

TABLE OF CONTENTS OF SPECIAL PROVISIONS

Note: This Table of Contents has been prepared for the convenience of those using this contract with the sole express purpose of locating quickly the information contained herein; and no claims shall arise due to omissions, additions, deletions, etc., as this Table of Contents shall not be considered part of the contract.

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AUGUST 27, 2025
FEDERAL AID PROJECT NO. 0842(327)
STATE PROJECT NO. 0151-0340

(REMOVAL OF I-84 EASTBOUND EXIT 21 OFF-RAMP)

City of Waterbury

The State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 819, dated 2024, as revised by the Supplemental Specifications dated January 2025 (otherwise referred to collectively as "ConnDOT Form 819") is hereby made part of this contract, as modified by the Special Provisions contained herein. The current edition of the State of Connecticut Department of Transportation's "Construction Contract Bidding and Award Manual" ("Manual"), is hereby made part of this contract. If the provisions of this Manual conflict with provisions of other Department documents (not including statutes or regulations), the provisions of the Manual will govern. The Special Provisions relate in particular to the REMOVAL OF I-84 EASTBOUND EXIT 21 OFF-RAMP in the Town of Waterbury.

**CONTRACT TIME AND LIQUIDATED DAMAGES INCLUDING
MILESTONE LIQUIDATED DAMAGES AND MILESTONE INCENTIVE**

In order to minimize the hazard, cost and inconvenience to the traveling public and pollution of the environment, it is necessary to limit the time of construction work, which interferes with traffic as specified in Article 1.08.04 of the Special Provisions.

There will be two assessments for liquidated damages and they will be addressed in the following manner:

1. For this contract, an assessment per day for liquidated damages, at a rate of Two Thousand Four Hundred (2,400) Dollars per day shall be applied to each calendar day the work runs in excess of the Six Hundred Sixty Three (663) allowed calendar days for the contract.
2. For this contract, an assessment per hour for liquidated damages shall be applied to each hour, or any portion thereof, in which the Contractor interferes with normal traffic operations during the restricted hours given in Article 1.08.04 of the Special Provisions. The liquidated damages shall be as shown in the following tables

entitled “Liquidated Damages Per Hour” for each hour, or any portion thereof, in which the Contractor interferes with normal traffic operations during the restricted hours.

For the purpose of administering this contract, normal traffic operations are considered interfered with when:

- a. Any portion of the travel lanes or shoulders is occupied by any personnel, equipment, materials, or supplies including signs.
- b. The transition between the planes of pavement surfaces is at a rate of one inch in less than fifteen feet longitudinally.

LIQUIDATED DAMAGES PER HOUR

PROJECT 0151-0340

Route: I-84 EASTBOUND From M.P. 32.3 to M.P. 33.0 3 Lane Section				
If Working Periods Extends Into	A.M. 1 Lane Closure	A.M. 2 Lane Closure	P.M. 1 Lane Closure	P.M. 2 Lane Closure
1 st Hour of Restrictive Period	\$500	\$2,000	\$500	\$50,000
2nd Hour of Restrictive Period	\$500	\$25,000	\$500	\$100,000
3rd Hour or any Subsequent Hour of Restrictive Period	\$500	\$60,000	\$12,000	\$100,000

The above liquidated damages apply to those hours shown on the Limitation of Operations charts designated with a “0”, “S”, “1” or “2”.

The above liquidated damages shall be applied when the actual number of lanes closed exceeds the number of lanes allowed to be closed, as dictated in the Limitation of Operations Chart.

If all available shoulder widths or gore areas are not available to traffic for each hour designated with a “0” on the Limitation of Operations Charts, then liquidated damages of \$500 shall apply for each hour, or part thereof.

