

**REPLACEMENT OF BRIDGE NO. 004015  
TILLOTSON ROAD OVER THOMPSON BROOK  
AVON, CT  
PROJECT NO. 9004-0015  
TABLE OF CONTENTS**

Notice to Contractor	Verification of Plan Dimensions and Field Measurements
Notice to Contractor	Minimum Concrete Compressive Strength
Notice to Contractor	Portland Cement Concrete (PCC) Mix Classifications
Notice to Contractor	Precast/Prestressed Portland Cement Concrete (PRC) Mix Classifications
Notice to Contractor	Detour Prerequisites
Notice to Contractor	Notify of Road Closure
Notice to Contractor	Permits
Notice to Contractor	Procurement of Materials
Notice to Contractor	Protection of Existing Utilities
Notice to Contractor	Increased Requirements for Construction Field Office
Notice to Contractor	Time of Year Restrictions
Notice to Contractor	Section 4.06 and M.04 Specification Changes, Rev. date 12/18/2025
Section 1.03.02	Award and Execution of Contract
Section 1.05.02	Control of Work
Section 1.06.01	Control of Materials
Section 1.07.10	Legal Relations and Responsibilities
Section 1.08.03	Prosecution and Progress
Section 1.10	Environmental Compliance
Section 4.06	Bituminous Concrete
Section M.04	Bituminous Concrete Materials
Item #0219011A	Sedimentation Control at Catch Basin
Item #0202216A	Excavation and Reuse of Existing Channel Bottom Material
Item #0204151A	Handling Water
Item #0406194A	Joint & Crack Sealing of Bituminous Concrete Pavement
Item #0601277A	Precast Concrete Bridge Components
Item #0707009A	Membrane Waterproofing (Cold Liquid Elastomeric)
Item #0819002A	Penetrating Sealer Protective Compound
Item #0904051A	3-Tube Curb Mounted Bridge Rail
Item #0910052A	Merritt Parkway Guiderail
Item #0910057A	Merritt Parkway Guiderail Replacement Parts
Item #0910058A	Merritt Parkway Guiderail Leading End Attachment
Item #0911476A	Merritt Parkway Guiderail End Anchorage Type I
Item #0912104A	Drilling Hole for Guiderail Post
Item #0921001A	Concrete Sidewalk
Item #0921005A	Concrete Sidewalk Ramp
Item #0950019A	Turf Establishment - Lawn
Item #0950040A	Conservation Seeding for Slopes
Item #0969060A	Construction Field Office, Small
Item #0971001A	Maintenance and Protection of Traffic
Item #1117111A	Rectangular Rapid Flaring Beacon (RRFB) Type B
Attachment A	

**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. No field corrections, adjustments, or modifications shall be made without prior approval from the Engineer.

There shall be no claim made against the Town 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 – MINIMUM CONCRETE COMPRESSIVE STRENGTH**

The concrete strength or allowable design stress specified in the General Notes is for design purposes only. The minimum compressive strength of concrete in constructed components shall comply with the requirements of Section 6.01 Concrete for Structures.

**NOTICE TO CONTRACTOR - PORTLAND CEMENT CONCRETE (PCC) MIX CLASSIFICATIONS**

***SECTIONS 6.01 and M.03 MIX CLASSIFICATION EQUIVALENCY***

Sections 6.01 *Concrete for Structures* and M.03 *Portland Cement Concrete* are herein revised to reflect changes to item names and nomenclature for standard Portland Cement Concrete (PCC) mix classifications. Other Special Provisions, standard specifications, plan sheets and select pay items in this Contract may not reflect this change. Refer to the Concrete Mix Classification Equivalency Table below to associate the Concrete Mix Classifications with Former Mix Classifications that may be present elsewhere in the Contract.

**Concrete Mix Classification Equivalency Table**

New Mix Classification (Class PCCXXYZ <sup>1</sup> )	Former Mix Classification
Class PCC03340	Class "A"
Class PCC03360	Class "C"
Class PCC04460 <sup>2</sup>	Class "F"
Class PCC04462 <sup>2</sup>	High Performance Concrete
Class PCC04481, PCC05581	Class "S"

Table Notes:

1. See Table M.03.02-1, Standard Portland Cement Concrete Mixes, for the new Mix Classification naming convention.
2. Class PCC04462 (low permeability concrete) is to be used for the following cast-in-place bridge components: decks, bridge sidewalks, and bridge parapets.

Where called for in the Contract, **Low Permeability Concrete** shall be used, as specified in Sections 6.01 and M.03. Please pay special attention to the requirements for Class PCC04462, including:

- Submittal of a mix design developed by the Contractor and a concrete supplier **at least 90 days prior to placing the concrete**
- Testing and trial placement of the concrete mix to be developed and discussed with the Department

The Department will not consider any requests for change to eliminate the use of Low Permeability Concrete on this Project.

## 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 (k $\Omega$ -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 – DETOUR PREREQUISITES**

The Contractor shall complete the following tasks prior to the initiation of detour:

- 1- All shop and working drawings shall be submitted for review and shall be approved.
- 2- All precast substructure elements shall be cast and approved.
- 3- All materials needed for the project shall be onsite.

**NOTICE TO CONTRACTOR – NOTIFY OF ROAD CLOSURE**

The Contractor shall provide advanced notices of the closure of Tillotson Road, which include at least a 4-week notice, to the following parties:

Town of Avon Engineering  
60 West Main Street  
Avon, CT 06001-3719  
Phone number: 860-409-4322

## **NOTICE TO CONTRACTOR — PERMITS**

The Contractor is hereby notified of permits associated with the work. The Contractor is bound to any conditions listed as part of the permit application approvals.

The Contractor may be required to incorporate special protections to perform the work while minimizing impacts to the environmentally sensitive surroundings.

The following permit approvals and conditions are included in Attachment A:

- The Town of Avon Inland Wetlands and Watercourse Commissions Permit Approval Letter with Conditions.
- CTDEEP LWRD Pre-Construction Notification (PCN)
- U.S. Army Corps of Engineers (USACE) Permit Pre-Construction Notification (PCN)
- CTDEEP Fisheries
- NDDB Review
- State Historic Preservation Office (SHPO)

**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 - PROTECTION OF EXISTING UTILITIES**

Existing utilities shall be maintained during construction. 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.

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

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.

In order to notify utility companies the number 1-800-922-4455 (Call Before You Dig), in accordance with Sections 16-345 through 16-359 of the Public Utilities Regulatory Authority (PURA) state statutes, must be called at least two (2) full working days prior to the start of excavation. This notification will enable the utility companies to mark out their facilities in the field.

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.

There are special areas of concern with regards to existing and proposed utilities within the limits of this project. They are the following.

Underground utility lines are being permanently relocated. The Contractor must coordinate this with the respective utility company prior to any construction. The Contractor must employ protective measures when working around these new locations.

The Contractor shall have the location of the underground utilities marked out prior to the excavation.

The Contractor shall perform all work in such a manner that will protect each Utility Company's facilities from damage. This may include excavation by hand methods as well as modified compaction methods when working close to underground Utilities.

The Contractor shall consider in his bid any inconvenience and work required to meet these conditions. The work to repair or replace any damage caused by the Contractor's Operations will be made solely at the Contractor's expense.

The Contractor's attention is directed to the requirements of Article 1.07.13 – Contractor's Responsibility for Adjacent Property, Facilities and Services. In areas where a minimum 3 feet nominal cover cannot be maintained, the Contractor shall employ positive methods of protection

such as steel plates to insure load transfer around the utilities. Further equipment wheel loads shall not exceed 24,000 pounds where construction equipment traverses water mains.

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.

**NOTICE TO CONTRACTOR – INCREASED REQUIREMENTS FOR  
CONSTRUCTION FIELD OFFICE**

This Notice is to alert the Contractor of the increased size and other requirements for the Contract item “Construction Field Office, (Medium)” due to Covid-19 and other considerations.

The revisions to special provisions:

**ITEM #0969060A - CONSTRUCTION FIELD OFFICE, SMALL**

**ITEM #0969062A - CONSTRUCTION FIELD OFFICE, MEDIUM**

**ITEM #0969064A - CONSTRUCTION FIELD OFFICE, LARGE**

**ITEM #0969066A - CONSTRUCTION FIELD OFFICE, EXTRA LARGE**

include but not limited to, increased field office size, increased ventilation requirements, increase cleaning requirements, and additional field office supply requirements.

All costs for these requirements shall be included in the Construction Field Office item included in the Contract.

## **NOTICE TO CONTRACTOR - TIME OF YEAR RESTRICTIONS**

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

### **Freshwater Mussel Relocation**

Three weeks prior to construction, between early May to early October, a pre-construction mussel relocation shall be performed by a biologist. All areas of direct impact and 25 meters upstream and downstream of the area shall be swept for mussels and relocated to the designated relocation site as specified in the freshwater mussel survey report.

### **In-Water Work**

The Contractor is hereby alerted to the time of year restrictions imposed by the Environmental Permits contained elsewhere in this contract. Any unconfined in-stream work within the watercourse shall be restricted to the period from July 1 to September 30, inclusive

### **Exclusionary Fencing/Silt Fencing**

Installation of the exclusionary fencing must be completed by April 15th to prevent turtles from entering the construction zone. If installation is delayed, additional steps to survey for, and relocate any individuals within the construction zone may be required per the Habitat Assessment and Recommended Species Protection Measures: Eastern Box Turtle Report.

### **Protection of Grassland Bird Habitat**

Clearing and grubbing of adjacent grassland areas to be kept to a minimum. Embankments, side slopes and grassland habitats to be kept as is to avoid disturbance from construction between April 1st – August 30th to protect habitats of grassland birds. If work must occur during the grassland bird nesting times, Contractor shall take precautions to be sure no staging or activities are designed to occur in grassland areas.

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

**NOTICE TO CONTRACTOR – SECTION 4.06 AND M.04**  
**SPECIFICATION CHANGES, REV. DATE 12/18/2025**

The Contractor is hereby notified that this Contract includes Special Provisions for Sections 4.06 and M.04. The following list of revisions is not all inclusive but highlights the significant updates.

M.04:

- M.04.01 Binder supplier split sample submission, save split, send upon request.
- M.04.01-1&2 Clarification that aggregate source(s) be qualified annually.
- M.04.01-4 a, d, e CTR, Certificate of Analysis (COA) submitted to Asphalt producer and Department, Anti-strip, Warm mix products listed on QPL, (link to QPL included in M.04.), WMA additive added at plant requires same testing and CTR as binder supplier.
- M.04.01-5b Daily tack coat delivery comes with Bill of Lading for Inspector to obtain.
- M.04.01-6 RAP - Producer submit monthly Materials Certification.
- M.04.02-1 Curb mix design - Table M.04.02-1 updated.
- M.04.02-2 Superpave mix design - 25% RAP S1.0 mixes.
- M.04.03-1 QCP requirement updates.
- M.04.03-2a, 2b Except curb mix, all sampling performed on Site by Contractor, S1.0 mix sample size 20,000 g, mix not meeting requirements evaluated under 1.06.04.
- M.04.03-2c Superpave Production – Table M.04.03-2 deleted, mix sample frequency is 1 per 500 ton, Table M.04.03-4 updated Pb  $\pm$  0.3.

4.06:

- 4.06.03-3 Added hopper insert when MTV is used.
- 4.06.03-4 Test Section language update.
- 4.06.03-6 Tack coat update, always use, minor update to thermometer language.
- 4.06.03-7 Butt joint use polymer joint seal material, previously was rubber material.
- 4.06.03 -8 QCP update. Valid for two years.
- 4.06.03-9 Temperature Seasonal - three temperature ranges based on lift thickness.
- 4.06.03-10 Three days to cut cores.
- 4.06.03-11 Add determining Gmm when mix testing does not exist.
- 4.06.03-12 Updates to Density Dispute Resolution - Use Gsb results to determine how dispute results are used, location of dispute core, reduced days to cut dispute cores from 7 days to 5.
- 4.06.04-2b Density limit change to meet FHWA “Gold Standard.” Maximum bonuses increase from 2.5% to 3.0% (1.5% each Mat/Joint).

## **SECTION 1.03 - AWARD AND EXECUTION OF CONTRACT**

### **Article 1.03.02 - Award and Execution of Contract:**

After the second sentence of the only paragraph add the following:

The successful bidder is hereby notified of the Town's intent to award this contract within 44 days of the bid opening.

### **Article 1.03.08 - Notice to Proceed and Commencement of Work:**

Change the first paragraph to read as follows:

The Contractor shall commence and proceed with the Contract work on the date specified in a written Notice to Proceed issued by the Engineer to the Contractor. The date specified will be no later than 45 calendar days after the date of the execution of the Contract by the Department, however, the contractor is hereby put on notice that it is the Department's intent to issue the Notice to Proceed no later than 24 calendar days after the date of the execution of the Contract by the Department.

## **SECTION 1.05 – CONTROL OF THE WORK**

*Replace Article 1.05.02 with the following:*

### **1.05.02 – Plans, Working Drawings, Shop Drawings, Product Data, Submittal Preparation and Processing - Review Timeframes, Town’s Action:**

**1. Plans:** The plans prepared by the Town of Avon show the details necessary to give a comprehensive idea of the construction contemplated under the Contract. The plans will generally show location, character, dimensions, and details necessary to complete the Project. If the plans do not show complete details, they will show the necessary dimensions and details, which when used along with the other Contract documents, will enable the Contractor to prepare Working Drawings, Shop Drawings or Product Data necessary to complete the Project.

Project submittals shall be delivered to:

Lawrence Baril  
Town of Avon Engineering  
60 West Main Street  
Avon, CT 06001-3719  
Phone Number: 860.409.4322

**2. Working Drawings:** When required by the Contract or when ordered to do so by the Engineer, the Contractor shall prepare and submit the Working Drawings, signed, sealed and dated by a qualified Professional Engineer licensed to practice in the State of Connecticut, for review. The Working Drawings shall be submitted sufficiently in advance of the work detailed, to allow for their review in accordance with the requirements specified in 1.05.02-5 (including any necessary revisions, resubmittal, and final review). There will be no direct payment for furnishing any Working Drawings, procedures or supporting calculations, but the cost thereof shall be considered as included in the general cost of the work.

The Contractor is only required to deliver paper copies that have been stamped with “No Exceptions Noted” or “Exceptions as Noted.” Guidance to the Contractor for the number of properly sized paper copies will be provided by the Town.

All Working Drawing submission documents shall conform to the following requirements:

A. Drawings:

- i. Delivered in a single multi-page PDF file.
- ii. Shall be sized ANSI D (34 inches × 22 inches).
- iii. Contain a border, title block and a rectangular box, 2.25 inches wide × 1.75 inches high, in the lower right hand corner for the Town’s stamp.
- iv. Text height and width shall be 0.125 inch.

- v. All letter characters shall be uppercase.
- vi. Shall be searchable.
- vii. Shall be black and white.
- viii. Cover Page - shall be digitally signed by the Contractor's Professional Engineer.
- ix. All pages shall include a watermark of the Professional Engineer's stamp in a common area.

**B. Calculations**

- i. Delivered in a single PDF file
- ii. Shall be sized ANSI A (8.5 inches × 11 inches).
- iii. Cover Page shall be digitally signed by the Contractor's Professional Engineer.

**C. Supporting Documentation:**

- i. Delivered as an independent single PDF file
- ii. Shall be sized ANSI A (8.5 inches × 11 inches).

- a. **Working Drawings for Permanent Construction:** The Contractor shall supply to the Town a certificate of insurance in accordance with 1.03.07 at the time that the Working Drawings for the Project are submitted.

The Contractor's designer, who prepares the working drawings, shall secure and maintain at no direct cost to the State a Professional Liability Insurance Policy for errors and omissions in the minimum amount of \$2,000,000 per error or omission. The Contractor's designer may elect to obtain a policy containing a maximum \$250,000 deductible clause, but if the Contractor's designer should obtain a policy containing such a clause, they shall be liable to the extent of at least the deductible amount. The Contractor's designer shall obtain the appropriate and proper endorsement of its Professional Liability Policy to cover the indemnification clause in this Contract, as the same relates to negligent acts, errors or omissions in the Project work performed by them. The Contractor's designer shall continue this liability insurance coverage for a period of

- (i) 3 years from the date of acceptance of the work by the Engineer, as evidenced by a State of Connecticut, Town of Transportation form entitled "Certificate of Acceptance of Work," issued to the Contractor; or
- (ii) 3 years after the termination of the Contract, whichever is earlier, subject to the continued commercial availability of such insurance.

- b. **Working Drawings for Temporary Construction:** The Contractor shall submit drawings, calculations, procedures and other supporting data to the Town in accordance with this Specification, with the exception of requirements defined under a. Working Drawings for Permanent Construction.

**3. Shop Drawings:** When required by the Contract, or when ordered to do so by the Engineer, the Contractor shall prepare and deliver Shop Drawings to the Town for review.

Shop Drawings shall be submitted sufficiently in advance of the work detailed, to allow for their review in accordance with the requirements specified in 1.05.02-5 (including any

necessary revisions, resubmittal, and final review). There will be no direct payment for furnishing any Shop Drawings but the cost thereof shall be considered as included in the general cost of the work.

The Contractor is only required to deliver paper copies that have been stamped with “No Exceptions Noted” or “Exceptions as Noted.” Guidance to the Contractor for the number of properly sized paper copies will be provided by the Town.

- Shop Drawing submission documents shall conform to the following requirements:
- A. Delivered in a single multi-page PDF file.
  - B. Shall be sized ANSI D (34 inches × 22 inches).
  - C. Contain a border, title block and a rectangular box, 2.25 inches wide × 1.75 inches high, in the lower right hand corner for the Town’s stamp.
  - D. Text height and width shall be 0.125 inch.
  - E. All letter characters shall be uppercase.
  - F. Shall be searchable.
  - G. Shall be black and white.

**4. Product Data:** When required by the Contract, or when ordered to do so by the Engineer, the Contractor shall prepare and deliver Product Data to the Town for review.

Product Data shall be submitted sufficiently in advance of the work detailed, to allow for their review in accordance with the requirements specified in 1.05.02-5 (including any necessary revisions, resubmittal, and final review). There will be no direct payment for furnishing any Product Data but the cost thereof shall be considered as included in the general cost of the work.

The Contractor shall submit the Product Data in a single submittal for each element of construction.

The Contractor shall mark each copy of the Product Data submittal to show applicable choices and options. Where Product Data includes information on several products that are not required, copies shall be marked to indicate the applicable information. Product Data shall include the following information and confirmation of conformance with the Contract to the extent applicable: manufacturer’s printed recommendations, compliance with recognized trade association standards, compliance with recognized testing agency standards, application of testing agency labels and seals, notation of coordination requirements, Contract item number, and any other information required by the individual Contract provisions.

The Contractor is only required to deliver paper copies that have been stamped with “No Exceptions Noted” or “Exceptions as Noted.” Guidance to the Contractor for the number of properly sized paper copies will be provided by the Town.

Product Data submission documents shall conform to the following requirements:

- A. Delivered in a single PDF file
- B. Shall be sized ANSI A (8.5 inches × 11 inches).
- C. Marked to indicate applicable choices and options.
- D. Where non-applicable information and products are included, notations shall be made to clearly delineate applicable from non-applicable information.

**5. Submittal Preparation and Processing – Review Timeframes:** If the Town deems a submittal incomplete or unacceptable because not all the required documents were attached, documents are incomplete, or are in the incorrect format, the Town will send the submittal back to the Contractor before reviewing. When a submittal is sent back as incomplete, the associated documents have not been reviewed and the review process and any associated timeframe requirements have not begun.

The Contractor shall allow 30 calendar days for submittal review by the Town, from the date receipt is acknowledged by the Town. For any submittals stamped with “Revise and Resubmit” or “Rejected,” the Town is allowed an additional 20 calendar days for review of any resubmissions.

An extension of Contract time will not be authorized due to the Contractor’s failure to transmit submittals sufficiently in advance of the work to permit processing.

The furnishing of Shop Drawings, Working Drawings or Product Data, or any comments or suggestions by the Designer or Engineer concerning Shop Drawings, Working Drawings or Product Data, shall not relieve the Contractor of any of its responsibility for claims by the State or by third parties, as per 1.07.10.

The furnishing of the Shop Drawings, Working Drawings and Product Data shall not serve to relieve the Contractor of any part of its responsibility for the safety or the successful completion of the Project construction.

**6. Town of New Avon’s Action:** The Town will review each submittal, mark each with a self explanatory action stamp, and return the stamped submittal promptly to the Contractor. The Contractor shall not proceed with the part of the Project covered by the submittal until the submittal is marked “No Exceptions Noted” or “Exceptions as Noted” by the Town. The Contractor shall retain sole responsibility for compliance with all Contract requirements. The stamp will be marked as follows to indicate the action taken:

- a. If submittals are marked “No Exceptions Noted,” the Designer or Engineer has not observed any statement or feature that appears to deviate from the Contract requirements. This disposition is contingent on being able to execute any manufacturer’s written warranty in compliance with the Contract provisions.

- b. If submittals are marked “Exceptions as Noted,” the considerations or changes noted by the Town’s Action are necessary for the submittal to comply with Contract requirements. The Contractor shall review the required changes and inform the Town if they feel the changes violate a provision of the Contract or would lessen the warranty coverage.
- c. If submittals are marked “Revise and Resubmit,” the Contractor shall revise the submittals to address the deficiencies or provide additional information as noted by the Town. The Contractor shall allow an additional review period as specified in article 1.05.02-5.
- d. If submittals are marked “Rejected,” the Contractor shall prepare and submit a new submittal in accordance with the Town’s notations. The resubmissions require an additional review and determination by the Town. The Contractor shall allow an additional review period as specified in article 1.05.02-5.

## **SECTION 1.06 – CONTROL OF MATERIALS**

*Add the following paragraph at the end of Article 1.06.01:*

### **1.06.01 – Source of Supply and Quality:**

**Telecommunications Equipment or Services:** In accordance with the FY 2019 National Defense Authorization Act (NDAA), 2 CFR 200.216, and 2 CFR 200.471, Federal agencies are prohibited from obligating or expending financial assistance for projects that install or use telecommunications and video surveillance services and equipment from:

- Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities)
- Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities)

As a result of this prohibition, contractors and subcontractors are prohibited from providing such telecommunication or video surveillance equipment, services, or systems on Town projects.

This prohibition is not limited to those contractors or subcontractors that directly use equipment, systems, or services provided by those companies, it also prohibits the indirect use of any equipment, systems or services manufactured or provided by others for which such equipment or services act as a substantial component, or as critical technology as part of the system(s). By signing the Contract, the Contractor certifies that it will not provide, nor does it directly or indirectly use covered telecommunications equipment or video surveillance services or equipment from the entities above.

## **SECTION 1.07 - LEGAL RELATIONS AND RESPONSIBILITIES**

**1.07.10—Contractor's Duty to Indemnify the State Against Claims for Injury or Damage:** is amended as follows:

*Add the following after the only paragraph:*

“It is further understood and agreed by the parties hereto, that the Contractor shall not use the defense of Sovereign Immunity in the adjustment of claims or in the defense of any suit, including any suit between the State and the Contractor, unless requested to do so by the State.”

Revise the title of this Article to read "Contractor's Duty to Indemnify the Town Against Claims for Injury or Damage."

In the first sentence, delete the words "the Department". Replace the word "State" with "Town" throughout this Article.

Replace the word "Commissioner" with "Engineer" throughout this Article.

**1.07.11—Opening of Section of Project to Traffic or Occupancy:** is amended as follows: Replace the word "State" with "Town" throughout this Article.

**1.07.13 —Contractor's Responsibility for Adjacent Property and Services:** is supplemented with the following:

The Contractor's attention is directed to the fact that there are utilities on the existing bridge. Overhead utilities (including utility poles, pole guys and overhead wires) and buried utilities do exist in the immediate vicinity of the project.

The Contractor shall be liable for all damages and 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.

The following companies and their representatives shall be contacted by the Contractor to coordinate the protection of their utilities on the construction site two (2) weeks prior to the start of any work on the project involving their utilities:

**The Town of Avon Department of Public Works**  
Bruce Williams  
Director.  
11 Arch Road  
Avon, CT 06001  
Phone: (860) 673-6151

**Southern New England Telephone Company dba Frontier Communications of Connecticut**

Ms. Lynne Delucia  
Manager – Engineering & Construction  
1441 North Colony Road  
Meriden, Connecticut 06450-4101  
Phone: (203) 238-5000  
Email: [Lynn.m.delucia@ftr.com](mailto:Lynn.m.delucia@ftr.com)

**Comcast of Connecticut, Inc.**

Mr. Christopher Simeone  
Construction Manager CT/NY  
222 New Park Drive  
Berlin CT 06037  
Phone: (860) 491-6701  
Email: [christopher\\_simeone@cable.comcast.com](mailto:christopher_simeone@cable.comcast.com)

**Crown Castle Fiber, LLC**

Mr. Mark Bonanno  
Manager, Network Construction  
1800 West Park Dr., Suite 250  
Westborough, MA 01581  
Phone: (508) 616-7818  
Email: [Mark.Bonsnno@crowncastle.com](mailto:Mark.Bonsnno@crowncastle.com)

**Connecticut Natural Gas Services**

Mr. Jonathan Gould  
76 Meadow Street  
Hartford, CT 06108  
Phone: (860) 727-3044  
E-MAIL: [jgould@ctgcorp.com](mailto:jgould@ctgcorp.com)

**The Connecticut Water Company**

Mr. David Peeling, P.E  
93 West Main Street  
Clinton, CT 06413  
Phone : (860) 664-6007  
E-Mail : [David.Peeling@ctwater.com](mailto:David.Peeling@ctwater.com)

All work shall be in conformance with Rules and Regulations of Public Utility Regulatory Authority (PURA) concerning Traffic Signals attached to Public Service Company Poles.

Representatives of the various utility companies shall be allowed access to the project site at all times.

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.

## **SECTION 1.08 – PROSECUTION AND PROGRESS**

Section 1.08 is supplemented and amended as follows:

Throughout this Section, make the following substitutions for all occurrences of the word(s) identified below for substitution:

Substitute “Town for “Department” and for “State”. Substitute “Engineer” for “Commissioner”.

**1.08.03 - Prosecution of Work:** Is supplemented as follows:

The Contractor shall not be permitted to interrupt traffic along the detour route for any continuous period of time due to construction operations until both of the following conditions are satisfied:

1. The Contractor has secured all of the required approvals from the Town, 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.

**1.08.04 - Limitation of Operations** - Is supplemented as follows:

In order to provide for traffic operations as outlined in the Special Provision "Maintenance and Protection of Traffic," the Contractor will not be permitted to perform any work which will interfere with the described traffic operations on all project roadways as follows:

### **Tillotson Road**

Monday through Friday between 6:00 a.m. and 9:00 a.m. & between 3:00 p.m. and 6:00 p.m. Saturday and Sunday between 10:00 a.m. and 6:00 p.m.

The Contractor will be allowed to close Tillotson Road in the vicinity of the bridge No. 004015 being replaced and detour traffic for a maximum duration of 200 consecutive days beginning on Monday August 24, 2026 at 7:00 a.m. and ending on or before Milestone Completion Date of Friday March 12, 2027 at 3:00 p.m. During roadway closures, the Contractor shall detour traffic as shown on the Detour Plans contained in the contract plans.

The Contractor shall notify the Engineer at least 14 days in advance of the start of the Tillotson Road closure. The Contractor shall coordinate with the Town of Avon prior to roadway closures.

### **Additional Lane Closure Restrictions**

It is anticipated that work on adjacent projects will be ongoing simultaneously with this project. The Contractor shall be aware of those projects and anticipate that coordination will be required to maintain proper traffic flow at all times on all project roadways, in a manner consistent with these specifications and acceptable to the Engineer.

The Contractor will not be allowed to perform any work that will interfere with traffic operations on a roadway when traffic operations are being restricted on that same roadway, unless there is at least a one mile clear area length where the entire roadway is open to traffic or the closures have been coordinated and are acceptable to the Engineer. The one mile clear area length shall be measured from the end of the first work area to the beginning of the signing pattern for the next work area.

## **SECTION 1.10–ENVIRONMENTAL COMPLIANCE**

### **In Article 1.10.03-Water Pollution Control: REQUIRED BEST MANAGEMENT PRACTICES**

*Add the following after Required Best Management Practices Number 13:*

14. The Contractor is hereby notified that State Special Concern *Terrapene carolina carolin* (Eastern box turtle), *Ligumia nasuta* (Eastern pondmussel), and *Margaritifera margaritifera* (eastern pearlshell) have been documented within the Project limits.

#### **Eastern box turtles:**

The project area is located in a large block of suitable habitat for Eastern box turtles, banks of roads and bridges typically utilized for nesting. Eastern box turtles are found in well-drained forest bottomlands and a matrix of open deciduous forests, early successional habitats, fields, gravel pits and powerlines. They are dormant between November 1st and April 1st in only a few inches from the surface in forested habitat.

The Contractor shall implement the following mitigation plan consisting of three phases (1) pre-construction, including site clearing/grubbing and the installation of cofferdams, (2) active construction monitoring, and (3) post-construction and site restoration.

#### **Pre-construction Protection Measures:**

1. Avoid important habitat, within or outside, of the primary construction zone by locating appropriate staging areas for the project. It is anticipated that equipment, materials, and fill will be staged along the immediate roadway and shoulder areas due to the necessity of road closure for the project. However, once a location(s) for staging has been identified by the contractor, the site(s) should be reviewed by the project herpetologist
2. Identify areas requiring the installation of exclusionary fencing and appropriately install the fencing. Exclusionary fencing at least 20 inches in height (above ground level) should be installed at the limits of disturbance within the construction zone. The fencing should be staked (12 inches into the ground) at appropriate distances to maintain rigidity (6-10 feet intervals), and the fencing buried at least 4 inches into the ground and back-filled. Standard erosion control/silt fencing (geotextile) can be used, but not fencing with a wider nylon mesh lining, which can entangle snakes. The terminus of each length of fencing should be angled back away from the road. The exclusionary fencing must be tied into the cofferdam to prevent turtles from accessing the work area in the river from the embankments. The exact location and layout of the fencing will be determined in coordination with the consulting herpetologist at the time of installation. Installation of the exclusionary fencing must be completed by April 15th to prevent turtles from entering the construction zone. If installation is delayed, additional steps to survey for, and relocate any individuals within the construction zone may be required. If so, a qualified

herpetologist must conduct surveys of the construction zone and relocate any reptiles encountered.

Construction Protection Measures:

1. Inform construction personnel on what to do if they encounter any reptile or amphibian species. An informal “construction team meeting” should be convened in the field, presented by a qualified herpetologist and coordinated with the construction project manager, to provide information on box turtles, including, identification, and what to do if any individuals are encountered.
2. Conduct regular monitoring of the exclusionary fencing. The exclusionary fencing should be inspected by the project herpetologist weekly from May 15th -July 15th and biweekly between July 16-October 15. The environmental monitor is responsible for daily silt fence checks to ensure damaged silt fence is immediately repaired.
3. Conduct sweeps of any areas to be cleared, temporary staging areas, or where heavy machinery will be in use throughout the duration of the project. A qualified herpetologist should conduct the visual sweeps to capture and relocate any animals that may be encountered.

Post-Construction Restoration Measures:

1. Restore disturbed areas in a manner that avoids impacts to surrounding habitat or individual animals. All open areas with bare, or sparsely vegetated soil that remain in the construction zone should be seeded and/or planted. A conservation seed mix that utilizes natural species should be used to avoid the spread of non-native, invasive plants into surrounding habitat. Because of the location of disturbances along a roadway, it is important to eliminate any potential areas that may attract turtles to nest. Consultation with the project herpetologist is recommended in reviewing these areas of disturbance during the restoration phase of the project.
2. At the completion of the project, and once areas of disturbance are stabilized, the exclusionary fencing should be removed from all areas, including the staging areas, to avoid impeding the dispersal of animals.
3. Following completion of the construction project, a summary report to the CTDEEP documenting the monitoring and maintenance of the exclusionary fence and erosion control measures will be completed. Any observations of state listed species will be reported to CTDEEP by the Herpetologist with photo-documentation (if possible) and with specific information on the location and disposition of the animal. Any data collected by construction personnel should be immediately sent to the Herpetologist for reporting purposes. GPS coordinates in decimal degrees should be collected where the listed species was encountered.

## **SECTION 4.06 - BITUMINOUS CONCRETE**

*Replace the entire Section with the following:*

### **SECTION 4.06 BITUMINOUS CONCRETE**

#### **4.06.01—Description**

#### **4.06.02—Materials**

#### **4.06.03—Construction Methods**

- 1. Material Documentation**
- 2. Transportation of Mixture**
- 3. Paving Equipment**
- 4. Test Section**
- 5. Transitions for Roadway Surface**
- 6. Spreading and Finishing of Mixture**
- 7. Longitudinal Joint Construction Methods**
- 8. Contractor Quality Control (QC) Requirements**
- 9. Temperature and Seasonal Requirements**
- 10. Field Density**
- 11. Acceptance Sampling and Testing**
- 12. Density Dispute Resolution Process**
- 13. Corrective Work Procedure**
- 14. Protection of the Work**
- 15. Cut Bituminous Concrete Pavement**

#### **4.06.04—Method of Measurement**

#### **4.06.05—Basis of Payment**

**4.06.01—Description:** Work under this Section shall include the production, delivery, placement and compaction of a uniform textured, non-segregated, smooth asphalt pavement to the grade and cross section shown on the plans.

The following terms as used in this specification are defined as:

Asphalt Mixture (formerly bituminous concrete): A composite material consisting of prescribed amounts of asphalt binder and aggregates. Asphalt binder may also contain additives engineered to modify specific properties and/or behavior of the composite material. References to asphalt mixture apply to all of its forms, such as those identified as hot-mix asphalt (HMA) or polymer-modified asphalt (PMA).

Asphalt Mixture Plant (Plant): A structure where aggregates and asphalt binder are combined in a controlled fashion into a asphalt mixture suitable for forming pavements and other paved surfaces.

Course: A continuous layer (a lift or multiple lifts) of the same asphalt mixture placed as part of the pavement structure.

Density Lot: The total tonnage of all asphalt mix placed in a single lift which are:

1. PWL density lots = When the project total estimated quantity per mixture is larger than 3,500 tons
2. Simple Average density lots = When the project total estimated quantity per mixture is 3,500 tons or less

Disintegration: Erosion or fragmentation of the pavement surface which can be described as polishing, weathering-oxidizing, scaling, spalling, raveling, or formation of potholes.

Dispute Resolution: A procedure used to resolve conflicts between the Engineer's and the Contractor's results that may affect payment.

Cool Weather Paving: Any asphalt paving that occurs when temperature is expected to be less than 50°F.

Hot Mix Asphalt (HMA): An asphalt mixture typically produced at 325°F.

Job Mix Formula (JMF): A recommended aggregate gradation and asphalt binder content to achieve the required mixture properties.

Leveling Course: A thin lift of HMA placed at an average consistent thickness, usually about an inch, as indicated on the plans to correct minor variations in the contour of the existing pavement surface.

Lift: An application of an asphalt mixture placed and compacted to a specified thickness in a single paver pass.

Percent Within Limits (PWL): The percentage of the lot falling between the Upper Specification Limit (USL) and the Lower Specification Limit (LSL).

Polymer Modified Asphalt (PMA): An asphalt mixture containing a polymer-modified asphalt binder and using a qualified warm mix technology.

Production Lot: The total tonnage of mixture from a single source that may receive an adjustment.

Production Sub Lot: Portion of the production lot typically represented by a single sample.

Quality Assurance (QA): All those planned and systematic actions necessary to provide CTDOT the confidence that a Contractor will perform the work as specified in the Contract.

Quality Control (QC): The sum total of activities performed by the vendor (Producer, Manufacturer, and Contractor) to ensure that a product meets contract specification requirements.

Superpave: A mix design used in mixtures designated as "S\*" where "S" indicates Superpave and \* indicates the sieve related to the nominal maximum aggregate size of the mix.

Segregation: A non-uniform distribution of a mixture in terms of gradation, temperature, or volumetric properties.

Warm Mix Asphalt (WMA) Technology: A qualified additive or technology that may be used to produce a mixture at reduced temperatures and/or increase workability of the mixture.

Wedge Course: A lift or multiple lifts of HMA placed at a varying thickness as indicated on the plans to increase or decrease the cross slope of the existing pavement surface.

**4.06.02—Materials:** All materials shall meet the requirements of M.04.

**1. Materials Supply:** The mixture must be from one source of supply and originate from one Plant unless authorized by the Engineer.

**2. Recycled Materials:** Reclaimed Asphalt Pavement (RAP), Crushed Recycled Container Glass (CRCG), Recycled Asphalt Shingles (RAS), or crumb rubber (CR) from recycled tires may be incorporated into the mixture in accordance with Project Specifications.

**3. Tack Coat:** Tack coat used for all applications shall be Non-Tracking Asphalt Tack Coat, meeting the requirements of M.04.01-5. Use of alternate tack coats conforming to Material for Tack Coat requirements may be requested by the Contractor. The request shall be submitted in writing to the Engineer for review prior to use.

**4.06.03—Construction Methods:**

**1. Material Documentation:** All vendors producing asphalt mix must have Plants with automated vehicle-weighing scales, storage scales, and material feeds capable of producing a delivery ticket containing the information below.

- a. State of Connecticut printed on ticket.
- b. Name of Producer, identification of Plant, and specific storage silo if used.
- c. Date and time.
- d. Mixture Designation, mix type and level. Curb mixtures for machine-placed curbing must state "curb mix only."
- e. If WMA Technology is used, "-W" must be listed following the mixture designation.
- f. Net weight of mixture loaded into the vehicle. (When RAP and/or RAS is used, the moisture content shall be excluded from mixture net weight.)
- g. Gross weight (equal to the net weight plus the tare weight or the loaded scale weight).
- h. Tare weight of vehicle (daily scale weight of the empty vehicle).
- i. Project number, purchase order number, name of Contractor (if Contractor other than Producer).
- j. Vehicle number - unique means of identification of vehicle.
- k. For Batch Plants: individual aggregate, recycled materials, and virgin asphalt max/target/min weights when silos are not used.
- l. For every mixture designation: the running daily and project total delivered and sequential load number.

The net weight of mixture loaded into the vehicle must be equal to the cumulative measured weights of its

components.

The Contractor must notify the Engineer immediately if, during production, there is a malfunction of the weight recording system in the automated Plant. Manually written tickets containing all required information will be allowed for no more than 1 hour.

The State reserves the right to have an Inspector present to monitor batching and/or weighing operations.

**2. Transportation of Mixture:** The mixture shall be transported in vehicles that are clean of all foreign material, excessive coating or cleaning agents, and that have no gaps through which material might spill. Any material spilled during the loading or transportation process shall be quantified by re-weighing the vehicle. The Contractor shall load vehicles uniformly so that segregation is minimized. Loaded vehicles shall be tightly covered with waterproof covers acceptable to the Engineer. Mesh covers are prohibited. The cover must minimize air infiltration. Vehicles found not to be in conformance shall not be loaded. Vehicles with loads of mix being delivered to State projects must not exceed the statutory or permitted load limits referred to as gross vehicle weight (GVW). The Contractor shall furnish a list and allowable weights of all vehicles transporting mixture. The State reserves the right to check the gross and tare weight of any vehicle. If the gross or tare weight varies from that shown on the delivery ticket by more than 0.4%, the Engineer will recalculate the net weight. The Contractor shall correct the discrepancy to the satisfaction of the Engineer.

If a vehicle delivers mixture to the Project and the delivery ticket indicates that the vehicle is overweight, the load may not be rejected but a "Measured Weight Adjustment" will be taken in accordance with 4.06.04.

Vehicle body coating and cleaning agents must not have a deleterious effect on the mixture. The use of solvents or fuel oil, in any concentration, is prohibited for the coating of vehicle bodies.

For each delivery, the Engineer shall be provided a clear, legible copy of the delivery ticket.

**3. Paving Equipment:** The Contractor shall have the necessary paving and compaction equipment at the Project Site to perform the work. All equipment shall be in good working order and any equipment that is worn, defective, or inadequate for performance of the work shall be repaired or replaced by the Contractor to the satisfaction of the Engineer. During the paving operation, the use of solvents or fuel oil, in any concentration, is strictly prohibited as a release agent or cleaner on any paving equipment (i.e., rollers, pavers, transfer devices, etc.).

Refueling or cleaning of equipment is prohibited in any location on the Project where fuel or solvents might come in contact with paved areas or areas to be paved. Solvents used in cleaning mechanical equipment or hand tools shall be stored clear of areas paved or to be paved. Before any such equipment and tools are cleaned, they shall be moved off of areas paved or to be paved.

**Pavers:** Each paver shall have a receiving hopper with capacity to provide for a spreading operation and a distribution system that places the mix uniformly, without segregation. The paver shall be equipped with and use a vibratory screed system with heaters or burners. The screed system shall be capable of producing a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture. Pavers with extendible screed units as part of the system shall have auger extensions and tunnel extenders as necessary. Automatic screed controls for grade and slope shall be used at all times unless otherwise authorized by the Engineer. The controls shall automatically adjust the screed to compensate for irregularities in the preceding course or existing base. The controls shall maintain the proper transverse slope and be readily adjustable, and shall operate from a fixed or moving reference such as a grade wire or floating beam (minimum length 20 feet).

**Rollers:** All rollers shall be self-propelled and designed for compaction of asphalt mixtures. Roller types shall include steel wheeled, pneumatic, or a combination thereof. Rollers that operate in a dynamic mode shall have drums that use a vibratory or oscillatory system or combination. Vibratory rollers shall be equipped with indicators for amplitude, frequency, and speed settings/readouts to measure the impacts per foot during the compaction process. Oscillatory rollers shall be equipped with frequency indicators. Rollers can operate in the dynamic mode using the oscillatory system on concrete structures such as bridges and catch basins if at the lowest frequency setting.

Pneumatic tire rollers shall be equipped with wide-tread compaction tires capable of exerting an average contact pressure from 60 to 90 psi uniformly over the surface. The Contractor shall furnish documentation to the Engineer regarding tire size, pressure and loading to confirm that the proper contact pressure is being developed and that the loading and contact pressure are uniform for all wheels.

**Tack Distributor Vehicle:** The Contractor shall provide a distributor vehicle capable of heating, circulating, and spraying the tack coat at the required application temperature range per the tack manufacturer's recommendations. The spray bar shall maintain a constant height above the pavement and distribute the material in an overlapping spray pattern out of the nozzles to ensure uniform coverage on the surface. The distributor vehicle shall include a tachometer, pressure gauges, and an accurate volume measuring device or a calibrated tank. Volume measuring devices shall meet all applicable state or federal sale requirements.

**Lighting for Operations:** As needed for paving operations, the Contractor shall provide sufficient artificial lighting to enable the Engineer to thoroughly inspect every phase of the work. The type and number of lights to be used on each piece of equipment shall be documented by the Contractor in the Project Specific Quality Control Plan. A minimum of 10 foot candle (fc) (or approximately 108 lumens) within a twenty-five-foot radius from millers, pavers, and transfer vehicles shall be provided by the lighting at all times. A minimum of 1 fc (or approximately 11 lumens) within a sixty foot radius from rollers shall be provided at all times. Lighting shall be oriented to minimize glare to passing traffic.

**Material Transfer Vehicle (MTV):** A MTV shall be used when placing asphalt mixture surface course (a lift or multiple lifts) as indicated in the Contract except as noted on the plans or as directed by the Engineer. In addition, continuous paving lengths of less than 500 feet may not require the use of a MTV as determined by the Engineer.

The MTV must be a vehicle specifically designed for the purpose of delivering the mixture from the delivery vehicle to the paver. The MTV must continuously remix the asphalt mixture throughout the placement process. When the MTV is in use the paver must have a hopper insert to prevent mix from segregating due to drop height.

The use of a MTV will be subject to the requirements stated in 1.07.05 Load Restrictions. The Engineer may limit the use of the vehicle if it is determined that the use of the MTV may damage highway components, utilities, or bridges. The Contractor shall submit to the Engineer at time of pre-construction the following information:

1. The make and model of the MTV.
2. The individual axle weights and axle spacing for each piece of paving equipment (haul vehicle, MTV and paver).
3. A Working Drawing showing the axle spacing in combination with all pieces of equipment that will comprise the paving echelon.

**4. Test Section:** The Engineer may require the Contractor to place a test section whenever the requirements of this specification or M.04 are not met. The sampling and testing frequency for the mixture and density shall be in accordance with this specification and M.04.

The Contractor shall submit the anticipated quantity of mixture to be placed and the location of the test section for review and approval by the Engineer. The same equipment used in the construction of a passing test section shall be used throughout production.

If a test section fails to meet specifications, the Contractor shall stop production, make necessary adjustments to the job mix formula, Plant operations, or procedures for placement and compaction. The Contractor shall construct test sections, as allowed by the Engineer, until all the required specifications are met. All test sections shall also be subject to removal as set forth in 1.06.04.

**5. Transitions for Roadway Surface:** Transitions shall be formed at any point on the roadway where the pavement surface deviates, vertically, from the uniform longitudinal profile as specified on the plans. Whether formed by milling or by using an asphalt mixture, all transition lengths shall meet the criteria below unless otherwise specified.

**Permanent Transitions:** Defined as any gradual change in pavement elevation that remains as a permanent part of the work. A transition shall be constructed no closer than 75 feet from either side of a bridge expansion joint or parapet. All permanent transitions, leading and trailing ends shall meet the following length requirements:

Posted Speed Limit	Permanent Transition Length Required
> 35 mph	30 feet per inch of elevation change
35 mph or less	15 feet per inch of elevation change

In areas where it is impractical to use the above-described permanent transition lengths, the use of a shorter permanent transition length may be permitted when approved by the Engineer.

Temporary Transitions: Defined as a transition that does not remain a permanent part of the work.

All temporary transitions shall meet the following length requirements:

Posted Speed Limit	Temporary Transition Length Required
> 50 mph	Leading Transition: 15 feet per inch of vertical change (thickness) Trailing Transition: 6 feet per inch of vertical change (thickness)
40, 45 or 50 mph	Leading and Trailing: 4 feet per inch of vertical change (thickness)
35 mph or less	Leading and Trailing: 3 feet per inch of vertical change (thickness)

**Note:** Any temporary transition to be in place over the winter shutdown period or during extended periods of inactivity (more than 30 calendar days) shall meet the greater than 50 mph requirements shown above.

**6. Spreading and Finishing of Mixture:** Prior to the placement of the mixture, the underlying subbase and other courses shall be brought to the plan grade and cross section within the allowable tolerance. Subbase material shall be free of standing water prior to placement of the mixture.

Before placing mix on an existing pavement surface, a uniform coating of tack coat shall be applied to the underlying pavement surface and on the exposed surface of a wedge joint. Such pavement surfaces shall be clean and dry. Mechanical sweeping or other means acceptable to the Engineer shall be used to clean pavement surfaces.

Tack Coat Application: The placement of Tack Coat shall not commence or continue when forecasted or unforeseen precipitation or other conditions cause the tack to runoff or prevent conformance to this specification. The Contractor shall protect appurtenances from tracking or splattering of tack coat material. All tack coat material shall be applied by pressurized spray that results in a uniform application rate over the entire surface being paved.

All tack coat material, as defined in M.04, shall be applied at an application rate of 0.04 to 0.06 gal./s.y. for a non-milled surface, and an application rate of 0.06 to 0.08 gal./s.y. for a milled surface.

The Engineer must approve the equipment and the method of measurement prior to use. The tack coat material shall be heated to 160°F ± 10°F and shall not be further diluted.

Tack coat shall be allowed sufficient time to break (cure) prior to any paving equipment or haul vehicles driving on it.

Placement: The mixture shall be placed and compacted to provide a smooth, dense surface with a uniform texture and no segregation at the specified thickness and dimensions indicated in the plans and specifications.

The placement of asphalt mixtures shall not commence or continue when forecasted or unforeseen precipitation may prevent conformance to this specification. The Engineer will not accept or pay for mixture that is placed in conditions that are not in conformance with these specifications.

In advance of paving, traffic control requirements shall be set up, maintained throughout placement, and shall not be removed until all associated work is completed, including quality control, sampling for density testing, and inspection activities.

The Contractor shall supply three infrared thermometers, acceptable to the Engineer, for mix delivery temperature verification by the Inspector and quality control personnel. At the beginning of each shift, the Engineer shall verify that the thermometers:

- have a minimum accuracy value of ±1% of reading or ± 2°F, whichever is greater.
- are in agreement within 5°F when measuring ambient, base, and mix temperature.

The Contractor shall include the thermometer verification process in the QCP, as well as the replacement or repair timeframe of a thermometer not meeting the above criteria or not functioning.

The placement temperature range shall be listed in the Quality Control Placement Plan and shall meet the requirements of Table M.04.03-4. Any material that falls outside the specified temperature range as measured by two of the three thermometers may be rejected.

The Contractor shall inspect the newly placed pavement for defects in mixture or placement before rolling is started. Any deviation from standard crown or section shall be immediately remedied by placing additional mixture or removing surplus mixture. Such defects shall be corrected to the satisfaction of the Engineer.

