, and any necessary repairs and remediation work as well as all materials, equipment, tools, labor incidental to this work.

<u>Pay Item</u>	<u>Pay Unit</u>
Membrane Waterproofing (Cold Liquid Elastomeric)	S.Y.

ITEM #0819002A - PENETRATING SEALER PROTECTIVE COMPOUND

Description: Work under this item shall consist of cleaning concrete surfaces of dirt, dust, and debris, and furnishing and applying a clear, penetrating sealer to concrete surfaces where shown on the plans, to provide a barrier against the intrusion of moisture and chlorides. This work also includes furnishing, installing, and removing platforms, scaffolding, ladders, and other means of access as well as shields, as required, to protect adjacent areas and traffic from overspray.

Materials: The penetrating sealer shall conform to Article M.03.09. A Materials Certificate shall be submitted for the penetrating sealer in accordance with Article 1.06.07. A product not listed on the Qualified Products List (QPL) may be considered for approval. A Certified Test Report shall be submitted in accordance with Article 1.06.07 indicating that the product being considered conforms to the Test Requirements listed on the QPL.

Construction Methods:

Submittals: The Contractor shall submit to the Engineer Safety Data Sheets (SDS), Technical Data Sheets and product literature for the approved sealer. The literature shall include written instructions how to apply the sealer to vertical and horizontal surfaces, and where required, overhead surfaces. Application rate and number of applications of sealer shall be addressed.

The Contractor shall submit to the Engineer, in accordance with Article 1.05.02, written procedures for cleaning the concrete surfaces prior to sealer application. The submittal shall include proposed equipment and materials and shall address how adjacent traffic and other areas shall be protected from dust, debris and overspray during the cleaning and application processes. Where the sealer is to be applied to parapets before pavement is placed, the submittal shall address protection of the deck and curb to which membrane waterproofing will be applied. Should the membrane already be present, the submittal shall address shielding of the membrane. It shall also indicate how vegetation and regulated areas shall be protected from overspray. The submittal shall address the conditions under which work may proceed, including wind speed, temperature and precipitation. It shall also include procedures to be followed to protect the work should unfavorable weather conditions occur before the product has been absorbed.

The Contractor shall inspect the surfaces to be sealed to identify surface cleaning needs before submitting the procedures. The Contractor shall identify concrete surfaces that:

- Need repair
- Require special attention or cleaning procedures
- Have been previously treated with coatings or curing compounds that would hinder penetration of the sealer into the concrete
- Will be new or newly repaired

Written procedures shall include observations listed above. Application of penetrating sealer to new concrete shall be addressed in the application procedures. Forms for surfaces of new concrete to receive penetrating sealer shall not be treated using form release oil, which can inhibit or prevent penetration of the sealer into the concrete.

Surface Preparation: Concrete surfaces to which penetrating sealer will be applied shall be clean and free of grease, oil, and other surface contaminants, including biological growth. Dry surfaces may be cleaned by sweeping with brushes or brooms, and blowing clean with oil-free, compressed air. The Contractor shall take care not to damage the concrete surface finish during cleaning operations. Care shall be taken so that cleaning methods do not damage joint sealant or other components of the structure that are to remain.

Application: Application of the sealer may begin only after the Engineer evaluates the concrete surfaces and determines that conditions for installation comply with the accepted written application procedures.

The sealer shall be applied in accordance with the accepted application procedures at the rate specified by the manufacturer. The Contractor shall monitor and record the number of square feet of concrete surface sealed and the number of gallons of sealer applied over that surface area to verify that the required application rate is being met. A minimum of three applications of sealer shall be assumed to be needed. After the first application of the sealer, curing time shall be recorded and submitted to the Engineer. Additional applications of sealer shall be applied as specified in the application instructions, provided adequate time between applications and appropriate curing of the sealer have occurred. For each application, the Contractor shall record the area and number of gallons of sealer applied as well as the curing time for that application. The Contractor may be directed to apply sealer in up to three separate applications if concrete surfaces readily absorb the previous application.

If the Contractor is directed to apply more than three applications of sealer, the additional applications will be compensated as extra work. Should salts, oil or other visually undesirable materials be evacuated from the concrete by the penetrating sealer and remain on the surface after sufficient rain events have occurred, the Engineer may order surface cleaning of the concrete as extra work.

The Engineer shall be provided access to inspect the concrete surface during application and after the sealer has had adequate time to cure.

Method of Measurement: This work will be measured for payment by the actual number of square yards of concrete, sealed and accepted, within the designated limits. The area will be measured once, regardless of the number of applications required.

Basis of Payment: This work will be paid for at the Contract unit price per square yard for “Penetrating Sealer Protective Compound,” complete, which price shall include all equipment tools, labor and materials, incidental thereto, including the preparation of the concrete surfaces and proper disposal of debris.

The following are not included in the cost of this item and will be considered Extra Work:

- Special cleaning procedures ordered by the Engineer to properly prepare the concrete surface for application of the penetrating sealer (such as removal of tightly adherent biological growth, graffiti, or other difficult-to-remove surface contaminants)

- Additional applications of sealer as noted in the Construction Methods
- Cleaning of evacuated material from sealed surfaces as ordered by the Engineer.

<u>Pay Item</u>	<u>Pay Unit</u>
Penetrating Sealer Protective Compound	S.Y.

ITEM #0910300A – METAL BEAM RAIL (R-B MASH)

Work under this item shall conform to the requirements of Section 9.10 supplemented as follows:

Description: *Add the following:*

Work under this item shall include installation of guiderail posts on top of culvert and associated materials and fasteners.

Materials: *Add the following:*

- Guiderail posts fastened to culvert shall be ASTM A992. Culvert guiderail post base plate shall be ASTM A36. The post and baseplate that be galvanized after fabrication in accordance with ASTM A123.
- Anchorage for guiderail posts to culvert shall be Hilti HAS-E 7/8” diameter, 10” long with washer and nut. Anchorage shall be installed with Hilti RE500 Epoxy according to manufacturer recommendations. The anchorage shall be galvanized after fabrication in accordance with ASTM F2329.

Construction Methods: *Add the following:*

The contractor shall submit shop drawings of the culvert mounted guiderail posts to the Engineer for review.

Basis of Payment: *Add the following to paragraph 1. Metal Beam Rail (Type):*

Installation, fabrication and materials of guiderail posts on culvert shall be included in this price and will not be paid for separately.

ITEM #0950019A – TURF ESTABLISHMENT - LAWN

Description: The work included in this item shall consist of providing an accepted stand of grass by furnishing and placing seed as shown on the plans or as directed by the Engineer.

Materials: The materials for this work shall conform to the requirements of Section 9.50 of Standard Specification Form 818. The following mix shall be used for this item:

Turf Seed Mix:

In order to preserve and enhance the diversity, the source for seed mixtures shall be locally obtained within the Northeast USA including New England, New York, Pennsylvania, New Jersey, Delaware, or Maryland. One approved seed mixture is detailed below. Other proposed mixtures must be approved by the ConnDOT Landscape Design office.

<u>Proportion (Percent)</u>	<u>Species Common name</u>	<u>Scientific name</u>
20	Kentucky Bluegrass Improved varieties	Poa pratensis
45	Red Fescue Improved varieties	Festuca rubra
20	Perennial Ryegrass Improved varieties	Lolium perenne

Construction Methods: Construction Methods shall be those established as agronomically acceptable and feasible and that are approved by the Engineer. Rate of application shall be field determined in Pure Live Seed (PLS) based on the minimum purity and minimum germination of the seed obtained. Calculate the PLS for each seed species in the mix. Adjust the seeding rate for the above composite mix, based on 250 lbs. per acre. The seed shall be mulched in accordance with Article 9.50.03.

Method of Measurement: This work will be measured for payment by the number of square yards of surface area of accepted established grasses as specified or by the number of square yards of surface area of seeding actually covered and as specified.

Basis of Payment: This work will be paid for at the contract unit price per square yard for “Turf Establishment - Lawn” which price shall include all materials maintenance, equipment, tools, labor, and work incidental thereto. Partial payment of up to 60% may be made for work completed, but not accepted.

Pay Item
Turf Establishment - Lawn

Pay Unit
S.Y.

ITEM #0950040A - CONSERVATION SEEDING FOR SLOPES

Description: The work included in this item shall consist of providing an accepted stand of established conservation grasses by furnishing and placing seed as shown on the plans, permits, or as directed by the Engineer within the wetland mitigation Sites(s) or other areas when required.

Materials: All conservation grass mixture sources shall be locally obtained within the Northeast USA (New England, New York, Pennsylvania, New Jersey, Delaware, or Maryland) in order to preserve and enhance the diversity of native conservation grass species.

Three qualified conservation seed mixtures are detailed below:

1. **New England Conservation/Wildlife Mix**, New England Wetland Plants, Inc. 820 West Street Amherst, MA 01002, or equal. Rate shall be 1 pound PLS per 1,750 sq. ft.
2. **Mesic to Dry Native Pollinator Mix**, Ernst Conservation Seeds, Inc. 8884 Mercer Pike, Meadville, PA 16335, or equal. Rate shall be 1 pound PLS per 2,178 sq. ft.
3. **Vermont Conservation and Wildlife**, Vermont Wetland Plant Supply, LLC, P.O. Box 153, Orwell, VT 05760, or equal. Rate shall be 1 pound PLS per 2,180 sq. ft.

Fertilizer, if required, shall meet the requirements of Article M.13.03.

Mulch shall meet the requirements of Article M.13.05.

Erosion control matting shall be bio-degradable and meet the requirements of Article M.13.09.

All conservation seed mixture sources shall be reviewed and approved by the Engineer in advance of purchase and prior to application.

The Materials Certificate for all seed mixtures shall have a statement that certifies that the seed mixture does not include any invasive species pursuant to Connecticut General Statutes Sec. 22a-381d or any State Threatened or State Endangered species pursuant to Connecticut General Statutes Sec. 26-303. The seed tags from the bags are to be removed by the Engineer upon delivery and attached to the Materials Certificate. Seeding shall not occur if these requirements are not met.

All approved seed mixtures shall be obtained in sufficient quantities to meet the pure live seed (PLS) application rates as determined by the seed analysis of the mixture.

Construction Methods: Construction methods shall be those established as agronomically acceptable and feasible and shall be approved by the Engineer. The methods described in Article 9.50.03 shall be amended as follows:

Conservation seeding for slopes for wetland mitigation Site(s): Seeding shall occur during the fall season immediately following construction of the wetland mitigation Site(s). Seeding for wetland mitigation Site(s) must occur from August 15th to October 31st.

For non-wetland mitigation Site(s), seeding shall occur during the dates specified in Article 9.50.03-2.

If seed is purchased in bulk rather than by PLS, the rate of application must be adjusted to meet the required PLS seeding rate. This seeding rate shall be increased by the appropriate percentage as determined by the following formula based off of the information provided on the seed tags at delivery.

$(\text{Germination Percentage} \times \text{Purity Percentage}) / 100 = \text{Percentage PLS}$

The Engineer will verify that the seed is applied at a rate that will allow for 100 percent PLS. Mowing will not be allowed within areas that are seeded with conservation seed mix, unless authorized by the Engineer.

Method of Measurement: This work will be measured for payment by the number of square yards of surface area of accepted established conservation grasses as specified.

Basis of Payment: This work will be paid for at the Contract unit price per square yard for “Conservation Seeding for Slopes,” which price shall include all materials, maintenance, equipment, tools, labor, and work incidental thereto. Partial payment of up to 50% may be made for work completed, but not accepted. Full payment shall not be made until the area has been accepted by the Engineer.

Pay Item

Conservation Seeding for Slopes

Pay Unit

S.Y.

ITEM #0950043A - WETLAND GRASS ESTABLISHMENT

Description: The work included in this item shall consist of providing an accepted stand of established wetland grasses by furnishing and placing seed as shown on the plans, permits, or as directed by the Engineer within the Wetland Mitigation Area(s) or other areas when required.

Materials: All wetland grass mixture sources shall be locally obtained within the Northeast USA including New England, New York, Pennsylvania, New Jersey, Delaware, or Maryland in order to preserve and enhance the diversity of native wetland grass species.

The placement of fertilizer, mulch or bio-degradable erosion control matting will not be allowed within any wetland area.

All wetland seed mixture sources shall be approved by the Engineer prior to purchase.