Limitation of Operations Chart – Maximum Number of Lanes Allowed to be Closed and Hours Allowed for a Rolling Roadblock (RRB)

Route: I-84 Eastbound (Waterbury) M.P. 32.3 to M.P. 33.0 (from on-ramp from Rt 8 SB to Exit 23 [To Rt 69]) Number of Through Lanes: 3							
Hour Beginn -ing	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Mid	2*	2*	2*	2*	2*	2*	2*
1 AM	2*	2*	2*	2*	2*	2*	2*
2 AM	2*	2*	2*	2*	2*	2*	2*
3 AM	2*	2*	2*	2*	2*	2*	2*
4 AM	2*	2*	2*	2*	2*	2*	2*
5 AM	2	2	2	2	2	2*	2*
6 AM	0	0	0	0	0	1	1
7 AM	0	0	0	0	0	1	1
8 AM	0	0	0	0	0	S	S
9 AM	S	S	S	S	S	S	S
10 AM	S	S	S	S	S	S	S
11 AM	S	S	S	S	S	S	S
Noon	S	S	S	S	S	S	S
1 PM	S	S	S	S	S	S	S
2 PM	S	S	S	S	S	S	S
3 PM	0	0	0	0	0	S	S
4 PM	0	0	0	0	0	S	S
5 PM	0	0	0	0	0	S	S
6 PM	S	S	S	S	S	S	S
7 PM	1	1	1	S	S	1	1
8 PM	1	1	1	1	1	1	1
9 PM	2*	2*	2*	2	2	2	2
10 PM	2*	2*	2*	2*	2*	2*	2*
11 PM	2*	2*	2*	2*	2*	2*	2*

On Legal Holidays and within Legal Holiday Periods, all hours shall be ‘0.’

“0” = No closures allowed = all available travel lanes, including exit only lanes, climbing lanes, gore areas, and all available shoulder widths shall be open to traffic during this time period.

“S” = Shoulders are allowed to be closed = all available travel lanes, including exit only lanes, climbing lanes, and gore areas shall be open to traffic during this time period.

“1” = One lane closure is allowed. Adjacent shoulder(s) and/or gore areas may also be closed.

“2” = Two lane closure is allowed. Adjacent shoulder(s) and/or gore areas may also be closed.

“*” = The hours that a rolling roadblock may be implemented with the approval of the Engineer.

NOTICE TO CONTRACTOR – RECENT REVISIONS

The Contractor is hereby notified that the following Traffic Engineering Special Provisions have been revised:

Section 1.07 – Legal Relations and Responsibilities

- Updated service entrance inspection requirements.

Section 10.00 – General Clauses for Highway Illumination and Traffic Signal Projects

- Added email information for digital PDF files
- Updated as-built plan requirements
- Added testing for video detection

1015034A – Grounding and Bonding

- Revised method of measurement and basis of payment

1107011A – Accessible Pedestrian Signal and Detector (Type A)

- Revised construction methods to include warranty and provisions of manuals
- Revised materials to include Bluetooth connection

1108110A – Traffic Signal Controller

- Added language to install and program an Advanced Transportation Controller (ATC)

1112286A – 360 Degree Camera Assembly

- Included the section for 360 Degree System Fiber Optic Cable
- Revised functional requirements to include capability for detecting wrong way vehicles

1118012A – Removal and/or Relocation of Traffic Signal Equipment

- Added line indicating salvage of State-owned traffic signal equipment shall be coordinated with District Electrical Maintenance (for permits only)
- Existing pedestals and span poles will not be salvaged anymore
- Added additional items in salvage materials table

The Contractor is hereby notified that the following Traffic Engineering Special Provisions have been newly added:

1017019A – Wireless Radio Assembly

1017109A – Service Disconnect Switch

1108208A – Install State Furnished Cellular Modem

1112205A – Radar Detector

1113179A – 360 Degree System Fiber Optic Cable

The Contractor is hereby notified that the following Traffic Engineering Guide sheets are included:

The Contractor is hereby notified that the following Traffic Engineering Standard sheets have been revised and uploaded to the CTDOT website:

TR_1001_01 – Trenching and Backfilling

TR_1002_01 – Traffic Control Foundations

TR_1010_01 – Concrete Handhole

The Contractor is hereby notified that the following Traffic Engineering items are now covered under the Standard Specifications (Form 819)

1008908 – Clean Existing Conduit

1010060 – Clean Existing Concrete Handhole

NOTICE TO CONTRACTOR – CONSTRUCTION SIGNS

The Contractor shall furnish, install, and maintain Bipartisan Infrastructure Law project signs for the duration of the Contract. The Contractor shall also remove the signs upon completion of the work under the project. A special provision for these signs has been added to the Contract for Item No. 1220027A - Construction Signs.