Where it is impractical due to physical limitations to operate the paving equipment, the Engineer may permit the use of other methods or equipment. Where hand spreading is permitted, the mixture shall be placed by means of suitable shovels and other tools, and in a uniformly loose layer at a thickness that will result in a completed pavement meeting the designed grade and elevation.

**Placement Tolerances:** Each lift of mix placed at a specified thickness shall meet the following requirements for thickness and area. Any pavement exceeding these limits shall be subject to an adjustment or removal. Lift tolerances will not relieve the Contractor from meeting the final designed grade. Lifts of specified non-uniform thickness, i.e. wedge course, shall not be subject to thickness and area adjustments.

1. Thickness: Where the average thickness of the lift exceeds that shown on the plans beyond the tolerances shown in Table 4.06-3, the Engineer will calculate the thickness adjustment in accordance with 4.06.04.

**TABLE 4.06-3: Thickness Tolerances**

Mixture Designation	Lift Tolerance
S1	+/- 3/8 inch
S0.25, S0.375, S0.5	+/- 1/4 inch

Where the thickness of the lift of mixture is less than that shown on the plans beyond the tolerances shown in Table 4.06-3, the Contractor, with the approval of the Engineer, shall take corrective action in accordance with this Section.

2. Area: Where the width of the lift exceeds that shown on the plans by more than the specified thickness, the Engineer will calculate the area adjustment in 4.06.04.
3. Delivered Weight of Mixture: When the delivery ticket shows that the truck exceeds the allowable gross weight for the vehicle type, the Engineer will calculate the weight adjustment in accordance with 4.06.04.

**Transverse Joints:** All transverse joints shall be formed by saw-cutting to expose the full thickness of the lift. Tack coat shall be applied to the sawn face immediately prior to additional mixture being placed.

**Compaction:** The Contractor shall compact the mixture to meet the density requirements as stated in 4.06.04 for any lift placed with a thickness of 1 1/2 inches or greater, and eliminate all roller marks without displacement, shoving, cracking, or aggregate breakage. This shall include wedge courses when the wedge thickness is 1 1/2 inches or greater within a single paver pass.

When placing a lift with a specified thickness less than 1 1/2 inches the Contractor shall provide a minimum rolling pattern as determined by the development of a compaction curve. This shall include wedge courses when the wedge or any portion of the wedge thickness is less than 1 1/2 inches within a single paver pass. The procedure to be used shall be documented in the Contractor's QCP for placement and demonstrated on the first day of placement.

The use of the vibratory system on concrete structures is prohibited. When approved by the Engineer, the Contractor may operate a roller using an oscillatory system at the lowest frequency setting.

If the Engineer determines that the use of compaction equipment in the dynamic mode may damage highway components, utilities or adjacent property, the Contractor shall provide alternate compaction equipment.

Rollers operating in the dynamic mode shall be shut off when changing directions.

These allowances will not relieve the Contractor from meeting pavement compaction requirements.

**Surface Requirements:**

Each lift of the surface course shall not vary more than 1/4 inch from a Contractor-supplied 10 foot straightedge. For all other lifts of asphalt mixture, the tolerance shall be 3/8 inch. Such tolerance will apply to all paved areas.

Any surface that exceeds these tolerances shall be corrected by the Contractor at its own expense.

**7. Longitudinal Joint Construction Methods:** The Contractor shall use Method I - Notched Wedge Joint (see Figure 4.06-1) when constructing longitudinal joints where lift thicknesses are 1 1/2 inches to 3 inches. S1 mixtures shall be excluded from using Method I.

Method II - Butt Joint (see Figure 4.06-2) shall be used for lifts less than 1 1/2 inches or greater than 3 inches. Each longitudinal joint shall maintain a consistent offset from the centerline of the roadway along its entire length. The difference in elevation between the two faces of any completed longitudinal joint shall not exceed 1/4 inch at any location.

**Method I - Notched Wedge Joint:**

A notched wedge joint shall be constructed as shown in Figure 4.06-1 using a device that is attached to the paver screed and is capable of independently adjusting the top and bottom vertical notches. The device shall have an integrated vibratory system. The top vertical notch must be located at the centerline or lane line or as directed by the Engineer in the final lift. The requirement for paving full width “curb to curb” as described in Method II may be waived if addressed in the QC plan and approved by the Engineer.

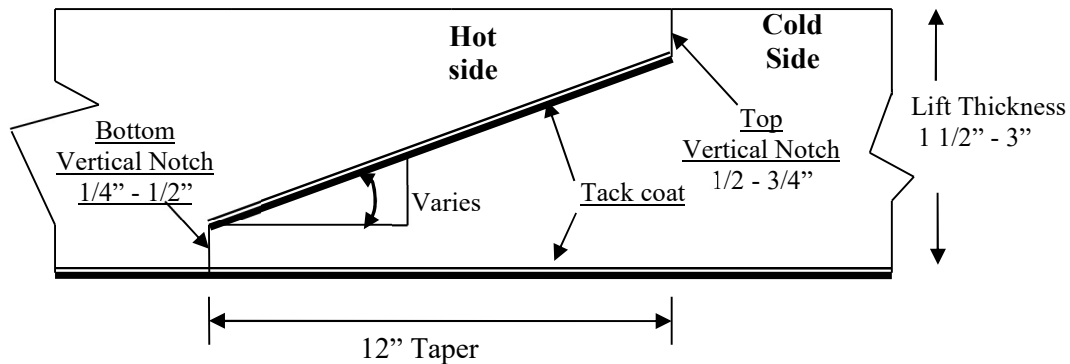
The taper portion of the wedge joint shall be evenly compacted using equipment other than the paver or notch wedge joint device. The compaction device shall be the same width as the taper and not reduce the angle of the wedge or ravel the top notch of the joint during compaction.

When placed on paved surfaces, the area below the sloped section of the joint shall be treated with tack coat. The top surface of the sloped section of the joint shall be treated with tack coat prior to placing the completing pass.

The taper portion of the wedge joint shall not be exposed to traffic for more than 5 calendar days.

**Figure 4.06-1: Method I, Notched Wedge Joint**

(Not to Scale)



Any exposed wedge joint must be located to allow for the free draining of water from the road surface.

The Engineer reserves the right to define the paving limits when using a wedge joint that will be exposed to traffic.

If Method I cannot be used on those lifts which are 1 1/2 inches to 3 inches, Method III may be substituted according to the requirements below for “Method III - Butt Joint with Hot Poured Rubberized Asphalt Treatment.”

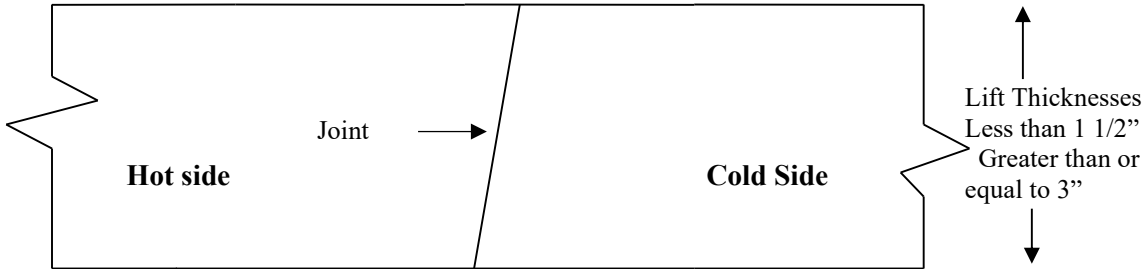
**Method II - Butt Joint:**

When adjoining passes are placed, the Contractor shall use the end gate to create a near vertical edge (refer to Figure 4.06-2). The completing pass (hot side) shall have sufficient mixture so that the compacted thickness is not less than the previous pass (cold side). During placement of multiple lifts, the longitudinal joint shall be constructed in such a manner that it is located at least 6 inches from the joint in the lift immediately below. The joint in the final lift shall be at the centerline or at lane lines or as directed by the Engineer. The end gate on the paver shall be set so there is an overlap onto the cold side of the joint.

When using this method, the Contractor must complete full width “curb to curb” paving when the vertical

edge exposed to traffic would be greater than one inch, unless otherwise allowed by the Engineer.

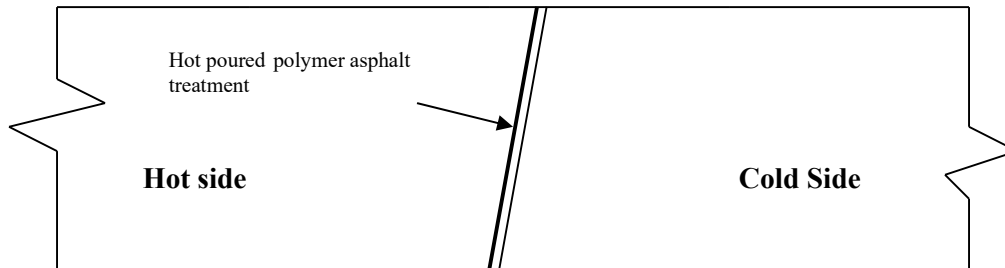
**Figure 4.06-2: Method II, Butt Joint**  
(Not to Scale)



**Method III - Butt Joint with Hot Poured Rubberized Asphalt Treatment:**

If Method I cannot be used due to physical constraints in certain limited locations, the Contractor may submit a request in writing for approval by the Engineer to use Method III as a substitution in those locations. There shall be no additional measurement or payment made when Method III is substituted for Method I. When required by the Contract or approved by the Engineer, Method III (see Figure 4.06-3) shall be used.

**Figure 4.06-3: Method III, Butt Joint with Hot Poured Rubberized Asphalt Treatment**  
(Not to Scale)



All of the requirements of Method II must be met with Method III. In addition, the longitudinal vertical edge must be treated with a joint seal material meeting the requirements of ASTM D6690, Type 2 with polymer. The joint sealant shall be placed on the face of the “cold side” of the butt joint as shown above prior to placing the “hot side” of the butt joint. The joint seal material shall be applied in accordance with the manufacturer’s recommendation so as to provide a uniform coverage and avoid excess bleeding onto the newly placed pavement.

**8. Contractor Quality Control (QC) Requirements:** The Contractor shall be responsible for maintaining adequate quality control procedures throughout the production and placement operations. Therefore, the Contractor must ensure that the materials, mixture, and work provided by Subcontractors, Suppliers, and Producers also meet Contract specification requirements.

This effort must be documented in Quality Control Plans (QCP) and must address the actions, inspection, or sampling and testing necessary to keep the production and placement operations in control, to determine when an operation has gone out of control, and to respond to correct the situation in a timely fashion.

There are two QCP submittals required for the production and placement of asphalt mixture, one for Plant Production and the other for Mix Placement. The QCP requirements for Plant Production can be found in Section M.04.03-1.

The QCP for production shall be specific to the production facility.

There are 2 required components to the QCP for Placement: a General QCP that is applicable to all projects, and a Project Summary Pre-Pave Form that supplements the standard QCP and details Project-specific information. The General QCP shall include a cool weather paving section that addresses project operations expected to occur when ambient temperature or pavement temperature is less than 50°F. This shall include a list of potential adjustments to be considered and made when paving below 50°F.

The General QCP for Placement shall be valid for two (2) years following acceptance by the Department. The Contractor shall submit updated equipment lists and personnel, if necessary, to the Department in January of year two (2) which will be appended to the accepted General QCP for HMA Placement.

The Project Summary Pre-Pave Form shall be submitted at least 7 days prior to the scheduling of any pre-pave meeting or pavement event.

Production or placement shall not occur until all QCP components have been accepted by the Engineer.

Each QCP shall include the name and qualifications of a Quality Control Manager (QCM). The QCM shall be responsible for the administration of the QCP, and any modifications that may become necessary.

The QCM shall have the ability to direct all Contractor personnel on the Project during paving operations.

The QCPs shall also include the name and qualifications of any outside testing laboratory performing any QC functions on behalf of the Contractor. The QC Technician performing in-place density testing shall be NETTCP certified as a paving inspector.

Acceptance of any QCP does not relieve the Contractor of its responsibility to comply with the Project specifications. The Contractor may propose modifications to their QCP as work progresses and must document the changes in writing prior to resuming operations. These modifications include changes in quality control procedures, equipment, or personnel.

QCP for Production: Refer to M.04.03-1.

QCP for Placement: The General QCP for HMA Placement and Project Summary Pre-Pave Form shall include the information listed on the [Pavement Advisory Team](#) website.

The Contractor shall perform all quality control sampling and testing, provide inspection, and exercise management control to ensure that all mixture placement meets the requirements as outlined in its QCP during all phases of the work. The Contractor shall document these activities for each day of placement.

The Contractor shall submit complete field density testing and inspection records to the Engineer within 48 hours in a format acceptable to the Engineer.

The Contractor may obtain one mat core and one joint core per day for process control, provided this process is detailed in the QCP. The results of these process control cores shall not be used to dispute the Department's determinations from the acceptance cores. The Contractor shall submit the location of each process control core to the Engineer for acceptance prior to taking the core. The core holes shall be filled to the same requirements described in 4.06.03-10.

**9. Temperature and Seasonal Requirements:** The following requirements shall apply to all asphalt concrete pavements (including temporary pavements) unless otherwise authorized or directed by the Engineer:

1. Mixtures shall not be placed on subbase material that is frozen.
2. Mixture or tack coat placement is limited to the following temperature ranges:
  - a. Mixtures placed at lift thickness of 2 1/2 inches or more shall not be placed when the air or pavement surface temperature is 35°F or less.
  - b. Mixtures placed at lift thicknesses between 1 1/2 and 2 1/2 inches shall not be placed when the air or pavement surface temperature is 40°F or less.
  - c. Mixtures placed at lift thickness of less than 1 1/2 inches shall not be placed when the air or pavement surface temperature is 45°F or less.
  - d. Should paving operations be scheduled during temperatures of 50°F or less, all asphalt mixes delivered shall meet the minimum delivered mix temperatures shown in Table M.04.03-4. When paving below 50°F the Contractor shall follow the cool weather paving procedures outlined in their accepted General QCP for HMA Placement and also as reflected in their accepted Project Summary Pre-pave Form.

**10. Field Density:**

1. The Contractor shall obtain cores in accordance with AASHTO R 67 for the determination of mat and longitudinal joint density of asphalt pavements. The Contractor's representative obtaining samples must be a certified NETTCP HMA Paving Inspector, NETTCP HMA Plant Technician, or must have successfully completed the HMA Field Sampling Course administered by The Connecticut Advanced Pavement Laboratory (CAP Lab). Within three (3) calendar days of placement, mat and joint cores shall be extracted on each lift with a specified thickness of 1 1/2 inches or more. Joint cores shall not be extracted on HMA S1 lifts.

The Contractor shall extract cores from random locations determined by the Engineer in

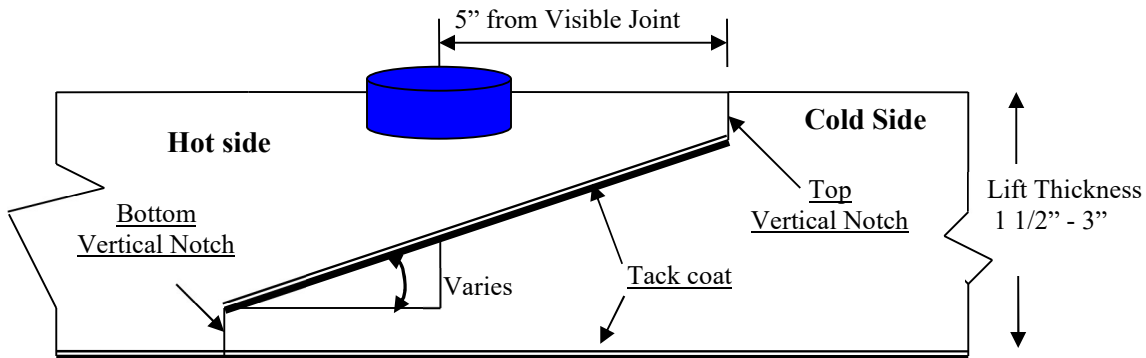
accordance with ASTM D3665. Six (6) inch diameter cores shall be extracted for all mixes. The number and location of the cores is specified in 4.06.03-10-2 Density Lots. The Contractor shall coordinate with the Engineer to witness the extraction, labeling of cores, and filling of the core holes. The size, shape, and weight of the cores shall not be modified, altered, or manipulated by the Contractor or its representative in any way after extraction from the pavement.

After the lift has been compacted and cooled, the Contractor shall cut cores to a depth equal to or greater than the lift thickness and shall remove them without damaging the lift(s) to be tested. The Contractor and Inspector witnessing the extraction shall check each core for damage or obvious defects while being obtained. Any core determined to be damaged or defective at the time of extraction will be replaced immediately with a new core from a location within 2 feet measured in a longitudinal direction. The size, shape, and weight of the cores shall not be modified, altered, or manipulated by the Contractor or its representative in any way after extraction from the pavement.

A mat core shall not be located any closer than 1 foot from the edge of a paver pass. If a random number locates a core less than 1 foot from any edge, the location will be adjusted by the Engineer so that the outer edge of the core is 1 foot from the edge of the paver pass.

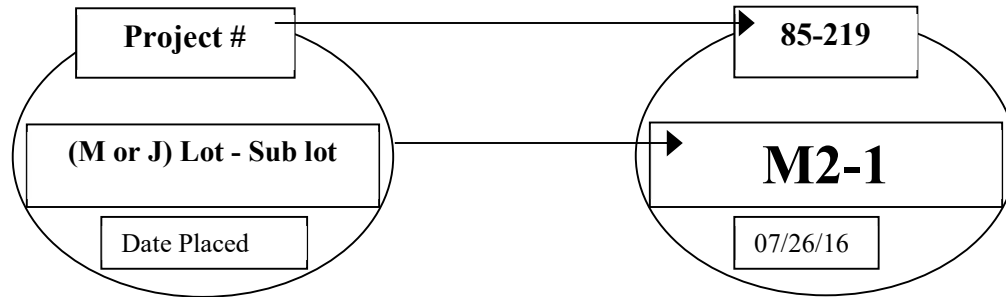
Method I, Notched Wedge Joint cores shall be taken so that the center of the core is 5 inches from the visible joint on the hot mat side (Figure 4.06-4). When Method II or Method III Butt Joint is used, cores shall be taken from the hot side so the edge of the core is within 1 inch of the longitudinal joint.

Figure 4.06-4: Notched Wedge Joint Cores (Not to Scale)



The cores shall be labeled by the Contractor with the Project number, date placed, lot number, and sub-lot number. The core's label shall include "M" for a mat core and "J" for a joint core. For example, a mat core from the first lot and the first sub-lot shall be labeled with "M1-1." A mat core from the second lot and first sub-lot shall be labeled "M2-1" (see Figure 4.06-5). The Engineer will fill out a MAT-109 form to accompany the cores. The Contractor shall deliver the cores and MAT-109 to the Department's Central Lab. The Contractor shall use a container approved by the Engineer. The container shall have a lid capable of being locked shut and tamper proof. The Contractor shall use foam, bubble wrap, or another suitable material to prevent the cores from being damaged during handling and transportation. Once the cores and MAT-109 are in the container the Engineer will secure the lid using security seals at the removable hinge(s) and at the lid opening(s). The security seals' identification number must be documented on the MAT-109. All sealed containers shall be delivered to the Department's Central Lab within two working days from time of extraction. Central Lab personnel will break the security seal and take possession of the cores.

Figure 4.06-5: Labeling of Cores



Each core hole shall be filled within 4 hours upon core extraction. Prior to being filled, the hole shall be prepared by removing any free water and applying tack coat using a brush or other means to uniformly cover the cut surface. The core hole shall be filled using an asphalt mixture at a minimum temperature of 240°F containing the same or smaller nominal maximum aggregate size as the paved surface and compacted with a hand compactor or other mechanical means to the maximum compaction possible. The asphalt mixture shall be compacted to 1/8 inch above the finished pavement.

2. Density Lots

a. Simple Average:

A standard simple average density lot evaluated using the Simple Average method is the quantity of material placed in a single lift within a defined area excluding any bridge decks less than 3,500 tons. For total individual mix quantities estimated on the Project below 2,000 tons, the lot will include all the material between the curb lines. For total individual mix quantities estimated on the Project between 2,000 and 3,500 tons, the lift will be evaluated as two lots each consisting of half of the total tonnage of material placed between the curb lines.

The number of cores per lot shall be determined in accordance with Table 4.06-4. For combo lots, if a randomly located mat or joint core location is on a bridge deck, the core is to be obtained on the bridge deck in addition to the core(s) required on the bridge deck.

A combo simple average density lot is the quantity of material placed within a defined area including bridge decks that are less than or equal to 500 feet long.

A bridge simple average density lot is the quantity of material placed on a bridge deck longer than 500 feet.

Bridge density lots will always be analyzed as using the simple average lot methodology. The number of cores per lot shall be determined in accordance with Table 4.06-5. Multiple bridge decks can be combined into one lot if the paving and underlying conditions are comparable. If multiple bridge decks are combined into a single bridge lot, at least one mat and joint core shall be obtained on each bridge.

The longitudinal locations of mat cores within a standard, combo, or bridge lot containing multiple paving passes will be determined using the combined length of the paving passes within the lot.

TABLE 4.06-4: Number of Cores per Lot (Simple Average)

Lot Type	No. of Mat Cores		No. of Joint Cores	
Standard Lot < 500 Tons	3		3	
Standard Lot ≥ 500 Tons	4		4	
Combo Lot < 500 Tons	2 plus	1 per bridge (≤ 300')	2 plus	1 per bridge (≤ 300)
Combo Lot ≥ 500 Tons <sup>(1)</sup>	4 plus	2 per bridge (301' – 500')	4 plus	2 per bridge (301' – 500')

**TABLE 4.06-5: Number of Cores per Bridge Density Lot (Simple Average)**

<b>Length of Bridge(s) (Feet)</b>	<b>Minimum No. of Mat Cores</b>	<b>Minimum No. of Joint Cores</b>
< 500	2	2
501 – 1,500	3	3
1,501 – 2,500	4	4
2,501 and greater	5	5

b. *PWL Density Lots:*

When total individual mix quantity estimated on the Project is 3,500 tons or more, the lot shall be evaluated by PWL method.

A PWL mat density lot is 3,500 tons of material placed within 30 calendar days excluding any bridges. One randomly located mat core will be obtained per every 500 tons subplot. Should the final subplot be less than 500 tons, a randomly located mat core is still required.

A PWL joint density lot consists of seven sublots defined by the linear feet of longitudinal joint excluding any joints on bridge decks. One randomly located joint core shall be obtained per every 1,500 linear feet when a lot includes one longitudinal joint. One randomly located joint core shall be obtained per every 2,000 linear feet of joint when a lot includes two or more longitudinal joints.

A partial PWL mat or joint lot is a lot with four to six samples due to completion of the course, or spanning past 30 calendar days.

**11. Acceptance Sampling and Testing:** Sampling shall be performed in accordance with ASTM D3665 or a statistically-based procedure of stratified random sampling approved by the Engineer.

**Plant Material Acceptance:** The Contractor shall provide the required sampling and testing during all phases of the work in accordance with M.04. The Department will verify the Contractor's acceptance test results. Should any test results exceed the specified tolerances in the Department's current QA Program for Materials, the Contractor's test results for a subject lot or sub lot may be replaced with the Department's results for the purpose of calculating adjustments. The verification procedure is included in the Department's current QA Program for Materials.

**Density Acceptance:** The Engineer will perform all acceptance testing in accordance with AASHTO T 331. Test specimens will be prepared from the cores by the Engineer. The density of each specimen will be determined using the daily production's average maximum theoretical specific gravity (Gmm) established during the testing of the parent material at the Plant. When there was no testing of the parent material or any Gmm exceeds the specified tolerances in the Department's current QA Program for Materials, the Engineer will determine the maximum theoretical density value to be used for density calculations in accordance with the Department's Quality Assurance Manual for Materials.

**12. Density Dispute Resolution Process:** The Contractor and Engineer will work in partnership to avoid potential conflicts and to resolve any differences that may arise during quality control or acceptance testing for density. Both parties will review their sampling and testing procedures and results and share their findings. If the Contractor disputes the Engineer's test results, the Contractor must submit in writing a request to initiate the Dispute Resolution Process within five calendar days of the notification of the test results. No request for dispute resolution will be allowed unless the Contractor provides quality control results from samples taken prior to and after finish rolling, and within the timeframe described in 4.06.03-8 supporting its position. No request for dispute resolution will be allowed for a density lot in which any core was not taken in accordance with 4.06.03-10. Should the dispute not be resolved through evaluation of existing testing data or procedures, the Engineer may authorize the Contractor to re-core the disputed lot. The core samples must be extracted no later than 5 calendar days from the date of the Engineer's authorization. All such core samples shall be extracted and the core hole filled using the procedure outlined in 4.06.03-10. The location of each core in the lot shall be located three (3) feet from the original acceptance core located along a line parallel to the base line that results in the same type (mat, joint, or structure) of core.

The bulk specific gravity (Gsb) result of each dispute core will be compared to the original core to determine how the dispute results will be used. If the Gsb results are outside of AASHTO T 331 multilaboratory precision range of two results, the dispute result will be averaged with the original result to calculate the adjustment. When the two Gsb results are equal to or less than the acceptable range of two

results, the dispute result will not be used in the adjustment calculation.

1. Simple Average Lots: The Contractor may only dispute any simple average lot that is adjusted at or below 95% payment.
2. PWL Lots: The Contractor may dispute any PWL lot when the PWL falls below 50% calculated in accordance with 4.06.04-2b.

**13. Corrective Work Procedure:**

If pavement placed by the Contractor does not meet the specifications, and the Engineer requires its replacement or correction, the Contractor shall:

- (a) Propose a corrective procedure to the Engineer for review and approval prior to any corrective work commencing. The proposal shall include:
  - Limits of pavement to be replaced or corrected, indicating stationing or other landmarks that are readily distinguishable.
  - Proposed work schedule.
  - Construction method and sequence of operations.
  - Methods of maintenance and protection of traffic.
  - Material sources.
  - Names and telephone numbers of supervising personnel.
- (b) Any corrective courses placed as the final wearing surface shall match the specified lift thickness after completion.

**14. Protection of the Work:** The Contractor shall protect all sections of the newly finished pavement from damage that may occur as a result of the Contractor’s operations for the duration of the Project.

**15. Cut Bituminous Concrete Pavement:** Work under this item shall consist of making a straight-line cut in the asphalt pavement to the lines delineated on the plans or as directed by the Engineer. The cut shall provide a straight, clean, vertical face with no cracking, tearing or breakage along the cut edge.

**4.06.04—Method of Measurement:**

**1. HMA S\* or PMA S\*:** The mixture will be measured for payment as the amount of material in tons placed as determined by the net weight on the delivered tickets and adjusted by area, thickness and weight as follows:

**Quantity Adjustments:** Adjustments may be applied to the placed quantities that will be measured for payment using the following formulas:

**Yield Factor** for Adjustment Calculation = 0.0575 tons/SY/inch

**Actual Area (SY)** = [(Measured Length (ft)) × (Avg. of width measurements (ft))] ÷ 9 s.f./SY

**Actual Thickness (t)** = Total tons delivered / [Actual Area (SY) × 0.0575 tons/SY/inch]

- (a) Area: If the average width exceeds the allowable tolerance, an adjustment will be made using the following formula. The tolerance for width is equal to the specified thickness (inch) of the lift being placed.

**Quantity Adjusted for Area (TA)** = [(L × W<sub>adj</sub>)/9] × (t) × 0.0575 Tons/SY/inch = (-) tons

Where: L = Length (ft)

(t) = Actual thickness (inches)

W<sub>adj</sub> = (Designed width (ft) + tolerance /12) - Measured Width

- (b) Thickness: If the actual average thickness is less than the allowable tolerance, the Contractor shall submit a repair procedure to the Engineer for approval. If the actual thickness exceeds the allowable tolerance, an adjustment will be made using the following formula:

**Quantity Adjusted for Thickness (TT)** = A × t<sub>adj</sub> × 0.0575 = (-) tons

Where: A = Area = {[L × (Design width + tolerance (lift thickness)/12)] / 9}

t<sub>adj</sub> = Adjusted thickness = [(Dt + tolerance) - Actual thickness]

Dt = Designed thickness (inches)

- (c) Weight: If the quantity representing the mixture delivered to the Project is in excess of the allowable gross vehicle weight (GVW) for each vehicle, an adjustment will be made using the following formula:

**Quantity Adjusted for Weight (Tw)** = GVW – DGW = (-) tons

Where: DGW = Delivered gross weight as shown on the delivery ticket or measured on a certified scale

**2. Bituminous Concrete Adjustment Cost:**

- (a) Production Lot Adjustment: An adjustment may be applied to each production lot as follows:
- i. Non-PWL Production Lot in accordance with article M.04.03-2c:
    - The adjustment values in Tables 4.06-6 and 4.06-7 will be calculated for each sub lot based on the Air Void (AV) and Asphalt Binder Content (PB) test results for that sub lot. The total adjustment for each day’s production (lot) will be computed as follows:
 

**Tons Adjusted for Superpave Design (T<sub>SD</sub>)** = [(AdjAV<sub>t</sub> + AdjPB<sub>t</sub>) / 100] × Tons

 Where: AdjAV<sub>t</sub>: Percent adjustment for air voids  
 AdjPB<sub>t</sub>: Percent adjustment for asphalt binder  
 Tons: Weight of material (tons) in the lot adjusted by 4.06.04-1
- Percent Adjustment for Air Voids = AdjAV<sub>t</sub> = [AdjAV<sub>1</sub> + AdjAV<sub>2</sub> + AdjAV<sub>i</sub> + ... + AdjAV<sub>n</sub>] / n  
 Where: AdjAV<sub>t</sub> = Total percent air void adjustment value for the lot  
 AdjAV<sub>i</sub> = Adjustment value from Table 4.06-6 resulting from each sub lot or the average of the adjustment values resulting from multiple tests within a sub lot, as approved by the Engineer.  
 n = number of sub lots based on Table M.04.03-2

**TABLE 4.06-6: Adjustment Values for Air Voids**

Adjustment Value (AdjAV <sub>i</sub> ) (%)	S0.25, S0.375, S0.5, S1 Air Voids (AV)
+2.5	3.8 - 4.2
+3.125*(AV-3)	3.0 - 3.7
-3.125*(AV-5)	4.3 - 5.0
20*(AV-3)	2.3 - 2.9
-20*(AV-5)	5.1 - 5.7
-20.0	≤ 2.2 or ≥ 5.8

- Percent Adjustment for Asphalt Binder = AdjPB<sub>t</sub> = [(AdjPB<sub>1</sub> + AdjPB<sub>2</sub> + AdjPB<sub>i</sub> + ... + AdjPB<sub>n</sub>)] / n  
 Where: AdjPB<sub>t</sub> = Total percent liquid binder adjustment value for the lot  
 AdjPB<sub>i</sub> = Adjustment value from Table 4.06-7 resulting from each sub lot  
 n = number of binder tests in a production lot

**TABLE 4.06-7: Adjustment Values for Binder Content**

Adjustment Value (AdjAV <sub>i</sub> ) (%)	S0.25, S0.375, S0.5, S1 Pb
0.0	JMF Pb ± 0.3
- 10.0	≤ JMF Pb - 0.4 or ≥ JMF Pb + 0.4

- ii. PWL Production Lot (3,500 tons or more):
  - For each lot, the adjustment values will be calculated using PWL methodology based on AV, VMA, and PB test results. The results will be considered as being normally distributed and all applicable equations in AASHTO R 9 and AASHTO R 42 Appendix X4 will apply.
  - Only one test result will be considered for each sub lot. The specification limits are listed in M.04.
  - For AV, PB, and voids in mineral aggregate (VMA), the individual material quantity characteristic adjustment (Adj) will be calculated as follows:
    - For PWL between 40 and 90%: Adj(AV<sub>t</sub> or PB<sub>t</sub> or VMA<sub>t</sub>) = (55 + 0.5 PWL) - 100
    - For PWL at and above 90%: Adj(AV<sub>t</sub> or PB<sub>t</sub> or VMA<sub>t</sub>) = (77.5 + 0.25 PWL) - 100
  - Where: AdjAV<sub>t</sub> = Total percent AV adjustment value for the lot  
 AdjPB<sub>t</sub> = Total percent PB adjustment value for the lot  
 AdjVMA<sub>t</sub> = Total percent VMA adjustment value for the lot
  - A lot with PWL less than 40% in any of the 3 individual material quality characteristics shall be removed and replaced at the Contractor’s expense..

The total adjustment for each production lot will be computed using the following formula:  
**Tons Adjusted for Superpave Design (T<sub>SD</sub>)** = [(0.5AdjAV<sub>t</sub> + 0.25AdjPB<sub>t</sub> + 0.25 AdjVMA<sub>t</sub>) / 100] × Tons

Where : Tons = Weight of material (tons) in the lot adjusted by 4.06.04-1

iii. Partial Lots:

Lots with less than 4 sub lots will be combined with the prior lot. If there is no prior lot with equivalent material or if the last test result of the prior lot is over 30 calendar days old, the adjustment will be calculated as indicated in 4.06.04-2(a)i.

Lots with 4 or more sub lots will be calculated as indicated in 4.06.04-2(a)ii.

**Production Lot Adjustment:  $T_{SD} \times \text{Unit Price} = \text{Est. (Pi)}$**

Where: Unit Price = Contract unit price per ton per type of mixture

Est. (Pi) = Pay Unit in dollars representing incentive or disincentive per lot

(b) **Density Lot Adjustment:** An adjustment may be applied to each density lot as follows:

i. Simple Average Density Lot (less than 3,500 tons) and Bridge Lots:

The final lot quantity shall be the difference between the total payable tons for the Project and the sum of the previous lots. If either the Mat or Joint adjustment value is “remove and replace,” the density lot shall be removed and replaced (curb to curb).

No positive adjustment will be applied to a density lot in which any core was not taken within the required 3 calendar days of placement.

**Tons Adjusted for Density ( $T_D$ ) =  $[\{(PA_M \times 0.50) + (PA_J \times 0.50)\} / 100] \times \text{Tons}$**

Where:  $T_D$  = Total tons adjusted for density for each lot

$PA_M$  = Mat density percent adjustment from Table 4.06-8

$PA_J$  = Joint density percent adjustment from Table 4.06-9

Tons: Weight of material (tons) in the lot adjusted by 4.06.04-1

**TABLE 4.06-8: Adjustment Values for Pavement Mat density**

Average Core Result	Percent Adjustment (Bridge and Non-Bridge) <sup>(1)(2)</sup>
Percent Mat Density	
98.6 - 100	-1.667*(ACRPD-98.5)
97.1 – 98.5	-2.0*(ACRPD-98.5)
95.0-97.0	+3.0
93.6 – 94.9	+2.0*(ACRPD-93.5)
93.0 – 93.5	0
92.0-92.9	-0.5*(93.0-ACRPD)
90.0 – 91.9	-5*(92-ACRPD)
88.0 – 89.9	-10*(91-ACRPD)
87.9 or less	Remove and replace (curb to curb)

<sup>(1)</sup> ACRPD = Average Core Result Percent Density.

<sup>(2)</sup> All Percent Adjustments to be rounded to the second decimal place; for example round 1.667 to 1.67

**TABLE 4.06-9: Adjustment Values for Pavement Joint Density**

Average Core Result	Percent Adjustment (Bridge and Non-Bridge) <sup>(1)(2)</sup>
Percent Joint Density	
98.6 - 100	-1.667*(ACRPD-98.5)
97.1 – 98.5	-2.0*(ACRPD-98.5)
94.5 – 97.0	+3.0
92.6 – 94.4	+1.5*(ACRPD-92.5)
92.0– 92.5	0
91.0 – 91.9	-0.5(92.0-ACRPD)
89.0 – 90.9	-7.5*(91-ACRPD)
88.0 – 88.9	-15*(90-ACRPD)

87.9 or less	Remove and Replace (curb to curb)
--------------	-----------------------------------

(1) ACRPD = Average Core Result Percent Density

(2) All Percent Adjustments to be rounded to the second decimal place; for example round 1.667 to 1.67

Additionally, any simple average subplot with a density result below 88% is subject to remove and replace.

ii. PWL Density Lot (3,500 tons or more):

For each lot, the adjustment values will be calculated using PWL methodology based on mat and joint density test results. Only one result will be included for each subplot. The results will be considered as being normally distributed and all applicable equations in AASHTO R 9 and AASHTO R 42 Appendix X4 will apply.

The specification limits for the PWL determination are as follows:

Mat Density: 92.0 – 98%

Joint Density: 90.5 – 98%

For mat and joint density, the individual percent adjustment (PA) will be calculated as follows:

For PWL between 50 and 90%:  $PA_{(M \text{ or } J)} = 0.25 * PWL - 22.50$

For PWL at and above 90%:  $PA_{(M \text{ or } J)} = 0.15 * PWL - 13.5$

Where:  $PA_M$  = Total percent mat density adjustment value for the PWL mat density lot

$PA_J$  = Total percent joint density adjustment value for the PWL joint density lot

No positive adjustment will be applied to a density lot in which any core was not taken within the required 3 calendar days of placement.

A lot with PWL less than 50%, the lot shall, after final evaluation and dispute resolution if approved, be removed and replaced at the Contractor's expense. The total adjustment for each PWL mat density lot will be computed as follows:

**Tons Adjusted for Mat Density ( $T_{MD}$ )** =  $(PA_M / 100) \times \text{Tons}$

Where: Tons = Weight of material (tons) in the lot adjusted by 4.06.04-1.

The total adjustment for each PWL joint density lot will be computed as follows:

**Tons Adjusted for Joint Density ( $T_{JD}$ )** =  $(PA_J / 100) \times J\_Tons$

(Tons Adjusted for Joint Density will be calculated at the end of each project or project phase.)

Where:  $J\_Tons$  = Tons in project or phase adjusted by 4.06.4 –  $1 \times \frac{\text{Lot joint length}}{\text{Joint length in project or phase}}$

All bridge density lot adjustments will be evaluated in accordance with 4.06.04-2(b)i.

Additionally, any bridge deck subplot with a density result below 88% is subject to remove and replace.

iii. Partial Lots:

Lots with less than 4 sub lots will be combined with the prior lot. If there is no prior lot with equivalent material and placement conditions or if the last test result of the prior lot is over 30 calendar days old, the mat and joint individual adjustments will be calculated in accordance to Tables 4.06-8 and 4.06-9.  $T_{MD}$  and  $T_{JD}$  will be calculated as indicated in 4.06.04-2(b)i.

Lots with 4 or more sub lots will be calculated as indicated in 4.06.04-2(b)ii.

**Density Lot Adjustment (Simple Average Lots):**  $T_D \times \text{Unit Price} = \text{Est. (Di)}$

**Density Lot Adjustment (PWL Lots):**  $(T_{MD} \text{ or } T_{JD}) \times \text{Unit Price} = \text{Est. (DMi or DJi)}$

Where: Unit Price = Contract unit price per ton per type of mixture

Est. (Di) = Pay Unit in dollars representing incentive or disincentive per simple average density lot

Est. (DMi) = Pay Unit in dollars representing incentive or disincentive per PWL mat lot

Est. (DJi) = Pay Unit in dollars representing incentive or disincentive per PWL joint lot

Additionally, any PWL subplot with a density result below 88% is subject to remove and replace.

**3. Transitions for Roadway Surface:** The installation of permanent transitions will be measured under the appropriate item used in the formation of the transition.

The quantity of material used for the installation of temporary transitions will be measured for payment under the appropriate item used in the formation of the transition. The installation and removal of a bond breaker and the removal and disposal of any temporary transition formed by milling or with asphalt pavement is not measured for payment.

**4. Cut Bituminous Concrete Pavement:** The quantity of asphalt pavement cut will be measured in accordance with 2.02.04.

**5. Non-Tracking Asphalt Tack Coat and Material for Tack Coat:** The quantity of tack coat will be

measured for payment by the number of gallons furnished and applied on the Project and approved by the Engineer. No tack coat material shall be included that is placed in excess of the tolerance described in 4.06.03.

- a. Container Method – Material furnished in a container will be measured to the nearest 1/2 gallon. The volume will be determined by either measuring the volume in the original container by a method approved by the Engineer or using a separate graduated container capable of measuring the volume to the nearest 1/2 gallon. The container in which the material is furnished must include the description of material, including lot number or batch number and manufacturer or product source.
- b. Vehicle Method
  - i. Measured by Weight: The number of gallons furnished will be determined by weighing the material on calibrated scales furnished by the Contractor. To convert weight to gallons, one of the following formulas will be used:
    1. Tack Coat (gallons at 60°F) = Measured Weight (pounds) / Weight per gallon at 60°F
    2. Tack Coat (gallons at 60°F) = 0.996 × Measured Weight (pounds) / Weight per gallon at 77°F
  - ii. Measured by automated metering system on the delivery vehicle:
 

Tack Coat (gallons at 60°F) = 0.976 × Measured Volume (gallons)

**6. Material Transfer Vehicle (MTV):** The furnishing and use of a MTV will be measured separately for payment based on the actual number of surface course tons delivered to a paver using the MTV.

**4.06.05—Basis of Payment:**

**1. HMA S\* or PMA S\*:** The furnishing and placing of Asphalt mix will be paid for at the Contract unit price per ton for "HMA S\*" or "PMA S\*."

All costs associated with providing illumination of the work area are included in the general cost of the work.

All costs associated with cleaning the surface to be paved, including mechanical sweeping, are included in the general cost of the work. All costs associated with constructing longitudinal joints are included in the general cost of the work

All costs associated with obtaining cores for acceptance testing and dispute resolution are included in the general cost of the work.

**2. Bituminous Concrete Adjustment Costs:** This adjustment will be calculated using the formulas shown below if all of the measured adjustments in 4.06.04-2 are not equal to zero. A positive or negative adjustment will be applied to monies due the Contractor.

**Production Lot:**  $\Sigma \text{ Est (Pi)} = \text{Est. (P)}$

**Density Lot (Simple Average Lots):**  $\Sigma \text{ Est (Di)} = \text{Est. (D)}$

**Density Lot (PWL):**  $\Sigma \text{ Est (DMi)} + \Sigma \text{ (DJi)} = \text{Est. (D)}$

**Bituminous Concrete Adjustment Cost= Est. (P) + Est. (D)**

Where: Est. ( )= Pay Unit in dollars representing incentive or disincentive in each production or density lot calculated in 4.06.04-2

The Bituminous Concrete Adjustment Cost item, if included in the bid proposal or estimate, 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 estimated cost will be used for the Contract.

**3. Transitions for Roadway Surface:** The installation of permanent transitions will be paid under the appropriate item used in the formation of the transition. The quantity of material used for the installation of temporary transitions will be paid under the appropriate pay item used in the formation of the transition. The installation and removal of a bond breaker, and the removal and disposal of any temporary transition formed by milling or with asphalt pavement is included in the general cost of the work.

**4.** The cutting of asphalt pavement will be paid in accordance with 2.02.05.

**5.** Non-tracking asphalt tack coat will be paid for at the Contract unit price per gallon for "Non-Tracking Asphalt Tack Coat."

**6.** Material for tack coat will be paid for at the Contract unit price per gallon for "Material for Tack Coat."

**7.** The Material Transfer Vehicle (MTV) will be paid at the Contract unit price per ton for "Material Transfer Vehicle."

**Rev. 12/18/2025**

Pay Item	Pay Unit
HMA S*	ton
PMA S*	ton
Bituminous Concrete Adjustment Cost	est.
Non-Tracking Asphalt Tack Coat	gal.
Material for Tack Coat	gal.
Material Transfer Vehicle	ton

## **SECTION M.04 - BITUMINOUS CONCRETE MATERIALS**

*Replace the entire Section with the following:*

### **SECTION M.04 BITUMINOUS CONCRETE MATERIALS**

#### **M.04.01—Asphalt Materials and Facilities**

#### **M.04.02—Mix Design and Job Mix Formula (JMF)**

#### **M.04.03—Production Requirements**

**M.04.01— Asphalt Materials and Facilities:** Each source of asphalt binder, emulsion, aggregate, and production facility used to manufacture asphalt mixture, and laboratory testing the mixture must be qualified on an annual basis by the Engineer.

The basis of qualification for asphalt binder sources is participation in AASHTO Product Evaluation and Audit Solutions (formerly NTPEP), Asphalt Binder Suppliers (ABS) program and review of the sources' Quality System Manual and on-site audit report from AASHTO Product Evaluation and Audit Solutions by the Department. The supplier shall save a split sample of binder supplied to Department projects which shall be provided to the Department upon request.

The basis of qualification for emulsion sources is the submittal of a "Quality Control Plan for Emulsified Asphalt" (Tack Coat) formatted in accordance with AASHTO R 77 to the Engineer for review. The supplier shall save a split sample of binder supplied to Department projects which shall be provided to the Department upon request.

The basis of source qualification for aggregates is indicated in M.01

The basis of qualification for production facilities is indicated in M.04.01-10.

The basis of testing laboratory qualification for mixture testing is all testing equipment, supplies, and safety equipment shall be capable of performing all the applicable tests in their entirety that are referenced in AASHTO R 35 and AASHTO M 323 and requirements indicated in M.04.01-11

AASHTO/ASTM Standards noted with an (M) have been modified and are detailed in Table M.04.03-5.

Aggregates from multiple sources of supply must not be blended or stored in the same stockpile.

**1. Coarse Aggregate:** All coarse aggregate shall meet the requirements listed in M.01 and be qualified annually.

**2. Fine Aggregate:** All fine aggregate shall meet the requirements in M.01 and be qualified annually.

**3. Mineral Filler:** Mineral filler shall meet the requirements of AASHTO M 17.

#### **4. Performance Graded (PG) Asphalt Binder:**

##### **(a) General:**

- i. PG asphalt binder shall be uniformly mixed and blended and be free of contaminants such as fuel oils and other solvents. Binder shall be properly heated and stored to prevent damage or separation.
- ii. The binder shall meet the requirements of AASHTO M 332 and shall be graded or verified in accordance with AASHTO R 29. The binder supplier shall submit a Certified Test Report and bill of lading representing each delivery in accordance with AASHTO R 26(M) to the asphalt producer and the Department. The Certified Test Report must also indicate the binder specific gravity at 77°F; rotational viscosity at 275°F and 329°F; and the mixing and compaction viscosity-temperature chart for each shipment.
- iii. The asphalt mix producer shall submit the name(s) of personnel responsible for receipt, inspection, and record keeping of PG binder. Asphalt mix producer personnel shall document specific storage tank(s) where binder will be transferred and stored until used and provide binder samples from the storage tank to the Engineer upon request. The person(s) shall assure that each shipment is accompanied by a statement certifying that the transport vehicle was inspected before loading, was found acceptable for the material shipped and that the binder is free of contamination from any residual material, along with 2 copies of the bill of lading.
- iv. The blending or combining of PG binders in one storage tank at the Plant from different suppliers, grades, or additive percentages is prohibited.

- v. PG binders stored at the asphalt mix plant shall be at temperatures not to exceed the manufacturer's recommendation and each tank shall have a calibrated thermometer to monitor storage temperature.
- (b) Standard Performance Grade (PG) Binder:
  - i. Standard PG binder shall be defined as "Neat." Neat PG binders shall be free from modification with: fillers, extenders, reinforcing agents, adhesion promoters, thermoplastic polymers, acid modification and other additives such as re-refined motor oil, and shall indicate such information on each bill of lading and Certified Test Report.
  - ii. The standard asphalt binder shall be PG 64S-22.
- (c) Modified Performance Grade (PG) Binder: The modified asphalt binder shall be Performance Grade PG 64E-22 asphalt modified solely with a Styrene-Butadiene-Styrene (SBS) polymer. The polymer modifier shall be added at either the refinery or terminal and delivered to the asphalt production facility as homogenous blend. The stability of the modified binder shall be verified in accordance with ASTM D7173 using the Dynamic Shear Rheometer (DSR). The DSR  $G^*/\sin(\delta)$  results from the top and bottom sections of the ASTM D7173 test shall not differ by more than 10%. The results of ASTM D7173 shall be included on the Certified Test Report. The binder shall meet the requirements of AASHTO M 332 (including Appendix X1) and AASHTO R 29.
- (d) Anti-strip and Warm Mix Additive:
  - i. The additive to be used must be prequalified and listed on the Department's Qualified Products List (QPL). The QPL can be found on the Department's website. [Policy on New Product Evaluation at Connecticut DOT](#)
  - ii. The additive shall be blended with the asphalt binder in accordance with the manufacturer's recommendations.
  - iii. The blended binder shall meet the requirements of AASHTO M 332 and shall be graded or verified in accordance with AASHTO R 29 for the specified binder grade. The Binder Supplier or Mix Producer shall submit a Certified Test Report showing the results of the testing demonstrating the binder grade. In addition, it must include the grade of the virgin binder, the brand name of the additive, the manufacturer's suggested rate for the additive, and the Technology manufacturer's recommended mixing and compaction temperature range for the dose rate.
- (e) Foaming Technology: Foaming shall be blended with the mix during production in accordance with the manufacturer's recommendations and at the water injection rate on the mix design. Qualification of the foaming equipment is based on the mixture meeting all requirements of M.04.