Three (3) qualified wetland seed mixtures are as follows:

1. **New England Wet Mix (Wetland Seed Mix)**, New England Wetland Plants, Inc. 820 West Street Amherst, MA 01002, or equal. Rate shall be 1 pound PLS per 2,500 sq. ft.
2. **OBL Wetland Mix**, Ernst Conservation Seeds, Inc. 8884 Mercer Pike, Meadville, PA 16335, or equal. Rate shall be 1 pound PLS per 2,000 sq. ft.
3. **Vermont Wetland Shrub**, Vermont Wetland Plant Supply, LLC, P.O. Box 153, Orwell, VT 05760, or equal. Rate shall be 1 pound PLS per 2,420 sq. ft.

All seed mixtures must be reviewed and approved by the Engineer prior to application. All seed Materials Certificates must have seed mixtures that shall not include any invasive species pursuant to Connecticut General Statute Sec. 22a-381d, or any State Threatened or State Endangered species known pursuant to Connecticut General Statute Sec. 26-303 which would be a violation of the Connecticut Endangered Species Act. The seed tags from the bags are to be removed by the Engineer upon delivery and attached to the Materials Certificate. No seeding shall occur if the requirements are not met.

All approved seed mixtures shall be obtained in sufficient quantities to meet the pure live seed (PLS) application rates as determined by the seed analysis of the mixture.

Construction Methods: Construction methods shall be those established as agronomically acceptable and feasible and approved by the Engineer.

Wetland grass establishment seeding for Wetland Mitigation Site(s): Seeding shall occur during the fall season immediately following construction of the wetland site(s). Fall seeding must occur from August 15th to October 31th.

Wetland grass establishment seeding for areas other than the Wetland Mitigation Site(s), when required: Seeding dates shall adhere to Section 9.50 – Turf Establishment.

Seeding shall be applied to wetland areas that will not be routinely inundated. If seed is purchased in bulk rather than by PLS, the rate of application must be adjusted to meet the required PLS seeding rate. This seeding rate shall be increased by the appropriate percentage based on the information provided on the seed tags at delivery, as determined by the following formula:

$$(\text{Germination Percentage} \times \text{Purity Percentage})/100 = \text{Percentage PLS}$$

The Engineer shall verify that the seed is applied at a rate that will allow for 100% PLS.

Method of Measurement: This work will be measured for payment by the number of square feet of surface area of established wetland seed mixture, planted, and accepted as specified or by the number of square feet of surface area of seeding actually covered as specified.

Basis of Payment: This work shall be paid at the Contract unit price per square foot for “Wetland Grass Establishment,” which price shall include all materials maintenance, equipment, tools, labor, transportation, operations and all work incidental thereto. Partial payment of up to 50% may be made for work completed, but not accepted. Full payment shall not be made until the area has been accepted by the Engineer.

Pay Item
Wetland Grass Establishment

Pay Unit
S.F.

ITEM #0952051A - CONTROL AND REMOVAL OF INVASIVE VEGETATION

Description: This work shall include the development and implementation of an Invasive Vegetation Removal Plan (IVRP) to outline the identification and treatment methods for the control of invasive vegetation as directed by the Engineer or their authorized delegate. This work will also include control of invasive vegetation in accordance with the accepted IVRP.

All invasive vegetation listed on the following websites will be subject to eradication:

- Connecticut Invasive Plant Working Group (CIPWG) Invasive Plants Council
(http://cipwg.uconn.edu/invasive_plant_list/)
- US Army Corps of Engineers (ACOE) New England District Compensatory Mitigation Guidance Appendix K
(http://www.nae.usace.army.mil/portals/74/docs/regulatory/Mitigation/2016_New_England_Compensatory_Mitigation_Guidance.pdf)

Materials: The herbicide shall be formulated as applicable for target-species foliar treatment or a flush cut treatment. All herbicide applications shall be in accordance with Product label rates and in conjunction with Sections 22a-46 to 22a-66z of the Connecticut General Statutes.

Flagging tape, if used, shall be Fluorescent, 'All-Weather' type, resistant to UV and water damage.

Stakes shall be survey-grade, minimum 1 inch x 1 inch x 36 inches or as specified under Article 9.80.02.

Construction Methods:

1. IVRP: Prior to any ground disturbance within the Project limits, the Contractor shall submit a proposed IVRP to the Engineer or their authorized delegate for review and comment. The Contractor shall address any comments to the satisfaction of the Engineer and resubmit their revised IVRP for review and acceptance.

The IVRP shall include the following information:

- 1) The Contractor's invasive treatment and removal schedule.
- 2) The Contractor's proposed field meeting dates.
- 3) Marked up plan sheets identifying the species of invasive vegetation within the Project limits showing the total square yards of proposed removal for the initial species treatment.
- 4) For each species of invasive vegetation present on-Site, the following shall be described:
 - a. Types and concentrations of any herbicides to be used to eradicate the identified species for the life of the Contract, including any adjuvants, SDS sheets, types of tools or machinery to be used.
 - b. Mechanical excavation and removal methods.
 - c. Schedule with dates for herbicide treatment for the life of the Contract, including a one (1) Year Control and Removal of Invasive Vegetation Warranty Period that begins at Substantial Completion. The treatment schedule shall coincide with the Contractor's baseline schedule.
- 5) Proof of CT DEEP Pesticide Business Registration and certifications for each supervisor

and operational commercial applicator on-Site or as required under CGS Sections 22a-54 to 22a-58. More information on DEEP certifications and permits for applying pesticides is available at the [Pesticide Management Program page](#) on the Department's website.

- 6) A description of safety equipment required.
- 7) Procedures for handling chemical spills.
- 8) Disposal Methods:
 - a. All invasive species and underlying soils are considered unsuitable materials and are to be taken off-Site to an approved disposal facility.
 - b. Provide address of disposal location, current permits / letters from the town authorizing such activity and a Site map (showing regulated areas).
 - c. Wood chips from invasive species are not allowed to be stockpiled or reused on-Site.
 - d. Wood chipping on-Site may be allowed if temporarily stored in a properly contained enclosure and removed at the end of the treatment cycle, to the satisfaction of the Engineer or their authorized delegate.
 - e. **Invasive vegetation shall not be buried on-Site.**

The Contractor shall be responsible to identify invasive vegetation at all times of the year and to prepare a plan for its eradication without assistance.

If changes are required to the accepted IVRP during the life of the Contract (including registration/certification changes for the personnel applying pesticides), these changes shall be documented by the Contractor and resubmitted to the Engineer or their authorized delegate for review and acceptance.

The IVRP or any amended version must be accepted by the Engineer or their authorized delegate prior to beginning any ground disturbance or herbicide treatment in the identified invasive vegetation removal or treatment areas. The accepted methods must be capable of total eradication of all identified invasive species in the identified areas throughout the life of the Contract and the 1-Year Control of Invasive Vegetation Warranty Period.

2. Special Handling of Invasive Species Vegetation: The Contractor will be allowed to mechanically excavate vegetation and underlying soils using the accepted methods in the IVRP. The accepted methods must be capable of the removal of all soil to a depth where invasive plant material and root system is no longer evident, to the satisfaction of the Engineer or their authorized delegate. All excavated materials shall be considered unsuitable material and shall be taken off-Site to an approved disposal facility.

Whether the Contractor's method of removal is by flush cutting or spraying of herbicides, invasive species, including trees identified as invasive in the above websites, must be removed separately from clearing and grubbing operations and disposed of at an approved location as described in the Contractor's IVRP.

No equipment or vehicles other than those required to complete the work as described in the Contractor's IVRP will be permitted in the areas designated for invasive vegetation removal. Any equipment used to process invasive vegetation, such as chippers and transport vehicles, must be cleaned prior to further use.

3. Site Maintenance: Broadcast or uncontrolled spray application will not be permitted, and care must be taken to avoid contacting non-target native species. If any non-target native species to remain within the Project limits are inadvertently treated with herbicide and perish, they shall be replaced with in-kind species at the Contractor's expense.

Vines shall be cut from the ground to the tree canopy. Twining vines within a tree canopy shall be removed to the greatest extent possible without damaging the existing tree to remain. Should branches be damaged, the Contractor shall prune damaged limbs at their expense. All corrective pruning shall meet the requirements of the National Arborists Association Pruning Standards. Note: Use of aerial equipment is encouraged; use of a pole saw to cut vines leaving unsightly debris hanging from the trees will not be allowed.

Flush cut brush and trees shall not be more than 2 inches above the ground line.

Any invasive species control and removal work performed throughout the duration of the Contract that causes damage or soil disturbance shall be repaired at the Contractor's expense within 7 days. Disturbed areas shall be vegetatively stabilized with the appropriate seed mix and protected with hay mulch, cellulous fiber mulch, or erosion control matting.

The Contractor will not be allowed to strip/cut topsoil from any location and reuse this material within the Project limits if the area was identified within the IVRP as an area requiring herbicide treatment or mechanical removal. The stripped/cut material is considered unsuitable material and is to be taken off-Site to an approved disposal facility as described in the Contractor's IVRP.

Limits for control and removal of invasive vegetation shall be maintained for the life of the Contract. Should stakes or flagging be damaged during the course of construction, the Contractor shall re-establish limits. Use of reference staking is permissible.

4. Field Meetings: The Contractor's IVRP must receive acceptance from the Engineer, or their authorized delegate and the Contractor shall have the Site surveyed, staked, and flagged prior to any field meeting.

The Contractor shall provide at least 10 working days' notice to the Engineer to schedule field meeting(s). During the meeting, the Contractor's IVRP shall be reviewed to verify the identified invasive species and to review the square yardage on the marked-up plan sheet(s). At this time, the Engineer or their authorized delegate may identify additional invasive species or designate additional areas for removal that are not included within the Contractor's submitted IVRP.

Additional field meetings may be warranted at any time, as directed by the Engineer or their authorized delegate, to ensure the Contractor is compliant with the IVRP or amended versions.

5. Treatment: The treatment schedule as identified in the IVRP may be modified based on changes to the Contractor's construction schedule or based on existing field conditions. The Contractor shall provide at least 10 working days' notice to the Engineer or their authorized delegate prior to proceeding with each treatment.

Treatment of invasive species will not be permitted without notifying the Engineer or their authorized delegate prior to activity and such personnel shall be on-Site to oversee the work, unless specifically authorized otherwise. Treatment shall not be permitted outside of normal working hours, unless specifically authorized.

Prior to any herbicide treatment on-Site, the Contractor shall provide proof of CT DEEP Pesticide registration/certification, as specified above in **1. IVRP**. The Contractor shall not perform, nor allow subcontractors to perform, any treatment work at any time unless proof of current registration/certification for the actual supervisor and operator conducting or overseeing the herbicide application is available to the Engineer, upon request.

Treatment Measures: At a minimum, the Contractor shall treat all areas within the optimal growing season between May 15 and October 15. Additional spot treatment measures may be warranted within the same optimal growing season in any year throughout the life of the Contract if full eradication of the invasive species is not achieved within the Project limits as outlined in the IVRP or as identified by the Engineer or their authorized delegate.

Mechanical excavation and disposal may occur at any time of the year as specified above in **2. Special Handling of Invasive Species Vegetation**.

If rain or windy conditions are anticipated on the day of the scheduled treatment, the Contractor will not be allowed to proceed with treatment, unless authorized by the Engineer or their authorized delegate.

Method of Measurement: This work will be measured for payment by the number of square yards of invasive vegetation identified, surveyed, treated, and eradicated as required including any required re-treatment of any regrowth or new growth. No additional payment will be made for subsequent treatments. The area for removal will be surveyed, flagged and measured prior to treatment. After a review of the surveyed limits during the field meeting(s), the Engineer may designate additional areas for removal not indicated on the plans which will be measured for payment by the number of square yards treated.

Basis of Payment: This work will be paid for at the Contract unit price per square yard for "Control and Removal of Invasive Vegetation." This payment shall include all labor, surveys, materials, tools, and equipment necessary for limits of the invasive area(s); development and required revisions of the IVRP; maintenance of the limits throughout the Project; species identification; proof of DEEP pesticide registration/certification; and cutting, excavation, treating, re-treating, removal, and off-Site disposal of designated invasive plant material and unsuitable material. Off-Site disposal of residue shall include the loading, transport, dumping, and fees associated with legal off-Site disposal.

- Upon Engineer's acceptance of the required IVRP, the Contractor will receive payment equal to 10% of the estimated Contract Item value.
- Upon completed initial herbicide or mechanical removal treatment methods as described in the IVRP, the Contractor will receive payment equal to 20% of all areas receiving treatment
- The Contractor will receive incremental payments for each additional treatment throughout

the duration of the Project of all areas receiving treatment. The total of incremental payments will not exceed 40% of the Contract item value.