NOTICE TO CONTRACTOR – MANDATED USE OF AASHTOWARE PROJECT CONSTRUCTION MANAGEMENT SOFTWARE (CONSTRUCTION)

The Contractor shall use *AASHTOWare Project*® software as outlined in the specifications noted below. This will require that the Contractor and all subcontractor(s) designate and dedicate staff within 10 days after the execution of the Contract or approval to sublet as appropriate. It will also require the Contractor and all subcontractors to provide internet access, computing devices suitable for this work, training, and other related work as outlined in the specifications noted below.

All costs for these requirements shall be included in the general cost of the work.

The following special provisions are pertinent to, and detail the requirements for, this work:

SECTION 1.05 - CONTROL OF THE WORK

Article 1.05.12 – Payrolls

This Article outlines the requirements for submission of payrolls.

Article 1.05.25 –Use of AASHTOWare Project® Software

This Article outlines the overall requirements for the use of the AASHTOWare Project® Software.

SECTION 1.08 – PROSECUTION AND PROGRESS

Article 1.08.01—Transfer of Work or Contract

This Article outlines the requirements for subcontractor payment and payment verifications.

NOTICE TO CONTRACTOR – EXISTING IMS

The Contractor is herein made aware of existing Incident Management System (IMS) conduit and appurtenances located in the area of the intersection of SR 847 (South Main Street), Market Square, and McMahon Street (Intersection No. 151-256), and the intersection of Meadow Street and Field Street. The Contractor will be responsible for maintaining the existing conduits throughout the duration of the project.

The Contractor will be responsible for locating, verifying the location of, and protecting all IMS below and above the ground. Prior to the start of construction, the Contractor shall contact Call Before You Dig (CBYD) by calling 811 and all utilities within the City of Waterbury. The Contractor shall also contact Zoltan Rigo (Zoltan.Rigo@ct.gov) of CTDOT Highway Operations to mark out IMS conduit and appurtenances.

Any damage caused to the IMS conduit/equipment will be the responsibility of the Contractor and will be replaced by the Contractor at the Contractor's expense, as directed by the Engineer. Mark-out of the IMS will not relieve the Contractor of responsibility for repair of damage caused by the Contractor or the Contractor's sub-contractors.

**NOTICE TO CONTRACTOR – GLOBAL POSITIONING SYSTEM (GPS)
COORDINATES FOR SIGNS**

The Contractor shall obtain and provide to the Engineer sign installation data, including Global Positioning System (GPS) latitude and longitude coordinates, for all new State owned and maintained signs. The Engineer shall forward the sign data to the Division of Traffic Engineering for upload into the Highway Sign Inventory and Maintenance Management Program (SIMS). Sign data submissions or questions relating to SIMS or GPS shall be sent to DOT-SignInventory@ct.gov. Refer to the special provision for Section 12.00 General Clauses For Highway Signing.

NOTICE TO CONTRACTOR – MAST ARM DESIGN REQUIREMENTS

Limitations and requirements for the pole, arm, bolt circle diameters, and use of vibration mitigation devices are as follows:

Arm Length (S)			Maximum Diameter of Pole at Base, See Note 2	Maximum Diameter of Arm at Base, See Note 2	Anchor Rod Circle Diameter	Vibration Mitigation Device, See Note 1
	S	≤ 40 ft.	18"	18"	diameter of pole at base plus 6" +/- 1"	Not Permitted
40 ft. <	S	≤ 50 ft.	19"	19"		Required
50 ft. <	S	≤ 60 ft.	20"	20"		Required
60 ft. <	S	≤ 70 ft.	21"	21"		Required

Notes:

1. Mast arm assemblies shall be designed for Fatigue Category I for the wind load effects due to galloping, natural wind gusts and truck-induced gusts, except when vibration mitigation devices as used. Mast arm assemblies with vibration mitigation devices shall be designed for the following fatigue design loads and fatigue categories:

Fatigue Design Load	Fatigue Category
Galloping	II
Natural Wind Gust	I
Truck-induced Gust	I

2. The diameter of the arm at the arm/pole connection shall be no less than the diameter of the pole at the connection and no greater than the diameter of the pole at the base.