## 5. Emulsified Asphalts:

- (a) General:
  - i. The emulsified asphalt shall meet the requirements of AASHTO M 140(M), AASHTO M 208, or as applicable herein.
  - ii. The emulsified asphalts shall be free of contaminants such as fuel oils and other solvents.
  - iii. The blending at mixing Plants of emulsified asphalts from different suppliers is prohibited.
  - iv. Materials used for tack coat shall not be diluted.
  - v. The emulsion supplier shall submit a Certificate of Analysis (COA) in accordance with AASHTO R 77 to the Department's Central Laboratory for every lot or batch used on Department projects. This is to be submitted upon testing being complete.
- (b) Basis of Approval:
  - i. Each shipment of emulsified asphalt delivered to the Project site shall be accompanied with the corresponding Bill of Lading in accordance with AASHTO R 77 listing residue by evaporation, penetration of residue, and weight per gallon at 77°F or 60°F, lot number, and grade.
  - ii. Non-Tracking Asphalt Tack Coat
    - Emulsion for Non-Tracking Asphalt Tack Coat shall meet the requirements of Table M.04.01-1 below.

**Table M.04.01-1: Asphalt Emulsion for Non-Tracking Tack Coat**

Property	Specification	Test Procedure
Viscosity, SFS, 77°F	20-100	AASHTO T 72
Sieve, %	0.3 maximum	AASHTO T 59
Asphalt Residue, %	50 minimum	AASHTO T 59
Oil Distillate, %	1.0 maximum	AASHTO T 59
Residue Penetration, at 77°F	10-40	AASHTO T 49
Original Dynamic Shear (G*/sin δ), kPa at 70°C (Base Asphalt)	1.0 minimum	AASHTO T 315
Ash, %	1.0 maximum	AASHTO T 111

- iii. Material for Tack Coat
  - Anionic emulsified asphalts shall meet the requirements of AASHTO M 140. Materials used for anionic tack coat shall meet grade RS-1 or RS-1h. When ambient temperatures are 80°F and rising, grade SS-1 or SS-1h may be substituted if permitted by the Engineer.
  - Cationic emulsified asphalt shall meet the requirements of AASHTO M 208. Materials used for cationic tack coat shall meet grade CRS-1. The settlement and demulsibility test will not be performed unless deemed necessary by the Engineer. When ambient temperatures are 80°F and rising, grade CSS-1 or CSS-1h may be substituted if permitted by the Engineer.

**6. Reclaimed Asphalt Pavement (RAP):**

(a) **General:** RAP is a material obtained from the cold milling or removal and processing of asphalt mixture. RAP material shall be crushed to 100% passing the 1/2 inch sieve and free from contaminants such as joint compound, wood, plastic, and metals.

- (b) **Basis of Approval:** The RAP material will be accepted on the basis of one of the following criteria:
- i. When the source of all RAP material is from pavements previously constructed on Department projects, the asphalt producer shall provide a monthly Materials Certificate listing the detailed locations and lengths of those pavements and that the RAP is only from those locations listed.
  - ii. When the RAP material source or quality is not known, the Contractor shall request approval from the Engineer at least 30 calendar days prior to the start of the paving operation. The request shall include a Materials Certificate and applicable test results stating that the RAP consists of aggregates that meet the specification requirements of M.04.01-1 through M.04.01-3 and that the binder in the RAP is substantially free of solvents, tars and other contaminants. The Contractor is prohibited from using unapproved material on Department projects and shall take necessary action to prevent contamination of approved RAP stockpiles. Stockpiles of unapproved material shall remain separate from all other RAP materials at all times. The request for approval shall include the following:
    - 1. A 50-lb. sample of the RAP to be incorporated into the recycled mixture.
    - 2. A 25-lb. sample of the extracted aggregate from the RAP.

**7. Crushed Recycled Container Glass (CRCG):**

(a) **Requirements:** The Contractor may propose to use clean and environmentally-acceptable CRCG in an amount not greater than 5% by weight of total aggregate.

(b) **Basis of Approval:** The Contractor shall submit to the Engineer a request to use CRCG. The request shall state that the CRCG contains no more than 1% by weight of contaminants such as paper, plastic, and metal and meets the following gradation:

CRCG Grading Requirements	
Sieve Size	Percent Passing
3/8 inch	100
No. 4	35-100
No. 200	0.0-10.0

The Contractor shall submit a Materials Certificate to the Engineer stating that the CRCG complies with all the applicable requirements in this Section.

**8. Joint Seal Material:** Joint seal material must meet the requirements of ASTM D6690 - Type 2. The Contractor shall submit a Materials Certificate in accordance with 1.06.07 or 1.20-1.06.07 certifying that the joint seal material meets the requirements of this Section.

**9. Recycled Asphalt Shingles (RAS):** RAS shall consist of processed asphalt roofing shingles from post-consumer asphalt shingles or from manufactured shingle waste. The RAS under consideration for use in asphalt mixtures must be certified as being asbestos-free and shall be entirely free of whole, intact nails. The RAS shall meet the requirements of AASHTO MP 23.

RAS shall be tested to determine the asphalt content and the gradation at a frequency acceptable to the Engineer. RAS stockpiles shall be maintained to prevent contamination.

The Contractor shall submit a Materials Certificate to the Engineer stating that the RAS complies with all the applicable requirements.

**10. Plant Requirements:**

**(a) General:** The Plant producing asphalt mixtures shall comply with AASHTO M 156.

**(b) Storage Silos:** The Contractor may use silos for short-term storage with the approval of the Engineer. A storage silo must have heated cones and an unheated silo cylinder if it does not contain a separate internal heating system. When multiple silos are filled, the Contractor shall discharge 1 silo at a time. Simultaneous discharge of multiple silos for the same Project is not permitted.

Type of silo cylinder	Maximum storage time for all classes (hr)	
	64S-22 Mixes	64E-22 Mixes
Open Surge	4	Mfg Recommendations*
Unheated - Non-insulated	8	Mfg Recommendations*
Unheated - Insulated	18	Mfg Recommendations*
Heated - No inert gas	24	Mfg Recommendations*

\*Not to exceed HMA limits

**(c) Documentation System:** The mixing Plant documentation system shall include equipment for accurately proportioning the components of the mixture by weight and in the proper order, controlling the cycle sequence, and timing the mixing operations. The plant documentation system shall monitor the batching sequence of each component of the mixture and produce an electronic record of these operations as specified herein. All electronic records shall be available to the Engineer upon request.

If recycled materials are used, the electronic record shall include their dry weight, percentage, and daily moisture content.

If an additive or warm mix foaming technology is added at the Plant, the Plant electronic record shall include the actual dosage rate.

For drum Plants, the electronic record shall be produced at 5 minute intervals and maintained by the vendor for a period of 3 years after the completion of the Project.

For batch Plants, the electronic record shall be produced for each batch and maintained by the vendor for a period of 3 years after the completion of the Project. In addition, an asterisk (\*) shall be automatically printed next to any individual batch weight(s) exceeding the following tolerances:

Each Aggregate Component	±1.5% of individual or cumulative target weight for each bin
Mineral Filler	±0.5% of the total batch
PG Binder Material	±0.1% of the total batch
Zero Return (Aggregate)	±0.5% of the total batch
Zero Return (PG Binder Material)	±0.1% of the total batch

The entire batching and mixing interlock cut-off circuits shall interrupt and stop the automatic batching

operations when an error exceeding the acceptable tolerance occurs in proportioning.

The scales shall not be manually adjusted during the printing process. In addition, the system shall be interlocked to allow printing only when the scale has come to a complete rest. A unique printed character (m) shall automatically be printed on the truck and batch plant printout when the automatic batching sequence is interrupted or switched to auto-manual or full manual during proportioning.

(d) Aggregates: Aggregate stockpiles shall be managed to prevent segregation and cross contamination. For drum Plants only, the percent moisture content, at a minimum prior to production and halfway through production, shall be determined.

(e) Mixture: The plant dry and wet mix times shall provide a uniform mixture with a minimum particle coating of 95% as determined by AASHTO T 195(M).

Asphalt mixtures shall contain no more than 0.5% moisture when tested in accordance with AASHTO T 329.

(f) RAP: RAP moisture and binder content shall be updated in the plant settings prior to production.

(g) Asphalt Binder: A binder log shall be maintained by the asphalt producer and submitted to the Department's Central Lab on a monthly basis. The log shall include the grade and tank loaded for each shipment. Asphalt binder plant setting shall not be set below the minimum binder content specified in Table M.04.02-5.

(h) Warm mix additive: For mechanically foamed WMA, the water injection rate shall be monitored during production, not to exceed 2.0% by total weight of binder, and must be documented on the electronic record.

**11. Testing Laboratory:** The laboratory performing acceptance testing on box samples shall be provided with functioning equipment and adequate supplies to test asphalt mixtures in accordance with Table M.04.03. The laboratory shall have a minimum of 300 s.f., have a potable water source and drainage in accordance with the CT Department of Public Health. The laboratory shall have a PC with internet connection capable of submitting electronic test results to the Engineer.

The laboratory shall be equipped with a heating system capable of maintaining a minimum temperature of 65°F. It shall be clear and free of all materials and equipment not associated with the laboratory. Sufficient light and ventilation must be provided. During summer months adequate cooling or ventilation must be provided so the indoor air temperature shall not exceed the ambient outdoor temperature.

The laboratory shall maintain a list of equipment used in the acceptance testing processes including, but not limited to, balances, scales, manometer/vacuum gauge, thermometers, and gyratory compactor, clearly showing calibration and/or inspection dates, in accordance with AASHTO R 18.

#### **M.04.02—Mix design and Job Mix Formula (JMF)**

##### **1. Curb Mix:**

(a) Requirements: The Contractor shall use asphalt mixture that meets the requirements of Table M.04.02-1. RAP may be used in 5% increments by weight up to 30%.

(b) Basis of Approval: Annually, an approved JMF based on a mix design for curb mix must be on file with the Engineer prior to use.

The Contractor shall test the mixture for compliance with the submitted JMF and Table M.04.02-1. The maximum theoretical density (Gmm) will be determined by AASHTO T 209. If the mixture does not meet the requirements, the JMF shall be adjusted within the ranges shown in Table M.04.02-1 until an acceptable mixture is produced.

An accepted JMF from the previous operating season may be acceptable to the Engineer provided that there are no changes in the sources of supply for the coarse aggregate, fine aggregate, recycled material (if applicable) and the Plant operation had been consistently producing acceptable mixture.

Any change in component source of supply or consensus properties must be approved by the Engineer. A revised JMF shall be submitted prior to use.

**TABLE M.04.02-1: Control Points for Curb Mix Mixtures**

Mix	Curb Mix	Production Tolerances from JMF Target
Grade of PG Binder content %	PG 64S-22 6.50 - 9.00	0.30
Sieve Size: No. 200	3.0 - 8.0 (b)	2.0
No. 50	10 - 30	4
No. 30	20 - 40	5
No. 8	40 - 70	6
No. 4	65 - 87	7
1/4 inch		
3/8 inch	95 - 100	8
1/2 inch	100	8
3/4 inch		8
1 inch		
2 inch		
<b>Additionally, the fraction of material retained between any 2 consecutive sieves shall not be less than 4%.</b>		
Mixture Temperature	265-325°F	
Mixture Properties	Air Voids (VA) %	0 - 4.0 (a)
<b>Notes:</b>	(a) Compaction Parameter 50 gyrations ( $N_{des}$ ) (b) The percent passing the No. 200 sieve shall not exceed the percentage of PG asphalt binder.	

## 2. Superpave Mix Design Method – S0.25, S0.375, S0.5, and S1:

(a) **Requirements:** All designated mixes shall be designed using the Superpave mix design method in accordance with AASHTO R 35. A JMF based on the mix design shall meet the requirements of Tables M.04.02-2 to M.04.02-5. Each JMF and component samples must be submitted no less than 14 days prior to production and must be approved by the Engineer prior to use. All JMFs expire at the end of the calendar year.

All aggregate properties listed in tables M.01.02-1 through M.01.03-2, Table M.04.02-3, and specific gravities including absorption shall be tested at an AASHTO re:source accredited laboratory by a NETTCP Soil and Aggregate Laboratory Technician Certified technician(s) annually and submitted to the Engineer.

All asphalt mixes shall be tested for stripping susceptibility by performing the TSR test procedure in accordance with AASHTO T 283(M) at a minimum every 36 months. A JMF revision requires a new mix design TSR test. The compacted specimens may be fabricated at the Plant and then tested at an AASHTO re:source accredited laboratory by NETTCP HMA Plant Certified Technicians and submitted to the Engineer. The test report shall include Job Mix Formula blend percentages and anti-strip dosage, if applicable. The design TSR test can be performed on either laboratory or plant produced mixture. A minimum of 45,000 grams of laboratory or plant blended mixture and the corresponding complete Form MAT-412s shall be submitted to the Department's Central Laboratory for design TSR testing verification. The mixture submitted shall be representative of the corresponding mix design as determined by the Engineer.

### 1. Superpave Mixtures with RAP: RAP may be used with the following conditions:

- RAP amounts up to 15% may be used with no binder grade modification.
- RAP amounts over 15% and up to 20% may be used provided a new JMF is approved by the Engineer. The JMF submittal shall include the grade of virgin binder added. The JMF shall be accompanied by a blending chart and supporting test results in accordance with AASHTO M 323 Appendix X1, or by testing that shows the combined binder (recovered binder from

the RAP, virgin binder at the mix design proportions, warm mix asphalt additive and any other modifier if used) meets the requirements of the specified binder grade. RAP amounts over 20% and up to 25% may be used in S1 or P1 mixes only provided a new JMF is accepted by the Engineer. The virgin binder grade shall be a PG 58S-28 or PG 64E-28 based on final PG grade of mix specified. In accordance with M.04.01-4, the virgin binder grade selected shall be “neat” or modified with SBS only. The JMF submittal shall include the true grade of the virgin binder and extracted rap binder. The JMF shall be accompanied by a blending chart and supporting test results in accordance with AASHTO M 323 Appendix X1, or by testing that shows the combined binder (recovered binder from the RAP, virgin binder at the mix design proportions, warm mix asphalt additive and any other modifier if used) meets the requirements of the specified binder grade.

- A representative sample of RAP shall be tested for binder content in accordance with AASHTO T 164 and in accordance with AASHTO T 308. A split sample shall be submitted to the Engineer.
  - RAP material shall not be used with any other recycling option.
2. Superpave Mixtures with RAS: RAS may be used solely in HMA S1 mixtures with the following conditions:
- RAS amounts up to 3% may be used.
  - RAS total binder replacement up to 15% may be used with no binder grade modification.
  - RAS total binder replacement up to 20% may be used provided a new JMF is approved by the Engineer. The JMF submittal shall include the grade of virgin binder added. The JMF shall be accompanied by a blending chart and supporting test results in accordance with AASHTO M 323 Appendix X1, or by testing that shows the combined binder (recovered binder from the RAP, virgin binder at the mix design proportions, warm mix asphalt additive and any other modifier if used) meets the requirements of the specified binder grade.
  - Superpave Mixtures with RAS shall meet AASHTO PP 78 design considerations.
- iii. Superpave Mixtures with CRCG: CRCG may be used solely in HMA S1 mixtures. One percent (1%) of hydrated lime, or other accepted non-stripping agent, shall be added to all mixtures containing CRCG. CRCG material shall not be used with any other recycling option.
- (b) Basis of JMF Approval: The following information must be included in the JMF submittal:
- i. Gradation, consensus properties, durability tests (Abrasion and Soundness), and specific gravities of the aggregate, RAP or RAS.
  - ii. Average asphalt content of the RAP or RAS by AASHTO T 164.
  - iii. RAP or RAS and percentage to be used.
  - iv. Warm mix technology and additive rate.
  - v. TSR test report and anti-strip manufacturer and dosage rate if applicable.
  - vi. Mixing and compaction temperature ranges for the mix with/without warm-mix technology.
  - vii. JMF ignition oven correction factor by AASHTO T 308.

With each JMF submittal, the following samples shall be submitted to the Central Lab:

- 4 - one (1) quart cans of PG binder with anti-strip and/or warm mix additive as applicable, with corresponding Safety Data Sheet (SDS) and PG binder lot Certified Test Report
- 1 - 50 lbs. bag of RAP
- 2 - 50 lbs. bags of Plant-blended virgin aggregate

A JMF may not be approved if any of the properties of the aggregate components or mix do not meet the verification tolerances as described in the Department’s current QA Program for Materials, Acceptance and Assurance Testing Policies and Procedures.

Any material based on a JMF, once approved, shall only be acceptable for use when it is produced by the designated Plant, it utilizes the same components, and the production of material continues to meet all criteria as specified in Tables M.04.02-2, M.04.02-3 M.04.02-4 and M.04.02-5. A new JMF must be submitted to the Engineer for approval whenever a new component source is proposed.

Only 1 mix with 1 JMF will be approved for production at a time. Switching between approved JMF mixes with different component percentages or sources of supply is prohibited.

**TABLE M.04.02-2: Superpave Asphalt Mixture Design Target Values**

Sieve	S0.25		S0.375		S0.5		S1	
	Control Points		Control Points		Control Points		Control Points	
	Min (%)	Max (%)	Min (%)	Max (%)	Min (%)	Max (%)	Min (%)	Max (%)
inches								
2.0	-	-	-	-	-	-	-	-
1.5	-	-	-	-	-	-	100	-
1.0	-	-	-	-	-	-	90	100
3/4	-	-	-	-	100	-	-	90
1/2	100	-	100	-	90	100	-	-
3/8	97	100	90	100	-	90	-	-
No. 4	72	90	-	72	-	-	-	-
No. 8	32	67	32	67	28	58	19	45
No. 16	-	-	-	-	-	-	-	-
No. 30	-	-	-	-	-	-	-	-
No. 50	-	-	-	-	-	-	-	-
No. 100	-	-	-	-	-	-	-	-
No. 200	2.0	10.0	2.0	10.0	2.0	10.0	1.0	7.0
VMA (%)	16.5 -0.5, +1.0		16.0 -0.5, +1.0		15.0 -0.5, +1.0		13.0 -0.5, +1.0	
VA (%)	4.0 ±0.5		4.0 ±0.5		4.0 ±0.5		4.0 ±0.5	
Dust / effective binder	0.6 - 1.2		0.6 - 1.2		0.6 - 1.2		0.6 - 1.2	
TSR	≥ 80%		≥ 80%		≥ 80%		≥ 80%	
T-283 Stripping	2 or less							

(c) **Mix Status:** Each facility will have each type of asphalt mixture rated based on the results of the previous year of production. Mix status will be developed for each facility prior to the beginning of the paving season.

The rating criteria are based on compliance with Air Voids and Voids in Mineral Aggregate (VMA) as indicated in Table M.04.03-4 and are calculated as follows:

Criteria : Percentage of acceptance test results with compliant air voids, VMA, VFA, Density to Nini and dust to Pbe.

Mix status is defined as:

**“A” – Approved:** Assigned to each mixture type from a production facility with a current rating of 70% or greater, or to each mixture type completing a successful PPT.

**“U” – Not Approved:** Status assigned to a type of mixture that does not have an approved JMF. Asphalt mixtures with a “U” status cannot be used on Department projects.

**“PPT” – Pre-Production Trial:** Temporarily assigned to each mixture type from a production facility when:

1. no compliant acceptance production test results have been submitted to the Department from the previous year;
2. there is a source change in one or more aggregate components;
3. there is a component percentage change of more than 5% by weight;
4. there is a change in RAP percentage;
5. the mixture has a rating of less than 70% from the previous season;
6. it is a new JMF not previously submitted; or

7. mixture being evaluated under “U” status.

Asphalt mixtures rated with a “PPT” status cannot be used on Department projects until modifications are made at the facility. Sufficient testing by NETTCP certified personnel must confirm that specification requirements in Tables M.04.02-2 through M.04.02-4 are met and the binder content (Pb) meets the requirements in Table M.04.03-2 before material can be used. One of the following methods must be used to verify the test results:

- Option A: Schedule a day when a Department Inspector can be at the facility to witness testing
- Option B: When the Contractor or their representative performs testing without being witnessed by an Inspector, the Contractor shall submit the test results and a split sample including 2 gyratory molds, 5,000 grams of boxed mixture, and 5,000 grams of cooled loose mixture for verification testing and acceptance

Department Witness or verification of compliant test results will change the mix’s status to “A”  
 The differences between the Department’s test results and the Contractor’s must be within the “C” tolerances included in the Department’s QA Program for Materials and meet all requirements in Table M.04.02-2, Table M.04.02-4 and Table M.04.02-5 in order to be verified.

**TABLE M.04.02-3: Superpave Consensus Properties Requirements for Combined Aggregate**

Traffic Level	Design ESALs (80kN) Millions	Coarse Aggregate Angularity <sup>(1)</sup> ASTM D5821, Minimum %	Fine Aggregate Angularity AASHTO T 304, Method A Minimum %	Flat and Elongated Particles <sup>(2)</sup> ASTM D4791, Maximum %	Sand Equivalent AASHTO T 176, Minimum %
1	< 0.3	55/- -	40	10	40
2	0.3 to < 3.0	75/- -	40	10	40
3	≥ 3.0	95/90	45	10	45

Notes:  
 (1) 95/90 denotes that a minimum of 95% of the coarse aggregate, by mass, shall have one fractured face and that a minimum of 90% shall have two fractured faces.  
 (2) Criteria presented as maximum Percent by mass of flat and elongated particles of materials retained on the No. 4 sieve, determined at 5:1 ratio.

**TABLE M.04.02-4: Superpave Traffic Levels and Design Volumetric Properties**

Traffic Level	Design ESALs (million)	Number of Gyration by Superpave Gyratory Compactor			Percent Density of Gmm from HMA/ WMA Specimen			Voids Filled with Asphalt (VFA) Based on Nominal Mix Size - Inch			
		N <sub>ini</sub>	N <sub>des</sub>	N <sub>max</sub>	N <sub>ini</sub>	N <sub>des</sub>	N <sub>max</sub>	0.25	0.375	0.5	1
1	<0.3	6	50	75	≤91.5	96.0	≤98.0	63-78	73-76	71-75	67-71
2	0.3 to <3.0	7	75	115	≤90.5	96.0	≤98.0				
*3	≥3.0	7	75	115	≤90.5	96.0	≤98.0				

\*Note 1- All Traffic Level 3 mixes shall include polymer modified asphalt.

**TABLE M.04.02-5:  
Superpave Minimum Binder Content by Mix Type and Level**

Mix Type	Level	Binder Content Minimum
S0.25	1	5.80
S0.25	2	5.70
S0.25	3	5.70
S0.375	1	5.70
S0.375	2	5.60
S0.375	3	5.60
S0.5	1	5.10
S0.5	2	5.00
S0.5	3	5.00
S1	1	4.60
S1	2	4.50
S1	3	4.50

**M.04.03—Production Requirements:**

**1. Standard Quality Control Plan (QCP) for Production:** The QCP for production shall describe the organization and procedures, which the Contractor shall use to administer quality control. The QCP shall include the procedures used to control the production process, to determine when immediate changes to the processes are needed, and to implement the required changes. The QCP must detail the inspection, sampling and testing protocols to be used, and the frequency for each.

Control Chart(s) shall be developed and maintained for critical aspect(s) of the production process as determined by the Contractor. The control chart(s) shall identify the material property, applicable upper and lower control limits, and be updated with current test data. As a minimum, the following quality characteristics shall be included in the control charts:

- percent passing No. 4 sieve
- percent passing No. 200 sieve
- binder content
- air voids
- Gmm
- Gse
- VMA

The control chart(s) shall be used as part of the quality control system to document variability of the production process. The control chart(s) shall be submitted to the Engineer the first day of each month.

The QCP shall document the Contractors Reclaimed Asphalt Pavement (RAP) management practices, including stockpile management, and sampling and testing frequencies. At a minimum, RAP moisture, binder content and gradation shall be tested daily when asphalt mixture is being produced for the Department. The Contractor shall maintain control charts for RAP binder content.

The QCP shall also include the name and qualifications of a Quality Control Manager. The Quality Control Manager shall be responsible for the administration of the QCP, including compliance with the plan and any plan modifications.

The Contractor shall submit complete production testing records to the Engineer within 24 hours in a manner acceptable to the Engineer including all testing records, RAP binder and moisture content, and testing equipment print outs, such is gyratory compactors and ignition oven print outs. These records must be maintained for a minimum of three years after project completion.

The QCP shall also include the name and qualifications of any outside testing laboratory performing any

QC functions on behalf of the Contractor. The QCP must also include a list of sampling and testing methods and frequencies used during production, and the names of all Quality Control personnel and their duties.

Approval of the QCP does not imply any warranty by the Engineer that adherence to the plan will result in production of asphalt mix that complies with these specifications. The Contractor shall submit any changes to the QCP as work progresses.

## **2. Acceptance Requirements:**

### **(a) General:**

All mixtures except for curb mix shall be sampled at the Project site by the Contractor as directed by the Engineer. A Contractor representative shall obtain a field sample of the material placed at the Project site in accordance with AASHTO R 97 or an alternate procedure acceptable to the Engineer. The Contractor's representative obtaining mix samples must be a certified NETTCP HMA Paving Inspector, NETTCP HMA Plant Technician, or has successfully completed the HMA Field Sampling Course administered by the Connecticut Advanced Pavement Laboratory. The bulk sample shall be quartered by the Contractor in accordance with AASHTO R 47 using a Type A Mechanical Splitter and placed into four new cardboard containers acceptable to the Engineer. The cardboard container shall be sealed with security tape provided by the Department and labelled to include the Project number, date of paving, mix type, lot and subplot numbers and daily tonnage. The minimum weight of each quartered sample shall be 14,000 grams with the exception of 1.0 mixes which require minimum sample size of 20,000 grams. If needed, more than four boxes can be used for 1.0 mixes. The Contractor shall transport one of the containers to the Department's Central Laboratory in Rocky Hill, retain one of the sealed containers for potential use in dispute resolution and test the remaining sample for acceptance in accordance with past practice within 2 days of sampling.

The Contractor shall submit all acceptance tests results to the Engineer within 24 hours or prior to the next day's production. All acceptance test specimens and supporting documentation must be retained by the Contractor and may be disposed of with the approval of the Engineer. All quality control specimens shall be clearly labeled and separated from the acceptance specimens.

Contractor QC personnel must be present at the facility prior to, during, and until completion of production, and be certified as a NETTCP HMA Plant Technician and be in good standing. Production of material for use on State projects must be suspended by the Contractor if such personnel are not present. Technicians found by the Engineer to be non-compliant with NETTCP policies and procedures or Department policies may be removed by the Engineer from participating in the acceptance testing process for Department projects until their actions can be reviewed.

Verification and dispute resolution testing will be performed by the Engineer in accordance with the Department's QA Program for Materials.

If the Contractor disputes the Engineer's test results, the Contractor must submit in writing a request to initiate the dispute resolution process within 24 hours of receiving the adjustment and must include supporting documentation or test results to justify the request. If the dispute resolution is granted by the Engineer, all sublots for the disputed lot(s) shall be transported by the Contractor to the Department's Central Laboratory for testing.

**(b) Curb Mix Acceptance Sampling and Testing Procedures:** Curb Mixes may be sampled and tested by Central Laboratory personnel at any time. When these mix designs are specified, the following acceptance procedures and AASHTO test methods shall be used:

TABLE M.04.03-1: Curb Mix Acceptance Test Procedures

Protocol	Reference	Description
1	AASHTO T 30(M)	Mechanical Analysis of Extracted Aggregate
2	AASHTO R 97	Sampling Asphalt Mixtures
3	AASHTO R 47	Reducing samples of Asphalt Mixtures to Testing Size
4	AASHTO T 308	Asphalt Binder Content of Asphalt Mixtures by Ignition Oven Method (Method A)
5	AASHTO T 209(M) <sup>(2)</sup>	Theoretical Maximum Specific Gravity and Density of Asphalt Mixtures (average of 2 tests)
6	AASHTO T 312 <sup>(2)</sup>	<sup>(1)</sup> Density of Asphalt Mixture Specimens by Means of Superpave Gyratory Compactor (1 set Compacted to N <sub>des</sub> )
7	AASHTO T 166	Bulk Specific Gravity of Compacted Asphalt Mixtures Using Saturated Surface Dry Specimens
8	AASHTO T 329	Moisture Content of Asphalt Mixtures by Oven Method
9	AASHTO R 35	Air voids (average 2 specimens)

**Notes:** <sup>(1)</sup> One (1) set equals 2 each of 6 inch molds. Molds to be compacted to 50 gyrations.

i. Determination of "U" Status:

1. Curb Mix is considered on "U" status when test results indicate that any single value for bitumen content, Va, or gradation are not within the tolerances shown in Table M.04.02-1 for that mixture. If the mix is on "U" status the Contractor must take action to correct the deficiency. A passing PPT and supporting documentation must be submitted and approved by the Engineer prior to the next day of production.
2. Material not meeting the requirements of Table M.04.02-1 will be evaluated under Article 1.06.04.

ii. JMF Revisions

1. Any modification to the JMF shall not exceed 50% of the JMF tolerances indicated in Table M.04.02-1 for any given component of the mixture without approval of the Engineer. When such an adjustment is made to the bitumen, the corresponding production percentage of bitumen shall be revised accordingly.

(c) Superpave Mix Acceptance:

i. Sampling and Testing Procedures

Production Lot: All mixture will begin as a PWL Production Lot. A PWL Lot will be defined as each 3,500 tons of mixture produced within 30 calendar days.

If a Lot is closed before reaching four (4) acceptance tests it will be processed as Non-PWL.

Lots will be closed due to:

- completion of the course;
- a Job Mix Formula revision due to changes in:
  - o cold feed percentages over 5%,
  - o target combined gradation over 5%,
  - o target binder over 0.15%,
  - o any component specific gravity; or
- a lot spanning 30 calendar days.

Production Sub Lot:

- 500 tons or portions thereof for last sub-lot. Last sub-lot may be less than 500 tons. For Project quantities under 75 tons no sample will be required. For quantities produced over 500 ton, the final acceptance test shall always be performed with material from the last sub lot regardless of the predetermined random location.

Partial Production Lots (For PWL only): A Lot with four (4) or more acceptance tests, but less than 3,500 tons.

The acceptance sample(s) location(s) shall be selected using stratified - random sampling in accordance with ASTM D3665.

The payment adjustment will be calculated as described in 4.06.

The following test procedures shall be used for acceptance:

**TABLE M.04.03-3: Superpave Acceptance Testing Procedures**

Protocol	Procedure	Description
1	AASHTO R 97	Sampling of Asphalt Mixtures
2	AASHTO R 47	Reducing Samples of Asphalt Mixtures to Testing Size
3	AASHTO T 308	Asphalt Binder Content of Asphalt Mixtures by Ignition Oven Method (Method A)
4	AASHTO T 30(M)	Mechanical Analysis of Extracted Aggregate
5	AASHTO T 312	<sup>(1)</sup> Density of Asphalt Mixture Specimens by Means of Superpave Gyrotory Compactor (Compacted to $N_{des}$ )
6	AASHTO T 166	<sup>(2)</sup> Bulk Specific Gravity of Compacted Asphalt Mixtures Using Saturated Surface Dry Specimens
7	AASHTO R 35	<sup>(2)</sup> Air voids, VMA
8	AASHTO T 209(M)	Theoretical Maximum Specific Gravity and Density of Asphalt Mixtures (average of 2 tests)
9	AASHTO T 329	Moisture content of Asphalt Mixtures

**Notes:** <sup>(1)</sup> One (1) set equals 2 each of 6 inch molds. Molds to be compacted to  $N_{max}$  for PPTs and to  $N_{des}$  for production testing. The first sub lot of the year shall be compacted to  $N_{max}$ .

<sup>(2)</sup> Average value of 1 set of 6 inch molds.

If the average ignition oven corrected binder content differs by 0.3% or more from the average of the Plant ticket binder content in 5 consecutive tests regardless of the production date (moving average), the Contractor shall immediately investigate, determine an assignable cause, and correct the issue. When 2 consecutive moving average differences are 0.3% or more and no assignable cause has been established, the Engineer may require a new ignition oven aggregate correction factor to be performed or to adjust the current factor by the average of the differences between the corrected binder content and production Plant ticket for the last 5 acceptance results.

Asphalt mixtures may be randomly sampled and tested by the Central Lab personnel at any time to verify compliance with the TSR requirements in Table M.04.02-2. If the material fails to meet specification requirements, The Central Laboratory will issue a notification to the Project, including test data, stating that the material does not meet Contract specification requirements.

If the Contractor receives a Non-Conformance Notice from the Engineer, the Contractor shall submit a corrective action plan within 24 hours to address the deficiency. The corrective action plan must be accepted by the Engineer prior to continued paving operations.

Supporting documentation demonstrating that the corrective action was implemented and resolved the issue, including test results, shall be submitted to the Engineer within 7 business days to allow completion of TSR testing on plant or lab produced mixture.

All deficient mixture will be evaluated in accordance with Article 1.06.04. The mix will be assigned a "U" (Unapproved) status if additional tests performed by the Department demonstrate that the mixture does not meet Contract specification requirements.

**Determination of "U" Status:** Superpave mixes shall be considered on "U" status when any control point sieve, binder content, VA, VMA, VFA,  $N_{ini}$ , dust to effective binder ratio, and Gmm value is outside of the limits specified in Table M.04.03-4 on four (4) consecutive tests in any combinations, or the target binder content at the Plant is below the minimum binder content stated in Table M.04.02-5. In addition the average of 10 consecutive acceptance results for VFA, Density to  $N_{ini}$  or dust to effective binder ratio does not meet the criteria in tables M.04.02-2 and M.04.02-4. Note that further testing of samples or portions of samples not initially tested for this purpose cannot be used to change the status.

1. Any time the asphalt mixture is designated as "U" status:

- A. The Contractor shall notify the Engineer.
- B. The Contractor must take immediate actions to correct the deficiency, minimize material shipped to the Project, and obtain an additional Process Control (PC) test after any corrective action to verify production is in conformance with the specifications. A PC test will not be used for acceptance and is solely for the use of the Contractor in its quality control process.

As a result of a U status, upon the submittal of an acceptable revised JMF, the mix status will be changed to PPT until the mix is corrected and a passing PPT is successfully completed.

2. JMF revisions:

JMF revisions are only permitted prior to or after a production shift. A JMF revision is effective from the time it was submitted and is not retroactive to the previous test(s).

JMF revisions shall be justified by a documented trend of test results.

Revisions to aggregate or RAP specific gravities are only permitted when testing is performed at an AASHTO re:source certified laboratory by NETTCP certified technicians.

A JMF revision is required when the Plant target RAP or bin percentage deviates by more than 5% or the Plant target binder content deviates by more than 0.15% from the active JMF.

**TABLE M.04.03-4: Superpave Mixture Production Requirements**

Sieve	S0.25		S0.375		S0.5		S1		Tolerances
	Control Points		Control Points		Control Points		Control Points		From JMF Targets <sup>(2)</sup>
inches	Min (%)	Max (%)	Min (%)	Max (%)	Min (%)	Max (%)	Min (%)	Max (%)	+/- Tolerance
1.5	-	-	-	-	-	-	100	-	
1.0	-	-	-	-	-	-	90	100	
3/4	-	-	-	-	100	-	-	90	
1/2	100	-	100	-	90	100	-	-	
3/8	97	100	90	100	-	90	-	-	
No. 4	72	90	-	72	-	-	-	-	
No. 8	32	67	32	67	28	58	19	45	
No. 16	-	-	-	-	-	-	-	-	
No. 200	2.0	10.0	2.0	10.0	2.0	10.0	1.0	7.0	
Pb	JMF value		JMF value		JMF value		JMF value		0.30
VFA	JMF value		JMF value		JMF value		JMF value		5
VMA (%)	16.5		16.0		15.0		13.0		1.0 <sup>(3)</sup>
VA (%)	4.0		4.0		4.0		4.0		1.0 <sup>(4)</sup>
Gse	JMF value		JMF value		JMF value		JMF value		0.030
Gmm	JMF value		JMF value		JMF value		JMF value		0.030
Mix Temp. – HMA <sup>(5)</sup>	265-325°F <sup>(1)</sup>		265-325°F <sup>(1)</sup>		265-325°F <sup>(1)</sup>		265-325°F <sup>(1)</sup>		
Mix Temp. – PMA <sup>(5)</sup>	285-335°F <sup>(1)</sup>		285-335°F <sup>(1)</sup>		285-335°F <sup>(1)</sup>		285-335°F <sup>(1)</sup>		

Prod. TSR	N/A	N/A	≥80%	N/A	
T 283 Stripping	N/A	N/A	2 or less	N/A	

Notes: <sup>(1)</sup> 300°F minimum when temperature is below 50°F.

<sup>(2)</sup> JMF tolerances shall be defined as the limits for production compliance.

<sup>(3)</sup> 1.30 for all PWL lots except S/P 0.25 mixes. 1.10 for S/P 0.25 Non-PWL lots. 1.40 for S/P 0.25 PWL lots

<sup>(4)</sup> 1.2 for PWL lots

<sup>(5)</sup> Also applies to placement

**Table M.04.03-5:**

**Modifications to Standard AASHTO and ASTM Test Specifications and Procedures**

<b>AASHTO Standard Method of Test</b>	
<b>Reference</b>	<b>Modification</b>
<b>T 30</b>	Section 7.2 through 7.4 Samples are not routinely washed for production testing *Wash gradation required for mix design and PPT
<b>T 209</b>	Section 7.2 The average of 2 bowls is used proportionally in order to satisfy minimum mass requirements. 8.3 Omit Pycnometer method.
<b>T 283</b>	When foaming technology is used, the material used for the fabrication of the specimens shall be cooled to room temperature, and then reheated to the manufacturer’s recommended compaction temperature prior to fabrication of the specimens.
<b>AASHTO Standard Recommended Practices</b>	
<b>Reference</b>	<b>Modification</b>
<b>R 26</b>	All laboratory technician(s) responsible for testing PG binders shall be certified or Interim Qualified by NETTCP as a PG Asphalt Binder Lab Technician. All laboratories testing binders for the Department are required to be accredited by AASHTO re:source. Sources interested in being approved to supply PG binders to the Department by use of an “in-line blending system” must record properties of blended material and additives used. Each source of supply of PG binder must indicate that the binders contain no additives used to modify or enhance their performance properties. Binders that are manufactured using additives, modifiers, extenders, etc., shall disclose the type of additive, percentage and any handling specifications or limitations required. All AASHTO M 320 references shall be replaced with AASHTO M 332. Once a month, 1 split sample and test results for each asphalt binder grade and each lot shall be submitted by the PG binder supplier to the Department’s Central Lab. Material remaining in a certified lot shall be re-certified no later than 30 days after initial certification. Each April and September, the PG binder supplier shall submit test results for 2 BBR tests at 2 different temperatures in accordance with AASHTO R 29.

**Freshwater Mussels:**

Freshwater mussels live in sediments on the bottom of streams and rivers. It is because they are filter-feeding animals that they are very susceptible to sediments and pollutants in the water in which they live.

A pre-construction mussel sweep is recommended to collect and relocate eastern pondmussel and any other freshwater mussels encountered. The pre-construction mussel relocation should be completed within three weeks prior to construction, within the time period from early May to early October. The level of effort is one day for one biologist. Due to the anticipated low numbers of salvaged mussels, tagging and post-relocation monitoring is not required.

The following pre-construction mussel relocation shall be performed:

1. The recommended survey area includes all areas of direct impacts plus a 25-meter upstream buffer and 25-meter downstream buffer.
2. Within three weeks prior to construction, biologists will collect and relocate all state-listed and uncommon mussels from the survey area.
3. Biologists will conduct visual searches for mussels while snorkeling.
4. Mussels will be gathered and held underwater in mesh bags during the collection process.
5. Mussels will be transported to the relocation site identified in the survey report and placed carefully into the substrate.
6. A written report will summarize results of the pre-construction mussel relocation. It will include a map of the survey area showing where target species were collected and relocated, and provide shell length measurements, shell condition, habitat, and photographs of relocated mussels. The report will be submitted to the client within three weeks of the fieldwork. Contractors will comply with other permit conditions specified by the CTDEEP.

## **ITEM #0219011A - SEDIMENTATION CONTROL AT CATCH BASIN**

### **Description**

This work shall consist of furnishing, installing, cleaning, maintaining, replacing, and removing sedimentation control 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®

SI Geosolutions: [www.sigeosolutions.com](http://www.sigeosolutions.com)  
(800)621-0444

#### Dandy Sack™ Dandy Products Inc.

P.O. Box 1980 Westerville, Ohio 43086 Phone:  
800-591-2284 Fax: 740-881-2791  
Email: [dlc@dandyproducts.com](mailto:dlc@dandyproducts.com) Website: [www.dandyproducts.com](http://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 will be manufactured to fit the opening of the catch basin or drop inlet. Sack will 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 should 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**

Sedimentation Control 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**

“Sedimentation Control 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

Sedimentation Control at Catch Basin

Pay Unit

ea.

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

**Description:** This work shall consist of excavating existing channel bottom material, herein referred to as natural streambed 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, cofferdam installation, as shown on the plans or as directed by the Engineer. This item shall also include the stockpiling and protecting of the excavated material on-Site, subsequent placement, top dressing, or backfilling of the excavated stockpiled material within the watercourse, as shown on the plans or as directed by the Engineer.

**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 shale, ledge (bedrock) formations broken from larger boulders, or material with sharp acute edges will not be accepted. Broken concrete will not be accepted.

Geotextile: Geotextile shall be as specified in M.08.01-19 Geotextiles.

### **Construction Methods:**

**1. Stockpiling of Material.** 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 natural streambed material to and from the stockpile are minimized. The Contractor shall prepare the area approved by the Engineer, suitable in size and location for stockpiling the natural streambed material.

The stockpile shall be located where it can remain undisturbed for the duration of the stream channel reconstruction or as shown on the plans and shall be protected using sedimentation control measures. The stockpile area shall be free of debris and cleaned adequately to prevent mixing with underlying soil or other materials, including the use of a separation barrier such as: Geotextile – (Separation Class 1), polyethylene sheeting, or similar. The stockpile area shall be adequately covered to protect the excavated natural streambed material from erosion by rain, wind, or other forces.

**2. Excavation of Natural Streambed Material.** The Contractor shall notify the Engineer 10 days in advance of excavation and placement of natural streambed material activities. The Engineer will identify the limits of the exposed natural streambed material during excavation under this item. The Engineer will identify the bottom limit of excavation, an amount up to but not exceeding 24 inches in depth, unless approved by the Engineer or their authorized delegate, based upon visual inspection of the natural streambed material. After the limits of excavation have been determined, the Contractor shall excavate the natural streambed material, separate from any other roadway, structure, channel or unsuitable material excavation on Site. After the natural streambed material has been excavated, it shall be placed in the pre-approved stockpile area.

**3. Backfilling and Placement with Natural Streambed Material.** The stockpiled natural streambed material shall be placed as fill material as specified at the designated location(s) to the required thickness and elevation as shown on the plans or as directed by the Engineer or their authorized delegate. Placement methods likely to cause segregation of the various sizes of stone will not be permitted. Placement techniques shall prevent integration with non-natural streambed material and shall keep the natural streambed material relatively homogenous. The natural streambed material shall be placed in a manner that replicates the original condition of the channel prior to excavation and to the elevation as shown on the plans.

**4. Top Dressing with Natural Streambed Material.** The stockpiled natural streambed material shall be used as top dressing over riprap or other material as specified at the designated location(s) to the required thickness and elevation as shown on the plans or as directed by the Engineer or their authorized delegate. Placement techniques shall prevent integration with the non-natural streambed material and shall keep the natural streambed material relatively homogenous. The natural streambed material shall be placed in a manner that replicates the original condition of the channel prior to excavation and to the elevation as shown on the plans.

**5. Site Maintenance.** When backfilling, placing, or top dressing, the Contractor shall perform all containment, diversion, or other separation of the channel flow to minimize sediment transport downstream.

The disposal of any surplus and/or unsuitable material shall be in accordance with Article 1.09.04.

If the Engineer determines that there is an insufficient quantity of natural streambed material within the Project limits, the Contractor shall procure Supplemental Streambed Channel Material as specified under Item #0202217A.

If it is required for the Project to have washing-in of supplemental streambed material, the Contractor shall procure Washing-in Supplemental Streambed Material as specified under Item #0202218A.

The pre-approved stockpile areas shall be restored to the satisfaction of the Engineer. Work to restore/regrade stockpile areas will be paid for under the respective pay item(s).

**Method of Measurement:** This work will be measured for payment by the number of cubic yards of natural streambed material excavated, stockpiled, maintained, installed, and accepted.

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 natural streambed 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 item(s).

**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, geotextile, tools, and labor incidental to the preparation of the stockpile area, excavation of natural streambed material, hauling of the material to the stockpile, and separation of any rock ledge or concrete debris, storing, and protecting (including sedimentation controls and covering) 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 surplus and/or unsuitable material will be in accordance with Article 1.09.04 – Extra and Cost-Plus Work.

Riprap or other specified material as shown on the plan will be paid for under the respective items.

Payment for supplemental streambed channel material will be included in the Item #0202217A "Supplemental Streambed Channel Material." If no item appears in the proposal, payment for the work will be in accordance with Article 1.09.04 – Extra and Cost-Plus Work.

Payment for washing in supplemental streambed channel material will be included in the Item #0202218A "Washing-in Supplemental Streambed Material." If no item appears in the proposal, payment for 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 will be included in the item "Cofferdam and Dewatering" or special provision for "Handling Water."

Pay Item	Pay Unit
Excavation and Reuse of Existing Channel Bottom Material	c.y.

## **ITEM #0204151A - HANDLING WATER**

**Description:** Work under this item shall consist of designing, furnishing, installing, maintaining, and removing of a temporary water handling system. This may include water-handling-cofferdams, bypass pipes, bypass pumps/hoses, temporary energy dissipation, sump pumps, drainage channels, water handling for ancillary drainage, and dewatering.

A temporary water handling system redirects 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 Contractor's Working Drawing submittal, 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, water elevations, expected weather, and risks 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 comply with the Temporary Hydraulic Table in the Contract plans and be compatible with the stage of construction and Maintenance and Protection of Traffic scheme, as indicated in the Contract, and shall conform to Section 1.10.

The Contractor shall be responsible to maintain and repair the water handling system throughout the duration of the Contract. If the system becomes damaged, displaced, or not functioning properly due to construction activities, stream conditions or storm events, the Contractor shall be responsible to remediate the system back to working order per plan or as required at the direction of the Engineer.

Unless otherwise directed by the Engineer, all temporary water handling system components shall be removed in an acceptable manner when no longer required.

### **Bypass Pumping:**

The bypass pump system shall be designed by the Contractor to comply with the Temporary Hydraulic Table in the Contract plans.

When incorporating a bypass pump/hose system, the Contractor shall provide a means to maintain continuous flow to the downstream channel to protect resources, unless otherwise noted in the Contract plans or as accepted by the Engineer. The Contractor shall provide for both maintaining continuous flow and accommodating temporary design flows using appropriate pump size for each case, valving, metering, or adjusting the flow during construction.

A pump screen shall be provided on the intake with maximum 0.5 inch diameter openings.

**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" completed and accepted, which price shall include designing (including submittals and

Working Drawings), furnishing, installing, maintaining, and removing 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	Pay Unit
Handling Water	l.s.

## **ITEM #0406194A – JOINT AND CRACK SEALING OF BITUMINOUS CONCRETE PAVEMENT**

**Description:** This work consists of furnishing and applying hot-applied rubberized asphalt crack sealer to bituminous concrete pavement joints and cracks. It shall be constructed in close conformity with the lines, grades, thicknesses, and typical cross sections shown on the plans or established by the Engineer. Joint and Crack Sealing of Bituminous Concrete Pavement may be used in conjunction with other repair treatments including joint and crack filling or patching, in which case the sequence of treatments will be provided in the Plans or directed by the Engineer.

For the purposes of this document, the word “crack” includes all longitudinal (along the direction of travel) and transverse (perpendicular to the direction of travel) cracks and joints. All work specified for “crack(s)” herein shall apply to all types of cracks and joints unless otherwise specified.

### **Materials:**

1. Crack Seal: The crack seal material shall be composed of a hot-applied, rubberized asphalt meeting AASHTO M 324 Type II requirements. The crack seal material will also contain a minimum of 10% crumb rubber by weight. The Contractor must submit to the Engineer all Material Safety Data Sheet documents from the material manufacturer prior to the commencement of work. During work progress, the Contractor must submit to the Engineer the manufacturer’s Material Certificate for compliance to AASHTO M 324 Type II requirements for each batch or lot of material utilized on the Contract.
2. Optional Barrier Material – Backer Rod: The backer rod shall be a heat resistant material compatible with the crack sealant and acceptable to the manufacturer of the sealant. No bond or reaction shall occur between the sealant and the rod. It shall be of a non-water absorbent material and shall not melt or shrink when hot sealant is poured on it.

The backer rod shall have a maximum of 5% absorption when immersed in water for 24 hours with the ends sealed. The backer rod shall be of such a size that compression is required for installation in the crack, so that it maintains its position during the sealing operation. Backer rod shall be dry.

3. Optional Barrier Material – Hot Mix Asphalt (HMA): Any HMA placed in the bottom of a crack between 1.5 and 2 inches wide shall be HMA S0.25 Traffic Level 2 and shall meet all requirements of Section 4.06 - Bituminous Concrete.