- Upon successful completion of the 1-Year Control and Removal of Invasive Vegetation warranty period covering all treated areas on the Project, the Contractor will receive final payment.
- Any fines levied against the Department due to the Contractor's or Subcontractor's failure to comply with the specifications or applicable regulations will be deducted from the monies due the Contractor.

All other vegetation to be removed which is not designated as invasive vegetation shall be removed in accordance with the Item "Clearing and Grubbing" or other Contract items. Vegetative stabilization of disturbed areas will be paid for under the respective Contract items.

<u>Pay Item</u>	<u>Pay Unit</u>
Control and Removal of Invasive Vegetation	S.Y.

ITEM NO. 0971001A – MAINTENANCE AND PROTECTION OF TRAFFIC

Article 9.71.01 – Description *is supplemented by the following:*

The Contractor shall maintain and protect traffic as described by the following and as limited in the special provision for Section 1.08 - Prosecution and Progress:

Lake Avenue

The Contractor will be not be permitted to close Lake Avenue to through traffic or detour traffic.

The Contractor shall maintain and protect 1 lane of traffic in each direction on a paved travel path with 11 feet wide travel lanes and 1 foot wide shoulders, with the following exceptions:

1. During the allowable periods and when the Contractor is actively working, the Contractor will be permitted to maintain and protect at least an alternating one-way traffic operation on a paved travel path not less than 11 feet in width and no more than 300 feet in length, unless specified elsewhere in the Contract. There shall be no more than one alternating one-way traffic operation within the Project limits without prior approval of the Engineer.

Commercial and Residential Driveways

The Contractor shall maintain access to and egress from all commercial and residential driveways throughout the Project limits. The Contractor will be permitted to temporarily close affected driveways while actively working with coordination and permission from the owner or proprietor.

Article 9.71.03 - Construction Methods *is supplemented as follows:*

General

Unpaved travel paths will only be permitted for areas requiring full depth and full width reconstruction. The unpaved section shall be the full width of the road and shall be perpendicular to the travel lanes. The Contractor will be allowed to maintain traffic on processed aggregate for a duration not to exceed 10 calendar days and opposing traffic lane dividers shall be used as a centerline.

The Contractor is required to delineate any raised structures within the travel lanes, so that the structures are visible day and night, unless there are specific Contract plans and provisions to temporarily lower these structures prior to the completion of work.

The Contractor shall schedule operations so that pavement removal and roadway resurfacing shall be completed full width across a roadway or bridge section by the end of a work shift, or as directed by the Engineer.

When the installation of all intermediate courses of bituminous concrete pavement is completed for the entire roadway, the Contractor shall then install the final course of bituminous concrete pavement.

When the Contractor is excavating adjacent to the roadway, the Contractor shall provide a 3 foot shoulder between the work area and travel lanes, with traffic drums spaced every 50 feet. At the end of the work shift if the vertical drop-off exceeds 3 inches, the Contractor shall provide a temporary bituminous concrete traversable slope of 4:1 or flatter that is acceptable to the Engineer.

When an existing sign is to be relocated or replaced, the work shall be completed during the same work shift.

The field installation of a signing pattern shall constitute interference with existing traffic operations and shall not be allowed, except during the allowable periods.

Existing Signing

The Contractor shall maintain all existing signs within the Project limits throughout the duration of the Project. The Contractor shall temporarily relocate signs and sign supports as many times as deemed necessary, and shall install temporary sign supports if necessary and as directed by the Engineer.

Requirements for Winter

The Contractor shall schedule a meeting with representatives of the Department, including the offices of Maintenance and Traffic, and the Town/City to determine any interim traffic control measures the Contractor shall accomplish prior to winter to provide safety to motorists and permit adequate snow removal procedures. This meeting shall be held prior to October 31 of each year and will include, but not be limited to, discussion of the status and schedule of the following items: lane and shoulder widths, pavement restoration, traffic signal work, pavement markings, and signing.

Signing Patterns

The Contractor shall erect and maintain all signing patterns in accordance with the traffic control plans contained herein. Proper distances between advance warning signs and proper taper lengths are mandatory.

Pavement Markings - Non-Limited Access Roadways

During construction, the Contractor shall maintain all pavement markings on paved surfaces on all roadways throughout the limits of the Project.

Temporary pavement markings shall be installed on each intermediate course of bituminous concrete pavement and on any milled surface by the end of the work shift.

Permanent Epoxy Resin Pavement Markings shall be installed on the final course of bituminous concrete pavement within 10 calendar days of the final pavement installation.

Temporary Pavement Markings

Temporary pavement markings that will be in place for less than 72 continuous hours may consist of temporary plastic pavement marking tape at the Contractor's expense. Additionally;

1. These temporary pavement markings shall include centerlines, lane lines (solid and broken), and stop bars.
2. Centerlines shall consist of two 4 inch wide yellow markings, 2 feet in length, side by side, 4 inches apart, at 40 foot intervals.
3. Lane lines shall consist of 4 inch wide white markings, 2 feet in length, at 40 foot intervals.
4. No passing zones shall be posted with signs in those areas where the final centerlines have not been established on two-way roadways.

5. Stop bars may consist of two 6 inch wide white markings or three 4 inch wide white markings placed side by side.
6. The temporary plastic pavement marking tape shall be installed in accordance with Section 12.12.
7. The Contractor shall remove and dispose of the temporary plastic pavement marking tape prior to another course of bituminous concrete pavement being installed.

Temporary pavement markings that will be in place for 72 continuous hours or more should consist of temporary painted pavement markings and shall be installed in accordance with Section 12.09. The markings shall include centerlines, edge lines, lane lines (solid and broken), lane-use arrows, and stop bars on each intermediate course of bituminous concrete pavement and on any milled surface by the end of the work shift. Edge lines and lane-use arrows are not required if the next course of bituminous concrete pavement will be placed within 10 calendar days.

All temporary pavement markings exposed throughout the winter shall be Epoxy Resin Pavement Markings, unless directed otherwise by the Engineer.

Temporary pavement markings, as described above, shall be maintained until the permanent pavement markings are installed.

Final Pavement Markings

Permanent epoxy resin pavement markings shall be installed in accordance with Section 12.10 and the applicable Traffic Engineering Standard Drawings.

If Temporary Plastic Pavement Marking Tape is installed, then the Contractor shall remove and dispose of these markings during the same work shift that the permanent epoxy resin pavement markings are to be installed. The cost of furnishing, installing and removing the Temporary Plastic Pavement Marking Tape shall be at the Contractor's expense.

Traffic Control During Construction Operations

The following guidelines shall assist field personnel in determining when and what type of traffic control patterns to use for various situations. These guidelines shall provide for a safer and more efficient movement of traffic through work zones and enhance the safety of work forces in the work area.

Traffic Control Patterns

Traffic control patterns shall be used when a work operation requires that all or part of any vehicle or work area protrudes onto any part of a travel lane or shoulder or is within the clear zone. For each situation, the installation of traffic control devices shall be based on the following:

- Speed and volume of traffic.
- Duration of operation.
- Exposure to hazards.

Traffic control patterns shall be uniform, neat, and orderly in order to command respect from the motorist.

Lane reduction tapers should be placed so that the entire length of the taper is installed on a tangent section of roadway and the entire taper area can be seen by the motorist.

All existing conflicting signs shall be removed, covered with an opaque material, or turned so that they are not legible to oncoming traffic prior to implementing a traffic control pattern. The existing signs shall be uncovered or reinstalled once the pattern is removed.

A buffer area should be provided during installation of a traffic control pattern and maintained for the duration of the work. The buffer area shall be free of any equipment, workers, materials, and parked vehicles.

Traffic control patterns are not required for vehicles on an emergency patrol type activity or for a short duration stop of up to one hour, as long as the equipment is contained within the shoulder. Flashing lights, arrow boards, truck-mounted or trailer-mounted impact attenuators, and appropriate Trafficperson(s) shall be used when required.

In a situation not adequately covered by the Construction Traffic Control Plans, the Contractor shall contact the Engineer for assistance prior to setting up a traffic control pattern.

Placement of Signs

Signs shall be placed in a position that allows motorists the opportunity to reduce their speed prior to the work area. Signs shall be installed on the same side of the roadway as the work area. On multi-lane divided highways, advance warning signs shall be installed on both sides of the highway. On directional roadways (on-ramps, off-ramps, one-way roads) where the sight distance to signs is restricted, these signs should be installed on both sides of the roadway.

Allowable Adjustment of Signs and Devices Shown on the Construction Traffic Control Plans

The Construction Traffic Control Plans contained herein show the location and spacing of signs and devices under ideal conditions. Signs and devices should be installed as shown on these plans.

The proper application of the Construction Traffic Control Plans and installation of traffic control devices is dependent upon actual field conditions.

In the case of a horizontal or vertical sight restriction in advance of the work area, the traffic control pattern shall be extended to provide adequate sight distance for approaching traffic.

Adjustments to the Construction Traffic Control Plans shall only be made at the direction of the Engineer.

Table 1 indicates the minimum taper lengths required for a lane closure based on the posted speed limit and lane width of the roadway. These taper lengths shall only be used when the recommended taper lengths shown on the Construction Traffic Control Plans cannot be achieved.

Table 1 – Minimum Taper Length

POSTED SPEED LIMIT (MPH)	MINIMUM TAPER LENGTH FOR A SINGLE LANE CLOSURE (FEET)	
	FREEWAYS	SECONDARY ROADS
30 OR LESS	180	165
35	245	225
40	320	295
45	540	495
50	600	550
55	660	605
65	780	715

1. Work Zone Safety Meetings

- 1.a) Prior to the commencement of work, a Work Zone Safety Meeting shall be conducted with representatives from DOT Construction, Connecticut State Police (Local Barracks), Municipal Police, the Contractor (Project Superintendent) and the Traffic Control Subcontractor (if different than the prime Contractor) to review the traffic operations, lines of responsibility, and operating guidelines which will be used on the Project. DOT Traffic Engineering shall be invited to the Work Zone Safety Meeting. Other Work Zone Safety Meetings during the course of the Project should be scheduled as needed.
- 1.b) A Work Zone Safety Meeting Agenda shall be developed and used at the Meeting to outline the anticipated traffic control issues during the construction of this Project. Any issues that can't be resolved at these Meetings will be brought to the attention of the District Engineer and the Office of Construction. The agenda shall include:
- i. Review Project scope of work and time;
 - ii. Review Section 1.08, Prosecution and Progress;
 - iii. Review Section 9.70, Trafficpersons;
 - iv. Review Section 9.71, Maintenance and Protection of Traffic;
 - v. Review Contractor's schedule and method of operations;
 - vi. Review special concern areas: ramps, turning roadways, medians, lane drops, etc.;
 - vii. Open discussion of work zone questions and issues;
 - viii. Discussion of review and approval process for changes in Contract requirements as they relate to work zone areas.

2. General

- 2.a) Traffic control patterns shall only be installed if the required minimum number of signs, traffic cones, traffic drums, and other equipment (i.e. one Arrow Board for each lane closed, two Truck-Mounted or Trailer-Mounted Attenuators (TMAs), Changeable Message Sign, etc.) are on Site.

- 2.b) The Contractor shall have spare maintenance and protection of traffic equipment (TMAs, Arrow Board, Changeable Message Sign(s), construction signs, traffic cones, traffic drums, etc.) available at all times in case of mechanical failures, etc. Spare maintenance and protection of traffic equipment installed as a result of a sudden equipment breakdown shall be replaced by the Contractor within 24 hours.
- 2.c) Failure of the Contractor to have the required minimum number of signs, personnel, and equipment, which results in the pattern not being installed, shall not be a reason for a time extension or claim for lost time.
- 2.d) In cases of differences of opinion between the Contractor and the Inspection staff, the Contractor shall follow the directions of the Engineer. The matter shall be brought to the District Office for resolution immediately or, in the case of work after regular business hours, on the next business day.