The diameter of the drilled shaft foundation shall be 3.0 feet for mast arms with pole diameters at the base less than or equal to 18 inches and 4.0 feet otherwise, unless otherwise noted on the plans.

See Special Provisions for “XX’ Steel Mast Arm Assembly”, “XX’ Steel Combination Mast Arm Assembly”, “Traffic Control Foundation – Mast Arm” and Contract Plans for additional design requirements for steel mast arm assemblies and foundations.

NOTICE TO CONTRACTOR – STEEL SPAN POLE SPAN WIRE AND MAST ARM SUBMITTAL PACKAGE

The Contractor shall submit a complete working drawing and calculation submittal for Steel Span Pole, Span Wire and Mast Arm in accordance with the requirements specified in the Contract documents. It is imperative the calculation submittal include all the design information outlined in the Contract documents to facilitate an efficient and timely review of the submittal. Non-compliance with the submittal requirements risk delaying the completion of the submittal review.

NOTICE TO CONTRACTOR - PRE-BID QUESTIONS AND ANSWERS

Questions pertaining to DOT advertised construction projects must be presented through the CTDOT Pre-Bid Q and A Website. The Department cannot guarantee that all questions will be answered prior to the bid date. **PLEASE NOTE - at 9:00 am Monday (i.e. typical Wednesday Bid Opening) the project(s) being bid will be closed for questions, at which time questions can no longer be submitted through the Q and A Website.**

Answers may be provided by the Department up to 12:00 noon, the day before the bid. At this time, the Q and A for those projects will be considered final, unless otherwise stated and/or the bid is postponed to a future date and time to allow for further questions and answers to be posted.

If a question needs to be asked the day before the bid date, please contact the Contracts Unit staff and email your question to dotcontracts@ct.gov immediately.

Contractors must identify their company name, contact person, contact email address and phone number when asking a question. The email address and phone number will not be made public.

The questions and answers (if any) located on the Q and A Website are hereby made part of the bid/contract solicitation documents (located on the State Contracting Portal), and resulting contract for the subject project(s). It is the bidder's responsibility to monitor, review, and become familiar with the questions and answers, as with all bid requirements and contract documents, prior to bidding. By signing the bid proposal and resulting contract, the bidder acknowledges receipt of, and agrees to the incorporation of the final list of Q and A, into the contract document.

Contractors will not be permitted to file a future claim based on lack of receipt, or knowledge of the questions and answers associated with a project. All bidding requirements and project information, including but not limited to contract plans, specifications, addenda, Q and A, Notice to Contractors, etc., are made public on the State Contracting Portal and/or the CTDOT website.

NOTICE TO CONTRACTOR – SITE NUMBERS

The Contractor is hereby notified that the below table shows the Site No. and corresponding Intersections as part of this contract:

Site No.	Intersection No. State / City	Description
1	151-XXX / #051	Bank Street at West Liberty Street, Waterbury
2	151-278 / #049	Meadow Street at Bank Street and Plaza Drive, Waterbury
3	151-XXX / #050	Meadow Street at I-84 Eastbound On-Ramp
4	151-XXX / #048	Meadow Street at Field Street
5	151-236 / #16A/B	S.R. 847 (Grand Street/Meadow Street) at Meadow Street, Freight Street, and Private Drive
6	151-229 / #20	South Main Street at West Liberty Street and East Liberty Street
7	151-212 / #019	S.R. 847 (South Main Street) at South Elm Street, East Clay Street, and West Clay Street
8	151-256 / #023	S.R. 847 (South Main Street) at I-84 EB Exit 22 Off-Ramp, Market Square, and McMahon Street

NOTICE TO CONTRACTOR - TRAFFIC SIGNALS

The Contractor is hereby notified that certain conditions pertaining to the installation of new signals and maintenance of traffic signal operations are required when relevant, as part of this contract.