The Contractor must submit to the Engineer all Material Safety Data Sheet documents from the material manufacturer(s) prior to the commencement of work. During work progress, the Contractor must submit to the Engineer the manufacturer’s Material Certificate for compliance to applicable specifications for each batch or lot of material utilized on the Contract.

**Construction Methods:** The crack sealing operation shall proceed in accordance with the requirements of the “Maintenance and Protection of Traffic” and “Prosecution and Progress” specifications.

1. Equipment: The equipment used by the Contractor shall include, the following:
  - a. **Melter Applicator:** The unit shall consist of a boiler kettle equipped with pressure pump, hose, and applicator wand; the boiler kettle may be a combination melter and pressurized applicator of a double-boiler type with space between the inner and outer shells filled with heat transfer oil. Heat transfer oil shall have a flash point of not less than 600°F. The kettle shall include a temperature control indicator. The kettle shall be capable of maintaining the crack seal material at the manufacturer’s specified application temperature range. The kettle shall include an insulated applicator hose and application wand. The hose shall be equipped with a shutoff control. The kettle shall include a mechanical full sweep agitator to provide continuous blending. The unit shall be equipped with thermometers to monitor the material temperature and the heating oil temperature. The unit shall be equipped with thermostatic controls that allow the operator to regulate material temperature up to at least 425°F.
  - b. **Application Wand and Squeegee Applicator:** The material shall be applied with a wand followed by a squeegee applicator. The squeegee applicator shall be of commercial/industrial quality designed with a “U” shaped configuration. It shall be of a size adequate to strike off, flush with the surrounding pavement surface and without overflow around the sides, all crack seal material placed. This tool shall be either attached to the applicator wand or used separately as its own long handled tool.
  - c. **Hot Air Lance:** The unit shall be designed for cleaning and drying the pavement surface cracks. Minimum compressed air capacity shall be 100 psi. The compressed air emitted from the tip of the lance shall be capable of achieving a temperature of at least 1500°F.
  - d. **Vertically Mounted Power Driven Wire Brush:** This tool shall be used to remove any dirt, debris, or vegetation to the depths specified that cannot be removed by the hot air lance. It shall be of adequate size and power to remove all material from cracks as specified.
2. Weather Requirements: Work shall not be performed unless the pavement is dry. No frost, snow, ice, or standing water may be present on the roadway surface or within the cracks. The ambient temperature must be 40°F and rising during the field application operations for work to proceed.
3. Material Mixing Procedure: The prepackaged material shall be added to the melter applicator in the presence of the Engineer. It shall then be mixed and heated to the recommended application temperature. The crack seal material shall never exceed 400°F.

4. Determination of Cracks to be Sealed: The width and depth requirements for cracks to be sealed are as follows:

All crack width determinations shall be made by measuring the crack width flush at the surface of the pavement prior to being sealed. A straightedge shall be used whenever necessary to establish the location or limits of the flush surface of the pavement.

All cracks from  $\frac{1}{8}$  inch up to 1.5 inches wide shall be prepared and sealed as stated below. Cracks that are between  $\frac{1}{8}$  inch and 1.5 inches wide, but eventually taper in width below the minimum  $\frac{1}{8}$  inch, shall also be prepared and sealed as stated below. Only cracks that are less than  $\frac{1}{8}$  inch wide throughout their entire length shall be excluded.

Transverse cracks, where a portion of the crack (50% or less) exceeds a width of 1.5 inches, up to 2 inches, shall also be prepared and sealed as stated below.

All joints to be sealed that are raveled (loss of the pavement surface material) shall be at least  $\frac{1}{2}$  inch in depth at the joint's deepest point. The minimum width of a raveled joint must be  $\frac{1}{2}$  inch. The maximum width of a raveled joint to be sealed is 3 inches.

Any cracks exceeding the width and depth requirements specified above shall be repaired using separate items.

5. Crack Preparation: Cracks to be sealed shall be treated with a hot air lance prior to application of the crack seal material. Two (2) passes minimum shall be made with the hot air lance. The hot air lance operation shall proceed at a rate no greater than 120 feet per minute. There shall be no more than 10 minutes between the second hot air lance treatment and the material application.

The use of the hot air lance is not intended to heat the crack. It is to be used to blow all debris from the crack to the depths specified below and to remove any latent moisture from the crack until the inside of the crack is completely dry as determined by the Engineer. "Moisture" does not include standing water. The hot air lance is not to be used to boil off or blow standing water from the bottom of a crack. If standing water is present in the bottom of any crack, the sealing operation shall be postponed until such time that the standing water evaporates naturally. The Contractor may use compressed, oil-free air (not heated) to blow standing water from a crack to help accelerate the natural evaporation process. If standing water remains after using compressed air, the crack shall be allowed to dry naturally until remaining standing water evaporates. The hot air lance shall be used after visible water has evaporated. If a crack is already completely dry as determined by the Engineer, the hot air lance shall be operated at its lowest temperature possible.

The hot air lance is to be used to blow all debris from cracks (not including raveled joints) to a depth of at least  $\frac{3}{4}$  inch for cracks between  $\frac{1}{8}$  inch and  $\frac{3}{4}$  inch wide, and to a depth of 1.25 inches for cracks between  $\frac{3}{4}$  inch and 2 inches wide. The hot air lance shall be used to blow

all debris from raveled joints to a depth of 1 inch or the full depth of the joint, whichever is smaller.

In the event that cracks are packed tightly with debris, dirt, vegetation, or other material, except previously placed sealant or filler, the Contractor shall use a vertically mounted power driven wire brush to remove all material and burnish the sides of the crack to the depths specified above. Cracks treated with the power driven wire brush shall subsequently be treated with a hot air lance as described in this section. The use of both the power driven wire brush and the hot air lance shall result in the complete removal of all material in the crack (except previously placed sealant or filler) to the depths specified above such that the sides of the crack are completely free and clean of any debris and moisture.

In the event that cracks have depths greater than 2 inches below the pavement surface, the Contractor may place a barrier composed of backer rod as specified herein. The backer rod shall be placed in a manner leaving 1.25 inches below the elevation of the pavement surface for crack seal material. Use of backer rod will not be allowed for cracks wider than 1.5 inches or less than ½ inch wide. For cracks between 1.5 and 2 inches wide, HMA S0.25 Traffic Level 2 may be placed in the bottom of the prepared crack. HMA shall be placed and compacted with a steel T-bar approved by the Engineer in a manner leaving 1.25 inches below the elevation of the pavement surface for crack seal material.

6. Crack Sealing: As soon as cracks have been prepared, they shall be filled to refusal along their entire length with the crack sealant material. The treatment material shall be maintained at the manufacturer's specified/recommended application temperature range at all times. The sealing operation shall be suspended if the temperature of the crack seal material falls outside the specified temperature range and shall remain suspended until the crack seal material is brought within the specified temperature range. Sealed cracks are to be squeegeed immediately following application of the crack seal material, striking excess sealer flat to the adjacent pavement surface. There shall be no build-up of treatment material above or adjacent to the crack at any time. If the initial application of crack sealant material fails to fill the crack or shrinks upon cooling such that there is a depression formed of at least ¼ inch or greater, a second application of sealant shall be placed over the first application.
7. Protection of Sealed Cracks: Traffic shall not be permitted on the pavement until the crack seal material is set so that the material does not track and is not deformed or pulled out by tires. If the work under this item is being performed prior to placing a hot mix overlay or other surface treatment, a detackifier or blotting agent will not be allowed. If work under this item is not followed by placement of an overlay of any kind, a detackifier or blotting agent may be used. If a detackifier or blotting agent is used, it shall be one recommended by the supplier of the crack seal material and shall be used as recommended by the supplier, except that no paper, cotton, or other organic materials shall be allowed. Information on the type and usage of a detackifier or blotting agent shall be presented to the Engineer for their written acceptance prior to use.

8. Removal and Disposal of Material: All debris generated from the operations described above shall be removed from the roadway by the Contractor.

Treatment material remaining in the Contractor's kettle at the close of the daily work session shall be discarded. At no time shall treatment material be re-heated for use in subsequent crack sealing applications unless permitted by the Engineer following a review of specific circumstances.

All debris and surplus treatment material shall be properly disposed in accordance with Article 1.10.03 and State of Connecticut law.

9. Acceptance of Work: When work is complete, an inspection shall be scheduled with the Engineer. The Engineer will note all deficiencies including, areas exhibiting adhesion failure, cohesion failure, tracking of sealant material, and missed cracks. Work identified by the Engineer as not acceptable shall be repaired at the Contractor's expense. The Contractor shall notify the Engineer upon completion of any corrective work performed.

**Method of Measurement:** This work will be measured by the total number of linear feet of cracks sealed as indicated in the Contract plans and as measured, verified, and accepted by the Engineer.

**Basis of Payment:** This work will be paid for at the Contract unit price per linear foot for "Joint and Crack Sealing of Bituminous Concrete Pavement" complete and accepted in place. The price shall include all submittals, materials, equipment, tools, and labor incidental thereto. No payment will be made to the Contractor prior to submittal of required documents.

Pay Item	Pay Unit
Joint and Crack Sealing of Bituminous Concrete Pavement	l.f.

## **ITEM #0601277A – PRECAST CONCRETE BRIDGE COMPONENTS**

### **Description:**

Work under this item shall include the design, furnishing and installation of precast concrete bridge components such as precast arches, headwalls with bridge curbs, wingwall footings, wingwall stems and/or wall anchors, and end blocks in the location, at the grades, and to the dimensions and details as shown on the plans and as ordered by the Engineer. Work under this item shall also include the load rating of the precast concrete arch. This item also includes all form liners, staining, hardware, inserts, reinforcing steel and joint materials as shown on the plans.

### **Materials:**

The materials for the precast components shall conform to the following requirements:

Concrete: Concrete shall meet the requirements of Subarticle M14.0-1. Concrete shall be air-entrained composed of Portland cement, fine and coarse aggregates, admixtures and water. Air-entrained concrete shall contain  $6 \pm 2$  percent air. The air-entraining admixture shall conform to AASHTO M154.

The Contractor shall design and submit to the Engineer a concrete which shall attain a minimum 28-day compressive strength of 5,000 psi. The Contractor shall further provide a certificate stating that the mixture submitted shall meet this strength.

Reinforcement: Deformed steel bars and welded wire fabric, including dowel bar mechanical connectors if applicable, shall be galvanized meeting the requirements of Section 6.02 and the applicable requirements of Section 5.14.02. The minimum steel yield strength shall be 60,000 psi

Non-Shrink Grout: Non-shrink grout shall meet the requirements of M.03.05 and be suitable for submerged applications.

Stained Form Liner: The concrete form liner shall conform to: Pattern No. 1352 North East Dry Stack. Special penetrating stain mix as provided by the manufacture shall achieve color variations present in the natural stone being stimulated by the pattern selected for the project. The Engineer/Town shall select a color pattern from photos of completed projects. The stain shall create a surface finish that is breathable (allowing water vapor transmission), and that resists deterioration from water, alkali, fungi, sunlight or weathering.

Inserts: 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. All hardware shall be as specified on the Working Drawings.

Joint Seal: Joint seal shall conform to the requirements of Section M.03.08.

### **Construction Methods:**

- 1. Design and Load Rating:** The design of the precast concrete arch, headwalls, and wingwalls shall conform to the requirements of the latest edition of the AASHTO LRFD Bridge Design Specifications, including the latest interim revisions, as supplemented by ASTM C1433 and amended as follows:
  - a. 1/1000 of the span (distance along the springline span) is the maximum allowable deflection of the precast concrete arch due to live load
  - b. Reinforcement concrete cover shall be 2 inches in arch sections, wingwalls, and headwalls, unless noted otherwise on the plans. Crack control calculations shall be based on Class 2 exposure conditions. In precast footings, the concrete cover over the bottom reinforcement shall be 3 inches minimum and 2 inches minimum for all other reinforcement.
  - c. The arch and associated connections to headwalls shall have adequate capacity to withstand at a minimum, MASH Test Level 3 (TL-3) crash test criteria.
  - d. The wingwalls shall be designed with adequate capacity to withstand a minimum, MASH Test Level 3 (TL-3) crash test criteria.
  - e. The design and detailing of the precast concrete arches and connections shall be coordinated with the design and detailing of the headwalls.
  - f. The precast concrete bridge components shall be designed for all construction load effects that may be applied during all stages/phases of fabricating delivery and construction.
  - g. The live load ratings shall conform to the load and resistance factor rating (LRFR) method in accordance with the CTDOT Bridge Load Rating Manual. Unless otherwise notes on the plans, the precast concrete arch sections shall achieve a minimum load rating factor of 1.20 for all design legal and permit vehicle loads. The CTDOT Bridge Load Rating manual can be found at the following link:  
[https://portal.ct.gov/dot/-/media/dot/bridge-design/load\\_rating/ctdotblrm201810pdf.pdf](https://portal.ct.gov/dot/-/media/dot/bridge-design/load_rating/ctdotblrm201810pdf.pdf)
  - h. All precast concrete components shall be designed to resist full hydrostatic pressure conditions. Design assumptions shall not assume the presence of drainage or relief of water pressure, as no underdrain system is provided.
  
- 2. Submittals:**
  - a. **Shop Drawings.** Before fabrication the Contractor shall submit Shop Drawings to the Engineer for acceptance in accordance with 1.05.02-3. Acceptance of the Shop Drawings will be required prior to ordering of the materials and the fabrication of the precast elements.

At a minimum the Shop Drawings shall include the following information:

- i. The stamp of the registered Professional Engineer licensed in the State of Connecticut who has reviewed and certified the Shop Drawings.
- ii. All lifting inserts, hardware, or devices and locations for Engineer's approval.
- iii. Locations and details of the lifting devices, including supporting calculations, type, and amount of any additional reinforcing required for lifting. All lifting devices will be designed based on the no cracking criteria in Chapter 8 of the latest edition PCI Design Handbook.
- iv. Dimensions from working points or working lines to prevent the accumulation of dimensional tolerances.
- v. The minimum compressive strength attained prior to handling the precast element.
- vi. Shear transfer devices provided between precast element sections.
- vii. Details of leveling devices or vertical adjusting hardware.
- viii. Reinforcement details in accordance with Subarticle 6.02.03-1 of Form 819.
- ix. Form liner details in accordance with the plans and Special Provision.
  - Pattern layout drawings shall include the plan, elevation and details showing the overall pattern, joint locations, form tie locations, weephole locations, drainage and other protrusion and any other special considerations. These drawings shall maximize re-use of form liners and minimize cutting of form liners and shall be approved prior to installation of the form liners.
  - Form Tie Sample – A sample and description of the form tie the Contractor proposes to use.
  - Photographs – Color photographs of at least (3) similar projects recently performed by the Contractor (or his subcontractor) and at least three (3) similar projects recently produced by the manufacturer.

**b. Working Drawings and Design Computations.** Prior to fabrication and installation of the precast components, the Contractor shall submit Working Drawings and design computations for each precast concrete arch section, headwall section, wingwall stem and footing section to the Engineer for review, including the lifting and placement of the components in their final position, in accordance with Article 1.05.02-2. A packaged set of working drawings and computations with all details and documents necessary for fabrication and erection, including a copy of the certificate of insurance, shall be prepared and submitted for each arch section and precast component. The Working Drawings and computations shall be prepared in U.S. Customary Units.

Under no circumstances shall the fabrication of the precast elements commence prior to the acceptance of the Shop Drawings and the Working Drawings unless written permission is given by the Engineer. The Department shall reject any components fabricated before receiving written approval or components that deviate from the approved drawings. Any expenses incidental to the revision of

materials furnished, in accordance with the Shop Drawings and order lists, to make them comply with the plans and specifications, including costs incurred due to faulty detailing or fabrication, shall be borne by the Contractor.

The Contractor shall be solely responsible for the adequacy of the drawings and computations, falsework, and other equipment and material necessary to place the components safely and without damage to the components. The Contractor's responsibility includes the investigation of stresses incurred within the components during placement.

The packaged set of Working Drawings and computations for each precast component section shall be submitted in an electronic portable document format (.pdf) with appropriate bookmarks. The package set shall include the following:

- Title sheet
- Table of contents
- Contact information for designer and fabricator – contact information should include name and address of each firm and the name of the contact person with phone number and email address
- Copy of the certificate of insurance
- Precast concrete arch working drawings, design computations and supporting data
- Precast concrete headwall working drawings, design computations and supporting data
- Precast concrete wingwall working drawings, design computations and supporting data

A Professional Engineer licensed in the State of Connecticut shall sign, date, and seal all working drawings, design computations and load ratings. The Engineer that signs the package must be available for consultation in interpreting their computations, drawings and in the resolution of conflicts which may occur during the performance of the work. Each working drawing shall be signed, dated and sealed. The cover/first sheet of the computation shall be signed, dated, and sealed.

#### Working Drawings

PDF created on ANSI D (22" x 34") full scale sheet

Includes: Border

Title block

Rectangular box for review stamp (2¼" wide x 1¾" high)

Upper case text with a height of 1/8" max.

Design computation, load ratings, procedures and other supporting data:

PDF created on ANSI A (8½" x 11" letter) sheet

The drawings shall include complete details of the precast concrete arches,

headwalls, and wingwalls. The drawings shall include, but may not be limited to the following:

- Project number, bridge number, town and crossing.
- Layout plan of the precast concrete arch segments. The plan shall include the dimensions of each arch segment. The Contractor shall determine that the length of each arch segment satisfies the sequence of construction and construction methodology shown on the plans. When installed, the combined length of the arch sections shall equal the total length of the precast concrete arch shown on the plans.
- Layout plan of the precast concrete headwalls and wingwalls. The plan shall include the dimensions of each wingwall and headwall section and the position of each relative to the arch.
- Plan and cross section of the arch, headwall, and wingwall sections detailing the length, width, height and thickness of all elements.
- Type, size, location and spacing of steel reinforcing mechanical connectors and concrete inserts for anchoring. Provide bending diagrams, material lists and catalog cuts for mechanical connects and inserts as applicable.
- Type, size, location and spacing of lifting holes and seating fixtures. All fixtures (inserts, etc.) cast permanently into the sections shall be recessed a minimum of  $\frac{3}{4}$ ". No more than four lifting holes or fixtures shall be located in each arch section.
- Location and size of all holes cast for grouting deformed steel bars, or other reasons noted on the plans as applicable.
- Complete details of the joints at the ends of the arch sections, between headwalls and top-of-arch, which shall include the type, size and location of the gaskets and additional steel reinforcement, as applicable.
- Complete details of the connection between headwalls and top-of-arch, which shall include the type, size and location of the connection hardware.
- Material specifications/designations for all components.

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

- Project number, town and crossing
- References to design specifications, including interim specifications.
- Diagrams identifying all members and load conditions and combinations.
- Description of each notation used, references to applicable specification sections and articles.
- Bending moment and shear diagrams.
- Section specific computations for arch, headwall, and wingwall section.
- Computation for reinforcement development lengths and diagrams identifying splice locations.
- Complete tabulate results from all load conditions and load combinations including shipping, handling and erection.
- Electronic copies of STAAD, CANDE-2019, input files
- Electronic unprotected copies of MathCad and Excel files.

- A Load Rating Report compiled per the requirements of the latest version of the CTDOT Bridge Load Rating Manual.
- c. **Load Rating – Precast Concrete Arches.** The Contractor shall submit a load rating report for each precast concrete arch location, separate from the design computations, to the Engineer for review. The load rating shall be in accordance with Article 1.05.02 and the latest version of the AASHTO Manual for Bridge Evaluation (MBE), as supplemented by the latest version of the CTDOT Bridge Load Rating Manual (BLRM).
- d. **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 location to the Engineer for review in accordance with Article 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.

The design of the lifting and seating devices shall be compatible with the Contractor's approved erection method.

- e. **Working Drawings – Installation of Precast Concrete Components.** Prior to the 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 the following:
- Plan of the work area showing all structures, roads, brooks, 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.)
- Detailed sequence of construction and a timeline for all operations. Account for setting and cure time for grouts, shear key concrete void concrete, and concrete closure pours.
- Include method of providing temporary support of the elements. Include method of adjusting and securing the elements after placement.
- Include procedures for controlling tolerance limits both horizontal and vertical.
- Include method for installing non-shrink grout and the sequence and equipment for the operation.

A maximum of two lifting points shall be assumed to support each component during erection unless adequate load equalizing devices are implemented to distribute loads to additional lifting points.

- f. 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, etc. not addressed in other submission to the Engineer for review in accordance with Article 1.05.02.
- 3. Fabrication and Manufacture:** All precast concrete bridge components shall be fabricated by a PCI certified fabricator. The fabrication and manufacture of the precast concrete components shall meet the requirements of M.08.02-4 as supplemented by the following:
- a. Forms and Forming Material.** Forms shall be mortar tight and strong enough to prevent misalignment of precast element edges. They shall be constructed to allow their removal without damage to the concrete. A positive means of supporting reinforcing cages in place during forming shall be required.

The forms shall not be removed until the concrete is strong enough to avoid possible damage from such removal. Forms shall not be removed without approval being granted by the Engineer. Damage to the concrete due to early removal of the forms shall be cause for rejection.

A concrete facing test panel shall be provided at least 30 days prior to fabricating the precast concrete components requiring form liners. The size of the test panel

shall be 5 square yards, or larger if needed to adequately illustrate the pattern selected. The test panel shall contain an area demonstrating simulated stone masonry butt joint, the continuation of the pattern through an expansion joint and an outside corner. The test joint shall include staining as may be required for the selected pattern.

- b. 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.
- c. Test Cylinders.** During the casting of the components, the Contractor shall cast a minimum of four (4) - 4 inch x 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.
- d. Placing Concrete.** The Contractor shall provide the Engineer advance notification prior to placement, in accordance with 1.05.10. Concrete may be deposited in the forms only after the Contractor or its representative has inspected the condition and adequacy of the forms, reinforcing steel, and 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 are in place. The concrete temperature shall be 60°F to 90°F at the time of placement. Truck-mixed, transit-mixed, and ready-mixed concrete from a source not located at the precast facility is prohibited.

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 concrete 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, form liners or other components. There shall be no interruption in the placement of concrete. Concrete shall be carefully placed in the forms and vibrated sufficiently to produce a surface free from imperfections such as honeycombing, segregation, cracking, or checking.

The bridge units shall be produced with flat butt ends. The ends of the bridge units

shall be such that when the sections are laid together they will make a continuous line with a smooth interior free of appreciable irregularities, all compatible with the permissible variations specified herein. The joint width between adjacent precast units shall not exceed 3/4 inches.

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

- e. **Finishing.** The bridge units, wingwalls, headwalls and foundation units shall be substantially free of fractures. 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. The ends of the bridge units shall be normal to the walls and centerline of the bridge section, within the limits of the variations specified herein, above, except where beveled ends are specified. The faces of the wingwalls and headwalls shall be parallel to each other, within the limits of variations given in section 5, above. The surface of the precast elements shall be a smooth steel form or troweled surface. Trapped air pockets causing surface defects shall be considered as part of a smooth, steel form finish. All exposed, outside concrete surfaces shall be given a grout clean-down finish in accordance with Subarticle 6.01.03-10(c).

All color staining of the areas textured by form liner shall be performed by the manufacturer, or their authorized representative and the hardened concrete shall be a minimum of 30 days old before color staining is applied. The walls shall be power washed to free it from latent, dirt, oil, and other objectionable materials. After the wall is dried, the color staining process shall be applied using colors approved by the Town/Engineer. Color staining shall be applied in such a way that the stones shall have individual colorations from one to the other. Water-based stains shall be used in air temperatures ranging from 50°F to 100°F. Solvent-based stains shall be used in air temperature of 50°F and below, but in no case when the temperature of the hardened concrete is 40°F and falling.

- f. **Inspection.** The quality of materials, the process of manufacture, and the finished precast elements shall be subject to inspection by the Contractor.
- g. **Marking.** Precast Elements shall be identified as to Project, structure, supplier identification, casting date, position in the structure, and the bridge span x bridge rise (on the inside of the vertical leg of the bridge section) by means of a non-corrosive tag embedded permanently or stenciled at a visible location on the piece mark end.
- h. **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.

The precast components shall not be shipped to the job site until the 28-day strength (f'c) has been attained.

- i. **Repairs.** The Engineer shall evaluate the acceptability and the cause of the defects and the service condition of the precast component sections. 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.
  - j. **Rejection.** The precast elements shall be subject to rejection on account of any of the specification requirements. Individual precast elements may be rejected because of any of the following:
    - Fractures or cracks passing through the wall, except for a single end crack that does not exceed one half the thickness of the wall.
    - Defects that indicate proportioning, mixing, and molding not in compliance with section 4 of these specifications.
    - Honeycombed or open texture.
    - Damaged ends, where such damage would prevent making a satisfactory joint.
4. **Fabrication Tolerances:** Tolerances of forming any precast concrete arch sections shall be as follows:
- a. **Internal Dimensions (Span and Rise).** The internal dimensions shall be within 1% of the design dimensions or within ½ inch, whichever is less.
  - b. **Arch Thickness.** The arch thickness shall be within ¼” inch of the thicknesses shown in the design.
  - c. **Laying Length of Opposite Surfaces:** Variations in laying lengths of two opposite surfaces of the arch section shall be less than 1/8 inch/foot of internal span up to ¾ inch maximum, whichever is less.
  - d. **Length of Section:** The length of section shall not vary from the designed length by more than ½ inch in any arch section.
  - e. **Position of Reinforcement:** The maximum variation in position of the reinforcement shall be ± 1/2 inch. In no case shall the cover over the reinforcement be less than 1 1/2 inches for the outside circumferential steel or be less than 1 inch for the inside circumferential steel as measured to the external or internal surface of the bridge. These tolerances or cover requirements do not apply to mating surfaces of the joints.
  - f. **Area of Reinforcement:** The areas of steel reinforcement shall be the design steel areas as shown and approved in the manufacturer's shop drawings. Steel areas greater than those required shall not be cause for rejection. The permissible variation in diameter of any reinforcement shall conform to the tolerances

prescribed in the ASTM Specification for that type of reinforcement.

- g. The length, height, and thickness of each headwall, wingwall, and foundation section shall be within ½ inch of the length, height, and thickness shown in the design.
- 5. Pre-assembly of Precast Sections:** Precast sections shall conform to all dimensions within tolerances specified herein. Headwall sections shall be fit to the applicable arch section, and adjacent arch 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 Engineer shall be given at least 2 working days' notice to inspect and evaluate the sections prior to shipping.
- 6. Lifting:** It is the responsibility of the contractor to ensure that a crane of the correct lifting capacity is available to handle the precast concrete units. This can be accomplished by using the weights given for the precast concrete components and by determining the lifting reach for each crane unit. Site conditions must be checked well in advance of shipping to ensure proper crane location and to avoid any lifting restrictions. The lift anchors or holes provided in each unit are the only means to be used to lift the elements. The precast concrete elements must not be supported or raised by other means than those given in the manuals and drawings without written approval from the Fabricator.
- 7. Construction equipment weight restrictions:** In no case shall equipment operating in excess of the design load (HL-93) be permitted over the bridge units unless approved by the Engineer and the Fabricator.  
In the immediate area of the bridge units, the following restrictions for the use of heavy construction machinery during backfilling operations apply:
  - No construction equipment shall cross the bare precast concrete bridge unit.
  - After the compacted fill level has reached a minimum of 4 inches over the crown of the bridge, construction equipment with a weight of less than 10 tons may cross the bridge.
  - After the compacted fill level has reached a minimum of 1 foot over the crown of the bridge, construction equipment with a weight of less than 30 tons may cross the bridge.
  - After the compacted fill level has reached the design cover, or 2 feet minimum, over the crown of the precast concrete bridge, construction equipment within the design load limits for the road may cross the precast concrete bridge.
- 8. Installation:** The installation of the precast concrete bridge components shall be in accordance with the plans and the following:
  - a. The installation of the precast concrete component sections shall proceed as required by the sequence of construction and the special provisions entitled "Prosecution and Progress" and "Maintenance and Protection of Traffic".

- b.** Prior to placement of the precast footing and pouring of the cast-in-place footing, the contractor shall prepare a 12-inch thick base layer of compacted granular fill to the limits shown on the plans. The footings shall be set to the line and grade indicated on the plans or as directed by the Engineer. Placement of precast wingwall footings and pouring of the cast-in-place arch footing shall not start until the Engineer has approved the depth of excavation and the suitability of the foundation material. Contractor shall not over-excavate foundations unless directed by the site soil Engineer to remove unsuitable soil. All wingwall footing joints shall be sealed and must provide a silt-tight fit.

The footings shall be given a smooth float finish and shall reach a compressive strength of 2,000 psi before placement of the bridge and wingwall elements. Backfilling shall not begin until the footing has reached the full design compressive strength.

The footing surface shall be constructed in accordance with grades shown on the plans. When tested with a 10-foot straight edge, the surface shall not vary more than 1/4 inch in 10 feet.

- c.** The bridge units and wingwalls shall be set on hardboard shims conforming to ASTM D1037 or plastic shims (Dayton Superior P-80, P-81 or approved equal) measuring 5" x 5", minimum, unless shown otherwise on the plans. A minimum gap of 1/2 inch shall be provided between the footing and the bottom of the bridge's vertical legs or the bottom of the wingwall. Also, a supply of 1/4 inch, 1/2 inch & 1/8 inch thick hardboard or plastic shims for various shimming purposes shall be on site.
- d.** The bridge units shall be placed as shown on the Engineer's plan drawings. Special care shall be taken in setting the elements to the true line and grade. The joint width between adjacent precast units shall not exceed 3/4 inches.
- e.** It is the Contractor's responsibility to maintain the structure span during all phases of installation. Due to the arch shape, bridge elements will tend to spread under self-weight. It is imperative that any lateral spreading of the bridge elements be avoided during and after their placement. Generally, horizontal tie rods are shipped in the larger bridge elements to assist in preventing this spreading. Tie rods shall not be removed until bridge units are grouted and grout has cured. It is recommended that temporary hardwood blocks be used in conjunction with the cable/tie rods to maintain span. If, however, due to site restrictions, these cable ties/tie rods must be removed prior to placement of the bridge elements, the contractor must notify the Fabricator and request a suggested installation procedure. In addition, if the cable ties/tie rods must be removed prior to setting arch units, the following quality control procedure must be followed:
  - 1. Find "measured span" upon arch unit's delivery to site, prior to lifting

from truck and removing cable ties/tie rods. "Measured span" shall be the average of (3) span measurements along the lay length of the arch unit.

2. After setting of bridge unit on the foundation, verify the span. This "installed span measurement" shall not exceed the maximum of
  - a. The nominal span + ½" OR
  - b. The "measured span".
3. If the "installed span measurement" exceeds this amount, the arch unit shall be lifted and re-set until the "installed span measurement" meets the limits.

- f. All arch joints shall be sealed and must provide a silt-tight fit.
  - g. Joints between wingwalls and headwalls shall be sealed with 1 inch preformed expansion joint filler. The back face of the wall stem joint shall be sealed with joint seal as indicated on the plans.
  - h. The wingwalls, headwalls, arch, and foundations shall be placed as shown on the plan drawings. Special care shall be taken in setting the elements to the true line and grade. After its installation, any precast components as determined by the Engineer not acceptable in vertical or horizontal alignment for any reason, including by 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.
  - i. 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.
- 9. Erection Tolerances:** The Contractor shall be responsible for ensuring the overall length of all precast bridge components meets the layout requirements of the plans within all acceptable tolerances as specified in the contract.
- 10. Joint Sealing:** The butt joint made by two adjoining bridge units shall be covered with a 7/8" x 1 3/8" preformed bituminous joint sealant and a minimum of a 9-inch wide joint wrap. The surface shall be free of dirt before applying the joint material. A primer compatible with the joint wrap to be used shall be applied for a minimum width of nine inches on each side of the joint. The external wrap shall be CS-212 by CONCRETE SEALANTS INC., EZ-WRAP RUBBER by PRESS-SEAL GASKET CORPORATION, SEAL WRAP by MAR MAC MANUFACTURING CO. INC. or approved equal. The joint shall be covered continuously from the bottom of one bridge section leg, across the top of the bridge and to the opposite bridge section leg. Any laps that result in the joint wrap shall be a minimum of six inches long with the overlap running downhill.

In addition to the joints between bridge units, the joint between the end bridge unit and the headwall shall also be sealed as described above. If precast wingwalls are used, the joint

between the end bridge unit and the wingwall shall be sealed with a 2'-0" strip of filter fabric. Also, if lift holes are formed in the bridge units, they shall be primed and covered with a 9" x 9" square of joint wrap.

During the backfilling operation, care shall be taken to keep the joint wrap in its proper location over the joint.

- 11. Grouting:** Grouting shall not be performed when temperatures are expected to go below 35° for a period of 72 hours. Grouting should be completed as soon as practical precast arches have been installed.

Fill the bridge-foundation and wingwall stem-footing keyway with cement grout (Portland cement and water or cement mortar composed of Portland cement, sand and water) with a minimum 28-day compressive strength of 3000 psi. Vibrate as required to ensure that the entire key around the bridge element is completely filled. If bridge elements have been set with temporary ties (cables, bars, etc.) grout must attain a minimum compressive strength of 1500 psi before ties may be removed.

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

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.

All grout shall have a maximum aggregate size of ¼ inch.

Lifting and erection anchor recesses shall be filled with grout.

After grout has reached its design strength the temporary hardwood wedges shall be removed and their holes filled with grout.

- 12. Backfilling:** No backfilling shall be placed against any structural elements until they have been approved by the Engineer. Backfilling shall not be performed during wet or freezing weather.

Backfill shall be considered as all replaced excavation and new embankment adjacent to the precast concrete elements. The project construction and material specifications, which include the specifications for excavation for structures, roadway excavation, embankment construction and pervious structure backfill, shall apply except as modified in this section.

- 13. Placing and Compacting Backfill:** The placement and compaction of backfill at the precast concrete bridge components shall be in accordance with the plans and the following:

Dumping for backfilling is not allowed any nearer than 3 ft from the bridge leg. The fill must be placed and compacted in layers not exceeding 8 inches. The maximum difference in the surface levels of the fill on opposite sides of the bridge must not exceed 2 feet.

The fill behind wingwalls must be placed at the same time as that of the bridge fill. It must be placed in progressively placed horizontal layers not exceeding 8 inches per layer.

The backfill area within a minimum of 4'-0' around the arch and a minimum of 1'-0" horizontally from the back of the wingwalls (Zone B) shall be compacted to a minimum density of 95% of the Standard Proctor, as required by AASHTO T-99.

Soil within 1 foot of concrete surfaces shall be hand-compacted. Elsewhere, use of rollers is acceptable. If vibrating roller-compactors are used, they shall not be started or stopped within Zone B and the vibration frequency should be at least 30 revolutions per second.

Backfill against a waterproofed surface shall be placed carefully to avoid damage to the waterproofing material.

**14. Monitoring:** The contractor shall check settlements and horizontal displacement of foundation to ensure that they are within the allowable limit provided by the engineer. These measurements should give an indication of the settlements and deformations along the length of the foundations.

The first measurement should take place after the erection of all precast bridge system elements, a second after completion of backfilling, and a third before opening of the bridge to traffic. Further measurements may be made according to local conditions.

**Method of Measurement:**

This work, being paid on a lump sum basis, will not be measured.

**Basis of Payment:**

This work will be paid for at the Contract lump sum price for "Precast Concrete Bridge Components", complete in place, which price shall include the design, load rating, shop drawings, working drawings, all equipment, materials, tools, and labor incidental to the design, fabrication, shipping and installation of the precast concrete bridge components at the locations specified on the plans.

Preformed expansion joint filler for bridges shall be paid for separately.

<u>Pay Item</u>	<u>Pay Unit</u>
Precast Concrete Substructure Components	LS

## **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, and as directed by the Engineer. Work shall also include conditioning of the surface to be coated, and all submittals and quality-control testing noted herein.

The completed membrane system shall be comprised of a primer coat, reinforcing material as specified or directed, 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, and an application of tack coat.

**Materials:** The Contractor shall select a waterproofing membrane system from the Department's Qualified Products List (QPL) for Spray-Applied Membrane Waterproofing System. All materials incorporated in the work shall meet the Manufacturer's specification for the chosen system. A Manufacturer is the original source of supply as defined in Article 1.06.01 of CTDOT's Standard Specifications. The Engineer will reject any system that is not on the QPL.

Reinforcing material (to bridge gaps, joints and cracks) shall be as recommended by the manufacturer.

**Aggregate:** The aggregate shall be a nonfriable, durable #8 aggregate stone with no more than one-half percent (0.5%) passing the #200 sieve by weight.

**Concrete Deck Repair Material:** Depressions greater than ½ inch that are required to be filled before application of the membrane shall be repaired with a neat repair mortar as approved by the Engineer. If the repair includes engagement of reinforcing steel, the repair shall be performed under separate, appropriate Contract items.

### **Construction Methods:**

#### 1. Submittals:

Prior to submission, the Contractor shall ensure that the Manufacturer and Supplier are fully informed regarding any site constraints or specific structural materials on which the membrane system is to be installed on.

At least 30 days prior to installation of the membrane system, the Contractor shall submit to the Engineer the following:

- (a) A Site-specific Installation Plan that includes, but is not limited to, the manufacturer's recommended equipment, materials and procedure for:
  - 1) Authorization by Manufacturer of applicator
  - 2) Safety precautions, SDS documents
  - 3) On site storage of material
  - 4) preparation of the deck surface and recommended surface moisture content at time of priming, including the manufacturer's recommendation for primer based on substrate material or environmental conditions

- 5) Pre-treatment or preparation procedure at cracks and gaps, treatment at curbs, vertical surfaces or discontinuities
  - 6) Overspray protections (masking and shielding)
  - 7) Method and equipment for taking/calculating onsite temperatures and dewpoint temperatures as well as listing of acceptable temperature and dewpoint ranges for application of primer and/or membrane
  - 8) Method and equipment for application of the primer and membrane
  - 9) Treatment of already primed areas when delays occur; include allowable time frame for covering already placed primer or treatment if the primed surface is compromised
  - 10) Treatment at overlap areas
  - 11) Method for placement of the aggregated coat
  - 12) All Quality Control (QC Plan) tests and procedures to be performed prior to and during the membrane system's installation
  - 13) Recommended repair methods for system non-compliant issues identified during application
- (b) Materials Certificate for the primer, membrane and aggregate in accordance with the requirements of Article 1.06.07.
- (c) Concrete Mix Design: At least two weeks before installation, the Contractor shall submit the concrete mix design to the Engineer for acceptance. For RSCP material, NTPEP lab test data shall be submitted that demonstrates that the concrete mix matches the mix that was tested by NTPEP and meets the pre-qualification criteria in the QPL. This test data shall be submitted with a Materials Certificate and a Certified Test Report in accordance with Article 1.06.07.

Automated mechanical applicators will be considered for approval for use, provided there is a trial installation area to demonstrate that the required thickness can be consistently achieved. The Installation Plan shall identify and differentiate between areas using automated applicators and areas where hand application will be used, such as on vertical surfaces and at areas prior to installation of reinforcing material.

2. A technical representative, in the employ of the manufacturer, shall be present on-Site immediately prior to and during application of the membrane. The technical representative shall not be an employee of the installation contractor but is on Site solely to perform QC. The technical representative shall review environmental conditions for proper application, inspect and approve the surface prior to priming, provide guidance on the handling, mixing and addition of components, observe application of the primer and membrane. The technical representative is required to notify the Engineer immediately when conditions are not within acceptable parameters and any further installation will be analyzed by the Engineer under Article 1.06.04. The technical representative shall be qualified and 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.

3. **Applicator Approval:** The Contractor's membrane Applicator shall be fully trained and authorized by the membrane manufacturer and shall have successfully completed at least six spray membrane projects in the past two 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.
4. **Job Conditions:**
  - (a) **Environmental Requirements:** Air and substrate temperatures shall be between 40°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.

Extra care shall be taken to prevent the introduction of moisture onto the area to be membraned including, but not limited to, locating water rest break areas/devices away from the works, prevent vehicles from accessing the prepared areas that may have AC units that drip water. If there is any potential for moisture to impact application, operations shall cease until conditions warrant proper adherence to specification requirements.

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

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

5. **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, lot and batch number, manufactured date and expiry or "Best-used-by Date."
  - (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 Safety Data Sheets (SDS) 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 original shelf life has expired shall be used.
6. Pre-application Meeting: A minimum one week prior to beginning any membrane waterproofing work, an on-site Pre-application meeting shall be scheduled to review all requirements of the approved Installation Plan. This meeting shall include representatives from the membrane system's Manufacturer and from the Installer as well as the Prime Contractor.
7. Surface Preparation:
- (a) Protection: The Contractor shall be responsible for the protection of equipment, adjacent areas, and affected pedestrians/traffic from over spray or other contamination. Permanent highway features adjacent to the work such as, but not limited to, curbs, parapets, sidewalks and bridge joints shall be masked prior to application of the materials.
  - (b) Surface Preparation: Surfaces shall be free of oil, grease, curing compounds, loose particles, moss, algae, growth, laitance, friable matter, dirt, bituminous products, previous waterproofing materials or any material that will affect the proper bonding/adhesion of the membrane to the surface receiving the membrane application. If required, degreasing shall be done by detergent washing in accordance with ASTM D4258.

Sharp peaks and discontinuities within the areas to be coated 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 and voids and holes greater than ½" in the surface patched with appropriate material. The surface shall be abrasively cleaned, in accordance with ASTM D4259, to provide a sound substrate free from laitance and shall achieve a Concrete Surface Profile (CSP) as defined by the International Concrete Repair Institute (ICRI) of between 4 and 6. The QC representative shall have on their person and available for use by Department Engineers, a full CSP Chip Set to confirm concrete surface meets above profile requirement. Areas not falling within the noted range shall be re-addressed as needed.

Steel components to receive membrane waterproofing shall be blast cleaned in accordance with the Society of Steel Protective Coatings' SSPC-SP6, Commercial Blast Cleaning, and shall be coated with the membrane waterproofing system within the same work shift.

8. Inspection and Testing: Prior to priming of the surface, the Engineer, the 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,” “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 written submittal installation documentation from the system’s Manufacturer.

- (b) The ambient air temperature and dew point temperature readings shall be taken immediately prior to starting any primer or membrane application and continuously throughout the installation process. No primer or membrane application shall be allowed if the difference between the two is 5° deg or less, or is not within the recommended air and dew point temperature ranges noted in the submitted Installation Plan from the system’s Manufacturer.
- (c) 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 D7234 for concrete substrate or ASTM D4541 for steel substrate. 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 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.

- (d) 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.

9. 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., embedded in wet membrane bonding layer,
  - 4) Membrane application,
  - 5) Membrane with aggregate.
- (b) Immediately prior to the application of any components of the System, the surface shall be adequately dry (see Section 8(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. All components shall be used from its original packaging (barrels) or be discarded – no mixing of like materials from different batches shall be allowed.
- (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.

**Bond Strength:** Random tests for adequate adhesion capacity shall be conducted on the primed substrate in accordance with the requirements of ASTM D7234 for concrete or ASTM D4541 for steel substrate. 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 adhesion 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.

Any primer not adequately applied shall be removed and new primer applied at the Contractor's expense, as directed by Engineer.

Delays to the membrane installation following installation of the primer may necessitate remedial measures. Re-application of the primer or any work required due to, but not limited to, precipitation, ambient or dew point temperatures falling out of allowable zone, materials dropped on the surface, shall be accomplished as outlined in the Installation Plan.

- (g) Membrane and Reinforcing Material: Application of the membrane on the primed surface shall not commence until the primer is cured and adequate adhesion capacity achieved as described in Section 9(f) of this specification.

The waterproofing membrane shall consist of two equal 40 mil coats for a total dry film thickness of a minimum 80 mils but not to exceed 120 mils. successive coats shall be of a contrasting color to aid in Quality Assurance and inspection.

Hand sprayer application of a single layer at 80 mils may be allowed after demonstration on a test section of not less than 100 sq. feet, of the applicator's ability to meet specified tolerances has been reviewed and found acceptable to the Engineer.

Use of an automated mechanical applicator to achieve the required thicknesses in either one or two equal layers, may be allowed after demonstration on a test section of not less than 100 sq. feet, of the applicator's ability to meet specified tolerances has been reviewed and found acceptable to the Engineer.

Reinforcing material, if required, shall be applied as described in the Installation Plan.

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 adhesion shall be conducted on the membrane in accordance with the requirements of ASTM D7234 for concrete substrate or ASTM D4541 for steel substrate. 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: For areas left untreated or where the membrane hasn't bonded or 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, abraded and wiped with solvent (e.g. acetone or other manufacturer-recommended material) up to a width of at least six inches on the periphery, removing any contaminants unless otherwise recommended by the Manufacturer. The substrate shall be primed as necessary and tested for adhesion before the membrane layer(s) are applied. A continuous layer shall be obtained over the substrate with a six-inch overlap onto any adjacent existing membrane. The repaired area shall be tested for adhesion, with a minimum of one test per repair area.
- (i) Overlapped areas: Where the membrane is to be joined to existing cured material, the overlapped area shall be cut back to sound material if necessary, abraded and wiped with solvent (e.g. acetone or other manufacturer-recommended material) or cleaned in accordance with the Installation Plan, up to a width of at least six inches prior to application of the overlapping membrane material. A continuous layer shall be obtained over the substrate with a six-inch overlap onto existing membrane. The overlapped section shall be tested for adhesion, with a minimum of one test per 200 lineal feet.
- (j) 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) Using motorized mechanical sweepers followed by a vacuum or motorized blower apparatus, remove all loose and excess aggregate and fines from the surface, to the satisfaction of the Engineer, and dispose of properly prior to application of tack coat and overlay.

- 3) Traffic shall not be allowed to travel on the completed membrane system without prior approval of Engineer upon consultation with Manufacturers technical representative.
  - 4) Localized areas not fully coated following removal of loose aggregate, defined as being at least 90% covered with well-adhered aggregate within any one square foot area, shall be touched-up with additional membrane and aggregate as needed. These areas shall then be swept and/or vacuumed or blown again prior to application of tack coat and overlay.
  - 5) Tack coat: a Tack Coat Emulsion shall be applied to the aggregated finish prior to covering with a bituminous concrete mat. Material shall be applied in two coats of 0.06 - 0.08 gal/s.y. allowing it to break in between coats. This work shall be done as part of the paving operation and paid under separate, applicable Contract items.
10. 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 will 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 submittals, Pre-Work Meeting, 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.

The asphalt emulsion (tack coat) will be paid separately.

Pay Item	Pay Unit
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.

Pay Item	Pay Unit
Penetrating Sealer Protective Compound	s.y.

**ITEM #0904051A – 3-TUBE CURB MOUNTED BRIDGE RAIL**

**Description:** Work under this item shall consist of fabricating, galvanizing, transporting and erecting a curb mounted bridge rail comprised of anchorages, concrete inserts, plates, posts, rails, fasteners and epoxy grout in accordance with the plans.

**Materials:** Structural steel shapes and plates shall meet the requirements of ASTM A572, Grade 50. Hollow structural sections shall meet the requirements ASTM A500, Grade C or ASTM A501, Grade B. Certified Test Reports and Materials Certificates shall be submitted in accordance with Article 1.06.07. The Certified Test Reports shall address that the steel meets the requirements of Article 1.06.01, Buy America.

All exposed steel shapes, plates and hollow structural sections shall have a controlled content of silicon within the range 0.0% to 0.4% or 0.15% to 0.25%. Before galvanizing, mill test certificates verifying silicon content shall be submitted to the Engineer and the galvanizer.

All steel shapes, plates and hollow structural sections shall be hot-dip galvanized in accordance with ASTM A123.

All high strength bolts shall meet the requirements of ASTM F3125, Grade A325, Type 1. Nuts shall conform to ASTM A563, Grade DH. Circular, flat, hardened steel washers shall meet the requirements of ASTM F436. The bolts, nuts and washers shall be galvanized in accordance with ASTM F2329 or ASTM B695, Class 55.

The anchor rods shall be fully threaded rods in accordance with ASTM F1554, Grade 105. The nuts shall meet the requirements of ASTM A563, Grade DH. The washers shall meet the requirements of ASTM F436. The bolts, nuts and washers shall be galvanized in accordance with ASTM F2329 or ASTM B695, Class 55.

Dome head bolts with wrench slots shall meet the requirements of ASTM F3125, Grade A325, Type 1 or ASTM A449, Grade 1. The nuts shall meet the requirements of ASTM A563, Grade DH. The washers shall meet the requirements of ASTM F436. The bolts, nuts and washers shall be galvanized in accordance with ASTM F2329 or ASTM B695, Class 55.

Concrete inserts shall meet the requirements shown on the plans. The concrete inserts shall be hot dip galvanized in accordance with ASTM A153. The bolts shall meet the requirements of ASTM A307 and the washers shall meet the requirements of ASTM F436. The bolts and washers shall be galvanized in accordance with ASTM F2329.