3. Installing and Removing Traffic Control Patterns

- 3.a) Lane closures shall be installed beginning with the advance warning signs and proceeding forward toward the work area.
- 3.b) Lane closures shall be removed in the reverse order, beginning at the end of the work area, or traffic control pattern, and proceeding back toward the advance warning signs.
- 3.c) Stopping traffic may be allowed within the allowable hours stated in Section 1.08.04:
 - i. For those activities stated within the Contract.
 - ii. During paving, milling operations, or similar activities where, in the middle of the operation, it is necessary to flip the pattern to complete the operation on the other half of the roadway so traffic does not travel across the longitudinal joint or difference in roadway elevation.
 - iii. To move slow moving equipment across live traffic lanes into the work area.
- 3.d) The Contractor shall adhere to using the proper signs, placing the signs correctly, and ensuring the proper spacing of signs.
- 3.e) Additional devices are required on entrance ramps, exit ramps, and intersecting roads to warn and/or move traffic into the proper travel path prior to merging with or exiting from the mainline traffic. This shall be completed before installing the mainline pattern past the ramp or intersecting roadway.
- 3.f) Workers are prohibited from crossing the travel lanes on limited access roadways to install and remove signs or other devices on the opposite side of the roadway. Any signs or devices on the opposite side of the roadway shall be installed and removed separately.

4. Use of Arrow Boards

- 4.a) On limited access roadways, one Arrow Board shall be used for each lane that is closed. The Arrow Board shall be installed concurrently with the installation of the traffic control pattern and its placement shall be as shown on the Construction Traffic Control Plans. Additional Arrow Boards shall be deployed if sight distances are limited.
- 4.b) On non-limited access roadways, the use of an Arrow Board for lane closures is optional. The roadway geometry, sight distance, and traffic volume shall be considered in the decision to use the Arrow Board.
- 4.c) A vehicle displaying an arrow board shall be equipped with high-intensity rotating, flashing, oscillating, or strobe lights.
- 4.d) The flashing arrow mode shall be used for lane closure (merge) tapers.
- 4.e) The flashing arrow mode shall not be used for temporary alternating one-way traffic operations or to laterally shift lanes of traffic.
- 4.f) The flashing double arrow mode shall only be used for closing a center lane on a multilane roadway where adjacent left and right lanes remain open.
- 4.g) For shoulder work or roadside work near the shoulder, the Arrow Board shall be positioned in the shoulder and the flashing alternating diamond mode should be used.
- 4.h) The flashing alternating diamond caution mode should also be used when supplemental Arrow Boards are positioned in an already closed lane.

5. Use of Truck-Mounted or Trailer-Mounted Impact Attenuators (TMAs)

- 5.a) On limited access roadways, lane closures shall use a minimum of two TMAs to install and remove traffic control patterns. If two TMAs are not available, then the pattern shall not be installed.
- 5.b) On non-limited access roadways, the use of TMAs to install and remove patterns closing a lane(s) is optional. The roadway geometry, sight line distance, and traffic volume shall be considered in the decision to utilize the TMAs.
- 5.c) On limited access roadways, one TMA shall be placed on the shoulder and the second TMA shall be approximately 1,000 feet ahead blocking the lane to establish the advance and transition signing. The Arrow Board mounted on the TMA shall be in the arrow mode when taking the lane. The sign truck and workers shall be at sufficient distance ahead of the second TMA. In no case shall the TMA be used as the sign truck or a work truck. Once the transition is in place, the TMAs shall travel in the closed lane until all Portable Changeable Message Signs, signs, Arrow Boards, and cones/drums are installed.

The Arrow Board mounted on the TMA should be in the flashing alternating diamond caution mode when traveling in the closed lane.

- 5.d) A TMA shall be placed prior to the first work area in the pattern. If there are multiple work areas within the same pattern, then additional TMAs shall be positioned at each additional work area as needed. The Arrow Board mounted on the TMA should be in the flashing alternating diamond caution mode when in the closed lane.
- 5.e) TMAs shall be positioned a sufficient distance prior to the workers or equipment being protected to allow for appropriate vehicle roll-ahead in the event that the TMA is hit, but not so far that an errant vehicle could travel around the TMA and into the work area. For additional placement and use details, refer to Section 18.06. Some operations, such as paving and concrete repairs, do not allow for placement of the TMA(s) within the specified distances. In these situations, the TMA(s) shall be placed at the beginning of the work area and shall be advanced as the paving or concrete operations proceed.
- 5.f) TMAs will be paid for in accordance with how the unit is used. If it is used as a TMA and is in the proper location as specified, then it will be paid for at the specified hourly rate for Truck-Mounted or Trailer-Mounted Impact Attenuator. When the TMA is used as an Arrow Board, it will be paid for at the daily rate for Arrow Board. If a TMA is used to install and remove a pattern and is also used as an Arrow Board in the same day, then the unit will be paid for as a Truck-Mounted or Trailer-Mounted Impact Attenuator for the hours used to install and remove the pattern, typically 2 hours (1 hour to install and 1 hour to remove). If the TMA is also used as an Arrow Board during the same day, then the unit will only be paid for at the daily rate as an Arrow Board.

6. Use of Traffic Drums and Traffic Cones

- 6.a) On limited-access highways, ramps, and turning roadways:
 - i. Traffic drums shall be used for taper channelization.
 - ii. Traffic drums shall be used to delineate raised catch basins and other hazards.
 - iii. Traffic cones with a minimum height of 42 inches may be used in place of drums in the tangent section of a closed lane or shoulder.
 - iv. Traffic cones less than 42 inches in height shall not be used.
- 6.b) On all roadways:
 - i. Traffic drums shall be used in place of traffic cones in traffic control patterns that are in effect for more than a 36-hour duration.
 - ii. Traffic cones shall not be left unattended.
 - iii. Traffic cones with a minimum height of 42 inches shall be used when the posted speed limit is 45 MPH or above.
- 6.c) Typical spacing of traffic drums and/or cones shown on the Construction Traffic Control Plans in the Contract are maximum spacings and may be reduced to meet actual field conditions as required.

7. Use of Barricade Warning Lights

- 7.a) Barricade Warning Lights may be installed on channelizing devices when used in a merge taper. The Barricade Warning Lights shall flash in a sequential pattern when used in a merge taper. The successive flashing shall occur from the upstream end (beginning) of the merge taper to the downstream end (end) of the merge taper.
 - 7.b) Type C Barricade Warning Lights may be used at night to delineate the edge of the travel way.
- 7) Type B Barricade Warning Lights shall be used on post-mounted advanced warning signs.

8. Use of Portable Changeable Message Signs (PCMS)

- 8.a) On limited access roadways, one PCMS shall be used in advance of the traffic control pattern for all lane closures. Prior to installing the pattern, the PCMS shall be installed and in operation, displaying the appropriate lane closure information. The PCMS shall be positioned ½ to 1 mile ahead of the start of the lane closure taper. If the distance to the nearest exit ramp is greater than the specified ½ to 1 mile distance, then an additional PCMS shall be positioned a sufficient distance ahead of the exit ramp (and before the previous on-ramp where practical) to alert motorists to the work and therefore offer them an opportunity to take the exit.
- 8.b) On non-limited access roadways, the use of PCMS for lane closures is optional. The roadway geometry, sight line distance, and traffic volume shall be considered in the decision to use the PCMS.
- 8.c) PCMS should be placed off the shoulder of the roadway and behind a traffic barrier, if practical. Where a traffic barrier is not available to shield the PCMS, it should be placed off the shoulder and outside of the clear zone. If a PCMS has to be placed on the shoulder of the roadway or within the clear zone, it should be placed on the paved shoulder with a minimum of five traffic drums placed in a taper in front of it to delineate its position. The taper shall meet minimum distance requirements for a shoulder closure. The PCMS shall be protected if it is used for a continuous duration of 36 hours or more.
- 8.d) The PCMS shall be removed from the clear zone and have the display screen cleared and turned 90 degrees away from the roadway when the PCMS is no longer required.
- 8.e) The PCMS should not be used within 1,000 feet of an existing PCMS or Variable Message Sign (VMS).
- 8.f) A PCMS message shall:
 - i. consist of no more than two phases;
 - ii. contain no more than three lines of text per phase;
 - iii. have no more than eight characters per line, including spaces.

- 8.g) The PCMS should be used for specific situations that need to command the motorist's attention which cannot be conveyed with standard construction signs. The PCMS should not be used for generic messages (ex.: Road Work Ahead, Bump Ahead, Gravel Road, etc.) or for messages that need to be displayed for long periods of time, such as during stage construction. These types of messages should be displayed with construction signs. Special signs shall be coordinated with the Office of Construction and the Division of Traffic Engineering for the proper layout/dimensions required.
- 8.h) Typical messages that are allowed on the PCMS are shown below. Approval must be received from the Office of Construction for any message(s) different than the typical messages shown in Figure 1.
- 8.i) All messages shall comply with the information provided in Tables 2 and 3.

	<u>Phase 1</u>	<u>Phase 2</u>	<u>Message No.</u>	<u>Phase 1</u>	<u>Phase 2</u>
1	LEFT LANE CLOSED	MERGE RIGHT	9	LANES CLOSED AHEAD	REDUCE SPEED
2	2 LEFT LANES CLOSED	MERGE RIGHT	10	LANES CLOSED AHEAD	USE CAUTION
3	LEFT LANE CLOSED	REDUCE SPEED	11	EXIT XX CLOSED	USE EXIT YY
4	2 LEFT LANES CLOSED	REDUCE SPEED	12	EXIT XX CLOSED USE YY	FOLLOW DETOUR
5	RIGHT LANE CLOSED	MERGE LEFT	13	2 LANES SHIFT AHEAD	USE CAUTION
6	2 RIGHT LANES CLOSED	MERGE LEFT	14	3 LANES SHIFT AHEAD	USE CAUTION
7	RIGHT LANE CLOSED	REDUCE SPEED			
8	2 RIGHT LANES CLOSED	REDUCE SPEED			

Figure 1: Typical PCMS Messages

Table 2: Acceptable Abbreviations

Word Message	Standard Abbreviation	Word Message	Standard Abbreviation
Access	ACCS	Minimum	MIN
Afternoon / Evening	PM	Minor	MNR
Ahead	AHD	Minute(s)	MIN
Alternate	ALT	Monday	MON
Avenue	AVE, AV	Morning / Late Night	AM
Bicycle	BIKE	Mount	MT
Blocked	BLKD	Mountain	MTN
Boulevard	BLVD	National	NATL
Bridge	BR	Normal	NORM
CB Radio	CB	North	N
Center	CTR	Northbound	NBND
Center	CNTR	Oversized	OVRSZ
Chemical	CHEM	Parking	PKING
Circle	CIR	Parkway	PKWY
Compressed Natural Gas	CNG	Pavement	PVMT
Condition	COND	Pedestrian	PED
Congested	CONG	Place	PL
Construction	CONST	Pounds	LBS
Court	CT	Prepare	PREP
Crossing	XING	Quality	QLTY
Crossing (other than highway-rail)	XING	Right	RT
Downtown	DWNTN	Road	RD
Drive	DR	Roadwork	RDWK
East	E	Route	RT, RTE
Eastbound	EBND	Saint	ST
Electric Vehicle	EV	Saturday	SAT
Emergency	EMER	Service	SERV
Entrance, Enter	ENT	Shoulder	SHLDR
Exit	EX	Slippery	SLIP
Express	EXP	South	S
Expressway	EXPWY	Southbound	SBND
Feet	FT	Speed	SPD
Freeway	FRWY, FWY	State, county, or other non-US or non-Interstate numbered route	[Route Abbreviation determined by highway agency]**
Friday	FRI	Street	ST
Frontage	FRNTG	Sunday	SUN
Hazardous	HAZ	Telephone	PHONE
Hazardous Material	HAZMAT	Temporary	TEMP
High Occupancy Vehicle	HOV	Terrace	TER
Highway	HWY	Thruway	THWY
Highway-Rail Grade Crossing	RR XING	Thursday	THURS

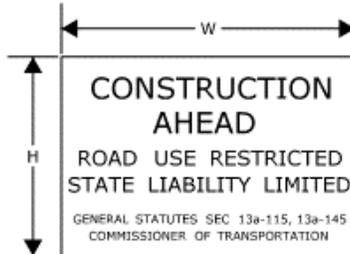
Hospital	HOSP	Tons of Weight	T
Hour(s)	HR, HRS	Traffic	TRAF
Information	INFO	Trail	TR
International	INTL	Travelers	TRVLRS
Interstate	I-	Tuesday	TUES
Junction / Intersection	JCT	Turnpike	TPK
Lane	LN	Two-Way Intersection	2-WAY
Left	LFT	Two-Wheeled Vehicles	CYCLES
Liquid Propane Gas	LP-GAS	Upper	UPR
Local	LOC	US Numbered Route	US
Lower	LWR	Vehicle(s)	VEH, VEHS
Maintenance	MAINT	Warning	WARN
Major	MAJ	Wednesday	WED
Maximum	MAX	West	W
Mile(s)	MI	Westbound	WBND
Miles Per Hour	MPH		

** A space and no dash shall be placed between the abbreviation and the number of the route.

Table 3: Unacceptable Abbreviations

Unacceptable Abbreviation	Intended Word	Common Misinterpretation
ACC	Accident	Access (Road)
CLRS	Clears	Colors
DLY	Delay	Daily
FDR	Feeder	Federal
L	Left	Lane (Merge)
LT	Light (Traffic)	Left
PARK	Parking	Park
POLL	Pollution (Index)	Poll
RED	Reduce	Red
STAD	Stadium	Standard
WRNG	Warning	Wrong

SERIES 16 SIGNS



		W	H
16-E	80-1605	84" x 60"	
16-H	80-1608	60" x 42"	
16-M	80-1613	30" x 24"	

		W	H
16-S	80-1619	48" x 30"	

SIGN 16-S SHALL BE USED ON ALL PROJECTS THAT REQUIRE SIDEWALK RECONSTRUCTION OR RESTRICT PEDESTRIAN TRAVEL ON AN EXISTING SIDEWALK.