Qualified/Unqualified Workers

U.S. Department of Labor

Occupational Safety & Health Administration (OSHA) www.osha.gov

Part Number 1910

Part Title Occupational Safety & Health Administration

Subpart S

Subpart Title Electrical

Standard Number 1910.333

Title Selection and use of work practices

Completion of this project will require Contractor employees to be near overhead utility lines. All workers and their activities when near utility lines shall comply with the above OSHA regulations. In general, unqualified workers are not allowed within 10 feet of overhead, energized lines. It is the contractor's responsibility to ensure that workers in this area are qualified in accordance with OSHA regulations.

The electric distribution company is responsible to provide and install all necessary anchors and guy strands on utility poles. It is the Contractors responsibility to coordinate with the utility company to ensure proper placement of the anchor.

**For utility poles owned and maintained by Frontier Communications:
Frontier will be responsible to provide and install the pole anchor. The installation of the guy wire will be the responsibility of the Contractor and should follow Frontier specifications.**

The Controller Unit (CU) shall conform to the current edition of the Functional Specifications for Traffic Control Equipment. The Functional Specifications require the CU meet NEMA Standard Publication No. TS2-1992 Type 2. The Functional Specifications are available on the Departments' web site <http://www.ct.gov/dot/site/default.asp>, click on "Doing Business with CONNDOT", under Engineering Resources click on "Traffic Engineering", Scroll down to Traffic Documents click on "Functional_Specifications_for_Traffic_Control_Equip.pdf".

Utility poles cannot be double loaded without proper guying.

The contractor will be held liable for all damage to existing equipment resulting from his or his subcontractor's actions. A credit will be deducted from monies due the Contractor for all maintenance calls responded to by Department of Transportation personnel.

All existing traffic appurtenances, in particular steel span poles, controller cabinets and pedestals shall be removed from the proposed roadway prior to excavation. The Contractor shall work with the utility companies to either relocate or install all traffic signal appurtenances prior to the roadway reconstruction.

The Contractor must install permanent or temporary spans in conjunction with utility company relocations. He then must either install the new signal equipment and controller or relocate the existing equipment.

The 30 Day Test on traffic control equipment, as specified in Section 10.00, Article 10.00.10 - Tests: Preliminary and Final, will not begin until the items listed below are delivered to the City of Waterbury.

Three (3) paper prints and one electronic PDF file sent to Roy Cavanaugh – City of Waterbury Engineer at rcavanaugh@waterburyct.org of cabinet wiring diagrams. Leave one set in the controller cabinet.

All spare load switches and flash relays.

NOTICE TO CONTRACTOR – TRAFFIC SIGNAL POLYCARBONATE

The Contractor is hereby notified that the following Traffic Engineering Items and Special Provisions have been newly added:

ITEM #1105415A—1 WAY, 3 SECTION TRAFFIC SIGNAL Polycarbonate

ITEM #1105416A—1 WAY, 4 SECTION TRAFFIC SIGNAL Polycarbonate

ITEM #1105417A—1 WAY, 5 SECTION TRAFFIC SIGNAL Polycarbonate

These pay items are to be used on span, mast arm, pole, or pedestal mounted applications as shown on the contract signal plans and includes all necessary hardware.

Examples of payment method:

- If the contract signal plan calls for 2 Way, 3 Section Traffic Signal Head, 2 pay items of ITEM #1105415A—1 WAY, 3 SECTION TRAFFIC SIGNAL Polycarbonate would be utilized.
- If the contract signal plan calls for a 5 Section (doghouse) Traffic Signal Head, 1 pay item of ITEM #1105417A—1 WAY, 5 SECTION TRAFFIC SIGNAL Polycarbonate is utilized.

NOTICE TO CONTRACTOR - CDMS SUBMITTALS

Upon execution of the Contract, the Contractor acknowledges and agrees that contractual submittals for this Project shall be submitted and handled through the Department's Construction Document Management System (CDMS). The CDMS that the Department is currently using is COMPASS.

Contractor submittals including Shop Drawings, Working Drawings, Product Data, RFIs, and RFCs shall be generated and delivered by the Contractor in accordance with the Department's [Contractor's User Manual](#). The administering District office will inform the Contractor of other deliverables required to be similarly submitted.

Access credentials will be provided free of charge to the Contractor.