Epoxy grout shall capable of being installed in the void below the baseplate and meet the following requirements:

- Compressive strength, ASTM C579, @ 73 degrees F, 10,000 psi
- Tensile strength, ASTM C307 @ 7 days or ASTM D638 @ 7 days, 2,000 psi
- Bond strength to concrete, ASTM C882, concrete failure
- Bond strength to steel, ASTM C882, 2,500 psi
- Volatile organic compounds (VOC), 0.0

Color, gray or concrete gray

Damaged areas of the hot-dip galvanized coatings shall be repaired in accordance with ASTM A780 amended as follows:

Paints containing zinc dust used for repairs shall contain either between 65% to 69% metallic zinc by weight or greater than 92% metallic zinc by weight in dry film.

**Construction Methods:**

**A. Submittals:** Prior to fabrication, the Contractor shall submit shop drawings for the bridge rail at each location in accordance with Article 1.05.02 and welding procedures in accordance with Article 1.05.17.

Prior to placing the epoxy grout, the Contractor shall submit the following to the Engineer for review in accordance with Article 1.05.02 Product Data requirements:

1. A copy of the epoxy grout manufacture's data sheet documenting the grout meets the specification requirements.
2. A copy of the epoxy grout manufacturer's printed installation instructions (MPII)
3. A copy of the epoxy grout manufacturer's printed safety instructions

**B. Fabrication Requirements:** The steel fabricator shall meet the requirements of the AISC Certification Program for Manufacturers of Bridge and Highway Components (CPT).

Shop fabrication of the bridge rail shall meet the requirements of Article 6.03.03-3. Structural steel elements of the bridge rail shall be prepared for galvanizing in accordance with Article M.06.02.

After galvanizing, surfaces with inadequate zinc thickness shall be repaired in the shop according to ASTM A780 and ASTM A123, with the exception that only brush applied flat, light gray zinc rich coating shall be permitted. Aerosol spray or galvanizing repair stick products shall not be used. Surfaces of galvanized steel that are damaged after the galvanizing operation shall be repaired in accordance with ASTM A780 whenever damage exceeds 0.1875 inch in width or 4 inches in length. Damage that occurs in the shop shall be repaired in the shop.

**C. Installation Requirements:** The anchor rods shall be securely bolted to anchor plates to create anchorage assemblies. The anchorage assemblies shall be accurately positioned and restrained to prevent movement during field placement of the concrete. The concrete inserts shall be accurately positioned and restrained against movement during the placement of concrete.

Field installation of the rail components shall be as shown on the plans.

The connection of the post baseplate to the anchor rods shall be a double nut connection. The post baseplate shall be installed on washers supported by leveling nuts. The baseplate shall be secured in place with a washer topped with a nuts at each anchor rod.

High-strength bolts, including nuts and washers, shall be installed and tensioned in accordance with Subarticle 6.03.03-5(f).

Dome headed bolts shall be installed with a washer, a lock washer and nut.

Epoxy grout shall be placed between the concrete curb and the baseplate at all post locations. The concrete and steel surfaces that will be in contact with the grout shall be dry, clean and free of all loose concrete and contaminants. The galvanized surface of the baseplate shall not be abrasively cleaned. Solvent cleaning is acceptable if allowed by the epoxy grout manufacturer. The grout shall be placed within an area formed around each baseplate. The forms shall be liquid tight and treated with a form release agent. The forms shall have chamfer strips placed along all vertical and horizontal finished grout edges. The vertical faces of the grout shall extend beyond the vertical edges of the baseplate.

Prior to placing the epoxy grout, the curb concrete shall have obtained the compressive strength shown on the plans.

The grout shall be mixed and placed in accordance with the manufacturer's printed installation and safety instructions. Conditions, including the temperature of the mixed grout, air and substrate, at the time of the installation shall meet the manufacturer's recommendations. The grout shall be placed from one side allowing it to flow beneath the baseplate to the formed surfaces and avoid air entrapment. After removal of the forms, rough surfaces and edges shall be trimmed or ground down to provide smooth surfaces and defined edges.

Damage that occurs to the hot-dip galvanized surfaces during transport or during installation shall be repaired in accordance with the requirements of ASTM A780. If paint containing zinc dust is used for repairs, the dry coating thickness shall be at least 50% greater than the thickness of the adjacent hot-dip galvanized coating, but no greater than 4.0 mils. The paint shall be brush applied. The use of aerosol spray cans or galvanizing repair stick is not permitted. The color of the finished repair area shall match the color of the adjacent hot-dip galvanized surface at the time of the repair to the satisfaction of the Engineer.

During installation of the rail and any component parts, the Contractor shall take necessary precautions to prevent any injury or property damage from any falling materials.

All work shall proceed in accordance with the special provisions "Maintenance and Protection of Traffic" and "Prosecution and Progress."

**Method of Measurement:** This work will be measured for payment by the number of linear feet of bridge rail installed, complete and accepted, measured within the pay limits shown on the plans.

**Basis of Payment:** This work will be paid for at the Contract unit price per linear foot for "3-Tube Curb Mounted Bridge Rail," complete and accepted in place, which price shall include all materials, equipment, tools, and labor incidental thereto.

Pay Item	Pay Unit
3-Tube Curb Mounted Bridge Rail	l.f.

**ITEM #0910052A - MERRITT PARKWAY GUIDERAIL**

**ITEM #0910057A - MERRITT PARKWAY GUIDERAIL REPLACEMENT PARTS**

**ITEM #0910058A - MERRITT PARKWAY GUIDERAIL LEADING END ATTACHMENT**

**ITEM #0912104A – DRILLING HOLE FOR GUIDERAIL POST**

**Description:** Work under this item shall consist of a single steel-backed timber rail element fastened to steel posts and the appropriate treatment at fixed objects, bridge parapets and terminal ends as shown on the plans. It shall be erected in the locations sited and fabricated in conformity with the designations, dimensions and details shown on the plans or as ordered by the engineer.

**Materials:**

1. **Steel:** All steel posts, back-up rails, splice plates and channel rubrails which are to be used as “Weathering Steel”, shall meet the requirements of ASTM A588. The fabricator shall notify the manufacturer that it is “Weathering Steel” (structural steel for use in bare, unpainted applications) and that the steel shall not be marked with paint or steel die stamped, but identification shall be stenciled with permanent ink. The dimensions of each component shall conform to the plans and ASTM A6. All steel posts shall be galvanized after fabrication to meet the requirements of ASTM A123 and conform to the galvanizing limits and tolerances shown on the plans. A single ¾” diameter hole may be drilled 2” from the top of each post, in the center of the web, to facilitate the galvanizing process on the bottom of all posts.
2. **Timber:** All timber rail and block-out components shall conform with the following:
  - a) Commercial lumber grade No. 1 or better after treatment;
  - b) AASHTO M 168;
  - c) Minimum stress rating of 1350 psi
  - d) Rough sawn (non-planed) or S4S (surface four side) Southern Yellow Pine or Douglas Fir- Larch with nominal dimensions as indicated on the plans. Variations in the size of any dimension shall not be more than  $\pm \frac{1}{4}$ ”
  - e) All timber components shall be pressure treated with CCA or ACZA depending on species supplied conforming to AWWA Standard P5 to a minimum net retention of 0.60lb/cubic foot in the assay zone in accordance with AWWA Standard C14.
  - f) All timber components shall be fabricated (including but not necessarily limited to cutting, drilling, dapping and chamfering) prior to treatment.
  - g) All timber components shall be free of excess preservative and solvent at the conclusion of the treating process. Post treatment cleaning shall be by expansion bath or steaming in accordance with AWWA Standard C2;

ITEM #0910052A  
#0910057A  
#0910058A  
#0912104A

- h) Kiln or air dried to a maximum moisture content of 25% after treatment (KDAT - 25);
- i) Grade-marked after treatment by an agency certified by the American Lumber Standard Committee (ALSC).

3. **Fasteners:** Round head bolts shall be manufactured in accordance with the sizes designated on the plans, the geometric specifications included in ANSI B18.5.1.2.2 and the material specifications for ASTM A588 steel. All round head bolts shall be marked with the manufactures symbol and A588. Hex Lag Screws shall be manufactured in accordance with ASTM A307 Grade A specifications. All Hex Lag Screws shall be hot-dipped galvanized in accordance with ASTM A153 Class C.

**Construction Methods:** The steel posts shall be driven. The Contractor shall use suitable caps and equipment to prevent damage to the posts during driving. Where rock or boulders are encountered in driving the posts, the material shall be removed so as to make a hole of sufficient size to permit the setting of the post. The hole shall then be backfilled and thoroughly compacted before the driving of the posts.

The Contractor is cautioned that within the limits of any project, buried cables for illumination or utilities, which may be energized, may be present.

The posts shall be located as shown on the plans, set plumb and in alignment with the rail or rail treatments. The block outs and rail elements shall then be erected to produce a smooth continuous rail as shown on the plans.

Whenever rail or rail treatments are being constructed adjacent to roadways open to traffic, the Contractor shall complete the installation to and including the designated terminal treatment at the close of each day's work.

On long runs or other locations where it is not practical to complete the installation to and including the designed terminal treatment by the end of each day's work, the Contractor shall use temporary methods for terminating the beam rail so as to minimize any hazard caused by leaving the end of the beam rail exposed to traffic. Temporary methods for terminating the beam rail shall include lowering the rail end to the ground and providing adequate anchorage of the rail end by bolting, securing, burying, etc.

The Contractor shall submit to the Engineer for approval details of his proposed methods for temporary terminating the end section. No work shall be performed adjacent to the areas open to traffic until approval is given.

The Contractor shall be required to furnish extra length posts at transition areas or where field conditions warrant. These posts shall be of such length that the minimum depth in the ground, as shown on the plans, is maintained.

Before final erection, all galvanized elements which have been cut or worked so as to destroy the zinc coating and cause the base metal to be exposed shall have the exposed base metal thoroughly cleaned and brush coated with zinc rich touch up material.

**Method of Measurement:** The length of Merritt Parkway Guiderail measured for payment will be the number of linear feet of accepted rail of the type or designation installed, measured along the top of the rail between centers of end posts in each continuous section.

“Merritt Parkway Guiderail (Type) End Attachment” shall be measured for payment by the actual number of each attachment installed in accordance with the “Pay Limit for attachment” as designated on the plans.

“Merritt Parkway Guiderail Replacement Parts” shall be measured for payment by the lump sum quantity.

“Drilling Hole for Guiderail Post” shall be measured to the nearest 4” in depth of actual rock encountered and removed.

**Basis of Payment:** Merritt Parkway Guiderail will be paid for at the contract unit price per linear foot for the type or designation indicated on the plan or ordered by the Engineer, complete in place. The price shall include all materials, fittings, back-up rail, posts, delineators, equipment, and tools and labor incidental to the installation of the rail.

“Merritt Parkway Guiderail (Type) End Attachment” to parapets or barriers will be paid for at the contract unit price each as shown on the plans or as ordered by the Engineer, complete and in place. The price shall include all materials, fittings, back-up rails, posts, anchor bolts, attachment brackets, drilling and grouting, chemical anchoring material, delineators, equipment, removal and disposal of surplus material, removal of existing rail, tools and labor incidental to the installation of the rail.

Drilling in or removal of rock or boulders and backfilling with suitable material when required for the installation of posts will be paid for at the contract unit price per foot of depth for “Drilling Hole for Guiderail Post”. The price shall include all materials, equipment, tools, and labor incidental thereto.

Pay Item	Pay Unit
Merritt Parkway Guiderail (Type)	L.F.
Merritt Parkway Guiderail Replacement Parts	Lump Sum
Merritt Parkway Guiderail (Type) End Attachment	Each
Drilling Hole for Guiderail Post	L.F.

## **ITEM #0911476A - MERRITT PARKWAY END ANCHORAGE-TYPE I**

Work under this item shall conform to the requirements of section 9.11, supplemented and amended as follows:

**Description:** This item shall consist of furnishing and installing terminals for sections of Merritt Parkway Guiderail (MPG) as shown on the plans. It contains appropriate treatments for anchorage of MPG end sections that are buried outside of the roadway clear zone, buried in earth-cut slopes, and anchored in rock-cut slopes as shown on the plans or as ordered by the Engineer.

### **Materials:**

1. **Steel:** All steel posts, back-up rails, splice plates and structural tees which are to be used as “Weathering Steel” shall meet the requirements of ASTM A588 and the fabricator shall notify the manufacturer that it is “Weathering Steel” (structural steel for use in bare, unpainted applications) and that the steel shall not be marked with paint or steel die stamped, but identification shall be stenciled with permanent ink. The dimensions of each component shall conform to the plans and ASTM A6. All steel posts shall be hot-dipped galvanized after fabrication in accordance with ASTM A123 and conform to the galvanizing limits and tolerances shown on the plans. A single  $\frac{3}{4}$ ” diameter hole may be drilled 2” from the top of each post, in the center of the web, to facilitate the galvanizing process on the bottom of all posts. Any back-up rails, splice plates or structural tees that will come into contact with the ground shall be hot-dipped galvanized after fabrication in accordance with ASTM A123.
2. **Timber:** All timber rail and block-out components shall conform with the following:
  - a) Commercial lumber grade No. 1 or better after treatment;
  - b) AASHTO M 168;
  - c) Minimum stress rating of 1350 psi;
  - d) Rough sawn (non-planed) or S4S (surface four side) Southern Yellow Pine or Douglas Fir- Larch with nominal dimensions as indicated on the plans. Variations in the size of any dimension shall not be more than  $\pm 1/4$ ”.
  - e) All timber components shall be pressure treated with CCA or ACZA depending on species supplied conforming to AWWA Standard P5 to a minimum net retention of 0.60lb/cubic foot in the assay zone in accordance with AWWA Standard.
  - f) All timber components shall be fabricated (including but not necessarily limited to cutting, drilling, dapping and chamfering) prior to treatment.
  - g) All timber components shall be free of excess preservative and solvent at the conclusion of the treating process. Post treatment cleaning shall be by expansion bath or steaming in accordance with AWWA Standard C2;
  - h) Kiln or air dried to a maximum moisture content of 25% after treatment (KDAT - 25);

- i) Grade-marked after treatment by an agency certified by the American Lumber Standard Committee (ALSC).
- 3. Fasteners:** Anchor bolts shall conform to ASTM A449. The nuts and washers for anchor bolts shall conform to ASTM A563, Grade B. Round head bolts shall be manufactured in accordance with the sizes designated on the plans, the geometric specifications included in ANSI B18.5.1.2.2 and the material specifications for ASTM A307 steel. All round head bolts shall be marked with the manufactures symbol and A307. Rock anchors shall be manufactured in accordance with the sizes designated on the plans and the specifications for ASTM A307 steel. Hex lag screws shall be manufactured in accordance with the sizes designated on the plans and the specifications for ASTM A307, Grade-A steel. All anchor bolts, round head bolts, rock anchors and hex lag screws shall be hot-dipped galvanized in accordance with ASTM A 153 Class C. Unless other wise noted on the plans, all other fasteners shall conform to the requirements of M.10.02.9.

**ITEM #0921001A – CONCRETE SIDEWALK**

**ITEM #0921005A – CONCRETE SIDEWALK RAMP**

Concrete sidewalks shall be constructed in accordance with Article 9.21, supplemented as follows:

**Article 9.21.01 - Description:** Add the following:

This item shall include furnishing and installing of welded wire mesh and smooth metal dowels in the locations and to the dimensions and details shown on the plans or as directed by the Engineer.

**Article 9.21.02 – Materials:** Add the following:

The welded wire mesh and smooth metal dowels for this work shall meet the requirements of Section M.06.

**Article 9.21.04 - Method of Measurement:** Add the following:

The welded wire mesh and smooth metal dowels will not be measured for payment. All materials, equipment, tools and labor incidental thereto shall be included in the Bid price for Concrete Sidewalk and Concrete Sidewalk Ramp.

**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 Engineer.

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

**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	Pay Unit
Turf Establishment - Lawn	s.y.

## **ITEM #0950040A - CONSERVATION SEEDING FOR SLOPES**

**Description:** The work included in this item shall consist of providing an accepted uniform stand of established conservation seed mixture by furnishing and placing seed and cover crop 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 seed mixture sources shall be obtained within the New England States, New York, Pennsylvania, New Jersey, Delaware, Virginia or Maryland to preserve and enhance the diversity of native conservation grass and plant species.

Four 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 25 lbs. PLS per acre (1 lb. 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 20 lbs. PLS per acre (1 lb. 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 20 lbs. PLS per acre (1 lb. PLS per 2,178 sq. ft.)
4. **Upland Partial Shade to Full Sun Mixture**, Chesapeake Valley Seed, 8869 Greenwood Place, Suite C, Savage, MD 20763, or equal. Rate shall be 25 lbs. PLS per acre (1 lb. PLS per 1,750 sq. ft.)

The Contractor must apply 30 lbs. of cover crop per acre in conjunction with the qualified conservation seed mixture selected. The 30 lbs. of cover crop shall consist of grain oats when seeding between March 15 to June 30 or grain rye when seeding between August 15 to October 31.

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.

The Contractor shall submit the selected qualified conservation seed mixture or equal including cover crop seed mixture information to the Engineer for review and acceptance 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 accepted by the Engineer. The methods described in Article 9.50.03 shall be amended as follows:

Preparation of Seedbed Areas:

- a. Level Areas, Median Areas, Interchanges and Lawns: These areas shall be made friable and receptive for seeding by discing or by other accepted methods to the satisfaction of the Engineer. The final prepared surface which has been seeded shall meet the lines and grades for such surface areas as shown on the plans, permits or as directed by the Engineer. In no event, will seeding be permitted on hard or crusted soil surface.
- b. Slope and Embankment Areas: These areas shall be made friable and receptive to seeding by accepted methods which will not disrupt the line and grade of the slope surface. In no event, will seeding be permitted on hard or crusted soil surface.

All areas to be seeded shall be reasonably free from weeds taller than 3 inches. Level Areas, Median Areas, Interchanges and Lawns: Seeding shall not be permitted until substantial weed growth is removed and accepted by the Engineer. Slope and Embankment Areas: Removal of weed growth shall be those methods which do not rut or scar the slope surface or cause excessive damage of the slope line or grade as accepted by the Engineer.

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 15 to October 31.

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 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.

<b>Pay Item</b>	<b>Pay Unit</b>
Conservation Seeding for Slopes	s.y.

**ITEM #0969060A - CONSTRUCTION FIELD OFFICE, SMALL**

**Description:**

Under the item included in the bid document, adequate weatherproof office quarters with related furnishings, materials, equipment and other services, shall be provided by the Contractor for the duration of the work, and if necessary, for a close-out period determined by the Engineer. The office, furnishings, materials, equipment, and services are for the exclusive use of Municipal forces and others who may be engaged to augment Municipal forces with relation to the Contract. The office quarters shall be located convenient to the work site and installed in accordance with Article 1.08.02. This office shall be separated from any office occupied by the Contractor. Ownership and liability of the office quarters shall remain with the Contractor.

**Furnishings/Materials/Supplies/Equipment:** All furnishings, materials, equipment and supplies shall be in like new condition for the purpose intended and require approval of the Engineer.

**Office Requirements:** The Contractor shall furnish the office quarters and equipment as described below:

Description \ Office Size	Small	Med.	Large
Minimum Sq. Ft. of floor space with a minimum ceiling height of 7 ft.	400	400	1000
Minimum number of exterior entrances.	2	2	2
Minimum number of parking spaces.	7	7	10

**Office Layout:** The office shall have a minimum square footage as indicated in the table above, and shall be partitioned as shown on the building floor plan as provided by the Engineer.

**Tie-downs and Skirting:** Modular offices shall be tied-down and fully skirted to ground level.

**Lavatory Facilities:** For field offices sizes Small and Medium the Contractor shall furnish a toilet facility at a location convenient to the field office for use by Municipal personnel and such assistants as they may engage; and for field office size Large the Contractor shall furnish two (2) separate lavatories with toilet (men and women), in separately enclosed rooms that are properly ventilated and comply with applicable sanitary codes. Each lavatory shall have hot and cold running water and flush-type toilets. For all facilities the Contractor shall supply lavatory and sanitary supplies as required.

**Windows and Entrances:** The windows shall be of a type that will open and close conveniently, shall be sufficient in number and size to provide adequate light and ventilation, and shall be fitted with locking devices, blinds and screens. The entrances shall be secure, screened, and fitted with a lock for which four keys shall be furnished. All keys to the construction field office shall be furnished to the Municipality and will be kept in their possession while Municipal personnel are using the office. Any access to the entrance ways shall meet applicable building codes, with appropriate handrails. Stairways shall be ADA/ABA compliant and have non-skid tread surfaces.

Lighting: The Contractor shall equip the office interior with electric lighting that provides a minimum illumination level of 100 foot-candles at desk level height, and electric outlets for each desk and drafting table. The Contractor shall also provide exterior lighting that provides a minimum illumination level of 2 foot-candles throughout the parking area and for a minimum distance of 10 ft. on each side of the field office.

Parking Facility: The Contractor shall provide a parking area, adjacent to the field office, of sufficient size to accommodate the number of vehicles indicated in the table above. If a paved parking area is not readily available, the Contractor shall construct a parking area and driveway consisting of a minimum of 6 inches of processed aggregate base graded to drain. The base material will be extended to the office entrance.

Field Office Security: Physical Barrier Devices - This shall consist of physical means to prevent entry, such as: 1) All windows shall be barred or security screens installed; 2) All field office doors shall be equipped with dead bolt locks and regular day operated door locks; and 3) Other devices as directed by the Engineer to suit existing conditions.

Electric Service: The field office shall be equipped with an electric service panel, wiring, outlets, etc., to serve the electrical requirements of the field office, including: lighting, general outlets, computer outlets, calculators etc., and meet the following minimum specifications:

- A. 120/240 volt, 1 phase, 3 wire
- B. Ampacity necessary to serve all equipment. Service shall be a minimum 100 amp dedicated to the construction field office.
- C. The electrical panel shall include a main circuit breaker and branch circuit breakers of the size and quantity required.
- D. Additional 120 volt, single phase, 20 amp, isolated ground dedicated power circuit with dual NEMA 5-20 receptacles will be installed at each desk and personal computer table (workstation) location.
- E. Additional 120 volt, single phase, 20 amp, isolated ground dedicated power circuit with dual NEMA 5-20 receptacles will be installed, for use by the Telephone Company.
- F. Additional 120-volt circuits and duplex outlets as required meeting National Electric Code requirements.
- G. One exterior (outside) wall mounted GFI receptacle, duplex, isolated ground, 120 volt, straight blade.
- H. After work is complete and prior to energizing, the Municipalities electrical inspector, must be contacted.

Heating, Ventilation and Air Conditioning (HVAC): The field office shall be equipped with sufficient heating, air conditioning and ventilation equipment to maintain a temperature range of 68°-80° Fahrenheit within the field office.

Telephone Service: The Contractor shall provide telephone service with unlimited nation-wide calling plan. For a Small, Medium and Large field office this shall consist of the installation of two

(2) telephone lines: one (1) line for phone/voice service and one (1) line dedicated for the facsimile machine. The Contractor shall pay all charges.

Data Communications Facility Wiring:

The Contractor shall supply cables to connect the Computer(s), Wi-Fi printer and Multi-Function Laser Printer/Copier/Scanner/Fax to the Contractor supplied internet router and to workstations/devices as needed.

Additional Equipment, Facilities and Services: The Contractor shall provide at the field Office at least the following to the satisfaction of the Engineer:

Furnishing Description	Office Size		
	Small	Med.	Large
	Quantity		
Office desk (2.5 ft. x 5 ft.) with drawers, locks, and matching desk chair that have pneumatic seat height adjustment and dual wheel casters on the base.	1	3	5
Personal computer tables (4 ft. x 2.5 ft.).	2	3	5
Drafting type tables (3 ft. x 6 ft.) and supported by wall brackets and legs; and matching drafters stool that have pneumatic seat height adjustment, seat back and dual wheel casters on the base.	1	1	1
Conference table, 3 ft. x 12 ft.	-	-	-
Table – 3 ft. x 6 ft.	-	-	-
Office Chairs.	2	4	8
Mail slot bin – legal size.	-	-	1
Non-fire resistant cabinet.	-	-	2
Fire resistant cabinet (legal size/4 drawer), locking.	1	1	2
Storage racks to hold 3 ft. x 5 ft. display charts.	-	-	1
Vertical plan racks for 2 sets of 2 ft. x 3 ft. plans for each rack.	1	1	2
Double door supply cabinet with 4 shelves and a lock – 6 ft. x 4 ft.	-	-	1
Case of cardboard banker boxes (Min 10 boxes/case)	1	1	2
Open bookcase – 3 shelves – 3 ft. long.	-	-	2
White Dry-Erase Board, 36" x 48" min. with markers and eraser.	1	1	1
Interior partitions – 6 ft. x 6 ft., soundproof type, portable and freestanding.	-	-	6
Wastebaskets - 30 gal., including plastic waste bags.	1	1	1
Wastebaskets - 5 gal., including plastic waste bags.	1	3	6
Telephone.	1	1	1
Full size stapler 20 (sheet capacity, with staples)	1	2	5
Desktop tape dispensers (with Tape)	1	2	5
8 Outlet Power Strip with Surge Protection	3	4	6

Furnishing Description	Office Size		
	Small	Med.	Large
	Quantity		
Rain Gauge	1	1	1
Mini refrigerator - 3.2 c.f. min.	1	1	1
Hot and cold water dispensing unit. Disposable cups and bottled water shall be supplied by the Contractor for the duration of the project.	1	1	1
Microwave, 1.2 c.f. , 1000W min.	1	1	1
Fire extinguishers - provide and install type and *number to meet applicable State and local codes for size of office indicated, including a fire extinguisher suitable for use on a computer terminal fire.	*	*	*
Electric pencil sharpeners.	1	2	2
Electronic office type printing calculators capable of addition, subtraction, multiplication and division with memory and a supply of printing paper.	1	2	2
Small Multi-Function Laser Printer/Copier/Scanner/Fax combination unit, network capable, as specified below under <u>Computer Related Hardware and Software</u> .	1	1	
Large Multi-Function Laser Printer/Copier/Scanner/Fax combination unit, network capable, as specified below under <u>Computer Related Hardware and Software</u> .			1
Field Office Wi-Fi Connection as specified below under <u>Computer Related Hardware and Software</u>	1	1	1
Wi-Fi Printer as specified below under <u>Computer Related Hardware and Software</u> .	1	1	1
Digital Camera as specified below under <u>Computer Related Hardware and Software</u> .	1	1	3
Desktop and/or Laptop Computer w/software as specified below under <u>Computer Related Hardware and Software</u>	1	1	2
Infrared Thermometer, including annual third party certified calibration, case, and cleaning wipes.	1	1	1
Concrete Curing Box as specified below under Concrete Testing Equipment.	1	1	1
Concrete Air Meter and accessories as specified below under Concrete Testing Equipment as specified below. Contractor shall provide third party calibration on a quarterly basis.	1	1	1
Concrete Slump Cone and accessories as specified below under Concrete Testing Equipment.	1	1	1
First Aid Kit	1	1	1

The furnishings and equipment required herein shall remain the property of the Contractor. Any supplies required to maintain or operate the above listed equipment or furnishings shall be provided by the Contractor for the duration of the project.

Computer Related Hardware and Software: The Contractor will supply by its own means the actual Personal Computer(s) for the Municipal representatives. The Contractor shall supply the Field Office Wi-Fi Connection, Wi-Fi Printer, Digital Camera(s) and Multifunction Laser Printer/Copier/Scanner/Fax as well as associated hardware and software, must meet the requirements of this specification as well as the latest minimum specifications posted, as of the project advertising date, at CTDOTs web site:

<http://www.ct.gov/dot/cwp/view.asp?a=1410&q=563904>

Within 10 calendar days after the signing of the Contract but before ordering/purchasing the Computers, Wi-Fi Printer, the Multifunction Laser Printer/Copier/Scanner/Fax), Field Office Wi-Fi and Digital Camera(s) as well as associated hardware, the Contractor must submit a copy of their proposed order(s) with catalog cuts and specifications to the Municipality or their Representative for review and approval. The Computers, Wi-Fi Printer, Multifunction Laser Printer/Copier/Scanner/Fax, Wi-Fi Router and digital cameras will be reviewed by Municipal personnel or their Representative. The Contractor shall not purchase the hardware, software, or services until the Municipality or their Representative informs them that the proposed equipment, software, and services are approved. The Contractor will be solely responsible for the costs of any hardware, software, or services purchased without approval.

The Contractor and/or their internet service provider shall be responsible for the installation and setup of the field office Wi-Fi, Wi-Fi printer, Computer(s) and the configuration of the wireless router as directed by the Municipality. Installation will be coordinated with Municipal and Project personnel.

After the approval of the hardware and software, the Contractor shall contact the designated representatives of the Municipality, a minimum of 2 working days in advance of the proposed delivery or installation of the Field Office Wi-Fi Connection, Computer(s), Wi-Fi Printer, Digital Camera(s), and Multifunction Laser Printer/Copier/Scanner/Fax, as well as associated hardware, software, supplies, and support documentation.

The Contractor shall provide all supplies, paper, maintenance, service and repairs (including labor and parts) for the Computer(s), Wi-Fi printers, copiers, field office Wi-Fi, fax machines and other equipment and facilities required by this specification for the duration of the Contract. All repairs must be performed with-in 48 hours. If the repairs require more than a 48 hours then an equal or better replacement must be provided.

Once the Contract has been completed, the hardware and software will remain the property of the Contractor.

First Aid Kit: The Contractor shall supply a first aid kit adequate for the number of personnel expected based on the size of the field office specified and shall keep the first aid kit stocked for the duration that the field office is in service.

Rain Gauge: The Contractor shall supply install and maintain a rain gauge for the duration of the project, meeting these minimum requirements. The rain gauge shall be installed on the top of a post such that the opening of the rain gauge is above the top of the post an adequate distance to avoid splashing of rain water from the top of the post into the rain gauge. The Location of the rain gauge and post shall be approved by the Engineer. The rain gauge shall be made of a durable material and have graduations of 0.1 inches or less with a minimum total column height of 5 inches. If the rain gauge is damaged the Contractor shall replace it prior to the next forecasted storm event at no additional cost.

Concrete Testing Equipment: If the Contract includes items that require compressive strength cylinders for concrete, in accordance with the Schedule of Minimum Testing Requirements for Sampling Materials for Test, the Contractor shall provide the following equipment.

- A) Concrete Cylinder Curing Box – meeting the requirements of Section 6.12 of the Standard Specifications.
- B) Air Meter – The air meter provided shall be in good working order and meet the requirements of AASHTO T 152.
- C) Slump Cone Mold – Slump cone, base plate, and tamping rod shall be provided in like-new condition and meet the requirements of AASHTO T119, Standard Test Method for Slump of Hydraulic-Cement Concrete.

All testing equipment will remain the property of the Contractor at the completion of the project.

Maintenance: During the occupancy by the Municipality, the Contractor shall maintain all facilities and furnishings provided under the above requirements, and shall maintain and keep the office quarters clean through the use of weekly professional cleaning to include, but not limited to, washing & waxing floors, cleaning restrooms, removal of trash, etc. Exterior areas shall be mowed and clean of debris. A trash receptacle (dumpster) with weekly pickup (trash removal) shall be provided. Snow removal, sanding and salting of all parking, walkway, and entrance ways areas shall be accomplished during a storm if on a workday during work hours, immediately after a storm and prior to the start of a workday. If snow removal, salting and sanding are not completed by the specified time, the Municipality will provide the service and all costs incurred will be deducted from the next payment estimate.

**Method of Measurement:**

The furnishing and maintenance of the construction field office will be measured for payment by the number of calendar months that the office is in place and in operation, rounded up to the nearest month.

There will not be any price adjustment due to any change in the minimum computer related hardware and software requirements.

**Basis of Payment:**

The furnishing and maintenance of the Construction Field Office will be paid for at the Contract unit price per month for “Construction Field Office, (Type),” which price shall include all material, equipment, labor, service contracts, licenses, software, repair or replacement of hardware and software, related supplies, utility services, parking area, external illumination, trash removal, snow and ice removal, and work incidental thereto, as well as any other costs to provide requirements of this specified this specification.

<u>Pay Item</u>	<u>Pay Unit</u>
Construction Field Office, (Type)	Month

## **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:

#### **Toelles Road**

1. The Contractor will be permitted to close Tillotson Road to through traffic and detour traffic as shown on the Detour Plans. The Contractor shall notify the Engineer at least 14 days in advance of implementing the detour.

#### **All Other Roadways**

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.

The Contractor, during the course of any active overhead construction work, shall close the lanes directly below the work area for the entire length of time overhead work is being undertaken.

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 overhead and side-mounted 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 if no Pavement Marking Grooves are proposed.

### **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**

Refer to Pavement Marking Groove special provisions for pavement marking requirements. 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.

Construction Traffic Control Plans 19 through 25 should be used for moving operations such as line striping, rumble strips, pothole patching, mowing, or sweeping when it is necessary for equipment to occupy a travel lane.

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. Implementation of Rolling Road Block (RRB)**

- 4.a) Temporary road closures using a RRB may be allowed on limited access highways for operations associated with the installation and removal of temporary lane closures. RRB may be allowed for the installation and removal of lead signs and lane tapers only and shall meet the following requirements:
  - i. Refer to the Limitation of Operations Chart provided in Section 1.08.04 for the hours allowed for implementing a RRB operation. The Contractor shall only implement a RRB operation within the hours shown in the Chart.
  - ii. In areas with good sight lines and full shoulders, signs on the side of the road opposite the traffic pattern should be installed in a separate operation.
  - iii. TMAs equipped with Arrow Boards shall be used to slow traffic to implement the RRB. State Police Officers in marked vehicles may be used to support the implementation of the RRB. The RRB shall start by having all vehicles,

- including TMAs and police vehicles, leave the shoulder or on-ramp and accelerate to normal roadway speeds in each lane. The vehicles will then position themselves side by side and decelerate to the RRB speed on the highway.
- iv. A Pre-Warning Vehicle, as specified elsewhere in the Contract, shall be used to advise the motorists that sign pattern installation or removal is underway.
  - v. The RRB duration shall not exceed 15 minutes from the start of the traffic block until all lanes are opened as designated in the Limitation of Operations chart. If the RRB duration exceeds 15 minutes on 2 successive shifts, no further RRB will be allowed until the Contractor obtains approval for a revised installation procedure from the District.
  - vi. RRB shall not be used to expand a lane closure pattern to an additional lane during the shift. The workers and equipment required to implement the additional lane closure should be staged from within the closed lane. TMAs (and State Police if available) shall be used to protect the workers installing the taper in the additional lane.
  - vii. Exceptions to these work procedures may be submitted to the District Office for consideration. A minimum of 2 business days shall be allowed for review and comment by the District.
  - viii. The Engineer and the Contractor will review and discuss the RRB procedures (including any revisions) in advance of the work. The implementation of the agreed upon plan will be reviewed with the State Police during the Work Zone Safety Meeting held before each shift involving temporary lane closures. If the State Police determine that alternative procedures should be implemented for traffic control during the work shift, the Department and Contractor will attempt to resolve any discrepancies with the duty sergeant at the Troop. If the discrepancies are unable to be resolved prior to the start of the shift, then the work will proceed as recommended by the Department. Any unresolved issues shall be addressed the following day.

## **5. Use of Arrow Boards**

- 5.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.
- 5.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.
- 5.c) A vehicle displaying an arrow board shall be equipped with high-intensity rotating, flashing, oscillating, or strobe lights.
- 5.d) The flashing arrow mode shall be used for lane closure (merge) tapers.

- 5.e) The flashing arrow mode shall not be used for temporary alternating one-way traffic operations or to laterally shift lanes of traffic.
- 5.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.
- 5.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.
- 5.h) The flashing alternating diamond caution mode should also be used when supplemental Arrow Boards are positioned in an already closed lane.

#### **6. Use of Truck-Mounted or Trailer-Mounted Impact Attenuators (TMAs)**

- 6.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.
- 6.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.
- 6.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.
- 6.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.
- 6.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.

- 6.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.

## **7. Use of Traffic Drums and Traffic Cones**

- 7.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.
- 7.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.
- 7.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.

## **8. Use of Barricade Warning Lights**

- 8.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.
- 8.b) Type C Barricade Warning Lights may be used at night to delineate the edge of the travel way.
- 8.c) Type B Barricade Warning Lights shall be used on post-mounted advanced warning signs.

## 9. Use of Portable Changeable Message Signs (PCMS)

- 9.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.
- 9.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.
- 9.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.
- 9.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.
- 9.e) The PCMS should not be used within 1,000 feet of an existing PCMS or Variable Message Sign (VMS).
- 9.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.
- 9.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.
- 9.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.
- 9.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**

<b>Word Message</b>	<b>Standard Abbreviation</b>	<b>Word Message</b>	<b>Standard Abbreviation</b>
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.

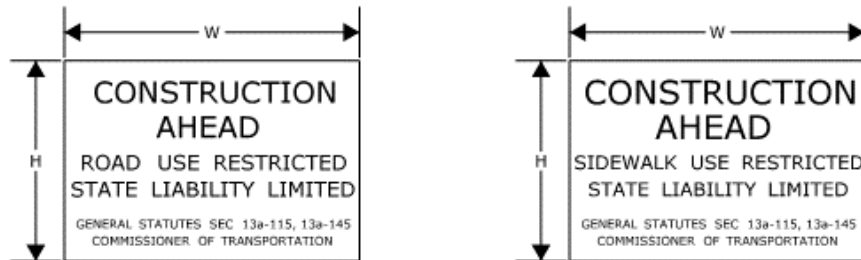
**Table 3: Unacceptable Abbreviations**

<b>Unacceptable Abbreviation</b>	<b>Intended Word</b>	<b>Common Misinterpretation</b>
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

## 10. Use of State Police Officers

- 10.a) State Police may be used only on limited access highways and secondary roadways that are under their primary jurisdiction. A minimum of one Officer may be used per critical sign pattern; however, a State Police presence is not required. Shoulder closures and right lane closures can generally be implemented without the presence of a State Police Officer. Left lane closures may also be implemented without State Police presence in areas with only moderate traffic and wide, unobstructed medians. It may be desirable to have a State Police presence, when available, under specific situations, such as nighttime lane closures; left lane closures with minimal width for setting up advance signs and staging; lane and shoulder closures on turning roadways/ramps or mainline where sight distance is minimal; and closures where extensive turning movements or traffic congestion regularly occur; however, they are not required.
- 10.b) If a State Police presence is provided, once the pattern is in place, the State Police Officer should be positioned in a non- hazardous location in advance of the pattern to provide advance warning to the motorist. If traffic backs up beyond the beginning of the pattern, then the State Police Officer shall reposition so that they are located prior to the backup. The State Police Officer should not be located immediately behind or within the roll ahead area of any TMA or within the work zone buffer area. The State Police Officer shall not be positioned in such a way that the State Police Officer obstructs any construction warning signs or PCMS from view of the motorist.
- 10.c) Other functions of the State Police Officer(s) may include:
  - i. Assisting construction vehicles entering and exiting the work area.
  - ii. Enforcement of motor vehicle laws within the work area, if specifically requested by the Engineer.
- 10.d) State Police Officers assigned to a work site shall take direction from the Engineer.

## 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**

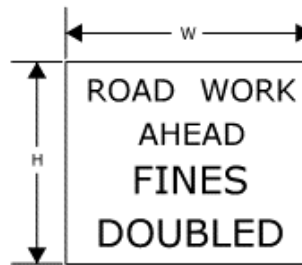
SCALE: NONE

## 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.

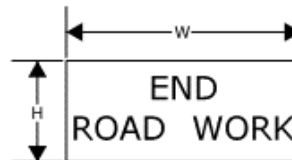
	W	H
31-1906	48"	42"
31-1907	60"	54"



## "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'

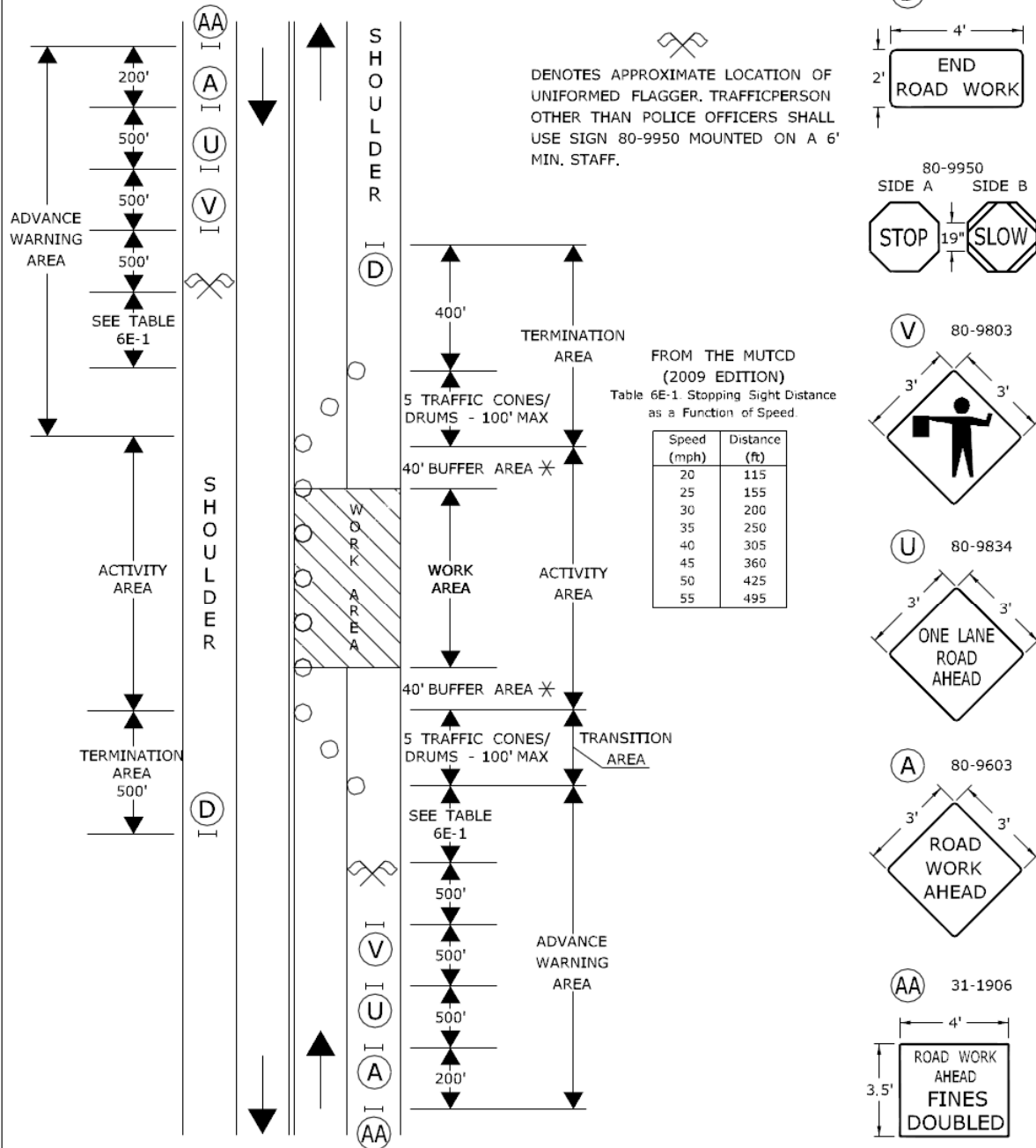
CONSTRUCTION TRAFFIC CONTROL PLAN

### 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



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* Charles S. Harlow  
2012.06.05 15:55:23-04'00"  
PRINCIPAL ENGINEER

# 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

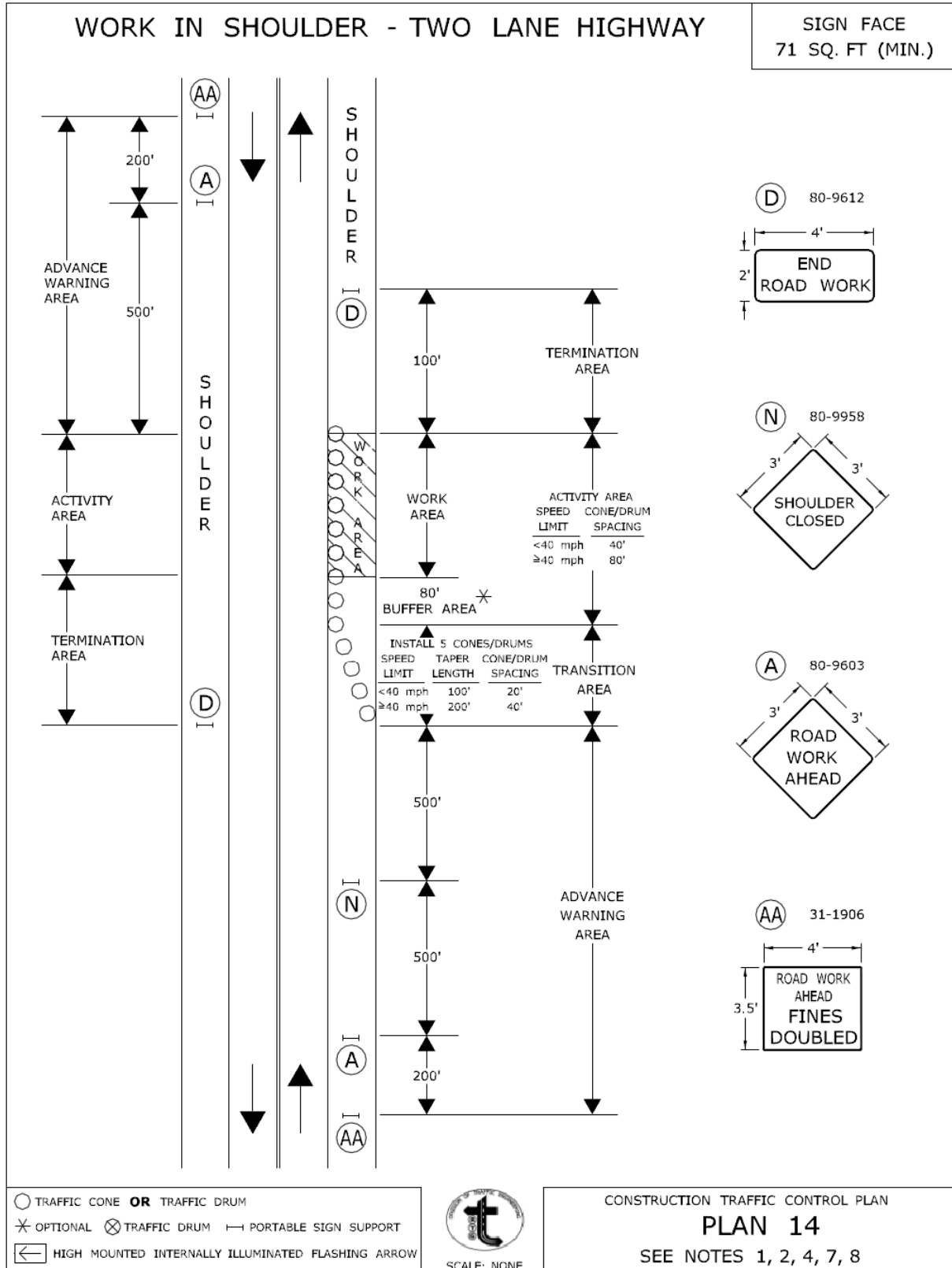


SCALE: NONE

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

CONNECTICUT DEPARTMENT OF TRANSPORTATION  
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED *Charles S. Harlow*  
PRINCIPAL ENGINEER  
Charles S. Harlow  
2012.06.05 15:55:45-04'00"



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



SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

### PLAN 14

SEE NOTES 1, 2, 4, 7, 8

CONNECTICUT DEPARTMENT OF TRANSPORTATION  
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED *Charles S. Harlow*  
PRINCIPAL ENGINEER  
2012.06.05 15:56:09-04'00"

**ITEM # 1117111A – RECTANGULAR RAPID FLASHING BEACON (RRFB)  
– TYPE B**

**Description:** Furnish and install a rectangular rapid flashing beacon (RRFB) at the location indicated on the plan or as directed by the Engineer.

Each RRFB will be a complete assembly consisting of but not limited to the following:

- RRFB unit with two rapidly flashed rectangular-shaped yellow LED indications
- Controller cabinet (circuit breaker, timer, or solid-state circuit boards etc.) or any electrical component hardware
- Pedestal
- Pedestal Foundation
- Pedestrian Pushbutton with accessible features
- Pushbutton Signs
- Mounting hardware
- If Solar, all solar equipment
- Crosswalk Illuminator

**Type A:** Single sided RRFB will contain two rapidly flashed rectangular-shaped yellow LED indications (two indications on one side facing traffic)

**Type B:** Double sided RRFB will contain four rapidly flashed rectangular-shaped yellow LED indications (two indications on each side facing traffic)

**Materials:** The materials for the work shall be specified in the following:

**Article M.16.03 - Pedestals**

**Article M.16.08 – Pedestrian Push Button – as revised by special provision M.16.08**

**Article M.16.10 – Cabinet**

**Article M.16.08 - Pedestrian Push Button:**

For RRFB (Rectangular Rapid Flashing Beacon):

Delete the entire section and replace with the following:

**A. General**

- Size and force compliant with ADA, Section 14.2.5, Crossing Controls.
- Tamper-proof, and Vandal-proof, Weatherproof, Freeze-proof, Impact-resistant design, and construction.
- Completely insulated to preclude electrical shock under any weather conditions.
- Wire entrance through the rear.
- Stainless steel mounting hardware.
- Any features in conflict with this spec and MUTCD shall be disabled.
- Accessible features shall:
  - conform to the [Manual on Uniform Traffic Control Devices \(MUTCD\) - FHWA](#)
  - provide the speech message “warning lights are flashing” that shall be spoken twice.