SERIES 16 SIGNS SHALL BE INSTALLED IN ADVANCE OF THE TRAFFIC CONTROL PATTERNS. SERIES 16 SIGNS SHOULD BE LOCATED TO ALLOW MOTORISTS THE OPPORTUNITY TO AVOID A WORK ZONE. SERIES 16 SIGNS SHOULD BE INSTALLED ON MAJOR INTERSECTING ROADWAYS THAT APPROACH THE WORK ZONE. ON LIMITED-ACCESS HIGHWAYS, THESE SIGNS SHOULD BE LOCATED IN ADVANCE OF THE NEAREST UPSTREAM EXIT RAMP AND ON ANY ENTRANCE RAMPS PRIOR TO OR WITHIN THE WORK ZONE LIMITS.

SIGNS 16-E AND 16-H SHALL BE POST-MOUNTED.

SIGN 16-E SHALL BE USED ON ALL FREEWAYS AND EXPRESSWAYS.

SIGN 16-H SHALL BE USED ON ALL RAMPS, OTHER STATE ROADWAYS AND MAJOR TOWN/CITY ROADWAYS.

SIGN 16-M SHALL BE USED ON OTHER TOWN ROADWAYS.

CONSTRUCTION TRAFFIC CONTROL PLAN
SERIES 16 SIGNS

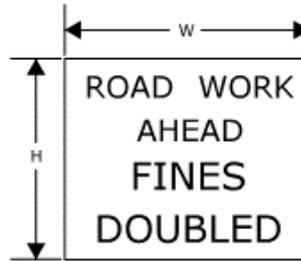
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REGULATORY SIGN "ROAD WORK AHEAD, FINES DOUBLED"

THE REGULATORY SIGN "ROAD WORK AHEAD FINES DOUBLED" SHALL BE INSTALLED FOR ALL WORK ZONES THAT OCCUR ON ANY STATE HIGHWAY AND MUNICIPAL ROAD IN CONNECTICUT WHERE THERE ARE WORKERS PRESENT ON THE HIGHWAY.

THE "ROAD WORK AHEAD FINES DOUBLED" REGULATORY SIGN SHALL BE PLACED AFTER THE SERIES 16 SIGN AND IN ADVANCE OF THE "ROAD WORK AHEAD" SIGN.

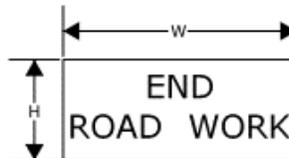
	W	H
31-1906	48"	42"
31-1907	60"	54"



"END ROAD WORK" SIGN

THE LAST SIGN IN THE PATTERN SHALL BE THE "END ROAD WORK" SIGN.

	W	H
80-9606	36"	18"
80-9612	48"	24"



CONSTRUCTION TRAFFIC CONTROL PLAN
**ROAD WORK AHEAD
 SIGNS**

SCALE: NONE

NOTES FOR TRAFFIC CONTROL PLANS

1. IF A TRAFFIC STOPPAGE OCCURS IN ADVANCE OF SIGN (A), THEN AN ADDITIONAL SIGN (A) SHALL BE INSTALLED IN ADVANCE OF THE STOPPAGE.
2. SIGNS (AA), (A), AND (D) SHOULD BE OMITTED WHEN THESE SIGNS HAVE ALREADY BEEN INSTALLED IN ADVANCE TO DESIGNATE A LARGER WORK ZONE THAN THE WORK ZONE THAT IS ENCOMPASSED ON THIS PLAN.
3. SEE TABLE 1 FOR ADJUSTMENT OF TAPERS IF NECESSARY.
4. TRAFFIC CONES AND PORTABLE CONSTRUCTION SIGNS SHALL NOT BE LEFT UNATTENDED.
5. ALL CONFLICTING SIGNS WITHIN THE LIMITS OF A ROADWAY / LANE CLOSURE AREA SHALL BE COVERED WITH AN OPAQUE MATERIAL WHILE THE CLOSURE IS IN EFFECT, AND UNCOVERED WHEN THE ROADWAY / LANE CLOSURE IS RE-OPENED TO ALL LANES OF TRAFFIC.
6. IF THIS PLAN REMAINS IN CONTINUOUS OPERATION FOR MORE THAN 48 HOURS, THEN ANY EXISTING CONFLICTING PAVEMENT MARKINGS SHALL BE ERADICATED OR COVERED, AND TEMPORARY PAVEMENT MARKINGS THAT DELINEATE THE PROPER TRAVELPATHS SHALL BE INSTALLED.
7. DISTANCES BETWEEN SIGNS IN THE ADVANCE WARNING AREA MAY BE REDUCED TO 100' ON LOW-SPEED URBAN ROADS (SPEED LIMIT \leq 40 MPH).
8. IF THIS PLAN IS TO REMAIN IN OPERATION FROM SUNSET TO SUNRISE, INSTALL BARRICADE WARNING LIGHTS - HIGH INTENSITY ON ALL POST-MOUNTED DIAMOND SIGNS IN THE ADVANCE WARNING AREA.
9. A PORTABLE CHANGEABLE MESSAGE SIGN SHALL BE INSTALLED ONE HALF MILE TO ONE MILE IN ADVANCE OF THE LANE CLOSURE TAPER.
10. SIGN (P) SHALL BE MOUNTED A MINIMUM OF 7 FEET FROM THE PAVEMENT SURFACE TO THE BOTTOM OF THE SIGN.

TABLE 1 - MINIMUM TAPER LENGTHS

POSTED SPEED LIMIT (MILES PER HOUR)	MINIMUM TAPER LENGTH FOR A SINGLE LANE CLOSURE
30 OR LESS	180'
35	245'
40	320'
45	540'
50	600'
55	660'
65	780'

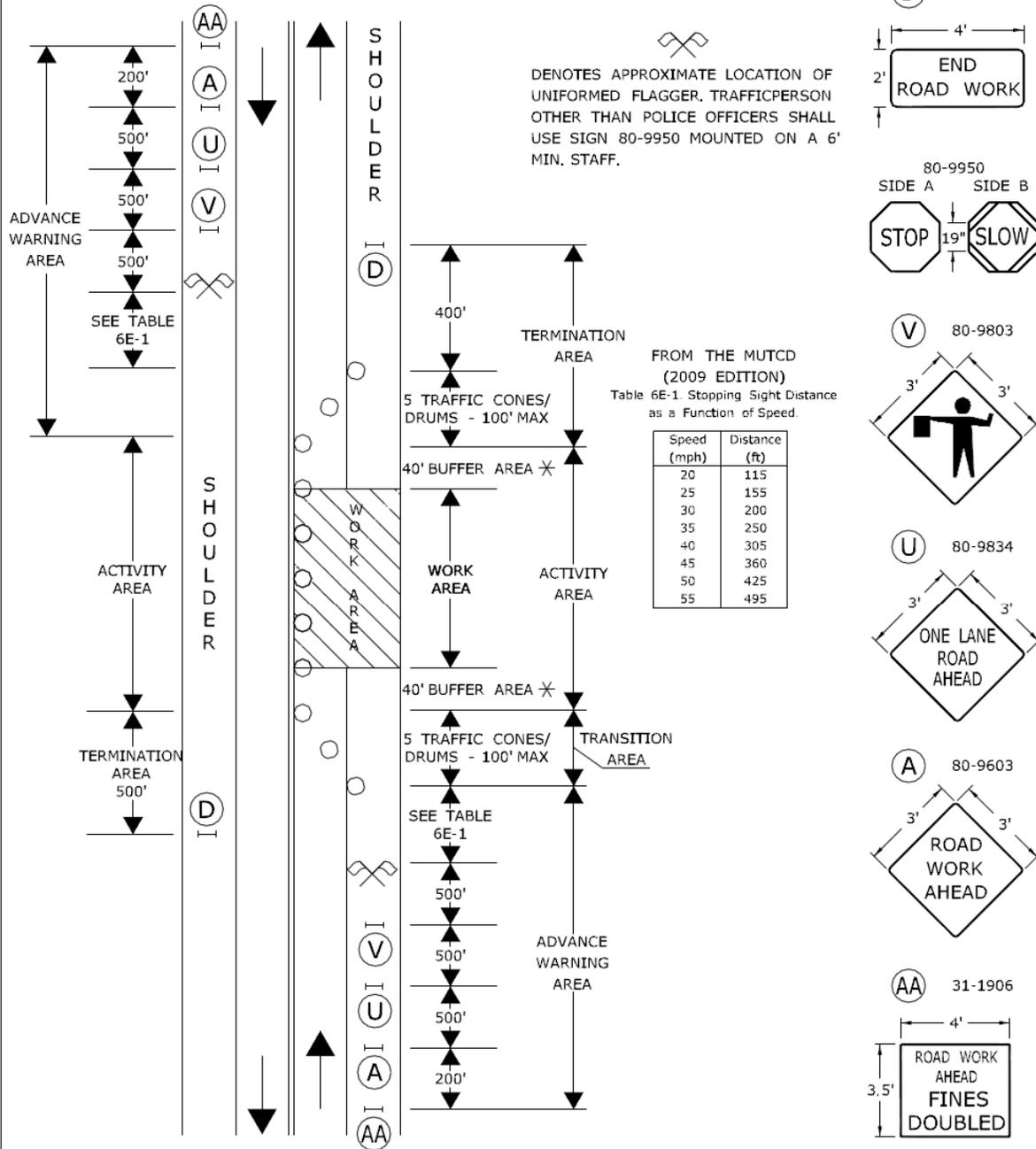
CONSTRUCTION TRAFFIC CONTROL PLAN

NOTES

SCALE: NONE

WORK IN TRAVEL LANE AND SHOULDER TWO LANE HIGHWAY ALTERNATING ONE-WAY TRAFFIC OPERATIONS

SIGN FACE
108 SQ. FT (MIN.)



- TRAFFIC CONE **OR** TRAFFIC DRUM
- ✱ OPTIONAL ⊗ TRAFFIC DRUM — PORTABLE SIGN SUPPORT
- ← HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW



SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN
PLAN 13 - SHEET 1 OF 2
SEE NOTES 1, 2, 4, 6, 7, 8

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED *Charles S. Harlow*
PRINCIPAL ENGINEER

Charles S. Harlow
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WORK IN TRAVEL LANE AND SHOULDER TWO LANE HIGHWAY ALTERNATING ONE-WAY TRAFFIC OPERATIONS

SIGN FACE
108 SQ. FT (MIN.)

HAND SIGNAL METHODS TO BE USED BY UNIFORMED FLAGGERS

THE FOLLOWING METHODS FROM SECTION 6E.07, FLAGGER PROCEDURES, IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES," SHALL BE USED BY UNIFORMED FLAGGERS WHEN DIRECTING TRAFFIC THROUGH A WORK AREA. THE STOP/SLOW SIGN PADDLE (SIGN NO. 80-9950) SHOWN ON THE TRAFFIC STANDARD SHEET TR-1220 01 ENTITLED, "SIGNS FOR CONSTRUCTION AND PERMIT OPERATIONS" SHALL BE USED.

A. TO STOP TRAFFIC

TO STOP ROAD USERS, THE FLAGGER SHALL FACE ROAD USERS AND AIM THE STOP PADDLE FACE TOWARD ROAD USERS IN A STATIONARY POSITION WITH THE ARM EXTENDED HORIZONTALLY AWAY FROM THE BODY. THE FREE ARM SHALL BE HELD WITH THE PALM OF THE HAND ABOVE SHOULDER LEVEL TOWARD APPROACHING TRAFFIC.



B. TO DIRECT TRAFFIC TO PROCEED

TO DIRECT STOPPED ROAD USERS TO PROCEED, THE FLAGGER SHALL FACE ROAD USERS WITH THE SLOW PADDLE FACE AIMED TOWARD ROAD USERS IN A STATIONARY POSITION WITH THE ARM EXTENDED HORIZONTALLY AWAY FROM THE BODY. THE FLAGGER SHALL MOTION WITH THE FREE HAND FOR ROAD USERS TO PROCEED.



C. TO ALERT OR SLOW TRAFFIC

TO ALERT OR SLOW TRAFFIC, THE FLAGGER SHALL FACE ROAD USERS WITH THE SLOW PADDLE FACE AIMED TOWARD ROAD USERS IN A STATIONARY POSITION WITH THE ARM EXTENDED HORIZONTALLY AWAY FROM THE BODY. TO FURTHER ALERT OR SLOW TRAFFIC, THE FLAGGER HOLDING THE SLOW PADDLE FACE TOWARD ROAD USERS MAY MOTION UP AND DOWN WITH THE FREE HAND, PALM DOWN.



- TRAFFIC CONE **OR** TRAFFIC DRUM
- * OPTIONAL ⊗ TRAFFIC DRUM — PORTABLE SIGN SUPPORT
- ◀ HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW

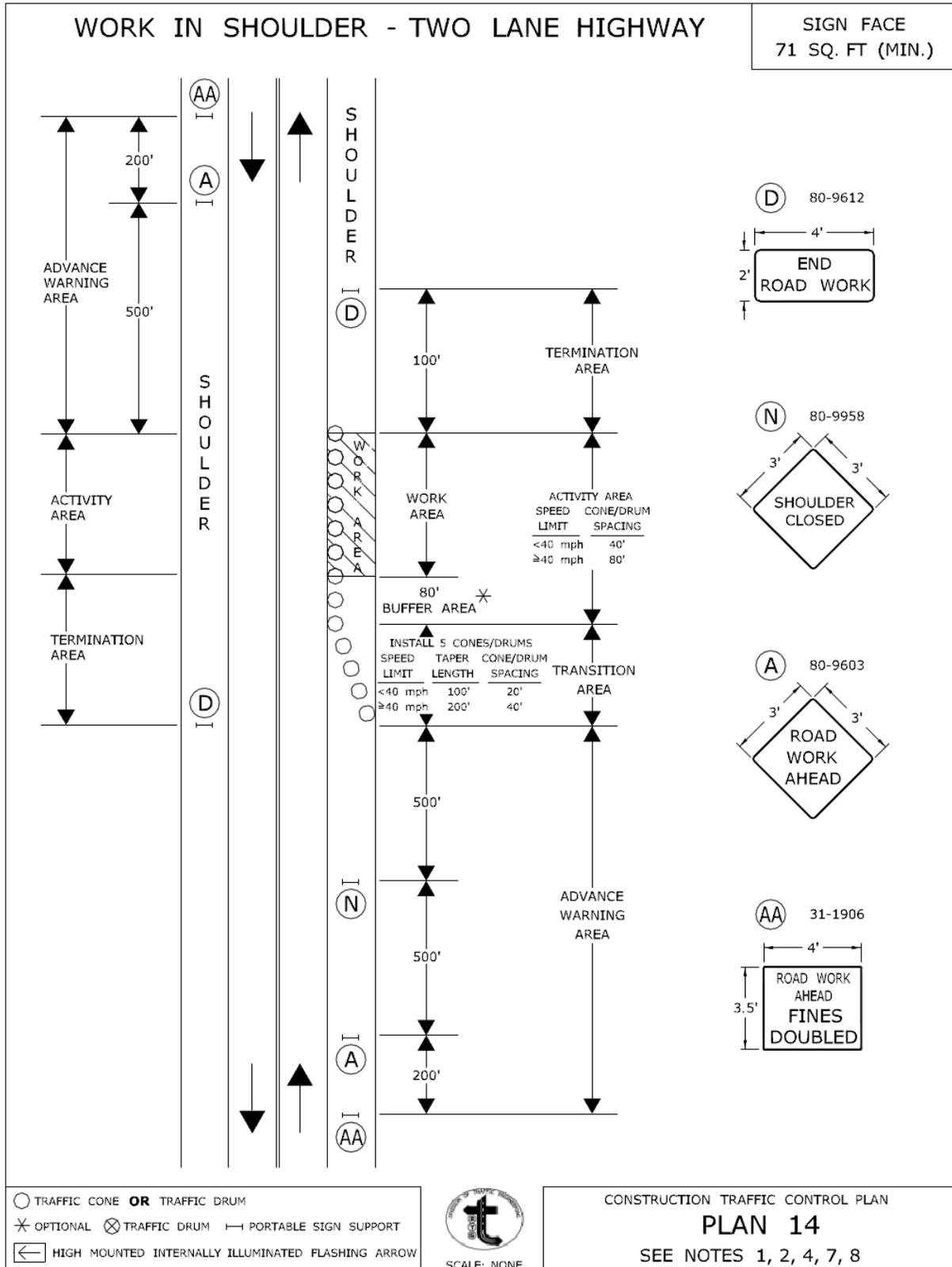


SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN
PLAN 13 - SHEET 2 OF 2
SEE NOTES 1, 2, 4, 6, 7, 8

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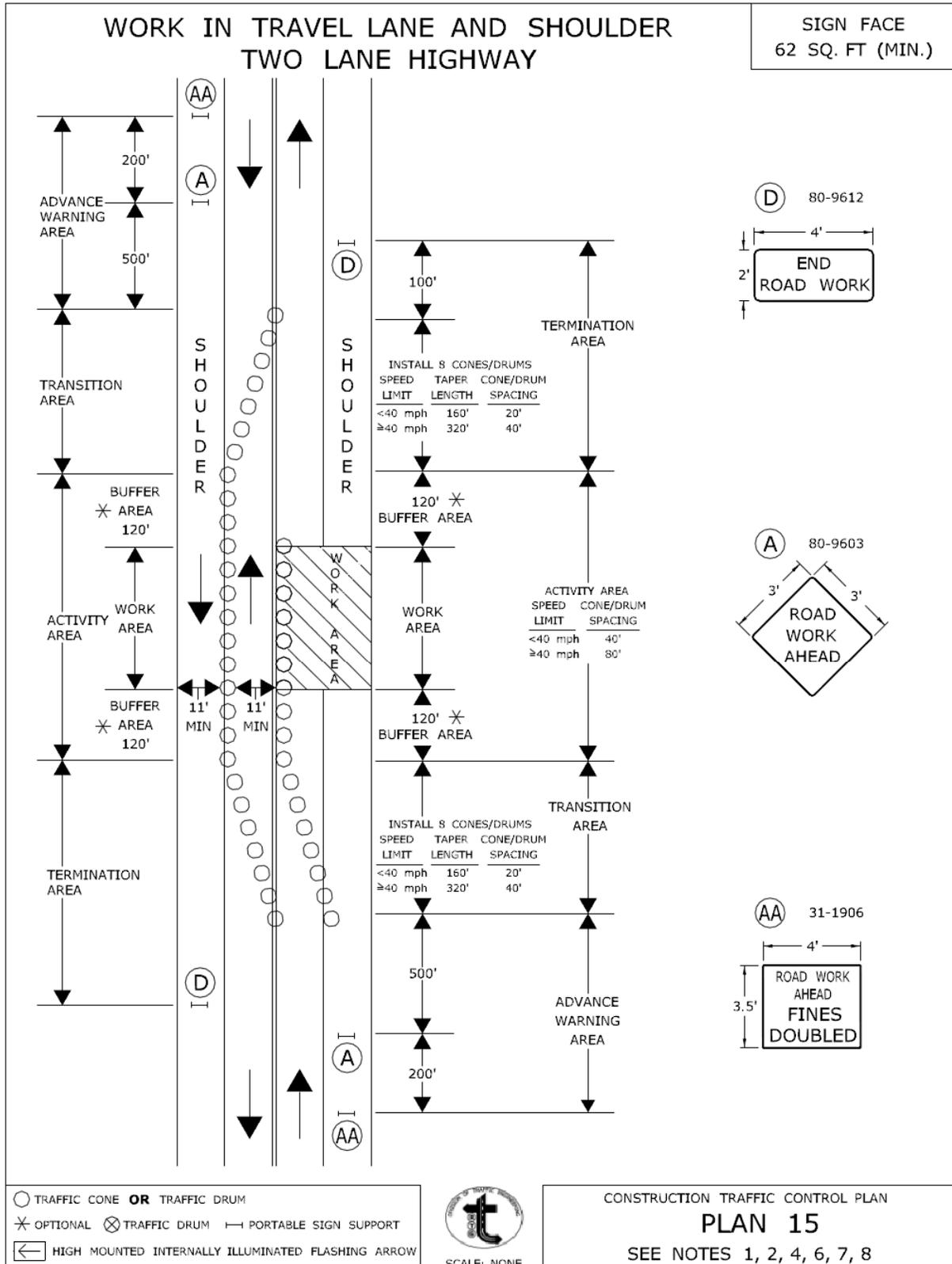
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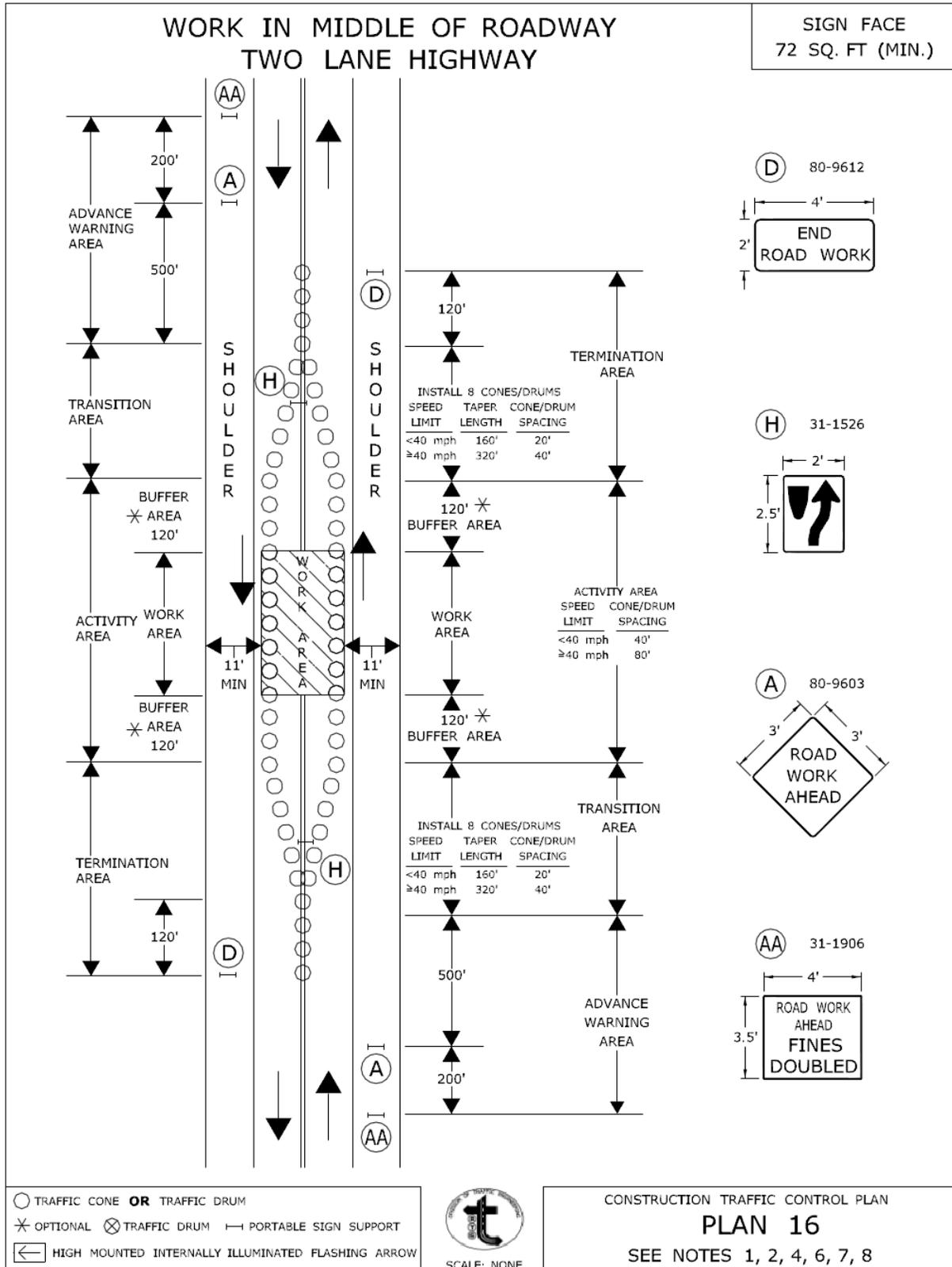