- include tactile arrow on the button.
- include a locator tone.
- not use vibrotactile indications or percussive indications for the audible information
  - The vibrotactile feedback shall be disabled.
- Bluetooth® Low Energy level 5 radio to provide wireless communication features.
- Operation programming method: Either or combination of:
  - Windows Laptop Computer with USB Cable
  - iOS Device and Bluetooth Wireless Connection
  - Android Device and Bluetooth Wireless Connection

#### B. Audible Pushbutton Locator Tone

- Frequency: repeating tone at one (1) second intervals
- Tone duration:  $\leq 0.15$  seconds
- Volume:
  - Minimum setting of zero
  - Manually adjustable initial setting
  - Automatically adjusted after initial setting. Volume increased in response to a temporary increase in ambient noise and subsequently decreased with a decrease in ambient noise.
  - Maximum volume: 100 dBA which is the approximate sound pressure of a gasoline powered lawn mower nearby.
  - Automatic volume adjustment independent of other Audible Information Devices at the intersection.
  - Should not be disabled but have the capability of being disabled without affecting operation of other features.
- Silent only when RRFB yellow lights are flashing. Active all other times.

#### C. Tactile Arrow Pushbutton:

- Pushbutton contained in a circular assembly which fits inside the housing and is attached to the housing with 4 screws.
- The confirmation light shall flash simultaneously with the RRFB indications.
- ADA compliant: Size:  $\geq 2.0$ " diameter, Actuation force:  $\leq 5$  ft-lb
- Shape: Circular, raised slightly above housing so that it may be actuated with the back of a hand
- Tamper-proof, vandal-proof, weatherproof, freeze-proof, impact-resistant design, and construction.
- Tactile Arrow:
  - Attached to surface of the button assembly by a tamperproof method.
  - Raised slightly above surface of pushbutton, minimum 0.125."
  - Size: Length  $\geq 1.5$ ", Height  $\geq 1.0$ "
  - Color: Sharp contrast to background color of pushbutton and housing

#### D. Housing

- Frame and button cover made of die cast aluminum meeting requirements of ASTM B85.
- Housing made of reinforced, UL-listed thermoplastic or aluminum. Designed to attach 9" x 12" four-hole advisory sign.
- Flat back to facilitate surface mount.
- Mounting plate made of aluminum mounts to pole with two  $\frac{1}{4}$ "-20 stainless steel bolts. Mounting plate separates from the button during installation and maintenance.
- Available extension bracket of a size indicated on the plan – 24" maximum.

#### E. Painting/Powder Coating

- Finish: Cover/Frame and all mounting brackets either:
  1. Painted with 3 coats of infrared oven-baked paint before assembly.
    - Primer: Shall be iron oxide baking primer and shall meet or exceed performance specification of FS TT-P-664.
    - Second coat: Exterior-baking enamel, light gray, which meets or exceeds FS TT-E-527.
    - Third coat: YELLOW exterior-baking enamel and shall meet the requirements of FS A-A 2962. The color shall be AMS-STD-595 Color No. 13538.
  2. Electrostatic powder coated after chemically cleaned. Pre coating material prep in accordance with ASTM\_D1730-09 to include all parts sent through a multi-stage phosphate wash process and preheat prior to any application of powder coat.

### **Construction Methods:**

- Each RRFB indication will be mounted on a standard aluminum pedestal and in accordance with dimensions and details shown on the plan.
- Each Solar RRFB will require a location free of any vegetation or obstruction which will inhibit solar charging.
- Each RRFB shall initiate operation only upon pedestrian actuation and shall cease operation after a programmed time as shown on the plan or determined by the Engineer (based on MUTCD procedures).
- All RRFBs associated with a given crosswalk (including those with an advance crossing sign, if used) shall, when activated, simultaneously commence operation of their rapid-flashing indications, and shall cease operation simultaneously.
- Install the pedestrian pushbutton according to the manufacturer's instructions.
- Install the pushbutton so that it is within 10" maximum lateral reach of a pedestrian in the ramp landing area. Position the pedestrian pushbutton so the plane of the sign face is parallel to the crossing (sign is facing perpendicular) and the arrow is pointing in the same direction as the crossing, not necessarily at the ramp. Notify the Engineer if there is any discrepancy or ambiguity between the plans and field conditions that prevent placement of the pedestrian pushbutton as shown on the plan.
- Set the minimum sound levels of the locator tone and the speech message when there is little or no ambient noise as in nighttime operation. Set the volume of speech message and pushbutton locator tones to a maximum of 5dBA louder than ambient sound. The locator tone should be audible 6' to 12' from the pushbutton or to the building line, whichever is less. Confirm the volume of both speech message and the locator tone increases with an increase in ambient sound and subsequently decreases when the ambient noise decreases.

### **Mechanical and Electrical Requirements:**

- a) Dimensions:

- Each indication shall be at least 5” wide by 2” high.
  - The indications shall be aligned horizontally, with the longer dimension horizontal and with a minimum space of 7” between the two indications.
  - The outside edges of the indications, including any housing, shall not project beyond the outside edges of the sign that it supplements.
- b) Power:
- Solar:
    - DC input, 12 VDC, 80W (min.)
    - DC output, 12 VDC, +/- 1%
- c) Temperature & Humidity:
- All components will be capable of continuous operation in accordance with NEMA Standards
- d) Indications:
- Flash Pattern:
    - When actuated, the two yellow indications in each RRFB unit shall flash in a rapidly flashing sequence and shall provide 75 flashing sequences per minute.
  - Shall comply with MUTCD Optics
    - ITE LED
  - Light Intensity:
    - During daytime conditions: shall meet the minimum specifications for Class 1 yellow peak luminous intensity in the Publication “Directional Flashing Optical Warning Devices for Authorized Emergency, Maintenance, and Service Vehicles J595,” Society of Automotive Engineers (SAE.).
    - During nighttime conditions: an automatic signal dimming device shall be used to reduce the brilliance of the indications.
  - Housing Color:
    - Federal Yellow
- e) Control Cabinet:
- Shall be NEMA 3R type.
- f) Crosswalk Illuminator:
- Power Input – 12 VDC
  - Power Consumption – 700mA to 1.4A
  - Activation – Initiated with pedestrian pushbutton activation and synchronized with the flash interval of RRFB.
  - Installation Height – 12 to 15 feet
  - Housing – Aluminum and weather resistant polycarbonate
  - Mounting - Adjustable Bracket
  - Operating Temperature Range - -40°F to 176°F
  - Wind Rating – Up to 120 mph (dependent upon pole size and system arrangement)

**Method of Measurement:**

This work will be measured as the number of RRFB furnished, installed, and accepted in place.

**Basis of Payment:**

This work will be paid for at the contract unit price of each “Rectangular Rapid Flashing Beacon (RRFB)” of the type specified which will include the cost of RRFB unit, hardware, pedestal, pedestal foundation, pedestrian pushbutton, pushbutton sign, crosswalk illuminator, ground rod, ground cable, paint and all materials, equipment, tools, and labor included thereto.

The following items will be paid for separately:

- Sign Face – Sheet Aluminum for the warning signs.

<b>Pay Items</b>	<b>Pay Unit</b>
Rectangular Rapid Flashing Beacon (RRFB) Type B	Ea.

# ATTACHMENT A



# Town of Avon

60 West Main Street  
Avon, Connecticut 06001-3719  
(860) 409-4300 • [www.avonct.gov](http://www.avonct.gov)

December 5, 2024

SENT ELECTRONICALLY: [lbaril@avonct.gov](mailto:lbaril@avonct.gov), [mgreer@aiengineers.com](mailto:mgreer@aiengineers.com)  
SENT HAND DELIVERY/USPS & CERTIFIED MAIL: 9589 0710 5270 2354 1515 58

Mr. Lawrence Baril  
Town of Avon, Engineering Department  
60 West Main Street  
Avon, CT 06001

Mr. Michael Greer  
AI Engineers, Inc.  
919 Middle Street  
Middletown, CT 06457

**RE: APPL. #797** – Town of Avon, Owner, and AI Engineers, Inc.; request for regulated activities within wetlands and a watercourse, and the 100-foot upland review area: reconstruction of the bridge and road over Thompson Brook and related site work. Locations: 75 and 100 Tillotson Road, Parcels 4330075 and 4330100.

At a Regular Meeting on December 3, 2024, the Inland Wetlands Commission of the Town of Avon voted to officially **APPROVE** the above application in accordance with plans and documents submitted.

#### SUBJECT TO THE FOLLOWING CONDITIONS:

1. Final erosion and sedimentation control plan using standard erosion control methods (Connecticut Guidelines for Soil Erosion and Sediment Control, 2002, DEP Bulletin 34) shall be submitted to the Planning & Community Development Specialist, Emily Kyle, prior to commencement of work.
2. Any unconfined in-stream work within the watercourse shall be restricted to the period from June 1 to September 30.
3. Water handling system shall not exceed impact areas shown on the wetland floodplain impact sheets of the permit plans.
4. Driven equipment is not permitted to enter the watercourse and all construction equipment cannot be stored or staged in the upland review area unless approved by E. Kyle.

5. Native streambed material excavated during the precast concrete arch installation shall be stockpiled and then replaced within the streambed to the depth shown on the plans.
6. Any stock piling shall be located outside the wetlands limits and within the Right-Of-Way/construction easements and protected with sedimentation control.
7. The demolition plan for the existing bridge and road shall be submitted to E. Kyle prior to the commencement of work.
8. E. Kyle must be notified 48 hours in advance of any work within a regulated area.
9. Construction activities shall be done in accordance with the final site plans submitted to the Inland Wetlands Commission.
10. The Owner and Applicant shall schedule a pre-construction meeting with E. Kyle to be held no sooner than two (2) weeks before the wetland activities are to begin. The Applicant shall, at that time, review the procedures to be taken to protect the wetland areas prior to and during construction.

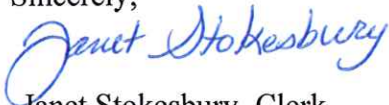
**THIS IS NOT AN AUTHORIZATION TO BEGIN CONSTRUCTION.**

Please note that this approval is valid for a period of five (5) years from the date of approval. If construction has not started during this period, an extension should be requested at least sixty-five (65) days prior to the expiration date.

Also, please note that this approval does not relieve the Applicant from his responsibility to apply for any other permits required by local, state, and federal agencies. Specifically, the Applicant is advised that a permit under Section 404 of Public Law 92-500 may be required. Additional information and applications regarding the Section 404 Permit Program may be obtained from the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, MA 01742, (978) 318-8111.

This letter of approval shall be reproduced on a final paper copy of the approved site plan to be filed in the Planning Office of the Town of Avon.

Sincerely,



Janet Stokesbury, Clerk  
Inland Wetlands Commission  
Town of Avon Planning and Community Development

Copy via email:

Emily Kyle, Planning and Community Development Specialist  
Town of Avon Inland Wetlands Commission  
Lisa Levin, Planning and Zoning Commission Chair  
Hiram Peck, Director of Planning and Community Development  
Brandon Robertson, Town Manager

Bruce Williams, Director of Public Works  
Chris Szylobryt, Town Building Official  
Harry DerAsadourian, Town Assessor  
Diane Harding, Farmington Valley Health District

N:\Planning\InlandWetlands\IWC\APPROVAL\Approval797.doc



**DEPARTMENT OF THE ARMY**  
**U.S. ARMY CORPS OF ENGINEERS**  
**NEW ENGLAND DISTRICT OFFICE**  
**696 VIRGINIA ROAD**  
**CONCORD, MASSACHUSETTS 01742-2751**

March 19, 2026

Regulatory Division  
Transportation & Utility Section  
File Number: NAE-2024-02946  
CT DEEP File: 202508020-PCN

Lawrence Baril  
Town of Avon  
60 West Main Street  
Avon, Connecticut 06001  
Via Email: [lbaril@avonct.gov](mailto:lbaril@avonct.gov)

Dear Mr. Baril:

This letter is in response to the pre-construction notification (PCN) you submitted to the U.S. Army Corps of Engineers, New England District, on November 4, 2025, for a Department of the Army general permit verification to replace the Tillotson Road Bridge. This project has been assigned the file number NAE-2024-02946. This file number should be referenced in all correspondence with this office. This letter follows a provisional notification letter sent on January 21, 2026. The project is located in the freshwater stream of Thompson Brook and in wetlands under Thompson Road, 650 feet east of the intersection of Farms Road, at Latitude 41.767240 and Longitude - 72.828500, in Avon, Hartford County, Connecticut.

The project will replace the existing 10-foot span Tillotson Road Bridge over Thompson Brook with a new 29-foot, open-bottom, precast concrete arch on micropile foundations. The work will involve the complete removal of the existing bridge superstructure and the partial demolition of the stone abutments, the bases of which will be left in place as scour protection. The project includes temporary cofferdams to dewater the work area for the installation of new micropile foundations and the new concrete arch with associated headwalls and wingwalls. The roadway approaches will be widened to accommodate two travel lanes and a new 5-foot sidewalk, and the existing embankments will be re-graded. There will be a permanent discharge of fill below the ordinary high water mark (OHWM) of Thompson Brook, totaling 240 square feet (SF) along 105 linear feet, due to the installation of the new bridge foundations and in 1,735 SF of wetlands associated with the construction of the new bridge structure and embankment grading. Temporary impacts to wetlands will occur in 525 SF and temporary impacts below the OHWM will occur in 645 SF with the installation of cofferdams and the use of a turbidity curtain downstream of the work area. All temporarily impacted areas will be graded and seeded with a native conservation mix to restore habitat and prevent erosion.

We have determined that the proposed work is authorized under the State of Connecticut General Permit 19; Stream, river and brook crossings (not including wetland crossings) (Coastal and Inland), pursuant to authorities under Section 404 of the Clean Water Act (33 U.S.C. § 1344). You can find a copy of these permits at: <https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/>. The proposed work must be accomplished in strict accordance with the general permit conditions, any regional conditions, the special conditions listed in this letter, the application materials, and the enclosed plans titled, "TOWN OF AVON REPLACEMENT OF TILLOTSON ROAD BRIDGE OVER THOMPSON BROOK AVON, CONNECTICUT," on 19 sheets dated September 23, 2025. If the extent of the project area and/or nature of the authorized impacts to waters are modified, a revised PCN must be submitted to this office for written approval before work is initiated. Any violation of permit conditions or deviation from your submitted plans may subject the permittee to enforcement action.

This verification is valid until December 15, 2026, unless prior to this date the subject General Permit (GP) is suspended, revoked, or is modified such that the activity no longer complies with the terms and conditions of this GP. If you commence or are under contract to commence this activity before the date that the relevant GP is modified or revoked, you will have 12 months from the date of the modification or revocation of the GP to complete the activity under the present terms and conditions of this GP. You must ensure the proposed work is performed in accordance with the enclosed applicable terms and conditions:

**Project Specific Special Conditions:**

1. The permittee shall complete and return the enclosed Work-Start Notification Form to this office at least two weeks prior to the anticipated construction start date.
2. The permittee shall complete and return the enclosed Completion Certification Form to this office at least one month following the completion of the authorized work.
3. All construction shall be completed in accordance with the limits of construction and construction sequences detailed on the enclosed plan drawings, titled "TOWN OF AVON REPLACEMENT OF TILLOTSON ROAD BRIDGE OVER THOMPSON BROOK AVON, CONNECTICUT," on a total of 19 sheets dated September 23, 2025. If you change the plans or construction methods for work within or adjacent to the Farmington River and the Salmon River, please contact us immediately to discuss modification of this authorization. The Corps of Engineers must approve any changes before you undertake them.
4. The permittee shall ensure that any and all construction debris (e.g., concrete, rebar, formwork, tools) generated by the authorized work below the OHWM of

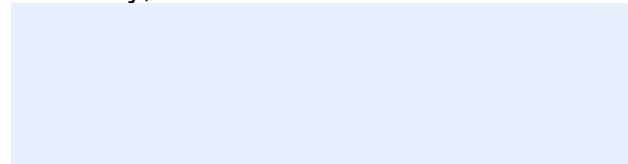
Thompson Brook or in wetlands is removed immediately. Such material shall be disposed of at an appropriate upland location outside of any wetlands.

5. The permittee shall ensure that all temporary erosion control measures are properly installed and maintained throughout the duration of construction. For any erosion control blankets, matting, or netting used to stabilize temporarily disturbed areas, only 100% biodegradable materials such as jute, coir (coconut fiber), or other similar natural fibers shall be used. The use of plastic or synthetic mesh netting is prohibited. The use of straw bales as an erosion control measure is prohibited. All temporary erosion and sediment control measures shall be removed upon final site stabilization.
6. The permittee shall restore all temporarily impacted areas to their original pre-construction contours. The permittee is responsible for the successful establishment of the native vegetation used for stabilization. The permittee shall implement all necessary measures, which may include manual watering or supplemental plantings, to ensure that a minimum of 85% vegetative cover is achieved across all restored areas by the end of the first full growing season following project completion. If this performance standard is not met, the permittee shall implement corrective measures and re-monitor until the standard is achieved.
7. To prevent the introduction of invasive species into waters of the U.S. in accordance with General Condition 12, the permittee shall ensure that all construction equipment (e.g., excavators, loaders, trucks) is thoroughly cleaned of soil, vegetation, and other debris prior to entering the project site. This cleaning protocol must be followed for the entire duration of the project.

This GP verification does not preclude the necessity to obtain any other Federal, State, or local permits, licenses, and/or certifications, which may be required.

If you have any questions related to this verification or have issues accessing documents referenced in this letter, please contact Matthew Hackett, Project Manager, at 978-318-8321, by mail at the above address, or by email at [matthew.r.hackett@usace.army.mil](mailto:matthew.r.hackett@usace.army.mil). Please take a moment to complete our customer satisfaction survey located at <https://regulatory.ops.usace.army.mil/customer-service-survey/>.

Sincerely,



Daniel Breen  
Chief, Transportation and Utilities Section  
Regulatory Division

Enclosures

cc (w/enclosures)

Michael Greer, AI Engineers, Inc. (via [mgreer@aiengineers.com](mailto:mgreer@aiengineers.com))

Bill Sigmund, CT DEEP (via: [william.sigmund@ct.gov](mailto:william.sigmund@ct.gov))

Caitlin Daddona, CT DEEP (via: [caitlin.daddona@ct.gov](mailto:caitlin.daddona@ct.gov))

Nate Margason, U.S. EPA (via: [margason.nathan@epa.gov](mailto:margason.nathan@epa.gov))

Jackie Dias, National Park Service (via: [jackie\\_dias@nps.gov](mailto:jackie_dias@nps.gov))

## Work-Start Notification Form

**File Number: NAE-2024-02946    State: Connecticut    County: Hartford**

**Permittee: Town of Avon, Lawrence Baril**

**Date Verification Issued: 3/19/2026**

**Project Manager: Matthew Hackett**

At least two weeks prior to commencing the activity authorized by this permit, sign this certification and return it to the following address:

**US ARMY CORPS OF ENGINEERS**

**New England District**

**Attn: Matthew Hackett**

**696 Virginia Road**

**Concord, MA 01742**

or

**cenae-r-tu@usace.army.mil**

**978-318-8321**

Please note that your permitted activity is subject to a compliance inspection by a U. S. Army Corps of Engineers (USACE) representative. Failure to comply with any terms or conditions of this authorization may result in the USACE suspending, modifying or revoking the authorization and/or issuing a Class I administrative penalty, or initiating other appropriate legal action.

**The people (e.g. contractor) listed below will do the work, and they understand the permit's conditions and limitations.**

**Contractor Name/Contractor Firm:** \_\_\_\_\_

**Business Address:** \_\_\_\_\_

**Contractor Phone and Email:** \_\_\_\_\_

**Proposed Construction Dates:    Start:** \_\_\_\_\_    **Finish:** \_\_\_\_\_

\_\_\_\_\_  
**Signature of Permittee**

\_\_\_\_\_  
**Date**

<p>U.S. Army Corps of Engineers (USACE)</p> <p><b>CERTIFICATION OF COMPLIANCE WITH DEPARTMENT OF THE ARMY PERMIT</b></p> <p>For use of this form, see Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act of 1899, and Section 103 of the Marine Protection, Research, and Sanctuaries Act; the proponent agency is CECW-COR.</p>	<p><i>Form Approved -</i></p> <p><i>OMB No. 0710-0003</i></p> <p><i>Expires 2027-10-31</i></p>
--	--

**The Agency Disclosure Notice (ADN)**

The Public reporting burden for this collection of information, 0710-0003, is estimated to average 10 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at [whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil](mailto:whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil). Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

**PURPOSE:** This form is used by recipients of U.S. Army Corps of Engineer Regulatory permits to certify compliance with the permit terms and conditions.

Your permitted activity is subject to a compliance inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with this permit, you are subject to permit suspension, modification, or revocation.

Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the U.S. Army Corps of Engineers, New England District, Regulatory Office.

The certification can be submitted by email at matthew.r.hackett@usace.army.mil or by mail at the below address:

U.S. Army Corps of Engineers  
 New England District Office  
 Street Address: 696 Virginia Road  
 City: Concord                      State: Massachusetts    Zip Code: 01742-2751

**COMPLETED BY THE CORPS**

Corps Action Number:	NAE-2024-02946
Permit Type: <u>General Permit</u>	
General Permit Number and Name ( <i>if applicable</i> ):	GP 19; Stream river and brook crossings (not including wetland crossings) (Coastal and Inland)
Name of Permittee:	Lawrence Baril
Project Name:	Town of Avon, CT
Project Location ( <i>physical address</i> ):	Thompson Brook under Thompson Road
	Avon, Connecticut (41.767240, -72.828500)

**PERMITTEE'S CERTIFICATION**

Date Work Started: \_\_\_\_\_

Date Work Completed: \_\_\_\_\_

Enclose photographs showing the completed project (*if available*).

I \_\_\_\_\_ hereby certify that the work authorized by the above referenced permit has been completed in accordance with all of the permit terms and conditions, and that any required compensatory mitigation has been completed in accordance with the permit conditions.

Name	Date	Signature
------	------	-----------

Regulatory and Enforcement Branch  
U.S. Army Corps of Engineers  
New England District  
696 Virginia Road  
Concord, MA 01742-2751

Attn: Dan Breen, Chief Transportation & Utilities Section

Re: 202508020-PCN, Concurrence of Eligibility  
NAE-2024-02946  
Tillotson Road over Thompson Brook, Avon, CT 06001

Dear Mr. Breen:

The above-referenced Pre-Construction Notification (“PCN”) was submitted to the Connecticut Department of Energy and Environmental Protection (“DEEP”) on October 23, 2025 by the Town of Avon, for eligibility screening under the Department of the Army Regional General Permit for the State of Connecticut (“CT RGP”) dated December 15, 2021, and authorized and conditioned pursuant to Section 401 of the Federal Clean Water Act.

**Project:** The applicant proposes activities in Waters of the United States which will result in the following impacts, as shown on attached plans titled “*Town of Avon Environmental Permit Plans Replacement of Tillotson Road Bridge over Thompson Brook,*” dated September 23, 2025, and prepared by AI Engineers Inc.:

1. Install Sedimentation and Erosion Controls;
2. Perform clearing and grubbing in accordance with plan sheets PMT-04 & PMT-06;
3. Install turbidity curtains and water handling cofferdam in accordance with plan sheets PMT-04 & PMT-05;
4. Divert water into temporary water handling cofferdam channel with minimum channel width of 10 feet;
5. Remove existing 7’9” wide stone arch facade and stone walls;
6. Install debris shield;
7. Remove existing superstructure;
8. Remove existing stone abutments up to elevation 154.70;
9. Install TERS (temporary earth retaining system) in accordance with plan sheets PMT-04 & PMT-05;
10. Install test micropile and steel encased cement micropiles with 10” diameter;

11. Excavate and install proposed cast-in-place footings;
12. Cut TERS 1' below top of proposed grade in accordance with plan sheet PMT-04;
13. Install pre-cast, open-bottom, arch span structure with 25' clear span width, 5'7" height, 34'6" out-to-out width, and stone masonry detailing, precast headwalls and wingwalls;
14. Backfill area in front of arch with natural streambed material;
15. Realign cofferdams in accordance with plan sheet no. PMT-05;
16. Excavate 2' wide, approximately 50 linear foot trapezoidal vegetated swale in accordance with plan sheet no. PMT-05;
17. Finalize grading and seed areas of disturbance in accordance with plan sheets PMT-05 & PMT-06; and
18. Replace excavated natural streambed material over existing cut abutments and TERS in accordance with plan sheets PMT-05 & PMT-06.

	<u>Waterway</u>	<u>Wetland</u>	<u>Total</u>
Temporary:	645 sf	525 sf	1,170 sf
Permanent:	240 sf	1,735 sf	1,975 sf
Total:	885 sf	2,260 sf	3,145 sf

**Adaptive Best Management Practices.** The Best Management Practices described in Attachment A included with this letter were found to be insufficient to protect existing and designated uses of waters such as propagation of fish, shellfish and wildlife, recreation, public water supply, and agriculture, industrial use and navigation, and the water quality necessary for their protection. Therefore, the following adaptive best management practices shall also be employed to protect water quality and designated uses of waters:

1. **DEEP Fisheries.** Unconfined in-water work shall be restricted to the period from July 1 through September 30, inclusive.
2. **NDDB (Natural Diversity Database) Species Protection.** The Project Proponent shall conduct work in accordance with protection measures identified in NDDB Final Determination #202410132, dated September 3, 2025, to protect state threatened and special concern species which include Grassland Birds, Reptiles, Fish and Freshwater Mussels. The Project Proponent shall perform those specified protection measures, which include but are not limited to:
  - a. **Grassland Birds.** Avoid staging areas and work within grassland areas and/or wildflower meadows during spring and summer months to protect grassland bird species;
  - b. **Reptiles.** Retain a qualified Herpetologist to oversee the implementation of the turtle protection plan attached hereto, *Final Report Habitat Assessment and*

*Recommended Species Protection Measures: Eastern Box Turtle Replacement of Bridge No. 04015 over Thompson Brook with In-Water Work*, prepared by Quinn Ecological LLC, which includes but is not limited to the following measures;

- i. Herpetologist shall review all proposed staging areas to confirm sweeping requirements and avoid siting in agricultural fields;
  - ii. Herpetologist shall identify and approve exclusionary fencing areas, and supervise their installation which shall be completed prior to April 15<sup>th</sup> (or relocation efforts may be required by the herpetologist);
  - iii. Herpetologist shall present an information to the construction team prior to construction start to identify species and action items to take upon observation;
  - iv. Herpetologist shall conduct weekly inspections of exclusionary fencing from May 15<sup>th</sup> to July 15<sup>th</sup>, inclusive (turtle nesting season), and biweekly from July 16<sup>th</sup> to October 15, inclusive.
  - v. Herpetologist shall conduct visual sweeps prior to any clearing activities and/or mobilization of heavy equipment.
  - vi. The Project Proponent shall restore temporarily disturbed areas with conservation seed mix or native species plantings;
  - vii. The Project Proponent shall remove exclusionary fencing upon site stabilization;
  - viii. Herpetologist shall report all species sightings to CTDEEP, as well as a summary report of site monitoring and maintenance which occurred during the project duration. All observations on site shall be reported to the herpetologist with location and disposition of the animal.
- c. **Freshwater Mussels.** Complete a Pre-construction Mussel Sweep and Relocation Effort in accordance with the Mussel Management Plan *Freshwater Mussel and Survey in Thompson Brook for the Tillotson Road Bridge Project (Avon, CT)*, prepared by Biodiversity LLC and attached herein, between May and October, and no earlier than 3 weeks prior to the start of construction, within all proposed impact areas and a 25-meter buffer upstream and downstream of the site, **AND**, Submit a Mussel Report of Finding/Relocation to CTDEEP no later than 3 weeks after the last day of field work.
3. **Discharge of Waste Material.** At no time shall the Licensee allow construction debris to discharge onto or enter the Thompson River.
  4. **Road Barricade and Flood Warning.** The Project Proponent shall post flood warning signage at both crossing approaches. In the event of a significant storm forecast with the potential for road overtopping, the Project Proponent shall barricade the road and allow for alternative routes.

Staff of the Land & Water Resources Division (the “Division”) have reviewed the project and determined that the proposed regulated work is eligible for PCN coverage under CT RGP #19. Therefore, an individual application to DEEP is not required at this time, provided that the project receives approval from the U.S. Army Corps of Engineers under the CT RGP and that the

authorized activities proceed as described in the PCN documentation provided to the Division in the above-referenced notification.

Please be advised that conducting regulated activities without the required state Section 401 Water Quality Certification (WQC) and federal Section 404 WQC is a violation of law and is subject to enforcement proceedings and legal action under 33 CFR Part 326 and citations thereunder.

If you have any questions or need additional information, please contact Caitlin Daddona at 860-424-3684 or [Caitlin.Daddona@ct.gov](mailto:Caitlin.Daddona@ct.gov).



---

Jeff Caiola, Assistant Director  
Land and Water Resources Division  
Bureau of Water Protection and Land Reuse

March 17, 2026  
Date

CC (via email):

Town of Avon, c/o Lawrence Baril, [lbaril@avonct.gov](mailto:lbaril@avonct.gov)

Michael Greer, AI Engineers Inc., [mgreer@aiengineers.com](mailto:mgreer@aiengineers.com)

Emina Puskarevic, AI Engineers Inc. [EPuskarevic@aiengineers.com](mailto:EPuskarevic@aiengineers.com)

Brandon Robertson, Town Manager of Avon, [brobertson@avonct.gov](mailto:brobertson@avonct.gov)

William Sigmund, CTDEEP LWRD, [William.Sigmund@ct.gov](mailto:William.Sigmund@ct.gov)

Francesca Discenza, CTDEEP LWRD, [Francesca.Discenza@ct.gov](mailto:Francesca.Discenza@ct.gov)

Andrew Miano, CTDEEP Fisheries, LWRD, [Andrew.J.Miano@ct.gov](mailto:Andrew.J.Miano@ct.gov)

Matthew Hackett – USACE Project Manager, [matthew.r.hackett@usace.army.mil](mailto:matthew.r.hackett@usace.army.mil)

Jackie Dias, National Parks Service, [jackie\\_dias@nps.gov](mailto:jackie_dias@nps.gov)

**ATTACHMENT A**  
**GENERAL TERMS AND CONDITIONS**

1. **Best Management Practices.** In constructing or maintaining the activities authorized herein, the permittee shall employ best management practices in accordance with Section 22a-426-1 of the Regulations for Connecticut State Agencies, consistent with the terms and conditions of this certificate, to control storm water discharges and erosion and sedimentation and to prevent pollution. Such practices to be implemented by the permittee at the site include, but are not necessarily limited to:
  - a. Prohibiting dumping of any quantity of oil, chemicals or other deleterious material on the ground;
  - b. Immediately informing the Commissioner's Oil and Chemical Spill Response Division at (860) 424-3338 (24- hour phoneline) of any adverse impact or hazard to the environment, including any discharges, spillage, or loss of oil or petroleum or chemical liquids or solids, which occurs or is likely to occur as the direct or indirect result of the activities authorized herein;
  - c. Separating staging areas at the site from the regulated areas by silt fences or straw/hay bales at all times;
  - d. Prohibiting storage of any fuel and refueling of equipment within twenty-five (25) feet from any wetland or watercourse;
  - e. Preventing pollution of wetlands and watercourses in accordance with the document "Connecticut Guidelines for Soil Erosion and Sediment Control" as revised. Said controls shall be inspected by the permittee for deficiencies at least once per week and immediately after each rainfall and at least daily during prolonged rainfall. The permittee shall correct any such deficiencies within 48 hours of said deficiencies being found;
  - f. Stabilizing disturbed soils in a timely fashion to minimize erosion. If a grading operation at the site will be suspended for a period of thirty (30) or more consecutive days, the permittee shall, within the first seven (7) days of that suspension period, accomplish seeding and mulching or take such other appropriate measures to stabilize the soil involved in such grading operation. Within seven (7) days after establishing final grade in any grading operation at the site the permittee shall seed and mulch the soil involved in such grading operation or take such other appropriate measures to stabilize such soil until seeding and mulching can be accomplished.
  - g. Prohibiting the storage of any materials at the site which are buoyant, hazardous, flammable, explosive, soluble, expansive, radioactive, or which could in the event of a flood be injurious to human, animal or plant life, below the elevation of the five hundred (500) year flood. Any other material or equipment stored at the site below said elevation by the permittee or the permittee's contractor must be firmly anchored, restrained or enclosed to prevent flotation. The quantity of fuel stored below such elevation for equipment used at the site shall not exceed the quantity of fuel that is expected to be used by such equipment in one day.
  - h. Immediately informing the Commissioner's Land & Water Resources Division at (860) 424-3019 and the U.S. Army Corps of Engineers' Permit Compliance Section at (617) 647-8674, of the occurrence of pollution or other environmental damage resulting from construction or maintenance of the authorized activity or any construction associated therewith in violation of this certificate. The permittee shall, no later than 48 hours after the permittee learns of a violation of this certificate, report same in writing to the Commissioner. Such report shall contain the

following information:

- (i) the provision(s) of this certificate that has/have been violated;
- (ii) the date and time the violation(s) was first observed and by whom;
- (iii) the cause of the violation(s), if known
- (iv) if the violation(s) has ceased, the duration of the violation(s) and the exact date(s) and times(s) it was corrected;
- (v) if the violation(s) has not ceased, the anticipated date when it will be corrected;
- (vi) steps taken and steps planned to prevent a reoccurrence of the violation(s) and the date(s) such steps were implemented or will be implemented;
- (vii) the signatures of the permittee and of the individual(s) responsible for actually preparing such report, each of whom shall certify said report in accordance with condition 8 of this certificate.

For information and technical assistance, contact the Land & Water Resources Division at (860) 424-3019.

2. **Inspection of the Facility or Activity, Adaptive Best Management Practices & Compliance with Conditions.** The concurrence of eligibility letters for Pre- Construction Notifications will be considered the initial inspection of the facility or activity for the purpose of determining whether the discharge from the certified project may violate WQC-202108351 (Non-Tidal) of the Department of the Army Regional General Permit for the State of Connecticut. The concurrence of eligibility letters may also address the remedial actions necessary in order to be considered to be compliance with this certification.

In the event that Best Management Practices employed to maintain compliance with the conditions of this Water Quality Certificate, as described in paragraph 1 above, have been found to be insufficient to protect existing and designated uses of waters such as propagation of fish, shellfish and wildlife, recreation, public water supply, and agriculture, industrial use and navigation, and the water quality necessary for their protection, such permittee shall employ additional or alternative adaptive best management practices to protect water quality.

All work and all activities authorized herein conducted by the permittee at the site shall be consistent with the terms and conditions of this certificate. Upon initiation of the activities authorized herein, the permittee thereby accepts and agrees to comply with the terms and conditions of this Water Quality Certificate.

3. **Rights.** This certificate is subject to and does not derogate any present or future property rights or other rights or powers of the State of Connecticut and conveys no property rights in real estate or material nor any exclusive privileges and is further subject to any and all public and private rights and to any federal, state, or local laws or regulations pertinent to the property or activity affected hereby. This certification does not comprise the permits or approvals as may be required by Chapters 440, 446i, 446j and 446k of the Connecticut General Statutes.
4. **Expiration of Certificate.** The Section 401 Water Quality Certifications contained herein shall be valid until such time as the Department of the Army Regional General Permits for the State of Connecticut expires or is modified, suspended, revoked or reissued.
5. **Transfer of Certificate.** This authorization is not transferable without the written consent of the Commissioner

6. **Reliance on Application.** In evaluating the permittee's application, the Commissioner has relied on information provided by the permittee. If such information subsequently proves to be false, deceptive, and incomplete or inaccurate, this certificate may be modified, suspended or revoked.
7. **Installation and Removal of Confining Structures.** Confinement of a work area by cofferdam techniques using sandbag placement, sheet pile installation (vibratory method only), portadam, or similar confinement devices is allowed any time of the year unless specifically prohibited by a permit condition. The removal of such confinement devices is allowed any time of the year unless specifically prohibited by a permit condition. Once a work area has been confined, in-water work within the confined area is allowed any time of the year. The confinement technique used shall completely isolate and protect the confined area from all flowing water. The use of silt boom/curtain or similar technique as a means for confinement is prohibited.
8. **Certification of Documents.** Any document, including but not limited to any notice, which is required to be submitted to the Commissioner under this certificate shall be signed by the permittee, a responsible corporate officer of the permittee, a general partner of the permittee, or a duly authorized representative of the permittee and by the individual or individuals responsible for actually preparing such document, each of whom shall certify in writing as follows:

"I have personally examined and am familiar with the information submitted in this document and all attachments and certify that based on reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief, and I understand that any false statement made in this document or its attachments may be punishable as a criminal offense in accordance with Section 22a-6 under Section 53a-157 of the Connecticut General Statutes."

9. **Submission of Documents.** The date of submission to the Commissioner of any document required by this certificate shall be the date such document is received by the Commissioner. Except as otherwise specified in this certificate, the word "day" as used in this certificate means the calendar day. Any document or action which falls on a Saturday, Sunday, or legal holiday shall be submitted or performed by the next business day thereafter.

Any document or notice required to be submitted to the Commissioner under this certificate shall, unless otherwise specified in writing by the Commissioner, be directed to:

Director, Land & Water Resources Division  
Bureau of Water Protection and Land Reuse  
Department of Energy & Environmental Protection  
79 Elm Street  
Hartford, Connecticut 06106-5127

10. **Work Commencement.** Not later than two (2) weeks prior to the commencement of any work authorized herein, the Licensee shall submit to DEEP.LWRDRegulatory@ct.gov, on the Work Commencement Form attached hereto, the name(s) and address(es) of all contractor(s) employed to conduct such work and the expected date for commencement and completion of such work, if any.



### LWRD Work Commencement Form

**To:** [DEEP.LWRDRegulatory@ct.gov](mailto:DEEP.LWRDRegulatory@ct.gov) or  
Regulatory Section  
Department of Energy and Environmental Protection  
Land & Water Resources Division  
79 Elm Street  
Hartford, CT 06106-5127

**Licensee Name:** Town of Avon

**Municipality in which the project is occurring:** Avon

**DEEP License No(s):** 202508020-PCN

**CONTRACTOR(s):**

# 1 Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
Telephone: \_\_\_\_\_  
E-mail: \_\_\_\_\_

# 2 Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
Telephone: \_\_\_\_\_  
E-mail: \_\_\_\_\_

# 3 Name: \_\_\_\_\_  
Address: \_\_\_\_\_

Date Contractor(s) received a copy  
of the license and approved plans: \_\_\_\_\_

EXPECTED DATE OF COMMENCEMENT OF WORK: \_\_\_\_\_

EXPECTED DATE OF COMPLETION OF WORK: \_\_\_\_\_

LICENSEE: \_\_\_\_\_  
(Signature) (Date)

Final Report

Habitat Assessment and Recommended Species Protection Measures: Eastern Box Turtle

Replacement of Bridge No. 04015 over Thompson Brook with In-Water Work

75 Tillotson Road

Avon, Connecticut

Portal Filing No.: 118446

NDDB Preliminary Assessment: 202410132

Prepared by:

Dennis P. Quinn – Owner/Herpetologist

Quinn Ecological, LLC

Prepared for:

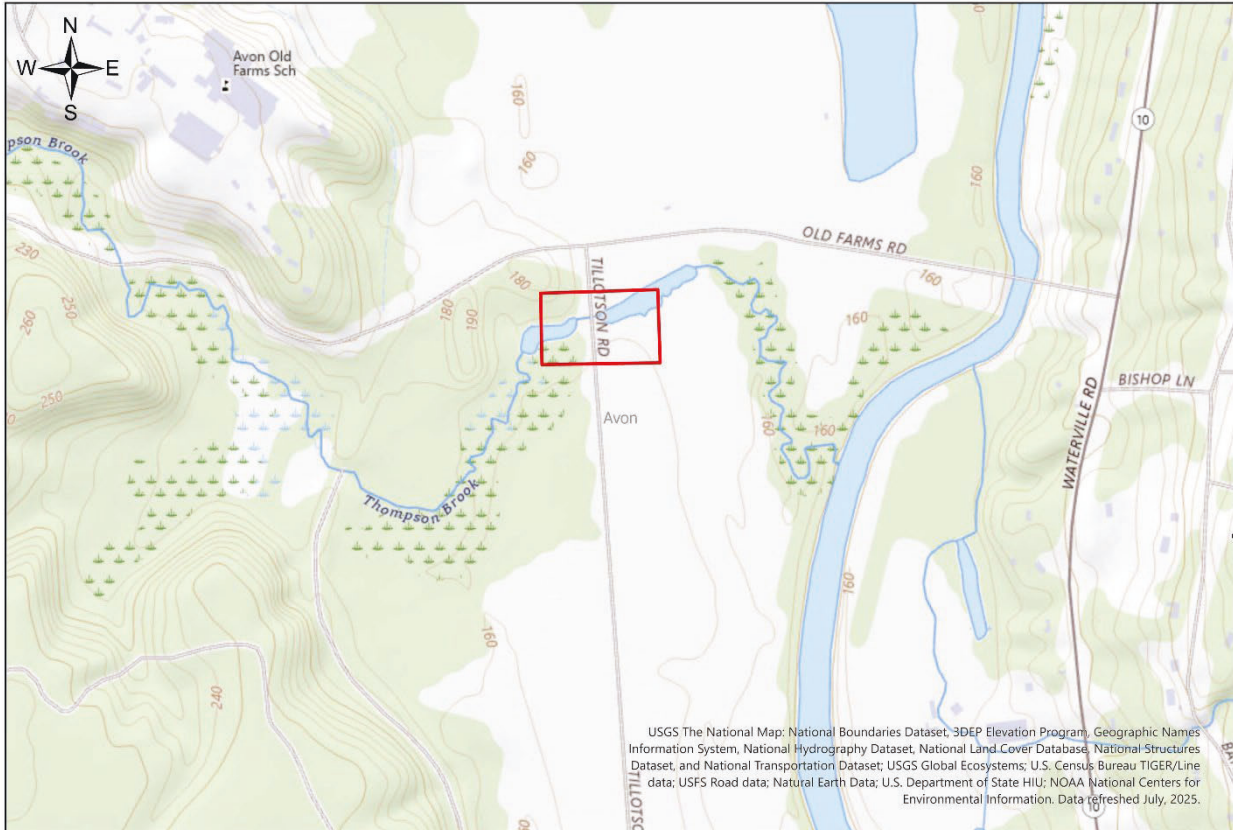
Michael Greer – Project Manager

AI Engineers

**Scope of Services:**

1. Quinn Ecological, LLC conducted a Site Visit to assess habitats within the project area for suitability to support an eastern box turtle population (Figure 1).
2. Review of the existing engineering plans. A summary of specifications which may potentially impact box turtles will be provided.
3. Based on the result of the field investigation, a comprehensive report detailing a reptile species and habitat mitigation plan, to be used during design, during construction, and post construction is provided in this report.

The proposed mitigation/protection plan focuses on protection of the eastern box turtle (*Terrapene c. carolina*), but the protection measures provided will also serve as suitable protection measures for other potentially present state listed amphibians and reptiles, these include: spotted turtle (*Clemmys guttata*), wood turtle (*Glyptemys insculpta*), ribbonsnake (*Thamnophis sauritus*), and northern leopard frog (*Lithobates [Rana] pipiens*), all of which have suitable habitats within the proposed project area. The box turtle is a state-listed (special concern) reptiles under Connecticut’s Endangered Species Act and have been identified as a “species of greatest conservation need” in Connecticut’s Wildlife Action Plan (CTDEEP Wildlife Division 2025). The occurrence of box turtles within, or in the vicinity of the project area has been confirmed, and suitable habitat exists to support a population (CTDEEP-NDDB; Klemens et.al 2021).



0 250 500 1,000 Feet

Location of Proposed Bridge Replacement



Figure 1. Location of proposed bridge replacement project and photos looking east and west at bridge crossing.

**Species Overview and Habitat Assessment Results:**

Eastern box turtles approach their northeastern range limit in Connecticut, inhabiting primarily low-lying portions of the State below 500-foot elevation. As Connecticut’s only terrestrial species of turtle, eastern box turtles use a mosaic of habitats seasonally (Klemens et al. 2021, Quinn et al., 2017 and Quinn, 2008). During the spring and early summer months they favor early and late successional habitats (fields and

shrublands), with a shift to forested habitats during the late-summer and fall seasons. Nesting occurs exclusively during the months of May and June in sparsely vegetated early successional habitat, with hibernation occurring exclusively in forested uplands for adult individuals and forested or shrub/scrub habitats for juveniles and hatchlings. (Nicolson et al., 2020, Quinn et al., 2017 and Quinn, 2008). The largest threat to eastern box turtles continues to be mortality relating to the fragmentation of habitat mosaics.

As a long-lived species with delayed sexual maturity and low reproductive output, the ability of box turtle populations to rebound from significant loss of adults is problematic. To ensure survivorship of populations, reducing impacts, such as habitat fragmentation and road mortality, and maintaining ecological connectivity within habitat mosaics is critical.

**Potential overwintering habitat:** The physical characteristics of the forested habitat immediate west of the construction zone are suitable for overwintering eastern box turtles (Figure 2). The potential for box turtles emigrating and immigration across Tillotson Road to this forested habitat would be the greatest during the spring and summer months when box turtles are transitioning between forested and early/late successional habitats.

**Spring and early summer habitats:** Limited natural early to late successional habitat occurs within and adjacent to the project area. The immediate area surrounding Thompson Brook within the project area consists of forest and agricultural lands. During the spring and early summer months, eastern box turtles favor early and late successional habitats. Although agricultural fields are not the preferred early successional habitats for box turtles, they will utilize these areas, especially in the absence of more favorable naturally occurring meadows (Figure 2).

**Seasonal turtle activity and nesting habitat:** Box turtles begin dispersing from forested habitats into early to late successional habitats during the spring months. *Therefore, a primary consideration within the construction zone is the installation of exclusionary fencing to prevent dispersing turtles from moving into areas of disturbance.* This is especially important to prevent female turtles from nesting in disturbed areas from late May through early July. Female turtles are attracted to open areas of bare, or sparsely vegetated soil to deposit their eggs. Applicable to this project would be the agricultural fields to the east of Tillotson Road. In addition, areas such as this are often created by site clearing and grubbing during construction projects. Location of this project along a road may result in the creation of disturbances that expose nesting females and/or hatchlings to mortality unless these areas are excluded from access during the construction period, and planted, or allowed to naturally revegetate post-construction.

Beyond consideration of potential impacts associated with the project's immediate construction zone, careful consideration of potential impacts associated with locating and preparing staging areas for the project need to be taken into consideration. Areas of critical habitat for this project include the agricultural field and forested habitat. These habitats adjacent to the construction area and temporary staging areas within these areas must be excluded with turtle exclusionary barrier.

No other critical seasonal habitat that would attract box turtles to the project area throughout their active season were observed.

The *primary goal* of the mitigation plan is to avoid inadvertent injury/mortality of turtles that may be dispersing through the area over the course of their spring - fall active season. A *secondary goal* is to



Figure 2. Forested habitat west of the project site.

prevent the establishment of conditions along the roadway that will attract turtles to nest, exposing both adults and hatchlings to road mortality.

The proposed mitigation plan consists of three phases: (1) pre-construction, including site clearing/grubbing and the installation of cofferdams, (2) active construction monitoring, and (3) post-construction and site restoration.

The objectives of the **pre-construction phase** are:

- (a) identify appropriate locations for staging construction equipment, temporary construction office trailers, work crew parking, and stock-piling of materials including fill, (b) identify areas where exclusionary fencing will be required, (c) guide installation of the exclusion fencing, (e) provide construction personnel with information on box turtles and what to do if they encounter them, (f) conduct sweeps of the project area and monitor site clearing and grubbing activities when heavy equipment is in use, and (g) complete regular inspections and make timely repairs as necessary to maintain the integrity of the exclusion fencing.

The objectives of the **construction phase** are:

(a) conduct regular on-site monitoring to ensure integrity of the exclusion fencing and relocate any animals encountered to suitable habitat outside of the project area, (b) conduct sweeps of work areas, or where heavy machinery is in use to relocate any reptiles encountered to suitable habitat away from the project area, and (c) provide construction personnel with information on box turtles and what to do if they encounter them during the project

The objectives of the **post-construction restoration phase** focus' on:

(a) restoration of areas that were disturbed during the project, including staging areas, and (b) removal of the exclusionary fencing once the disturbed areas are stabilized, (c) conduct a site inspection to review the restored areas to ensure that no hazards remain for turtles (i.e., "ecological traps" – see Klemens et.al 2021).