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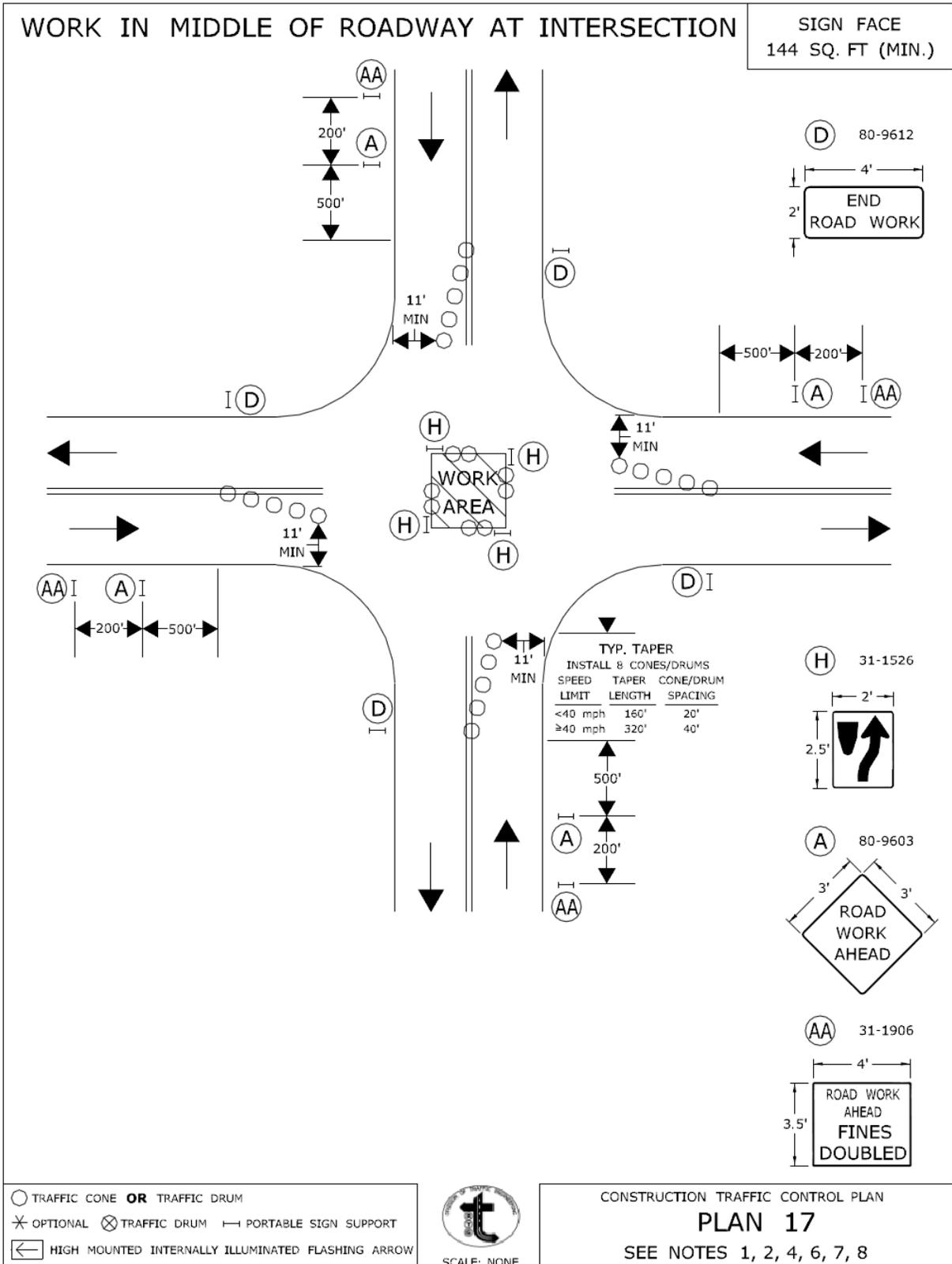
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Article 9.71.05 – Basis of Payment *is supplemented by the following:*

The temporary relocation of signs and supports, and the furnishing, installation and removal of any temporary supports shall be paid for under the item “Maintenance and Protection of Traffic”.

ITEM #1208931A - SIGN FACE - SHEET ALUMINUM (TYPE IX RETROREFLECTIVE SHEETING)

Section 12.08 is supplemented and amended as follows:

12.08.01—Description:

Add the following:

This item shall also include field testing of metal sign base posts as directed by the Engineer. Signs shall conform to the sign details located at <https://portal.ct.gov/DOT/Traffic-Engineering/Catalog-of-Signs> with legend for variable signs as shown in the plans.

12.08.03—Construction Methods:

Delete the second to last paragraph and add the following:

Metal sign base posts shall be whole and uncut. Sign base post embedment and reveal lengths shall be as shown on the plans. The Contractor shall drive the metal sign base posts by hand tools, by mechanical means or by auguring holes. If an obstruction is encountered while driving or placing the metal sign base post, the Contractor shall notify the Engineer who will determine whether the obstruction shall be removed, the sign base post or posts relocated, or the base post installation in ledge detail shall apply. Backfill shall be thoroughly tamped after the posts have been set level and plumb.

Field Testing of Metal Sign Posts: When the sign installations are complete, the Contractor shall notify the Engineer the Project is ready for field testing. Based on the number of posts in the Project, the Engineer will select random sign base posts which shall be removed by the Contractor for inspection and measurement by the Engineer. After such inspection is completed at each base post location, the Contractor shall restore or replace such portions of the work to the condition required by the Contract. Refer to the table in 12.08.05 for the number of posts to be field tested.

12.08.04—Method of Measurement:

Add the following:

The work required to expose and measure sign base post length and embedment depth using field testing methods, and restoration of such work, will not be measured for payment and shall be included in the general cost of the work.

12.08.05—Basis of Payment:

Replace the entire Article with the following:

This work will be paid for at the Contract unit price per square foot for “Sign Face - Sheet Aluminum” of the type specified complete in place, adjusted by multiplying by the applicable Pay Factor listed in the table below. The price for this work shall include the completed sign, metal sign post(s), span-mounted sign brackets and mast arm-mounted brackets, mounting hardware, including reinforcing plates, data labels, field testing, restoration and replacement of defective base post(s), and all materials, equipment, and work incidental thereto.

Pay Factor Scale: Work shall be considered defective whenever the base post length or base post embedment depth is less than the specified length by more than 2 inches. If the number of defects results in rejection, the Contractor shall remove and replace all metal sign base posts on the Project, at no cost to the Department.

Number of Posts to be Tested and Pay Factors (Based on Number of Defects)

Number of Posts in Project =>	51-100	101-250	251-1000	>1000
Sample Size=>	5 Posts	10 Posts	40 Posts	60 Posts
0 Defects	1.0	1.0	1.025	1.025
1 Defect	0.9	0.95	0.975	0.983
2 Defects	Rejection	0.9	0.95	0.967
3 Defects	Rejection	Rejection	0.925	0.95
4 Defects	Rejection	Rejection	0.9	0.933
5 Defects	Rejection	Rejection	Rejection	0.917
6 Defects	Rejection	Rejection	Rejection	0.9
7 or more Defects	Rejection	Rejection	Rejection	Rejection

Note: Projects with 50 or fewer posts will not include field testing

ITEM #1300005A – RELOCATION OF WATER MAINS

Description: Work under this item consists of designing, furnishing and installing the relocated water main as shown on the plans and as ordered by the Engineer or the Bristol Water Department. This item also includes all excavation, sheeting and other excavation supports, removal of the old water main, 12” water main, fittings, water gates, water main sleeve, connections to existing mains, disinfection, caps, thrust blocks, back fill, and compaction, as shown on the plans.

Materials:

The following water main materials shall be purchase directly from a water works supply company or manufacturer.

A. PIPE:

Four-inch and larger diameter ductile iron pipe, class 52 or better, tyton or mechanical joint, cement-lined, conforming to ANSI/AWWA C151/A21.51-91, with two bronze wedges per joint and accessories, as manufactured by one of the following: Atlantic States Pipe, U.S. Pipe Company, Griffin Pipe Company.

Bristol Water Department shall determine all water main sizes and joint types. Only one brand of pipe will be allowed per extension. SBR Gaskets shall be used in accordance with ANSI/AWWA C111/A21.11-95.

B. VALVES:

All gate valves and tapping valve shall be mechanical joint resilient-seated valves, open right, non-rising stem, 200 Psi working pressure, O-ring seals, iron body, bronze mounted, parallel seat open right with accessories, and shall meet or exceed ASNI/AWWA C509a-95 or its latest revision an shall be manufactured by one of the following: Kennedy Valve, American Valve & Hydrant, M+H Valve Co., Waterous, Mueller, American AVK Co., or U.S. Pipe Company’s “METRO-SEAL”, Clow.

C. GATE BOXES:

All gate boxes shall be a minimum five (5) feet, cast-iron; two piece slide top flanged top complete, 6” shaft diameter, bell-bottom only.

D. MECHANICAL FITTINGS:

Tees, bends, and other fittings shall be gray cast iron, class 250 or better cement lined; mechanical joint ends, bituminous seal-coated, complete with accessories and conforming to ANSI/AWWA C153/A21.53.

E. JOINT RESTRAINTS:

All mechanical joints shall be restrained using a EBAA Iron, Inc. MEGALUG 1100 Series wedge style restraint. All bell joint restraints shall be McWane Ductile TR Flex Bell Restraint. All joints on mains shall be restrained a minimum 40 feet prior to and

after any valves, bends, caps or plugs. Field lock gaskets or manufacturer equivalent will not be accepted.

F. AIR RELEASES AND BLOW-OFFS:

Air releases shall be a minimum 1” and manufactured by Wedge Manufacturing. Blow-Off assemblies shall be a minimum 2” and consist of a 2” tapped mechanical joint cap or plug with a 2” Wedge type assembly as manufactured by Wedge Manufacturing. A #6 style gate box shall be installed on all 2” blow-off assemblies. All air releases and blow-offs shall be installed a maximum 6” below finished grade.

The substitution of equivalent materials not specified herein, must be applied for in writing stating the materials requested to be used and accompanied by the manufacturer’s engineering transmittal drawings, written confirmation from reputable suppliers of availability of repair parts, replacement parts and repair service where applicable, and test data for review by the Bristol Water Department whose decision shall be final.

Construction Methods:

The Contractor shall be responsible for coordinating any work associated with the existing water utility with the City of Bristol Water Department at 119 Riverside Avenue, Bristol, CT. The contact person is Robert Longo and can be reached at (860) 582-7431.

A. GENERAL

All work shall be in accordance with the current Bristol Water Department Rules and Regulations.

Installation of mains and services shall be performed by a person with a valid Connecticut P-1 or P-7 license.

The shutdown to accommodate the water main relocation shall not be more than 4 hours and shall done between 11:00 pm and 3:00am.

B. PERMITS, FEES AND INSPECTION

All required State of Connecticut Department of Transportation or City of Bristol Road Opening Permits must be taken out prior scheduling any work.

All fees to the Bristol Water Department must be paid in full a minimum 4 business days prior to scheduling any work.

Estimates for taps and inspections will be prepared by the Bristol Water Department and shall conform to the current “Bristol Water Department Miscellaneous Charges”.

All inspections shall be scheduled with the Bristol Water Department a minimum 4 business days prior and fees for inspection within City of Bristol or State of Connecticut roadways shall be waived at the discretion of the Bristol Water Department.

All work requiring the shut down of existing mains must be approved by the Bristol Water Department 2 weeks prior and must be scheduled a minimum 4 business days prior to work.

All water main inspections within Private developments shall be inspected by the Bristol Water Department or its representative at an hour fee.

C. *INSTALLATION PROCEDURES*

1.01 EXCAVATION

Contractor shall perform all excavation and installation of the water main and appurtenances.

All excavation shall be in accordance with City of Bristol or State of Connecticut Department of Transportation specifications.