## **REQUIREMENTS OF THE PROTECTION PLAN**

### **Requirement #1: Avoid important habitat, within or outside, of the primary construction zone by locating appropriate staging areas for the project:**

It is anticipated that equipment, materials, and fill will be staged along the immediate roadway and shoulder areas due to the necessity of road closure for the project. However, once a location(s) for staging has been identified by the contractor, the site(s) should be reviewed by the project herpetologist to determine if there is a need to conduct sweeps for any of the target species. Beyond the scope of the project construction easement, the agricultural land surrounding the project site should be avoided to the greatest extent possible. If these areas are required to be used for staging, an appropriate exclusionary barrier will need to be installed. If the agricultural field is proposed for staging, the location and extent should be coordinated and reviewed by the project herpetologist.

### **Requirement #2: Identify areas requiring the installation of exclusionary fencing and appropriately install the fencing:**

Exclusionary fencing at least 20 inches in height (above ground level) should be installed at the limits of disturbance within the construction zone. The fencing should be staked (12 inches into the ground) at appropriate distances to maintain rigidity (6-10 feet intervals), and the fencing buried at least 4 inches into the ground and back-filled. Standard erosion control/silt fencing (geotextile) can be used, but not fencing with a wider nylon mesh lining, which can entangle snakes (WI DNR 2015).

The terminus of each length of fencing should be angled back away from the road to divert animals moving along the exterior of the fence back into undisturbed habitat to discourage them from moving around the fence. Installation of each length of fence should be coordinated with the project herpetologist to determine the best angle and placement depending upon the location, topography, and surrounding habitat. In general, a "J-hook" loop design with an interior width of no more than 18 inches, and return length of fencing of approximately 10 feet should be used (see Figure 3). The exclusionary fencing must be tied into the cofferdam to prevent turtles from accessing the work area in the river from the embankments. Figure 4 illustrates approximate locations for exclusionary fencing. The exact location and layout of the fencing will be determined in coordination with the consulting herpetologist at the time of installation.

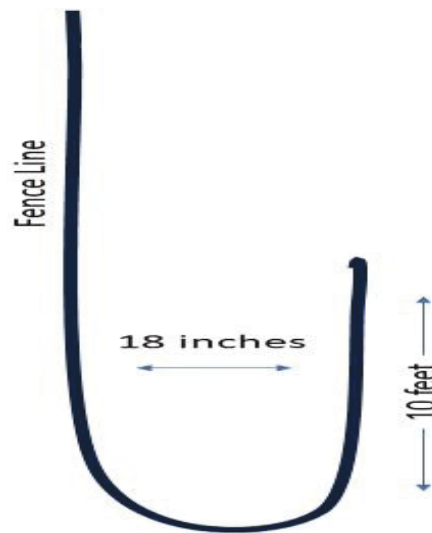


Figure 3. “J-hook” loop design for the end points of the exclusion fencing.

Exclusionary fencing may also be required to be installed around other staging areas for the project, depending upon their location and the habitat present. The project herpetologist should be consulted to review the selected areas.

Installation of the exclusionary fencing must be completed by April 15<sup>th</sup> to prevent turtles from entering the construction zone. If installation is delayed, additional steps to survey for, and relocate any individuals within the construction zone may be required.

If so, a qualified herpetologist must conduct surveys of the construction zone and relocate any reptiles encountered to appropriate habitat outside of the construction zone, and within a distance representative of the species’ typical home range based on published studies. The sweeps must be conducted on the same day that the construction activity is occurring, and the herpetologist should work directly with the contractors mowing or clearing areas to guide these activities based on the type and density of vegetation.

#### Construction Phase

The focus of protection strategies during the construction phase of the project center around maintaining the integrity of the exclusion fencing and conducting sweeps to relocate any individual turtles to appropriate habitat outside of the construction area. Turtles have evolved a reproductive life history that depends upon high survivorship in the adult stage. Loss of individuals, especially adult females, can contribute to local population declines.

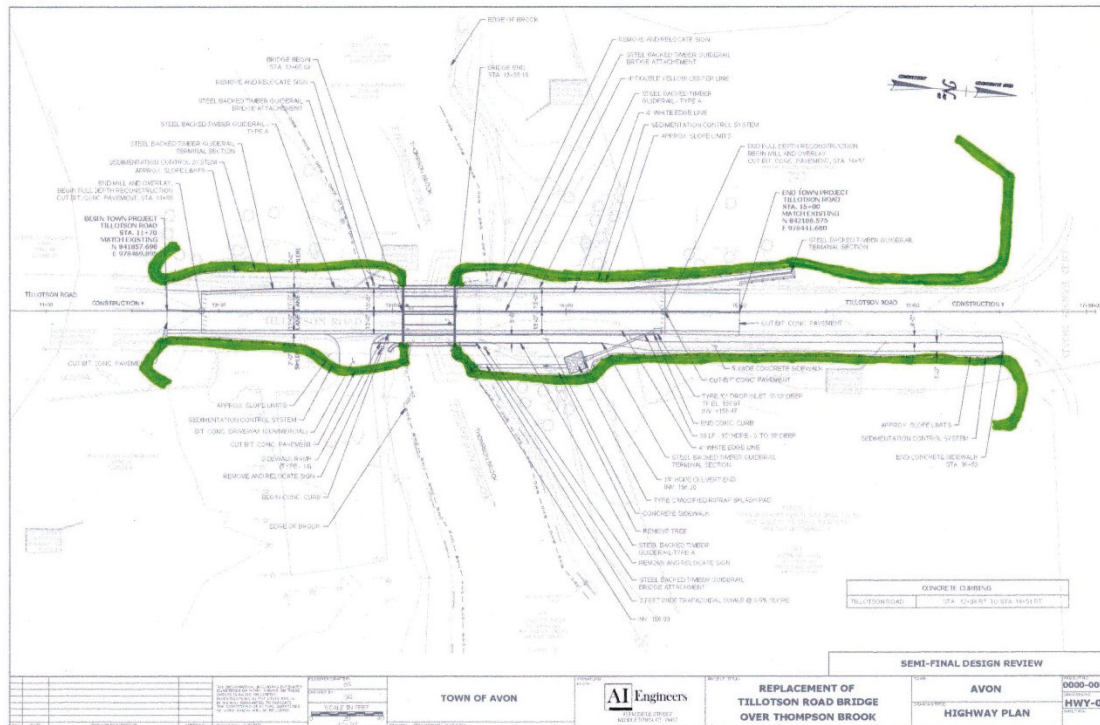


Figure 4. Approximate location of exclusionary fencing (in green) to prevent turtles from entering the construction zone.

**Requirement #3: Inform construction personnel on what to do if they encounter any reptile or amphibian species:**

An informal “construction team meeting” should be convened in the field to provide information on box turtles, including, identification, and what to do if any individuals are encountered. This will also be an opportunity to summarize the components and goals of the protection plan for the work crew. It is also important to stress to construction personnel that any turtles encountered should not be removed. Not infrequently, turtles encountered by individuals are taken from the wild and brought home as pets. Collection of wild turtles can be a significant contributing factor in population declines. The information session should be presented by a qualified herpetologist and coordinated with the construction project manager.

**Requirement #4: Conduct regular monitoring of the exclusionary fencing.**

It is important to monitor the integrity of the exclusion fencing on a regular basis to ensure that animals cannot enter active construction areas. This is especially important during the turtle nesting season when females are actively moving around seeking appropriate sites in which to deposit their eggs. The exclusionary fencing should be inspected by the project herpetologist weekly from May 15<sup>th</sup> -July 15<sup>th</sup> and biweekly between July 16-October 15.

Installation of exclusionary fencing within or adjacent to habitats sometimes results in individuals encountered moving along the exterior of the fence and being directed linearly along the fence for some distance (Quinn pers. obs.). This can expose them to predation. Thus, it is important that a qualified herpetologist conduct the inspections, as they are capable of capturing, and relocating any individuals

encountered to appropriate habitat within the area that would fall within the species' typical home range, yet safely away from the project.

The environmental monitor is responsible for daily silt fence checks to ensure damaged silt fence is immediately repaired. This is especially true following any heavy rain events or windstorms and it is imperative that the fencing be inspected within 24 hours, and any necessary repairs made. These events often lead to fencing being pulled away from stakes, and branches falling on the fence creating gaps.

**Requirement #5: Conduct sweeps of any areas to be cleared, or where heavy machinery will be in use throughout the duration of the project:**

Prior to clearing any areas, including any temporary staging areas, a qualified herpetologist should conduct visual sweeps to capture and relocate any animals that may be encountered.

**Post-construction Restoration Phase**

The focus of mitigation strategies during the post-construction phase of the project is on restoration of areas disturbed during the project, including any staging areas, as well as the removal of the exclusionary fencing.

**Requirement #6: Restore disturbed areas in a manner that avoids impacts to surrounding habitat or individual animals:**

All open areas with bare, or sparsely vegetated soil that remain in the construction zone should be seeded and/or planted. A conservation seed mix that utilizes natural species should be used to avoid the spread of non-native, invasive plants into surrounding habitat. Because of the location of disturbances along a roadway, it is important to eliminate any potential areas that may attract turtles to nest.

Consultation with the project herpetologist is recommended in reviewing these areas of disturbance during the restoration phase of the project.

**Requirement #7: Remove all exclusionary fencing:**

At the completion of the project, and once areas of disturbance are stabilized, the exclusionary fencing should be removed from all areas, including the staging areas, to avoid impeding the dispersal of animals.

**Requirement #8: CTDEEP NDDB Compliance Reporting:**

a. Following completion of the construction project, a summary report to the CTDEEP documenting the monitoring and maintenance of the exclusionary fence and erosion control measures will be completed.

b. Any observations of state listed species will be reported to CTDEEP by the Herpetologist with photo-documentation (if possible) and with specific information on the location and disposition of the animal. Any data collected by construction personnel should be immediately sent to the Herpetologist for reporting purposes. GPS coordinates in decimal degrees should be collected where the listed species was encountered.

## REFERENCES CITED

Barbara J. Nicholson, Quinn D. P., Rivadeneyra M.A. 2020. Post-natal Movement, Habitat Use, and Hibernacula Selection of Eastern Box Turtles (*Terrapene carolina carolina*) in Southern New England. *Northeastern Naturalist*. 27(2):358-380.

Connecticut Department of Energy and Environmental Protection, Wildlife Division. 2025. *Connecticut Wildlife Action Plan: Protecting our wildlife and habitats together*. July 2025 draft, 2025 CT Wildlife Action Plan Draft

Klemens, M.W., H.J. Gruner, D.P. Quinn, and E. R. Davison. 2021. *Conservation of Amphibians and Reptiles in Connecticut*. Revision to State Geological and Natural History Survey Bulletin 112. Department of Energy and Environmental Protection, Hartford, CT.

(WI DNR) 2015. Amphibian and reptile exclusion fencing protocols. Wisconsin Department of Natural Resources, Endangered Resources Review Program. Revised February

Quinn, D., H. Gruner, and S. Cronkite. 2017. Eastern box turtle and eastern hog-nosed snake final monitoring report 2011. Parsons Transportation Group. Project 18-113/129. U.S. Route 7 Bypass, Brookfield, Connecticut. Connecticut Department of Transportation

Quinn, D. 2008. A radio-telemetric study of the Eastern Box Turtle (*Terrapene carolina carolina*) home range, habitat use, and hibernacula selection in Connecticut. M. Sc Thesis. Central Connecticut State University, New Britain, CT. 84 pp.



### **LWRD Work Commencement Form**

**To:** [DEEP.LWRDRegulatory@ct.gov](mailto:DEEP.LWRDRegulatory@ct.gov) or  
Regulatory Section  
Department of Energy and Environmental Protection  
Land & Water Resources Division  
79 Elm Street  
Hartford, CT 06106-5127

**Licensee Name:** Town of Avon

**Municipality in which the project is occurring:** Avon

**DEEP License No(s):** 202508020-PCN

**CONTRACTOR(s):**

# 1 Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
Telephone: \_\_\_\_\_  
E-mail: \_\_\_\_\_

# 2 Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
Telephone: \_\_\_\_\_  
E-mail: \_\_\_\_\_

# 3 Name: \_\_\_\_\_  
Address: \_\_\_\_\_

Date Contractor(s) received a copy  
of the license and approved plans: \_\_\_\_\_

EXPECTED DATE OF COMMENCEMENT OF WORK: \_\_\_\_\_

EXPECTED DATE OF COMPLETION OF WORK: \_\_\_\_\_

LICENSEE: \_\_\_\_\_  
(Signature) (Date)

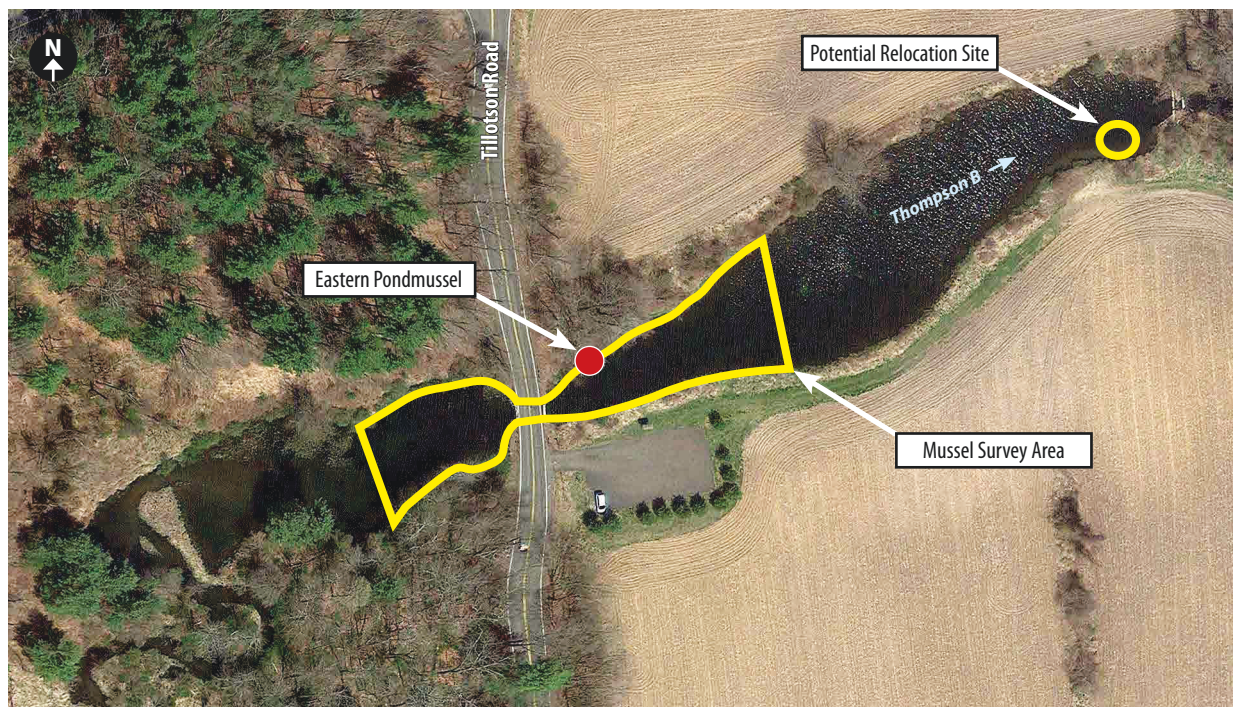
August 25, 2025

REPORT

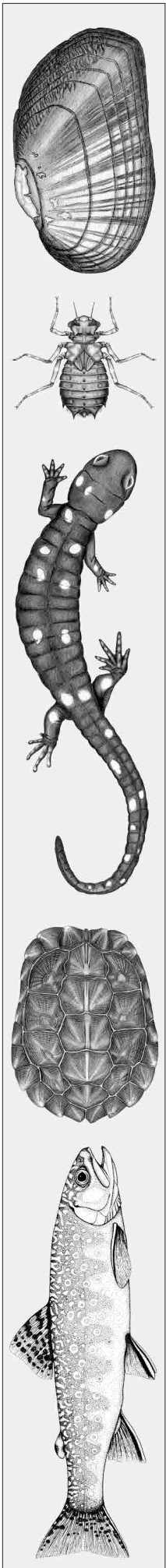
Freshwater Mussel and Survey in Thompson Brook for the Tillotson Road Bridge Project (Avon, CT)

Biodrawversity LLC conducted a freshwater mussel survey in Thompson Brook as part of the permitting for replacement of the Tillotson Road bridge in Avon, Connecticut. The objectives were to document the presence, distribution, and density of any state-listed mussel species in areas that would be affected by the proposed project, to develop a management plan if target species were found, and to identify a potential relocation site a safe distance away from the project area. Although the survey was focused on freshwater mussels, we also planned to record and photograph any slimy sculpin (*Cottus cognatus*) observed during the survey because this species is also uncommon in Connecticut and might occur in Thompson Brook. We are not aware of previous mussel surveys in Thompson Brook, but the bridge is near its confluence with the Farmington River where state-listed species have been documented, especially eastern pearlshell (*Margaritifera margaritifera*) and eastern pondmussel (*Sagittunio nasutus*). Both species are listed as Species of Special Concern in Connecticut.

**Methods:** Ethan Nedeau conducted the survey on June 19, 2025. The mussel survey was conducted in all areas where the stream bottom may be affected by project-related construction, including a 50-meter downstream buffer and 25-meter upstream buffer (Figure 1). The biologist searched for freshwater mussels at the sediment surface by snorkeling and wading. The shell length, shell condition, habitat (depth and substrate), and location of each state-listed mussel were recorded. Three potential relocation sites were assessed, including one approximately 170 meters downstream from the bridge, one 75 meters upstream from the bridge, and a third approximately 150 meters upstream from the bridge.



**Figure 1.** Freshwater mussel survey area, location where eastern pondmussel was observed, and potential relocation site in Thompson Brook near the Tillotson Road bridge in Avon, Connecticut.





Thompson Brook downstream from the Tillotson Road bridge.



Thompson Brook upstream from the Tillotson Road bridge.

**Results:** One live eastern pondmussel was found near the left bank (as facing downstream), approximately 27 meters downstream from the bridge (Figure 1). The mussel was 81.0 mm in length, with a moderately eroded shell, and it was found at a depth of 1.5 ft in silty sand and gravel. In addition, approximately 200-300 eastern elliptio (*Elliptio complanata*) were found throughout the survey area, mostly downstream from the bridge in water depths greater than 3.0 ft. No other mussel species were found. Asian clams were present but sparse, and snails were abundant. Slimy sculpin were not observed. This portion of Thompson Brook is likely too warm and sluggish for slimy sculpin, which prefer cold, well-oxygenated water and moderate to fast flows. This entire reach of Thompson Brook is an impoundment, with the dam located approximately 180 meters downstream from the bridge.

Although three potential relocation sites were assessed, the two upstream from the bridge lacked eastern pondmussels and had poor to marginal habitat. Therefore, we recommend a relocation site downstream from the bridge, in the lower end of the impoundment in deeper water (Figure 1). Eastern elliptio and eastern pondmussel were both found at this location.

**Conclusion:** The survey documented the presence of eastern pondmussels in an area of Thompson that may be affected by replacement of the Tillotson Road bridge. In-stream work associated with the bridge replacement will involve placement of ters and cofferdams surrounding the work areas upstream and downstream from the dam, and dewatering within the cofferdams. The proposed cofferdams will essentially isolate the work area once installed. Standard practice recommended by CTDEEP is to conduct a mussel sweep immediately prior instream disturbance, to collect and relocate mussels that are either in the direct footprint of construction, or close enough to be exposed to construction-related stressors such as sedimentation or elevated turbidity. Based on the design plans, we suggest that the mussel sweep should include a 25-meter upstream and downstream buffer. A draft *Mussel Management Plan* that follows CTDEEP standard prac-



Eastern pondmussel found during the survey.

tices is included below. This report and draft Plan should be submitted to CTDEEP for review and approval, modified if the design or schedule changes significantly, and implemented within 2-3 weeks prior to the start of construction and only during the period from early May to early October.

## DRAFT MUSSEL MANAGEMENT PLAN

**Initial Mussel Survey:** A freshwater mussel survey was conducted on June 19, 2025, to assist with the planning and permitting for the Tillotson Road Bridge replacement. The survey documented very low numbers of eastern pondmussel in an area of Thompson Brook that would be affected by the proposed project, along with moderate densities of eastern elliptio. During the survey, biologists also identified a suitable relocation site approximately 170 meters downstream from the bridge.

**Recommendations:** We recommend standard best management practices to reduce streambed and riparian disturbance to the greatest extent possible, and reduce the potential for turbidity/sedimentation. The proposed ters and cofferdams will isolate the work area. We recommend a pre-construction mussel sweep to collect and relocate eastern pondmussels. Due to anticipated low numbers of salvaged mussels, we do not recommend tagging or post-relocation monitoring.

### Pre-Construction Mussel Relocation

- For mussel relocation, this plan recommends a *survey area* that includes all areas of direct impacts plus a 25-meter upstream buffer and 25-meter downstream buffer.
- Within three weeks prior to construction, biologists will collect and relocate all state-listed and uncommon mussels from the survey area.
- Biologists will conduct visual searches for mussels while snorkeling.
- Mussels will be gathered and held underwater in mesh bags during the collection process.
- Mussels will be transported to the relocation site identified in the survey report and placed carefully into the substrate.
- A written report will summarize results of the pre-construction mussel relocation. It will include a map of the survey area showing where target species were collected and relocated, and provide shell length measurements, shell condition, habitat, and photographs of relocated mussels.

### Schedule

- Pre-Construction Mussel Relocation: This should be completed within three weeks prior to construction, within the time period from early May to early October. The construction schedule has not yet been determined. The level of effort is one day for one biologist.
- Reporting: A report will be submitted to the client within three weeks of the fieldwork. Contractors will comply with other permit conditions specified by the CTDEEP.

## ETHAN JAY NEDEAU

206 Pratt Corner Road, Leverett, MA 01054  
(413) 253-6561; nedeau.ethan@gmail.com

### EDUCATION

M.S., Michigan State University. 1996 – 1998. Entomology (Concentration: Stream Ecology)  
B.S., University of Massachusetts Amherst. 1992 – 1996. Wildlife and Fisheries Conservation

### EMPLOYMENT HISTORY

**Biodrawversity LLC.** Sole Owner and Senior Scientist. 1998–Present

- Built a small and efficient ecological consulting company.
- Consulting services include endangered species surveys, ecological assessment, and ecological monitoring. Specific skills include aquatic macroinvertebrate sampling and taxonomy, malacology, stream ecology, biological assessment of aquatic environments, study design, GPS data collection, and reporting. Maintain a fully licensed and equipped SCUBA team.
- Recognized as a qualified surveyor for all state-listed and federally listed freshwater mussel species in northeastern states: MD, NY, PA, NJ, CT, MA, VT, NH, ME, RI.

### REPRESENTATIVE CONSULTING PROJECTS

Led more than 1,000 ecological consulting projects in northeastern North America (Maryland to Maine), mostly focused on aquatic invertebrate studies and ecological monitoring. The following are some examples:

- Freshwater Mussel Survey and Relocation in the Delaware River for the Interstate 9 Bridge (Callicoon) Project (New York), 2023-Present.
- Freshwater Mussel Relocation and Monitoring in the Chenango River for the Route 79 Bridge Demolition Project (New York), 2023-2024.
- Freshwater Mussel Relocation and Monitoring in the Susquehanna River for the Route 17 Bridge Project (New York), 2023-2024.
- Brook Floater Mark-Recapture Study in Wesserunsett Stream and the East Branch Pleasant River in Maine. 2018-2021.
- Yellow Lampmussel and Eastern Pondmussel Relocation and Monitoring in the Connecticut River for the Mt Tom Power Plant Decommissioning Project (Massachusetts). 2020-Present.
- Dwarf Wedgemussel Recruitment Study in New Hampshire and Massachusetts for the US Fish and Wildlife Service. 2020-2021.
- Freshwater Mussel Surveys, Relocation, and Monitoring for Thirteen Dam Removal Projects in New Jersey. 2017-Present.
- Freshwater Mussel and Submerged Aquatic Vegetation Survey in the Hudson River and Normanskill for the Port of Albany Project (New York). 2020.
- Freshwater Mussel Surveys for Infrastructure Projects for the Maine Department of Transportation. 2018-Present.
- Freshwater Mussel Surveys for Seven Hydroelectric Projects in the Upper Androscoggin River (New Hampshire). 2020-Present.
- Dwarf Wedgemussel Relocation and Monitoring in Muddy Brook and Stony Brook (Suffield, Connecticut) for a Natural Gas Pipeline. 2017 to Present.
- Dwarf Wedgemussel (*Alasmidonta heterodon*) Relocation and Monitoring in the Mill River for a Stream Channel Restoration Project (Massachusetts). 2013-Present.
- Dwarf Wedgemussel (*Alasmidonta heterodon*) Research in the Connecticut River for the Relicensing of the Vernon, Bellows Falls, and Wilder Hydroelectric Projects (Vermont and New Hampshire). 2011–2016.
- Freshwater Mussel and Odonate Studies in the Connecticut River for the Relicensing of the Turners Falls and Northfield Mountain Hydroelectric Projects (Massachusetts). 2012–2016.
- Freshwater Mussel Surveys at Stream Crossings for the Northern Pass Transmission Project (New Hampshire). 2013–2014.
- Field Study of Green Floater (*Lasmigona subviridis*) and Co-occurring Mussel Species in the Susquehanna River to Evaluate Potential Impacts of a Water Withdrawal for a Proposed Nuclear Power Plant (Pennsylvania). 2012.
- Freshwater Mussel Research for the Relicensing of the Conowingo Dam in the Lower Susquehanna River (Maryland). 2011–2012.
- Freshwater Mussel Research, Relocation, and Monitoring for the Penobscot River Restoration Project in Maine: Removal of the Great Works Dam and Veazie Dam (Maine). 2010–2015.
- Baseline Assessment of Stream Salamanders and Aquatic Macroinvertebrates in Headwater Streams of Lowell Mountain Prior to Upland Disturbance from Commercial Wind Power Development (Vermont). 2011–2013.
- Two-phase Qualitative and Quantitative Surveys to Determine the Distribution, Abundance, and Demographics of the Brook Floater (*Alasmidonta varicosa*) in >40 rivers in Maine, New Hampshire, Vermont, Massachusetts, and Connecticut. 2006–Present.
- Threatened and Endangered Mussel Survey and Habitat Evaluation of the Castleton and Poultney Rivers for a Proposed Biomass Facility (Vermont). 2010.
- Relocation and Monitoring of Dwarf Wedgemussel (*Alasmidonta heterodon*) Populations in the Ashuelot River in the Impoundment of the Homestead Woolen Dam Before and After Dam Removal (New Hampshire). 2010.
- The Potential Spread of Zebra Mussels in Western Massachusetts: Physical, Chemical, and Biological Surveys of Lakes and Rivers in the Housatonic and Connecticut River Watersheds (Massachusetts). 2009–2010.



9/3/2025

Michael Mastroluca  
AI ENGINEERS, INC.  
919 MIDDLE ST  
MIDDLETOWN, CT 06457  
mmastroluca@aiengineers.com

Subject: 3572

Filing #: 118446

NDDB - New Determination Number: 202410132

Expiration Date: 9/3/2027

Location Description: Replacement of Bridge No. 04015 over Thompson Brook with In-Water Work Located at 75 Tillotson Road in Avon, Connecticut

I have re-reviewed Natural Diversity Data Base (NDDB) maps and files regarding this project. According to our records, the following State-listed species (RCSA Sec. 26-306) are documented within or nearby the project area.

### **Protection for State-listed Animals**

The following animal species are known from this area:

- Savannah sparrow (*Passerculus sandwichensis*) State Special Concern
- Eastern meadowlark (*Sturnella magna*) State Threatened
- Eastern box turtle (*Terrapene carolina carolina*) State Special Concern
- Eastern pondmussel (*Ligumia nasuta*) State Special Concern
- Eastern pearlshell (*Margaritifera margaritifera*) State Special Concern
- Slimy sculpin (*Cottus cognatus*) State Special Concern

### **Grassland Birds**

- Savannah sparrow (*Passerculus sandwichensis*) State Special Concern
- Eastern meadowlark (*Sturnella magna*) State Threatened

The continuing decline of suitable grassland habitats is a major threat to our state listed grassland bird species. The decline is exacerbated by the intense development pressure on grassland habitat due to its accessibility. Many grassland species require expansive tracts of grassland mosaics that may include mowed areas, meadows of tall grasses and wildflowers that function best if kept in 30-acre parcels. **If work is confined to fall and winter the NDDB Program does not anticipate adverse impacts to grassland**

**birds. If work must occur during the grassland bird nesting times take precautions to be sure no staging or activities are designed to occur in grassland areas.**

## **Eastern Box Turtle Protection**

The NDDDB Program received a final report Habitat Assessment and recommended Species Protection Measures: Eastern Box Turtle Replacement of Bridge No. 04015 over Thompson Brook with In-Water Work 75 Tillotson Road Avon, Connecticut prepared by Dennis P Quinn of Quinn Ecological, LLC and dated August 25, 2025. The primary goal of the mitigation plan is to avoid inadvertent injury/mortality of turtles that may be dispersing through the area over the course of their spring to fall active season. A second goal is to prevent the establishment of conditions along the roadway that will attract turtles to nest, exposing both adults and hatchlings to road mortality.

The Quinn Ecological, LLC report is accepted by the NDDDB Program, and all species and habitat mitigation and protection protocols are accepted and are expected to be implemented as described in the report. The protection and mitigation measures will minimize impacts to species during the design phase, construction and post construction activities of this project. The implementation of the Quinn Ecological, LLC requirements of the protection plan to prevent impacts to the state listed species will minimize impacts of the eastern box turtle population known from this area. **A qualified herpetologist, one with extensive conservation experience with Eastern Box Turtle, such as Quinn Ecological, LLC must oversee the implementation of the turtle Protection Plan.** The protection and mitigation requirements, as described in the Quinn report include:

**Requirement #1: Avoid important habitat, within or outside, of the primary construction zone by locating appropriate staging areas for the project:** It is anticipated that equipment, materials, and fill will be staged along the immediate roadway and shoulder areas due to the necessity of road closure for the project. However, once a location(s) for staging has been identified by the contractor, the site(s) should be reviewed by the project herpetologist to determine if there is a need to conduct sweeps for any of the target species. Beyond the scope of the project construction easement, the agricultural land surrounding the project site should be avoided to the greatest extent possible. If these areas are required to be used for staging, an appropriate exclusionary barrier will need to be installed. If the agricultural field is proposed for staging, the location and extent should be coordinated and reviewed by the project herpetologist.

**Requirement #2: Identify areas requiring the installation of exclusionary fencing and appropriately install the fencing:** Exclusionary fencing at least 20 inches in height (above ground level) should be installed at the limits of disturbance within the construction zone. The fencing should be staked (12 inches into the ground) at appropriate distances to maintain rigidity (6-10 feet intervals), and the fencing buried at least 4 inches into the ground and backfilled.

Standard erosion control/silt fencing (geotextile) can be used, but not fencing with a wider nylon mesh lining, which can entangle snakes (WI DNR 2015). The terminus of each length of fencing should be angled back away from the road to divert animals moving along the exterior of the fence back into undisturbed habitat to discourage them from moving around the fence. **Installation of each length of fence should be coordinated with the project herpetologist to determine the best angle and placement depending upon the location, topography, and surrounding habitat.** In general, a “J-hook” loop design with an interior width of no more than 18 inches and return length of fencing of approximately 10 feet should be used (see Figure 3 in the Quinn Report).

The exclusionary fencing must be tied into the cofferdam to prevent turtles from accessing the work area in the river from the embankments. Figure 4, in the Quinn Report illustrates approximate locations for exclusionary fencing. **The exact location and layout of the fencing will be determined in coordination with the consulting herpetologist at the time of installation.**

Exclusionary fencing may also be required to be installed around other staging areas for the project, depending upon their location and the habitat present. **The project herpetologist should be consulted to review the selected areas.**

Installation of the exclusionary fencing must be completed by April 15th to prevent turtles from entering the construction zone. If installation is delayed, additional steps to survey for, and relocate any individuals within the construction zone may be required. If so, a qualified herpetologist must conduct surveys of the construction zone and relocate any reptiles encountered to appropriate habitat outside of the construction zone, and within a distance representative of the species' typical home range based on published studies.

The sweeps must be conducted on the same day that the construction activity is occurring, and the herpetologist should work directly with the contractors mowing or clearing areas to guide these activities based on the type and density of vegetation.

**Construction Phase** The focus of protection strategies during the construction phase of the project center around maintaining the integrity of the exclusion fencing and conducting sweeps to relocate any individual turtles to appropriate habitat outside of the construction area. Turtles have evolved a reproductive life history that depends upon high survivorship in the adult stage. Loss of individuals, especially adult females, can contribute to local population declines.

**Requirement #3: Inform construction personnel on what to do if they encounter any reptile or amphibian species:** An informal "construction team meeting" should be convened in the field to provide information on box turtles, including, identification, and what to do if any individuals are encountered. This will also be an opportunity to summarize the components and goals of the protection plan for the work crew. It is also important to stress to construction personnel that any turtles encountered should not be removed. Not infrequently, turtles encountered by individuals are taken from the wild and brought home as pets. Collection of wild turtles can be a significant contributing factor in population declines.

The information session should be presented by a qualified herpetologist and coordinated with the construction project manager.

**Requirement #4: Conduct regular monitoring of the exclusionary fencing.** It is important to monitor the integrity of the exclusion fencing on a regular basis to ensure that animals cannot enter active construction areas. This is especially important during the turtle nesting season when females are actively moving around seeking appropriate sites in which to deposit their eggs. The exclusionary fencing should be inspected by the project herpetologist weekly from May 15th -July 15th and biweekly between July 16-October 15. Installation of exclusionary fencing within or adjacent to habitats sometimes results in individuals encountered moving along the exterior of the fence and being directed linearly along the fence for some distance (Quinn pers. obs.). This can expose them to predation. Thus, it is important that a qualified herpetologist conduct the inspections, as they are capable of capturing, and relocating any individuals encountered to appropriate habitat within the area that would fall within the species' typical home range, yet safely away from the project. The environmental monitor is responsible for daily silt fence checks to ensure damaged silt fence is immediately repaired. This is especially true following any heavy rain events or windstorms and it is imperative that the fencing be inspected within 24 hours, and any necessary repairs made. These events often lead to fencing being pulled away from stakes, and branches falling on the fence creating gaps.

**Requirement #5: Conduct sweeps of any areas to be cleared, or where heavy machinery will be in use throughout the duration of the project:** Prior to clearing any areas, including any temporary staging areas, a qualified herpetologist should conduct visual sweeps to capture and relocate any animals that may be encountered. Post-construction Restoration Phase The focus of mitigation strategies during the post-construction phase of the project is on restoration of areas disturbed during the project, including any staging

areas, as well as the removal of the exclusionary fencing.

**Requirement #6: Restore disturbed areas in a manner that avoids impacts to surrounding habitat or individual animals:** All open areas with bare, or sparsely vegetated soil that remain in the construction zone should be seeded and/or planted. A conservation seed mix that utilizes natural species should be used to avoid the spread of non-native, invasive plants into surrounding habitat. Because of the location of disturbances along a roadway, it is important to eliminate any potential areas that may attract turtles to nest. Consultation with the project herpetologist is recommended in reviewing these areas of disturbance during the restoration phase of the project.

**Requirement #7: Remove all exclusionary fencing:** At the completion of the project, and once areas of disturbance are stabilized, the exclusionary fencing should be removed from all areas, including the staging areas, to avoid impeding the dispersal of animals.

**Requirement #8: CTDEEP NDDB Compliance Reporting:**

1. Following completion of the construction project, a summary report to the CTDEEP documenting the monitoring and maintenance of the exclusionary fence and erosion control measures will be completed.
2. Any observations of state listed species will be reported to CTDEEP by the Herpetologist with photo documentation (if possible) and with specific information on the location and disposition of the animal. Any data collected by construction personnel should be immediately sent to the Herpetologist for reporting purposes. GPS coordinates in decimal degrees should be collected where the listed species was encountered.

**Freshwater mussels**

Eastern pondmussel (*Ligumia nasuta*) State Special Concern

Eastern pearlshell (*Margaritifera margaritifera*) State Special Concern

The NDDB Program received a report [Freshwater Mussel and Survey in Thompson Brook for the Tillotson Road Bridge Project \(Avon, CT\)](#) developed by Ethan Nadeau of Biodrawiversity and dated August 25, 2025. The report documented the presence of *Margaritifera margaritifera* (Eastern pearlshell) in an area that may be impacted by this project.

The [Mussel Management Plan](#) and relocation of State Listed Mussel is accepted by the NDDB Program to reduce and mitigate for impacts to the State Listed mussel species. The Mussel Management Plan includes the following protection and mitigation actions:

**MUSSEL MANAGEMENT PLAN**

**Initial Mussel Survey:** A freshwater mussel survey was conducted on June 19, 2025, to assist with the planning and permitting for the Tillotson Road Bridge replacement. The survey documented very low numbers of eastern pondmussel in an area of Thompson Brook that would be affected by the proposed project, along with moderate densities of eastern elliptio. During the survey, biologists also identified a

suitable relocation site approximately 170 meters downstream from the bridge.

**Recommendations:** We recommend standard best management practices to reduce streambed and riparian disturbance to the greatest extent possible and reduce the potential for turbidity/sedimentation. The proposed trestles and cofferdams will isolate the work area. We recommend a pre-construction mussel sweep to collect and relocate eastern pondmussels. Due to anticipated low numbers of salvaged mussels, we do not recommend tagging or post-relocation monitoring.

### **Pre-Construction Mussel Relocation**

- For mussel relocation, this plan recommends a survey area that includes all areas of direct impacts plus a 25-meter upstream buffer and 25-meter downstream buffer.
- Within three weeks prior to construction, biologists will collect and relocate all state-listed and uncommon mussels from the survey area.
- Biologists will conduct visual searches for mussels while snorkeling.
- Mussels will be gathered and held underwater in mesh bags during the collection process.
- Mussels will be transported to the relocation site identified in the survey report and placed carefully into the substrate.
- A written report will summarize results of the pre-construction mussel relocation. It will include a map of the survey area showing where target species were collected and relocated, and provide shell length measurements, shell condition, habitat, and photographs of relocated mussels.

### **Schedule**

- Pre-Construction Mussel Relocation: This should be completed within three weeks prior to construction, within the time period from early May to early October. The construction schedule has not yet been determined. The level of effort is one day for one biologist.
- Reporting: A report will be submitted to the client within three weeks of the fieldwork. Contractors will comply with other permit conditions specified by the CTDEEP

### **State Listed Fish**

Slimy sculpin (*Cottus cognatus*) State Special Concern

Please be advised that a DEEP Fisheries Biologist will review the permit applications you may submit to DEEP regulatory programs to determine if your project could adversely impact slimy sculpin. DEEP Fisheries Biologists are routinely involved in pre-application consultations with regulatory staff and applicants in order to identify potential fisheries issues and work with applicants to mitigate negative effects, including to endangered species. If you have not already talked with a Fisheries Biologist about your project, you may contact the Permit Analyst assigned to process your application for further information, including the contact information for the Fisheries Biologist assigned to review your application. The consultation form can be found here: [Fisheries Consultation Form \(ct.gov\)](#)

Instructions for submitting your survey information or other additional reporting requirements can be found at the end of this letter.

Your submission information indicates that your project requires a state permit, license, registration, or authorization, or utilizes state funding or involves state agency action. This NDDDB - New determination may be utilized to fulfill the Endangered and Threatened Species requirements for state-issued permit applications, licenses, registration submissions, and authorizations.

Please be aware of the following limitations and conditions:

Natural Diversity Database information includes all information regarding listed species available to us at the time of the request. This information is a compilation of data collected over the years by the Department of Energy and Environmental Protection's Natural History Survey and cooperating units of DEEP, land owners, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as enhance existing data. Such new information is incorporated into the Database and accessed through the ezFile portal as it becomes available. New information may result in additional review, and new or modified restrictions or conditions may be necessary to remain in compliance with certain state permits.

- During your work listed species may be encountered on site. A report must be submitted by the observer to the Natural Diversity Database promptly and additional review and restrictions or conditions may be necessary to remain in compliance with certain state permits. Please fill out the [appropriate survey form](#) and follow the instructions for submittal.
- Your project involves the state permit application process or other state involvement, including state funding or state agency actions; please note that consultations with your permit analyst or the agency may result in additional requirements. In this situation, additional evaluation of the proposal by the DEEP Wildlife Division may be necessary and additional information, including but not limited to species-specific site surveys, may be required. Any additional review may result in specific restrictions or conditions relating to listed species that may be found at or in the vicinity of the site.
- If your project involves preparing an Environmental Impact Assessment, this NDDDB consultation and determination should not be substituted for biological field surveys assessing on-site habitat and species presence.
- The NDDDB - New determination for the 3572 as described in the submitted information and summarized at the end of this document is valid until 9/3/2027. This determination applies only to the project as described in the submission and summarized at the end of this letter. Please re-submit an updated Request for Review if the project's scope of work and/or timeframe changes, including if work has not begun by 9/3/2027.

Additional reporting requirements indicated above have been requested. Include the Project Name 3572 and Determination Number 202410132 on all correspondence. Please note that, as stated above, survey data indicating the presence of listed species not described in this letter may necessitate additional review and restrictions or conditions. Forward additional reporting requirements to each of the following two addresses:

1. Dawn.McKay@ct.gov
2. deep.nddbrequest@ct.gov

If you have further questions, please contact me at the following:

Dawn McKay  
CT DEEP Bureau of Natural Resources  
Wildlife Division

Natural Diversity Database  
79 Elm Street  
Hartford, CT 06106-5127  
(860) 424-3592  
Dawn.McKay@ct.gov

Please reference the Determination Number 202410132 when you e-mail or write. Thank you for consulting the Natural Diversity Data Base.

Dawn McKay  
Wildlife Division- Natural Diversity Data Base  
79 Elm Street  
Hartford, CT 06106-5127  
(860) 424-3592  
Dawn.McKay@ct.gov

Application Details:

Project involves federal funds or federal permit:	Yes
Project involves state funds, state agency action, or relates to CEPA request:	Yes
Project requires state permit, license, registration, or authorization:	Yes
DEEP enforcement action related to project:	
Project Type:	
Project Sub-type:	New Bridge Including Upland and In-water work
Project Name:	3572
Project Description:	

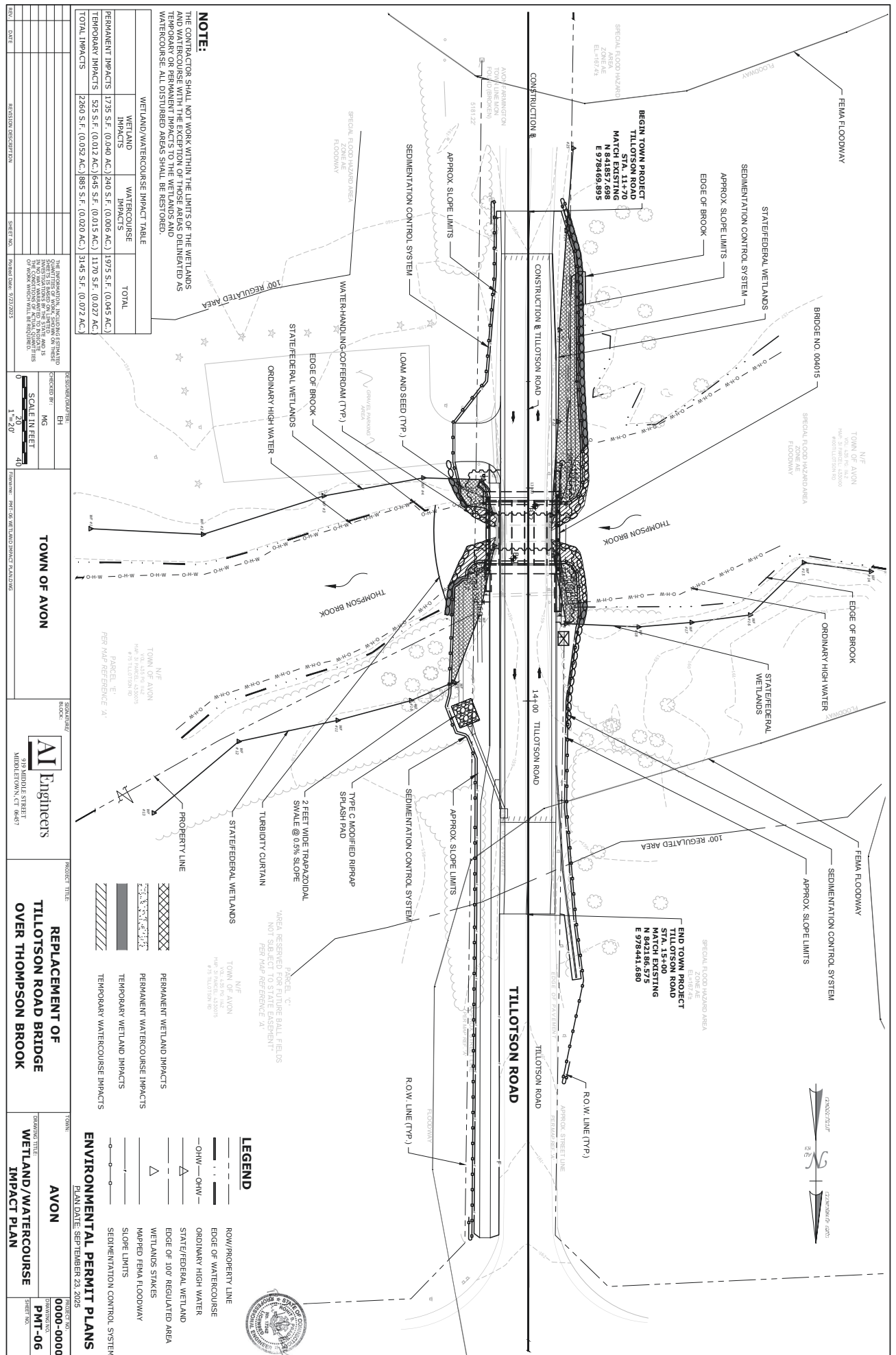












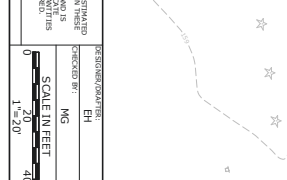
**NOTE:**  
 THE CONTRACTOR SHALL NOT WORK WITHIN THE LIMITS OF THE WETLANDS AND WATERCOURSE WITH THE EXCEPTION OF THOSE AREAS DELINEATED AS TEMPORARY OR PERMANENT IMPACTS TO THE WETLANDS AND WATERCOURSE. ALL DISTURBED AREAS SHALL BE RESTORED.