The water main must be installed a minimum horizontal distance of 10 feet and a vertical distance of 1 ½ feet from existing or proposed sanitary sewer or septic system as per State of Connecticut Public Health Code.

Gravel or sand cushion below the pipe shall be provided depending on soil conditions.

1.02 INSTALLATION OF PIPE AND FITTINGS

The interior of all pipe and fittings shall be thoroughly cleaned of all foreign matter before being lowered into the trench, and shall be kept clean during laying operations by plugging or other approved method. The full length of each section of piping shall rest solidly upon the pipe bed, with recesses excavated to accommodate bells and joints. Any pipe that has the grade or joint disturbed after laying shall be taken up and relaid. Pipe shall not be laid in water, or when trench or weather conditions are unsuitable for the work, except by permission of the Bristol Water Department or its representative. Water shall be kept out of the trench until the joints have been completed. Any section of pipe found to be defective before or after laying shall be immediately removed from the construction site and replaced by the contractor.

Where connections are made between existing mains and new mains a new gate valve shall be installed to prevent contamination. All connections between existing mains and new mains shall require an Outside Diameter (O.D.) be taken on the existing main prior to cutting or altering the pipe.

All installations shall be inspected prior to backfill by the Bristol Water Department or its representative. Any area backfilled prior to inspection shall be re-excavated at the discretion of the Bristol Water Department or its representative.

All pipe, fittings, valves and appurtenances shall be carefully inspected for defects immediately prior to placing the trench. Any pipe, fittings, valves or appurtenances found to be defective shall be immediately removed from the construction site.

Pipe shall be Ductile Iron, Class 52, tyton joint and installed with two bronze wedges at each joint, unless mechanical or restrained joint pipe is required by the Bristol Water Department or its representative.

All fittings shall be ductile iron, mechanical joint. All fittings shall be restrained with mechanical joint restraints according to manufacturer's specifications.

All pipes and fittings shall be installed at a minimum depth of 4 ½ feet and a maximum 5 ½ feet below finished grade unless otherwise approved by the Bristol Water Department or its representative prior to installation.

All pipe shall be handled into the trench carefully and in a workmanlike manner. The contractor shall furnish all slings & straps to permit satisfactory support of all parts of pipe when it is being handled.

Metallic warning tape shall be installed a foot above all pipe and services.

1.03 BACKFILL

Suitable material, as determined on site, shall be required for backfill. Removal of surplus or objectionable materials shall be the responsibility of the contractor. Backfill shall not contain any rocks or stones over 2 inches in diameter. Minimum 200 mm compaction layers with approved spoils or sand or gravel will be accepted. Compaction should meet all State of Connecticut, Department of Transportation specifications for roads, bridges and incidental construction, Form 818.

2.01 JOINTING PIPE

Ends of the pipe shall be thoroughly cleaned before joint is made. The surface of the joint shall be lubricated in accordance with the manufacturer's directions. The lubricant shall be of type recommended by pipe manufacturer and in accordance with AWWA specifications. Pipes shall be jointed in strict accordance with pipe manufacturer's directions and work shall be done by skilled workmen.

No pipe or fittings shall be laid in water or on a frozen trench bottom or when, in the opinion of the Bristol Water Department or its representative, the trench conditions or the weather is unsuitable for such work.

2.02 JOINT RESTRAINT

Joint Restraints shall be installed on all joints at a minimum 40' prior to and after all mechanical bends. Thrust blocks shall be used in conjunction with joint restraints to restrain water main or appurtenances where indicated by the Bristol Water Department or its representative (concrete blocks may be used, ie: catch basin blocks into undisturbed soil) When connecting to existing water mains, restraint shall be made using 2 friction clamps and treaded rod and thrust blocks as directed by the Bristol Water Department or its representative.

2.03 INSTALLATION OF VALVES

Valves shall be installed on all tees at a maximum 2 feet from the connection with the tee. In line valves shall be installed at a maximum of every 800 feet of pipe or as directed by the Bristol Water Department or its representative. Each valve shall be plumb to grade and shall be equipped with a gate box set vertically with top even with finished grade.

2.04 DEFLECTION

Wherever curves are negotiated by deflecting successive lengths of pipe, the deflection of each length of pipe shall not exceed the manufacturer's recommendations. All mechanical joint bends shall be restrained with approved glands. Poured thrust blocks using 3,300 Psi concrete and rodding may be additionally required by the Bristol Water Department or its representative. Thrust blocks must be allowed to cure for a minimum of three days, before the water main can be filled. 90 degree bends shall only be permitted with prior approval by the Bristol Water Department or its representative.

2.05 TESTING

All water mains shall be hydrostatic tested for leakage at 200 Psi for ½ hour and 150 Psi for 1 ½ hours. Leakage shall be measured in gallons by pumping the water main back up to the required pressure at the end of the test and must not exceed allowable leakage specified in ANSI/AWWA C600-93 section 4.2.2 or its latest revision. All water used to fill, flush and hydrostatic test the main must be potable water. Any water to be used from any water source other than the Bristol Water Department must be tested for bacteria by a State of Connecticut certified laboratory and test results must be submitted to the Bristol Water Department prior to use.

The contractor shall furnish all labor and equipment necessary for tests. Tests shall be made by section or as directed by the Bristol Water Department or its representative. Air shall be expelled by filling the main slowly and permitting air to escape at the high points. Air bleeders shall be installed at all high points and in locations directed by the Bristol Water Department or its representative.

All valves shall be operated only by Bristol Water Department personnel.

In the event the leakage exceeds maximum allowable amount, the contractor shall take such steps that are required and necessary or as are directed by the Bristol Water Department to reduce leakage to below the allowable maximum amount and shall replace

any and all defective joints or piping and the test shall be repeated until the leakage requirements are complied with. No leak shall be repaired with a wrap around or bell/joint repair band.

All visible leaks shall be repaired in any event. Contract must assure water used for testing has chlorine residual of 1 mg/L. Testing water may then remain in system. The contractor shall make all necessary arrangements for obtaining supply, furnish all pumps, piping, hose, etc., and remove same when work is completed. All work shall conform to AWWA C600-65 or the latest revision thereof.

All testing must be inspected by the Bristol Water Department or its representative and shall be conducted during normal business hours of the Bristol Water Department.

2.06 CHLORINATION

All water mains shall be disinfected by the installer to a minimum 50 Parts Per Million (PPM) in accordance with ANSI/AWWA C651a-90 or its latest revision using the tablet or continuous feed method. After disinfection, water must remain in the pipes a minimum 24 hours at which point, the water main shall be flushed and the free chlorine residual after flushing shall be a minimum 0.2 PPM to a maximum 1.0 PPM. The Bristol Water Department or its representative shall collect a bacteria sample and have it analyzed by its laboratory for total coliform. In the event the bacteria sample indicates a presence of coliform, the water line shall be flushed and resample by the Bristol Water Department. If the second set of samples indicates the presence of coliform the water main shall be re-chlorinated by and at the expense of the contractor. No water main shall be approved by the Bristol Water Department or its representative until a sample with zero coliform is obtained.

It shall be the contractor's responsibility to dispose of all chlorinated water used to disinfect a water main. This shall be accomplished in accordance with the federal CLEAN WATER ACT and current Connecticut D.E.P. standards for disposal.

2.07 TAPS AND SERVICES

All water main and service taps shall be performed by Bristol Water Department personnel with the exception of taps on Private Water Main. All curb valves are owned by the Bristol Water Department, Only Bristol Water Department personnel are authorize to operate curb valves.

All service installations shall be inspected by the Bristol Water Department prior to backfill. Water Services must have sand bedding and minimum 12" sand covering pipe, bury tape clearly marked water will be installed 12"above water line. Curb box must be installed plumb and to grade before meter will be installed.

All services 2 inches and under shall be completely exposed and energized with water to full pressure by the Bristol Water Department prior to backfill.

All services 4 inches in diameter and over shall be installed as water main and shall be hydrostatic pressure tested.

All services 2 inches and under shall be of Type K Copper tubing and all connections shall be made with compression type fittings.

Any services 2 inches and under that are backfilled prior to inspection shall be re-excavated and inspected by the Bristol Water Department or its representative prior to a water meter being installed.

2.08 AS-BUILTS DRAWINGS

The contractor is responsible to submit As-Built field drawings with detailed location assessment of all valves, fittings, hydrants and service valves to the Bristol Water Department within one month of completion.

At least two ties are required for each water main valve, hydrant secondary gate valve and water service valve.

All valve boxes must be at grade prior to approval by the Bristol Water Department or its representative.

Method of Measurement: The work for the relocation of the water main, being paid on a lump sum basis, will not be measured for payment.

Basis of Payment: This work will be paid for at the Contract lump sum price for “Relocation of Water Mains” complete and accepted, which price shall include all equipment, labor, materials, tools, excavation, sheeting and other excavation supports, 12” water main, fittings, water gates, water main sleeve, connections to existing mains, disinfection, caps, thrust blocks, back fill, compaction, removal of the old water main and incidentals thereto; as ordered by the Engineer or the Bristol Water Department. The contract unit price shall also include the costs of preparing and furnishing design and working drawings.

Pay Item
Relocation of Water Mains

Pay Unit
L.S.

ITEM #1403501A - RESET MANHOLE (SANITARY SEWER)

Description: This item shall consist of the adjustment to final grade the manhole frames and covers on sanitary manholes, all as shown, specified or directed. It shall also consist of the furnishing and the installation of additional manhole riser sections, brick masonry, where necessary, and metal manhole extension rings to manhole frame; where indicated on the plans or directed by the engineer.

Reference to the “Department” in this item refers to “Bristol Water and Sewer Department”.

Materials: Materials shall conform to the following:

BRICK UNITS - Shall conform to ASTM C-32, Grade MS

MORTAR – Shall conform to Section M.11

MANHOLE RISER SECTIONS - Shall conform to ASTM C-478

MANHOLE RUNGS (STEPS) - Shall be 14 inches x 10 7/8 inches forged aluminum safety rung fabricated from 6061-T6 aluminum alloy as manufactured by ALCOA, or equal; or copolymer polypropylene steps in conformance with ASTM D4101, Grade 60 steel reinforcing rod, ASTM A615, with epoxy coating, ASTM A-934/M-95. The steps shall be either Model PS-1B or PS2-PFSL as manufactured by M.A. Industries, Inc. or equal.

MANHOLE EXTENSION RINGS - Shall conform to Article M.08.02-5 Metal for Drainage Structures. The type of manhole extension rings will be designed so that the existing manhole cover, when set in place, will have substantially the same bearing, fitness and load carrying capacity as existed in the existing manhole frame. The extension rings shall be designed to fit into the original manhole frame resting specifically on the flange area that originally supported the manhole cover. The cover shall be reasonably flush with the extension ring.

Construction Methods: The Contractor shall carefully excavate the manhole frame and cover and add or delete brick masonry as necessary to reset the frame and cover to the final grade. The manhole frame and cover shall be reasonably flush with the roadway surface.

The present cover slab or cone section may be reused if it is not damaged. If the cover slab or cone section is damaged, it shall be replaced by the Contractor at their expense.

The Contractor may be required to “un-stack” the existing cone section so that riser sections can be added or deleted, where the change in grade is greater than 12 inches.

The distance between the proposed elevation of the manhole cover and the first manhole step shall be a minimum of 12 inches and a maximum of 16 inches.

Any material damaged by the Contractor shall be repaired or replaced by the Contractor at no cost to the City, State or Department.

Where the change in grade is 3 inches or less, metal manhole extension rings may be used to raise and support the existing manhole covers to the grade of the proposed roadway surface without disturbing the existing manhole frame. Extension rings and covers shall be reasonably flush with the road surface.

Method of Measurement: The work for “Reset Manhole (Sanitary Sewer)” will be measured for payment by the actual number of each manhole reset to grade and accepted by the Engineer.

Basis of Payment: This work will be paid for at the Contract unit price for each contract price for “Reset Manhole (Sanitary Sewer)” complete in place, which price shall include all labor and equipment necessary to incorporate the manhole into the work. It shall also include the clearing, trenching, excavation and disposal of excavated materials, refilling trenches, furnishing additional material for refilling, grading, sheeting, bracing, pumping, and temporary and permanent resurfacing of disturbed areas.

The maximum 3 feet vertical adjustments shall not apply to adjusting sanitary sewer manholes, and there will be no extra compensation for adjusting the manhole in excess of 3 feet.

Pay Item

Reset Manhole (Sanitary Sewer)

Pay Unit

EA.