**WETLAND/WATERCOURSE IMPACT TABLE**

	WETLAND IMPACTS	WATERCOURSE IMPACTS	TOTAL
PERMANENT IMPACTS	1738 S.F. (0.040 AC.)	240 S.F. (0.006 AC.)	1978 S.F. (0.045 AC.)
TEMPORARY IMPACTS	525 S.F. (0.012 AC.)	845 S.F. (0.021 AC.)	1370 S.F. (0.032 AC.)
<b>TOTAL IMPACTS</b>	<b>2263 S.F. (0.052 AC.)</b>	<b>885 S.F. (0.020 AC.)</b>	<b>3148 S.F. (0.072 AC.)</b>

**REVISIONS**

NO.	DATE	REVISION DESCRIPTION	SHEET NO.
1		ISSUED FOR PERMIT	1



**TOWN OF AVON**

191 MADRID STREET  
 MADRID TOWN, CT 06457

**REPLACEMENT OF TILLOTSON ROAD BRIDGE OVER THOMPSON BROOK**

**ENVIRONMENTAL PERMIT PLANS**

PLAN DATE: SEPTEMBER 23, 2025

**LEGEND**

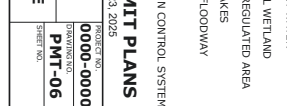
	ROW/PROPERTY LINE
	EDGE OF WATERCOURSE
	ORDINARY HIGH WATER
	STATE/FEDERAL WETLAND
	WETLANDS STAKES
	MARKED FEMA FLOODWAY
	SLOPE LIMITS
	SEDIMENTATION CONTROL SYSTEM

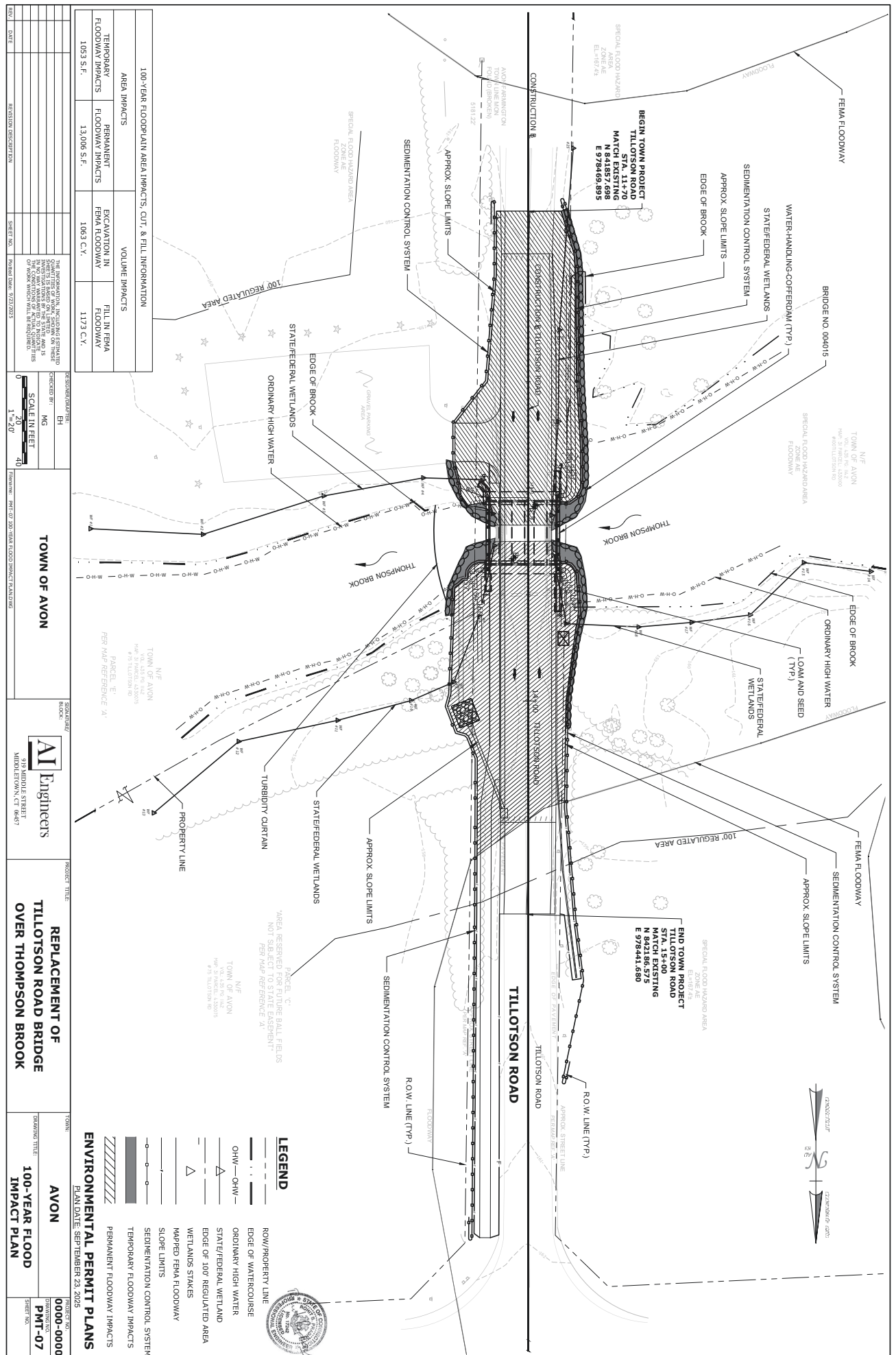
**ENVIRONMENTAL PERMIT PLANS**

PERMANENT WETLAND IMPACTS	TEMPORARY WETLAND IMPACTS	TEMPORARY WATERCOURSE IMPACTS

**AVON**

PROJECT NO.: 0000-0000  
 DRAWING NO.: PMT-06  
 SHEET NO.:





100-YEAR FLOODPLAIN AREA IMPACTS, CUT, & FILL INFORMATION			
AREA IMPACTS	PERMANENT FLOODWAY IMPACTS	EXCAVATION IN FEMA FLOODWAY	FILL IN FEMA FLOODWAY
TEMPORARY FLOODWAY IMPACTS	13,006 S.F.	1063 C.Y.	1173 C.Y.
PERMANENT FLOODWAY IMPACTS	1063 S.F.		

VOLUME IMPACTS	
EXCAVATION IN FEMA FLOODWAY	1063 C.Y.
FILL IN FEMA FLOODWAY	1173 C.Y.

THE INFORMATION, INCLUDING BUT NOT LIMITED TO, THE DESIGN AND CONSTRUCTION OF THE PROJECT IS BASED ON THE INFORMATION PROVIDED BY THE CLIENT AND THE DESIGNER HAS NOT CONDUCTED ANY VISUAL VERIFICATION OF THE INFORMATION PROVIDED BY THE CLIENT. THE DESIGNER ASSUMES NO LIABILITY FOR ANY ERRORS OR OMISSIONS IN THE INFORMATION PROVIDED BY THE CLIENT OR FOR ANY CONSEQUENCES ARISING FROM THE USE OF THE INFORMATION PROVIDED BY THE CLIENT.

CHECKED BY: EH  
SCALE IN FEET: 1" = 20'  
DATE: 09/23/2023

TOWN OF AVON  
199 MADOLE STREET  
MIDDLETOWN, CT 06457

PROJECT TITLE:  
**REPLACEMENT OF TILLOTSON ROAD BRIDGE OVER THOMPSON BROOK**

PROJECT NO.:  
0000-0000  
DRAWING NO.:  
PMT-07  
SHEET NO.:

ENVIRONMENTAL PERMIT PLANS  
PLAN DATE: SEPTEMBER 23, 2023

AREA RESERVED FOR FUTURE BALL FIELDS NOT SUBJECT TO STATE EASEMENT PER MAP REFERENCE 'A'

TOWN OF AVON  
199 MADOLE STREET  
MIDDLETOWN, CT 06457

PROJECT TITLE:  
**REPLACEMENT OF TILLOTSON ROAD BRIDGE OVER THOMPSON BROOK**

PROJECT NO.:  
0000-0000  
DRAWING NO.:  
PMT-07  
SHEET NO.:

ENVIRONMENTAL PERMIT PLANS  
PLAN DATE: SEPTEMBER 23, 2023

AREA RESERVED FOR FUTURE BALL FIELDS NOT SUBJECT TO STATE EASEMENT PER MAP REFERENCE 'A'

TOWN OF AVON  
199 MADOLE STREET  
MIDDLETOWN, CT 06457

PROJECT TITLE:  
**REPLACEMENT OF TILLOTSON ROAD BRIDGE OVER THOMPSON BROOK**

PROJECT NO.:  
0000-0000  
DRAWING NO.:  
PMT-07  
SHEET NO.:

ENVIRONMENTAL PERMIT PLANS  
PLAN DATE: SEPTEMBER 23, 2023

AREA RESERVED FOR FUTURE BALL FIELDS NOT SUBJECT TO STATE EASEMENT PER MAP REFERENCE 'A'

TOWN OF AVON  
199 MADOLE STREET  
MIDDLETOWN, CT 06457

PROJECT TITLE:  
**REPLACEMENT OF TILLOTSON ROAD BRIDGE OVER THOMPSON BROOK**

PROJECT NO.:  
0000-0000  
DRAWING NO.:  
PMT-07  
SHEET NO.:

ENVIRONMENTAL PERMIT PLANS  
PLAN DATE: SEPTEMBER 23, 2023

AREA RESERVED FOR FUTURE BALL FIELDS NOT SUBJECT TO STATE EASEMENT PER MAP REFERENCE 'A'

TOWN OF AVON  
199 MADOLE STREET  
MIDDLETOWN, CT 06457

PROJECT TITLE:  
**REPLACEMENT OF TILLOTSON ROAD BRIDGE OVER THOMPSON BROOK**

PROJECT NO.:  
0000-0000  
DRAWING NO.:  
PMT-07  
SHEET NO.:

ENVIRONMENTAL PERMIT PLANS  
PLAN DATE: SEPTEMBER 23, 2023

AREA RESERVED FOR FUTURE BALL FIELDS NOT SUBJECT TO STATE EASEMENT PER MAP REFERENCE 'A'

TOWN OF AVON  
199 MADOLE STREET  
MIDDLETOWN, CT 06457

PROJECT TITLE:  
**REPLACEMENT OF TILLOTSON ROAD BRIDGE OVER THOMPSON BROOK**

PROJECT NO.:  
0000-0000  
DRAWING NO.:  
PMT-07  
SHEET NO.:

ENVIRONMENTAL PERMIT PLANS  
PLAN DATE: SEPTEMBER 23, 2023

AREA RESERVED FOR FUTURE BALL FIELDS NOT SUBJECT TO STATE EASEMENT PER MAP REFERENCE 'A'

TOWN OF AVON  
199 MADOLE STREET  
MIDDLETOWN, CT 06457

PROJECT TITLE:  
**REPLACEMENT OF TILLOTSON ROAD BRIDGE OVER THOMPSON BROOK**

PROJECT NO.:  
0000-0000  
DRAWING NO.:  
PMT-07  
SHEET NO.:

ENVIRONMENTAL PERMIT PLANS  
PLAN DATE: SEPTEMBER 23, 2023

AREA RESERVED FOR FUTURE BALL FIELDS NOT SUBJECT TO STATE EASEMENT PER MAP REFERENCE 'A'

TOWN OF AVON  
199 MADOLE STREET  
MIDDLETOWN, CT 06457

PROJECT TITLE:  
**REPLACEMENT OF TILLOTSON ROAD BRIDGE OVER THOMPSON BROOK**

PROJECT NO.:  
0000-0000  
DRAWING NO.:  
PMT-07  
SHEET NO.:

ENVIRONMENTAL PERMIT PLANS  
PLAN DATE: SEPTEMBER 23, 2023

AREA RESERVED FOR FUTURE BALL FIELDS NOT SUBJECT TO STATE EASEMENT PER MAP REFERENCE 'A'

TOWN OF AVON  
199 MADOLE STREET  
MIDDLETOWN, CT 06457

PROJECT TITLE:  
**REPLACEMENT OF TILLOTSON ROAD BRIDGE OVER THOMPSON BROOK**

PROJECT NO.:  
0000-0000  
DRAWING NO.:  
PMT-07  
SHEET NO.:

ENVIRONMENTAL PERMIT PLANS  
PLAN DATE: SEPTEMBER 23, 2023

AREA RESERVED FOR FUTURE BALL FIELDS NOT SUBJECT TO STATE EASEMENT PER MAP REFERENCE 'A'

TOWN OF AVON  
199 MADOLE STREET  
MIDDLETOWN, CT 06457

PROJECT TITLE:  
**REPLACEMENT OF TILLOTSON ROAD BRIDGE OVER THOMPSON BROOK**

PROJECT NO.:  
0000-0000  
DRAWING NO.:  
PMT-07  
SHEET NO.:

ENVIRONMENTAL PERMIT PLANS  
PLAN DATE: SEPTEMBER 23, 2023

AREA RESERVED FOR FUTURE BALL FIELDS NOT SUBJECT TO STATE EASEMENT PER MAP REFERENCE 'A'

TOWN OF AVON  
199 MADOLE STREET  
MIDDLETOWN, CT 06457

PROJECT TITLE:  
**REPLACEMENT OF TILLOTSON ROAD BRIDGE OVER THOMPSON BROOK**

PROJECT NO.:  
0000-0000  
DRAWING NO.:  
PMT-07  
SHEET NO.:

ENVIRONMENTAL PERMIT PLANS  
PLAN DATE: SEPTEMBER 23, 2023

AREA RESERVED FOR FUTURE BALL FIELDS NOT SUBJECT TO STATE EASEMENT PER MAP REFERENCE 'A'

TOWN OF AVON  
199 MADOLE STREET  
MIDDLETOWN, CT 06457

PROJECT TITLE:  
**REPLACEMENT OF TILLOTSON ROAD BRIDGE OVER THOMPSON BROOK**

PROJECT NO.:  
0000-0000  
DRAWING NO.:  
PMT-07  
SHEET NO.:

ENVIRONMENTAL PERMIT PLANS  
PLAN DATE: SEPTEMBER 23, 2023

AREA RESERVED FOR FUTURE BALL FIELDS NOT SUBJECT TO STATE EASEMENT PER MAP REFERENCE 'A'

TOWN OF AVON  
199 MADOLE STREET  
MIDDLETOWN, CT 06457

PROJECT TITLE:  
**REPLACEMENT OF TILLOTSON ROAD BRIDGE OVER THOMPSON BROOK**

PROJECT NO.:  
0000-0000  
DRAWING NO.:  
PMT-07  
SHEET NO.:

ENVIRONMENTAL PERMIT PLANS  
PLAN DATE: SEPTEMBER 23, 2023

AREA RESERVED FOR FUTURE BALL FIELDS NOT SUBJECT TO STATE EASEMENT PER MAP REFERENCE 'A'

TOWN OF AVON  
199 MADOLE STREET  
MIDDLETOWN, CT 06457

PROJECT TITLE:  
**REPLACEMENT OF TILLOTSON ROAD BRIDGE OVER THOMPSON BROOK**

PROJECT NO.:  
0000-0000  
DRAWING NO.:  
PMT-07  
SHEET NO.:

ENVIRONMENTAL PERMIT PLANS  
PLAN DATE: SEPTEMBER 23, 2023

AREA RESERVED FOR FUTURE BALL FIELDS NOT SUBJECT TO STATE EASEMENT PER MAP REFERENCE 'A'

TOWN OF AVON  
199 MADOLE STREET  
MIDDLETOWN, CT 06457

PROJECT TITLE:  
**REPLACEMENT OF TILLOTSON ROAD BRIDGE OVER THOMPSON BROOK**

PROJECT NO.:  
0000-0000  
DRAWING NO.:  
PMT-07  
SHEET NO.:

ENVIRONMENTAL PERMIT PLANS  
PLAN DATE: SEPTEMBER 23, 2023

AREA RESERVED FOR FUTURE BALL FIELDS NOT SUBJECT TO STATE EASEMENT PER MAP REFERENCE 'A'

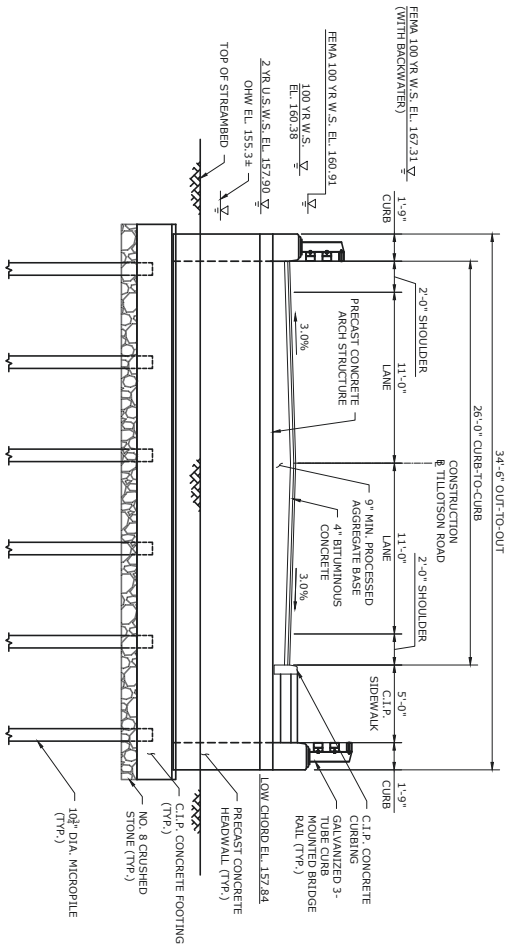
TOWN OF AVON  
199 MADOLE STREET  
MIDDLETOWN, CT 06457

PROJECT TITLE:  
**REPLACEMENT OF TILLOTSON ROAD BRIDGE OVER THOMPSON BROOK**

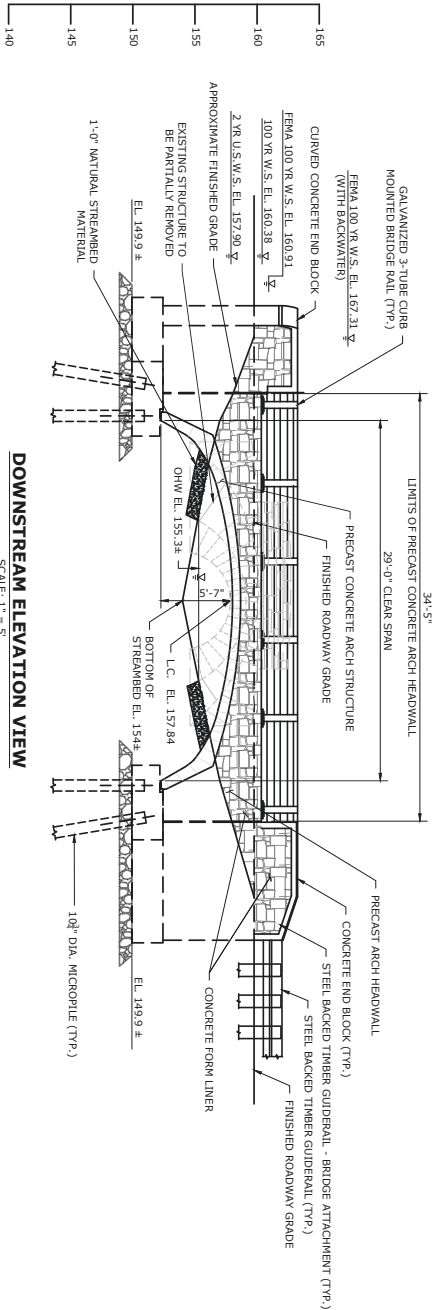
PROJECT NO.:  
0000-0000  
DRAWING NO.:  
PMT-07  
SHEET NO.:

ENVIRONMENTAL PERMIT PLANS  
PLAN DATE: SEPTEMBER 23, 2023

HYDRAULIC DATA SUMMARY	
DRAINAGE AREA (SQUARE MILES)	4.32
DESIGN FREQUENCY (YEARS)	100
DESIGN DISCHARGE (CFS)	1,080
DESIGN WATER SURFACE ELEVATION - U.S. (FT)	160.38
FEMA DESIGN DISCHARGE (CFS)	840
FEMA DESIGN WATER SURFACE ELEVATION (FT)	160.91
FEMA DESIGN WATER SURFACE ELEVATION - WITH BACKWATER (FT)	167.31
MAXIMUM SCOUR DEPTH (FT)	6.86
FREQUENCY (YEARS)	10
WORST CAST SCOUR SUBSTRUCTURE UNIT	SOUTH ABUTMENT



**TYPICAL BRIDGE SECTION**  
SCALE: 1/4" = 1'-0"



**DOWNSTREAM ELEVATION VIEW**  
SCALE: 1" = 5'

THE INFORMATION, INCLUDING BUT NOT LIMITED TO, THE DESIGN, CALCULATIONS, AND SPECIFICATIONS, IS BASED ON THE INFORMATION PROVIDED BY THE CLIENT AND IS NOT TO BE USED FOR ANY OTHER PROJECTS WITHOUT THE WRITTEN CONSENT OF THE ENGINEER. THE ENGINEER SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS IN THE INFORMATION PROVIDED BY THE CLIENT.	REVISIONS:	SHEET NO.	PROJECT NO.
CHECKED BY:	DATE:	TOWN OF AVON	PROJECT TITLE:
SCALE AS NOTED	REVISION DESCRIPTION:	TOWN OF AVON	REPLACEMENT OF TILLOTSON ROAD BRIDGE OVER THOMPSON BROOK
DRAWING TITLE:	PROJECT NO.:	TOWN OF AVON	ENVIRONMENTAL PERMIT PLANS
BRIDGE ELEVATION AND SECTION	PLAN DATE: SEPTEMBER 23, 2025	AVON	PLAN DATE: SEPTEMBER 23, 2025
PROJECT NO.:	PROJECT NO.:	0000-0000	PROJECT NO.:
DRAWING TITLE:	DRAWING TITLE:	PMT-08	DRAWING TITLE:
SHEET NO.:	SHEET NO.:	PMT-08	SHEET NO.:





## DEEP Fisheries Consultation Form

**To the Applicant** - Prior to the submission of your license application to the Connecticut Department of Energy & Environmental Protection (DEEP) Water Planning and Management Division (WPMD) or Land and Water Resources Division (LWRD) or Water Permitting and Enforcement Division (WPED), please complete Part I below and e-mail the following to [deep.inland.fisheries@ct.gov](mailto:deep.inland.fisheries@ct.gov):

1. this completed DEEP *Fisheries Consultation Form*;
2. a site location map,
3. a PDF version of the proposed project plans including a site survey of existing conditions (if available), and
4. photos of the site.

Fisheries Division staff will contact you if further details are needed. Once the Fisheries Division staff returns the completed form to you, please include the form, and any signed plans (if applicable) in your license application submittal to DEEP.

### Part I: Applicant and Site Information (to be completed by APPLICANT)

<b>1. Applicant/Registrant Information</b>		
Name: <u>Town of Avon Engineering</u>		
Mailing Address: <u>60 West Main Street</u>		
City/Town: <u>Avon</u>	State: <u>CT</u>	Zip Code: <u>06001-3719</u>
Business Phone: <u>8604094322</u>	Ext.: _____	
Contact Person: _____	Phone: _____	Ext: _____
E-mail Address: <u>LBaril@avonct.gov</u>		
<b>2. Engineer/Surveyor/Agent Information (list as applicable)</b>		
Name: <u>AI Engineers Inc.</u>		
Mailing Address: <u>919 Middle Street</u>		
City/Town: <u>Middletown</u>	State: <u>CT</u>	Zip Code: <u>06457</u>
Business Phone: <u>860-319-7938</u>	Ext.: _____	
Contact Person: <u>Michael Mastroluca, P.E.</u>	Phone: <u>860-319-7938</u>	Ext: _____
E-mail Address: <u>mmastroluca@aiengineers.com</u>		
Service Provided: <u>Permit preparation</u>		
<b>3. Site Location:</b>		
Name of Site: <u>Tillotson Road Bridge Replacement</u>		
Address of Site or Location Description: <u>75 Tillotson Road</u>		
City/Town: <u>Avon</u>	State: <u>CT</u>	Zip Code: <u>06001</u>
Parcel Location/Tax Assessor's Reference: Map _____	Block _____	Lot _____
Name of Stream or Waterbody: <u>Thompson Brook</u>		
<b>4. Activity:</b> Check the box best describing your activity: (check all that apply):		
<input type="checkbox"/> new public/fishing access;	<input type="checkbox"/> maintenance dredging	<input type="checkbox"/> work within LIS Blue Plan area
<input type="checkbox"/> new docks and marinas on tidal rivers;	<input type="checkbox"/> beach nourishment	<input type="checkbox"/> Other
<input type="checkbox"/> coastal/tidal dredging projects;	<input type="checkbox"/> cofferdam installation	
<input checked="" type="checkbox"/> activities in inland/non-tidal waterbodies and watercourses;	<input type="checkbox"/> conducting construction activity within a 100-foot buffer of a Cold Water Stream Habitat	
<input type="checkbox"/> withdrawal of water from a non-tidal/inland river, stream, pond or lake;		
<input type="checkbox"/> withdrawal of water from a wetland, marsh, swamp, or bog hydrologically connected to a non-tidal/inland river, stream, pond or lake;		
<input type="checkbox"/> withdrawal of groundwater from stratified drift deposits hydrologically connected to a non-tidal/inland river, stream, pond or lake.		
Note: Fisheries consultation is <b>not required</b> for docks and marinas on Long Island Sound.		

**Part I: Applicant and Site Information (to be completed by APPLICANT) (continued)**

5. **DEEP Pre-application Contact:** Indicate name of permit analyst or engineer, if applicable.  
\_\_\_\_\_

6. **Project Description:** Provide or attach a brief, but thorough, description of the project including any measures to protect, enhance or restore fish populations:

The project involves the replacement of Bridge No. 04015 over the Thompson Brook in the Town of Avon. The existing bridge was constructed in 1925 and consists of one ten-foot long simple span bridge supported by stone masonry abutments (stone arch). There are two ponds, one located upstream and one downstream of the existing bridge. The existing bridge will be replaced with a 25-foot clear span precast concrete arch structure founded on precast concrete footings that will be supported on drilled micro piles providing a natural bottom. The footings will be located behind the existing abutments so that in water work is minimized. The existing bridge along with cofferdams will be utilized during installation of the footings in order to maintain flow from the upstream pond to the downstream pond. The existing low chord will be maintained; however, the existing roadway will be raised to allow for the installation of a new sidewalk that will provide access to the Farmington Canal Trail that is proposed along Avon Old Farms Road.

**Part II: Fisheries Determination (To be completed by DEEP Fisheries Staff only)**

**To Fisheries Staff -** This completed consultation form is required to be submitted as part of an application to DEEP. The application has not yet been submitted to DEEP. Please review the enclosed materials and determine whether the project will significantly impact any fisheries or fisheries habitat. You may provide comments or recommendations regarding the proposal. Send this completed form to the applicant and copy the DEEP analyst, if known, or the applicable WPMD/LWRD/WPED Supervisor. If the proposed work **WILL** significantly impact any fisheries and/or habitat or if you have any comments or concerns regarding the regulatory review for this project, contact the DEEP analyst, if known, or the applicable WPMD/LWRD/WPED Supervisor.

**DEEP FISHERIES DIVISION DETERMINATION**

Date Consultation Form received: 10/07/2024

Please check applicable boxes and return the completed Consultation Form to the applicant:

- I have determined that the work described in Part I of this form and attachments **WILL NOT** significantly impact any fisheries and/or habitat;
- I have determined that the work described in Part I of this form and attachments **WILL NOT** significantly impact any fisheries and/or habitat **if the below Recommendations are followed**; and/or,
- I have determined that the work described in Part I of this form and attachments **WILL NOT** significantly impact any fisheries and/or habitat **if the design features shown on the attached plans are incorporated**. Fisheries staff to sign and date plans and return to the applicant with the completed Consultation Form.

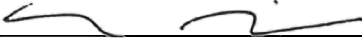
COMMENTS/RECOMMENDATIONS (or check here if these are attached following this page: ):

See attached

---

“By entering my name below, I agree that I am providing my legal signature, and am legally bound by the determination above.”

Type text here  
11/08/2024



Signature of Fisheries Division Staff

Date

Andrew Miano

Fisheries Biologist

Print Name of Fisheries Division Staff

Title

## DEEP Fisheries Determination Attachment

**Bridge Number: 04015**

**Tillotson Road Over Thompson Brook**

**Avon, Connecticut**

### **Fisheries Resources:**

This section of Thompson Brook is designated coldwater habitat and supports a diverse fish community including Brown Trout, Brook Trout, Bluegill Sunfish, Blacknose Dace, Chain Pickerel, Creek Chub, Common Shiner, Fallfish, Largemouth Bass, Pumpkinseed, Redbreast Sunfish, Tessellated Darter, and White Sucker. Additionally, Thompson Brook and its tributaries support Slimy Sculpin, a species of Special Concern (SC) in Connecticut. The current bridge structure provides unrestricted fish passage but appears to be undersized. Instream habitat upriver and downriver of the bridge consists of primarily pool habitat, due to a downriver dam with silt, sand, cobble, and boulder substrates.

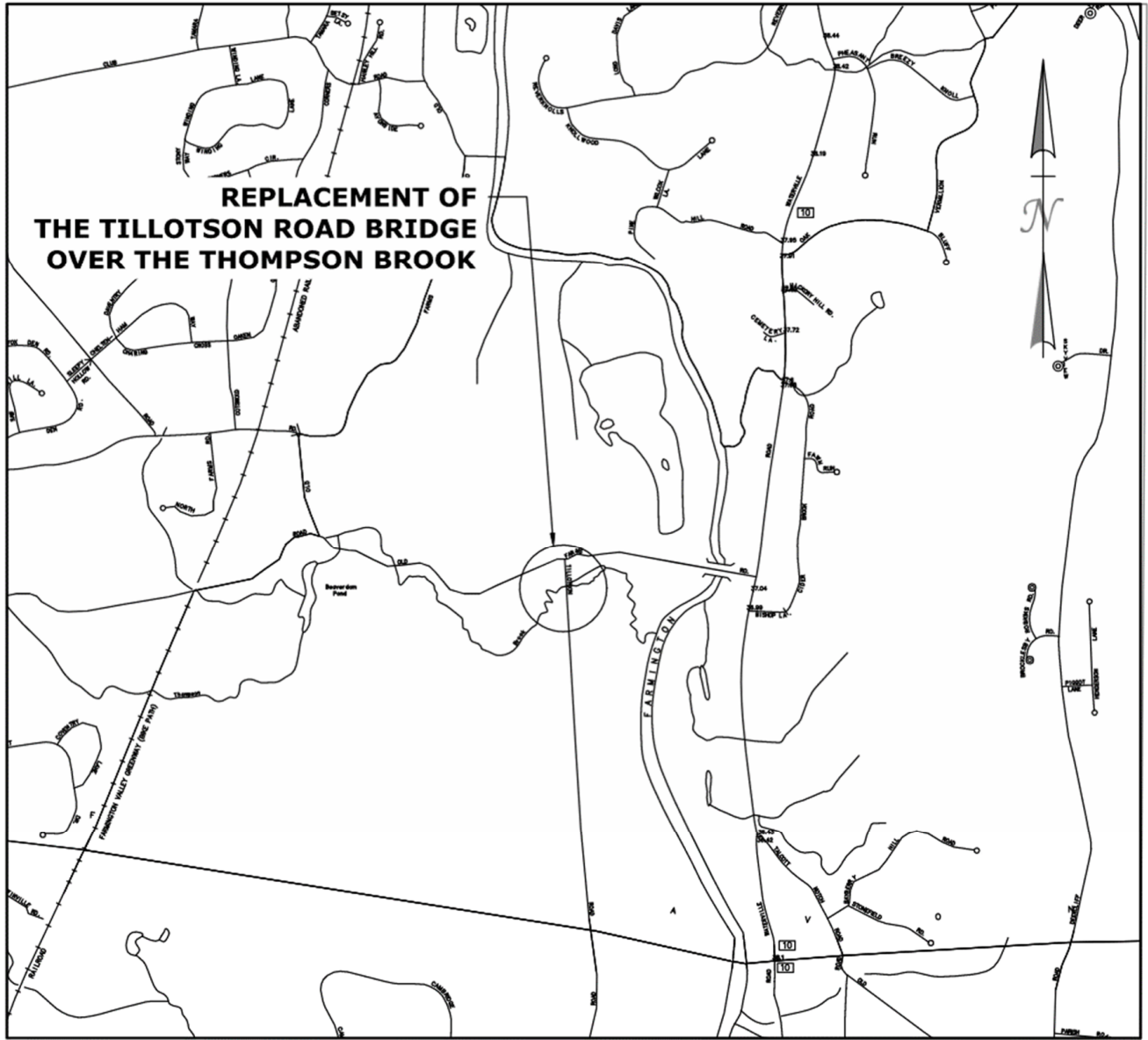
Thompson Brook is an important tributary of the Farmington River, which supports diadromous American Eel, Alewife, Blueback Herring, American Shad, and Sea Lamprey. The Fisheries Division has increased focus on restoring diadromous fish to the Farmington River and its tributaries, including Thompson Brook.

### **Comments/Recommendations:**

1. Unconfined in-water work should be restricted to the period from July 1 through September 30, inclusive.
2. Proper erosion and sedimentation controls should be installed and maintained throughout the duration of this project. Additionally, all disturbed areas should be stabilized and restored with native vegetation after completion of the project.
3. This project is within ¼ mile of the Farmington River, therefore the applicant should contact the Wild and Scenic Committee for potential further review by emailing project details to Liz Lacy at [liz\\_lacy@nps.gov](mailto:liz_lacy@nps.gov).
4. The dam <600 ft downriver of this project, Farms Road Pond Dam (#416), is blocking approximately 1 mile of upriver river habitat to the Beaver Dam Pond (#409). The applicant should consider if the removal of the Farms Road Pond Dam could be incorporated into this project. The removal of the Farms Road Pond Dam would have numerous benefits to Thompson Brook and the Farmington watersheds including:
  - Restoring 1 mile of high-quality stream habitat for important diadromous fish, particularly American Eel and Sea Lamprey.
  - Restoring connectivity to the Farmington River for inland fish species.
  - Increasing the amount of available habitat for coldwater species, including wild trout and the state listed Slimy Sculpin (SC).
  - Increasing water quality by eliminating the ponded section of the brook. Restoring this ponded area to a natural stream system would increase water quality by:
    - Reducing temperatures by reducing sunlight exposure and water residence time.
    - Increasing dissolved oxygen by increasing stream velocities and water turbulence.
    - Reducing the potential for harmful algal blooms.

CC. Matt Goclowski, Supervising Fisheries Biologist, DEEP Fisheries Division

**REPLACEMENT OF  
THE TILLOTSON ROAD BRIDGE  
OVER THE THOMPSON BROOK**



**PROJECT LOCATION PLAN**

NOT TO SCALE

June 16, 2025

Lawrence Baril, P.E., GISP  
Town of Avon Engineering  
60 West Main Street  
Avon, CT 06001-3719  
(sent via email only to [lbaril@avonct.gov](mailto:lbaril@avonct.gov))

Subject: Revised Finding  
Replacement of Bridge No. 004015  
Tillotson Road over Thompson Brook  
Avon, Connecticut

Dear Mr. Baril:

The State Historic Preservation Office (SHPO) previously reviewed the referenced project and commented in a letter dated December 2, 2024. Since that time, SHPO staff visited the project area to better understand the existing conditions. During that visit, armoring rip rap and fill deposits were noted, as well as areas of scour. These observations provided evidence that most, if not all, of the project area has been significantly disturbed or consists of fill deposits. As SHPO stated in our previous correspondence, the project area is considered archeologically sensitive, but it is unlikely intact archeological resources are located in the project areas because of prior activities. Based on this additional information, it is SHPO's opinion that no historic properties will be affected by the proposed bridge replacement. However, should the project boundaries change to include a larger area, we request additional consultation.

SHPO appreciates the opportunity to review and comment upon this project. This letter supersedes all prior communications. All comments are provided in accordance with the Connecticut Environmental Policy Act and Section 106 of the National Historic Preservation Act. Do not hesitate to contact Catherine Labadia, Deputy State Historic Preservation Officer and Staff Archaeologist, for additional information at (860) 500-2329 or [catherine.labadia@ct.gov](mailto:catherine.labadia@ct.gov).

Sincerely,



Jonathan Kinney  
State Historic Preservation Officer



9/3/2025

Michael Mastroluca  
AI ENGINEERS, INC.  
919 MIDDLE ST  
MIDDLETOWN, CT 06457  
mmastroluca@aiengineers.com

Subject: 3572

Filing #: 118446

NDDB - New Determination Number: 202410132

Expiration Date: 9/3/2027

Location Description: Replacement of Bridge No. 04015 over Thompson Brook with In-Water Work Located at 75 Tillotson Road in Avon, Connecticut

I have re-reviewed Natural Diversity Data Base (NDDB) maps and files regarding this project. According to our records, the following State-listed species (RCSA Sec. 26-306) are documented within or nearby the project area.

### **Protection for State-listed Animals**

The following animal species are known from this area:

- Savannah sparrow (*Passerculus sandwichensis*) State Special Concern
- Eastern meadowlark (*Sturnella magna*) State Threatened
- Eastern box turtle (*Terrapene carolina carolina*) State Special Concern
- Eastern pondmussel (*Ligumia nasuta*) State Special Concern
- Eastern pearlshell (*Margaritifera margaritifera*) State Special Concern
- Slimy sculpin (*Cottus cognatus*) State Special Concern

### **Grassland Birds**

- Savannah sparrow (*Passerculus sandwichensis*) State Special Concern
- Eastern meadowlark (*Sturnella magna*) State Threatened

The continuing decline of suitable grassland habitats is a major threat to our state listed grassland bird species. The decline is exacerbated by the intense development pressure on grassland habitat due to its accessibility. Many grassland species require expansive tracts of grassland mosaics that may include mowed areas, meadows of tall grasses and wildflowers that function best if kept in 30-acre parcels. **If work is confined to fall and winter the NDDB Program does not anticipate adverse impacts to grassland**

**birds. If work must occur during the grassland bird nesting times take precautions to be sure no staging or activities are designed to occur in grassland areas.**

## **Eastern Box Turtle Protection**

The NDDDB Program received a final report Habitat Assessment and recommended Species Protection Measures: Eastern Box Turtle Replacement of Bridge No. 04015 over Thompson Brook with In-Water Work 75 Tillotson Road Avon, Connecticut prepared by Dennis P Quinn of Quinn Ecological, LLC and dated August 25, 2025. The primary goal of the mitigation plan is to avoid inadvertent injury/mortality of turtles that may be dispersing through the area over the course of their spring to fall active season. A second goal is to prevent the establishment of conditions along the roadway that will attract turtles to nest, exposing both adults and hatchlings to road mortality.

The Quinn Ecological, LLC report is accepted by the NDDDB Program, and all species and habitat mitigation and protection protocols are accepted and are expected to be implemented as described in the report. The protection and mitigation measures will minimize impacts to species during the design phase, construction and post construction activities of this project. The implementation of the Quinn Ecological, LLC requirements of the protection plan to prevent impacts to the state listed species will minimize impacts of the eastern box turtle population known from this area. **A qualified herpetologist, one with extensive conservation experience with Eastern Box Turtle, such as Quinn Ecological, LLC must oversee the implementation of the turtle Protection Plan.** The protection and mitigation requirements, as described in the Quinn report include:

**Requirement #1: Avoid important habitat, within or outside, of the primary construction zone by locating appropriate staging areas for the project:** It is anticipated that equipment, materials, and fill will be staged along the immediate roadway and shoulder areas due to the necessity of road closure for the project. However, once a location(s) for staging has been identified by the contractor, the site(s) should be reviewed by the project herpetologist to determine if there is a need to conduct sweeps for any of the target species. Beyond the scope of the project construction easement, the agricultural land surrounding the project site should be avoided to the greatest extent possible. If these areas are required to be used for staging, an appropriate exclusionary barrier will need to be installed. If the agricultural field is proposed for staging, the location and extent should be coordinated and reviewed by the project herpetologist.

**Requirement #2: Identify areas requiring the installation of exclusionary fencing and appropriately install the fencing:** Exclusionary fencing at least 20 inches in height (above ground level) should be installed at the limits of disturbance within the construction zone. The fencing should be staked (12 inches into the ground) at appropriate distances to maintain rigidity (6-10 feet intervals), and the fencing buried at least 4 inches into the ground and backfilled.

Standard erosion control/silt fencing (geotextile) can be used, but not fencing with a wider nylon mesh lining, which can entangle snakes (WI DNR 2015). The terminus of each length of fencing should be angled back away from the road to divert animals moving along the exterior of the fence back into undisturbed habitat to discourage them from moving around the fence. **Installation of each length of fence should be coordinated with the project herpetologist to determine the best angle and placement depending upon the location, topography, and surrounding habitat.** In general, a “J-hook” loop design with an interior width of no more than 18 inches and return length of fencing of approximately 10 feet should be used (see Figure 3 in the Quinn Report).

The exclusionary fencing must be tied into the cofferdam to prevent turtles from accessing the work area in the river from the embankments. Figure 4, in the Quinn Report illustrates approximate locations for exclusionary fencing. **The exact location and layout of the fencing will be determined in coordination with the consulting herpetologist at the time of installation.**

Exclusionary fencing may also be required to be installed around other staging areas for the project, depending upon their location and the habitat present. **The project herpetologist should be consulted to review the selected areas.**

Installation of the exclusionary fencing must be completed by April 15th to prevent turtles from entering the construction zone. If installation is delayed, additional steps to survey for, and relocate any individuals within the construction zone may be required. If so, a qualified herpetologist must conduct surveys of the construction zone and relocate any reptiles encountered to appropriate habitat outside of the construction zone, and within a distance representative of the species' typical home range based on published studies.

The sweeps must be conducted on the same day that the construction activity is occurring, and the herpetologist should work directly with the contractors mowing or clearing areas to guide these activities based on the type and density of vegetation.

**Construction Phase** The focus of protection strategies during the construction phase of the project center around maintaining the integrity of the exclusion fencing and conducting sweeps to relocate any individual turtles to appropriate habitat outside of the construction area. Turtles have evolved a reproductive life history that depends upon high survivorship in the adult stage. Loss of individuals, especially adult females, can contribute to local population declines.

**Requirement #3: Inform construction personnel on what to do if they encounter any reptile or amphibian species:** An informal "construction team meeting" should be convened in the field to provide information on box turtles, including, identification, and what to do if any individuals are encountered. This will also be an opportunity to summarize the components and goals of the protection plan for the work crew. It is also important to stress to construction personnel that any turtles encountered should not be removed. Not infrequently, turtles encountered by individuals are taken from the wild and brought home as pets. Collection of wild turtles can be a significant contributing factor in population declines.

The information session should be presented by a qualified herpetologist and coordinated with the construction project manager.

**Requirement #4: Conduct regular monitoring of the exclusionary fencing.** It is important to monitor the integrity of the exclusion fencing on a regular basis to ensure that animals cannot enter active construction areas. This is especially important during the turtle nesting season when females are actively moving around seeking appropriate sites in which to deposit their eggs. The exclusionary fencing should be inspected by the project herpetologist weekly from May 15th -July 15th and biweekly between July 16-October 15. Installation of exclusionary fencing within or adjacent to habitats sometimes results in individuals encountered moving along the exterior of the fence and being directed linearly along the fence for some distance (Quinn pers. obs.). This can expose them to predation. Thus, it is important that a qualified herpetologist conduct the inspections, as they are capable of capturing, and relocating any individuals encountered to appropriate habitat within the area that would fall within the species' typical home range, yet safely away from the project. The environmental monitor is responsible for daily silt fence checks to ensure damaged silt fence is immediately repaired. This is especially true following any heavy rain events or windstorms and it is imperative that the fencing be inspected within 24 hours, and any necessary repairs made. These events often lead to fencing being pulled away from stakes, and branches falling on the fence creating gaps.

**Requirement #5: Conduct sweeps of any areas to be cleared, or where heavy machinery will be in use throughout the duration of the project:** Prior to clearing any areas, including any temporary staging areas, a qualified herpetologist should conduct visual sweeps to capture and relocate any animals that may be encountered. Post-construction Restoration Phase The focus of mitigation strategies during the post-construction phase of the project is on restoration of areas disturbed during the project, including any staging

areas, as well as the removal of the exclusionary fencing.

**Requirement #6: Restore disturbed areas in a manner that avoids impacts to surrounding habitat or individual animals:** All open areas with bare, or sparsely vegetated soil that remain in the construction zone should be seeded and/or planted. A conservation seed mix that utilizes natural species should be used to avoid the spread of non-native, invasive plants into surrounding habitat. Because of the location of disturbances along a roadway, it is important to eliminate any potential areas that may attract turtles to nest. Consultation with the project herpetologist is recommended in reviewing these areas of disturbance during the restoration phase of the project.

**Requirement #7: Remove all exclusionary fencing:** At the completion of the project, and once areas of disturbance are stabilized, the exclusionary fencing should be removed from all areas, including the staging areas, to avoid impeding the dispersal of animals.

**Requirement #8: CTDEEP NDDB Compliance Reporting:**

1. Following completion of the construction project, a summary report to the CTDEEP documenting the monitoring and maintenance of the exclusionary fence and erosion control measures will be completed.
2. Any observations of state listed species will be reported to CTDEEP by the Herpetologist with photo documentation (if possible) and with specific information on the location and disposition of the animal. Any data collected by construction personnel should be immediately sent to the Herpetologist for reporting purposes. GPS coordinates in decimal degrees should be collected where the listed species was encountered.

**Freshwater mussels**

Eastern pondmussel (*Ligumia nasuta*) State Special Concern

Eastern pearlshell (*Margaritifera margaritifera*) State Special Concern

The NDDB Program received a report [Freshwater Mussel and Survey in Thompson Brook for the Tillotson Road Bridge Project \(Avon, CT\)](#) developed by Ethan Nadeau of Biodrawiversity and dated August 25, 2025. The report documented the presence of *Margaritifera margaritifera* (Eastern pearlshell) in an area that may be impacted by this project.

The [Mussel Management Plan](#) and relocation of State Listed Mussel is accepted by the NDDB Program to reduce and mitigate for impacts to the State Listed mussel species. The Mussel Management Plan includes the following protection and mitigation actions:

**MUSSEL MANAGEMENT PLAN**

**Initial Mussel Survey:** A freshwater mussel survey was conducted on June 19, 2025, to assist with the planning and permitting for the Tillotson Road Bridge replacement. The survey documented very low numbers of eastern pondmussel in an area of Thompson Brook that would be affected by the proposed project, along with moderate densities of eastern elliptio. During the survey, biologists also identified a

suitable relocation site approximately 170 meters downstream from the bridge.

**Recommendations:** We recommend standard best management practices to reduce streambed and riparian disturbance to the greatest extent possible and reduce the potential for turbidity/sedimentation. The proposed ters and cofferdams will isolate the work area. We recommend a pre-construction mussel sweep to collect and relocate eastern pondmussels. Due to anticipated low numbers of salvaged mussels, we do not recommend tagging or post-relocation monitoring.

### **Pre-Construction Mussel Relocation**

- For mussel relocation, this plan recommends a survey area that includes all areas of direct impacts plus a 25-meter upstream buffer and 25-meter downstream buffer.
- Within three weeks prior to construction, biologists will collect and relocate all state-listed and uncommon mussels from the survey area.
- Biologists will conduct visual searches for mussels while snorkeling.
- Mussels will be gathered and held underwater in mesh bags during the collection process.
- Mussels will be transported to the relocation site identified in the survey report and placed carefully into the substrate.
- A written report will summarize results of the pre-construction mussel relocation. It will include a map of the survey area showing where target species were collected and relocated, and provide shell length measurements, shell condition, habitat, and photographs of relocated mussels.

### **Schedule**

- Pre-Construction Mussel Relocation: This should be completed within three weeks prior to construction, within the time period from early May to early October. The construction schedule has not yet been determined. The level of effort is one day for one biologist.
- Reporting: A report will be submitted to the client within three weeks of the fieldwork. Contractors will comply with other permit conditions specified by the CTDEEP

### **State Listed Fish**

Slimy sculpin (*Cottus cognatus*) State Special Concern

Please be advised that a DEEP Fisheries Biologist will review the permit applications you may submit to DEEP regulatory programs to determine if your project could adversely impact slimy sculpin. DEEP Fisheries Biologists are routinely involved in pre-application consultations with regulatory staff and applicants in order to identify potential fisheries issues and work with applicants to mitigate negative effects, including to endangered species. If you have not already talked with a Fisheries Biologist about your project, you may contact the Permit Analyst assigned to process your application for further information, including the contact information for the Fisheries Biologist assigned to review your application. The consultation form can be found here: [Fisheries Consultation Form \(ct.gov\)](#)

Instructions for submitting your survey information or other additional reporting requirements can be found at the end of this letter.

Your submission information indicates that your project requires a state permit, license, registration, or authorization, or utilizes state funding or involves state agency action. This NDDDB - New determination may be utilized to fulfill the Endangered and Threatened Species requirements for state-issued permit applications, licenses, registration submissions, and authorizations.

Please be aware of the following limitations and conditions:

Natural Diversity Database information includes all information regarding listed species available to us at the time of the request. This information is a compilation of data collected over the years by the Department of Energy and Environmental Protection's Natural History Survey and cooperating units of DEEP, land owners, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as enhance existing data. Such new information is incorporated into the Database and accessed through the ezFile portal as it becomes available. New information may result in additional review, and new or modified restrictions or conditions may be necessary to remain in compliance with certain state permits.

- During your work listed species may be encountered on site. A report must be submitted by the observer to the Natural Diversity Database promptly and additional review and restrictions or conditions may be necessary to remain in compliance with certain state permits. Please fill out the [appropriate survey form](#) and follow the instructions for submittal.
- Your project involves the state permit application process or other state involvement, including state funding or state agency actions; please note that consultations with your permit analyst or the agency may result in additional requirements. In this situation, additional evaluation of the proposal by the DEEP Wildlife Division may be necessary and additional information, including but not limited to species-specific site surveys, may be required. Any additional review may result in specific restrictions or conditions relating to listed species that may be found at or in the vicinity of the site.
- If your project involves preparing an Environmental Impact Assessment, this NDDDB consultation and determination should not be substituted for biological field surveys assessing on-site habitat and species presence.
- The NDDDB - New determination for the 3572 as described in the submitted information and summarized at the end of this document is valid until 9/3/2027. This determination applies only to the project as described in the submission and summarized at the end of this letter. Please re-submit an updated Request for Review if the project's scope of work and/or timeframe changes, including if work has not begun by 9/3/2027.

Additional reporting requirements indicated above have been requested. Include the Project Name 3572 and Determination Number 202410132 on all correspondence. Please note that, as stated above, survey data indicating the presence of listed species not described in this letter may necessitate additional review and restrictions or conditions. Forward additional reporting requirements to each of the following two addresses:

1. Dawn.McKay@ct.gov
2. deep.nddbrequest@ct.gov

If you have further questions, please contact me at the following:

Dawn McKay  
CT DEEP Bureau of Natural Resources  
Wildlife Division

Natural Diversity Database  
79 Elm Street  
Hartford, CT 06106-5127  
(860) 424-3592  
Dawn.McKay@ct.gov

Please reference the Determination Number 202410132 when you e-mail or write. Thank you for consulting the Natural Diversity Data Base.

Dawn McKay  
Wildlife Division- Natural Diversity Data Base  
79 Elm Street  
Hartford, CT 06106-5127  
(860) 424-3592  
Dawn.McKay@ct.gov

Application Details:

Project involves federal funds or federal permit:	Yes
Project involves state funds, state agency action, or relates to CEPA request:	Yes
Project requires state permit, license, registration, or authorization:	Yes
DEEP enforcement action related to project:	
Project Type:	
Project Sub-type:	New Bridge Including Upland and In-water work
Project Name:	3572
Project Description:	