The Department shall not be held responsible for delays, lack of processing or responses to submittals that do not follow the specified guidelines in the Contractor's User Manual.

NOTICE TO CONTRACTOR - PROTECTION OF EXISTING BUILDINGS AND PROPERTY

The Contractor's attention is directed to the need for the protection of the existing property, Saint Anne Roman Catholic Church, located at 515 South Main Street Waterbury, CT 06706. Protection includes, but is not limited to, the stone wall and iron fencing, not to be damaged by construction activities.

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 property caused directly or indirectly by the operations of the contractor.

Any damage to any existing property shall be repaired including all materials, labor, etc., to the Engineer's and/or respective property owners satisfaction at no cost to the Owner, City of Waterbury, State of Connecticut, or it's representative.

Refer to Section 1.10 ENVIRONMENTAL COMPLIANCE - Article 1.10.06 – Protection of Archaeological and Paleontological Remains and Materials included within the contract specifications.

NOTICE TO CONTRACTOR - WORK ON RAILROAD PROPERTY

The Contractor acknowledges that some of the work to be accomplished under this Contract is to be performed on Railroad territory, which consists of territory operated by Metro-North Commuter Railroad (Railroad). The Contractor's work must be accomplished simultaneously with ongoing daily railroad operations. Such operations include, but are not limited to, the passage of trains, storage of trains, flagging, inspection, repair, construction, reconstruction, and maintenance of the railroad right-of-way and facilities.

The Contractor is advised that the Railroad controls **all activity** in their respective right-of-way, and the Department expects that these conditions may cause delays and possibly a complete suspension of construction activity. If the Contractor is delayed or suspended in the completion of the work by railroad operations, the Contractor will be entitled to a time extension for every day that they can demonstrate that the delays affected the completion date of the Contract. This extension of time will be considered non-compensable. The Contractor will not be entitled to any additional compensation for damages incurred for all direct and indirect costs including, but not limited to, all delay and impact costs, and inefficiencies because of railroad operational delays. For delays the Contractor attributes to railroad operations, the Contractor shall notify the Engineer and the Railroad, within two days following the occurrence, of their intent to claim time for each delay. The actual claim filing shall be as per Section 1.11.

Additionally, the Contractor is advised, that this Contract contains periods reserved exclusively for work that must be performed by the Railroad and the Contractor will not be allowed on the tracks or to interfere with Railroad while that work is conducted. The Railroad shall notify the Engineer upon completion of their work and the Engineer shall notify the Contractor when work may resume.

The Contractor shall be responsible for the coordination of the work of their various subcontractors. The Contractor shall coordinate their operations with those of the Railroad in carrying out railroad force account work.

The Contractor's employees, and the employees of all subcontractors, who will be entering the jobsite within railroad territory, must undergo the on-line Railroad Safety Training Program. The Contractor is responsible for ensuring that all employees on the jobsite have been trained. No additional compensation will be allowed to the Contractor for employees' time for taking this training. Refer to the special provisions and to Article 1.05.06 entitled "Cooperation with Utilities (Including Railroads)."

The Contractor must make their own arrangements with the Railroad for the use of railroad equipment or changes in railroad facilities made solely to facilitate the Contractor's operations. The expense incurred by making such arrangements shall not be a part of this Contract.

Contractors who have worked directly for the Railroad and have outstanding railroad service charges from previous projects must discharge that indebtedness prior to starting work on this

Project, or the Railroad will not allow the Contractor onto railroad property. Requests for time extension(s) for any delay to the Contractor's operations caused by the Contractor's indebtedness to the Railroad will be denied.

All matters requiring Railroad Company approval or coordination shall be directed to:

Mr. David Willard
Deputy Director – Structures Engineering
Metro-North Railroad Company
525 Water Street, 3rd Floor
Bridgeport, CT 06604

GENERAL INSURANCE INFORMATION FOR THE NEW HAVEN LINE:

For the purpose of complying with Section 1.03, the following information is provided:

Normal speed of passenger trains is **30 mph** in the area of the work.

In the WATERBURY area, there are in a 24 hour weekday period:

(22) Scheduled Metro-North Passenger Trains
(4) Extra Trains

There are occasional Freight Trains in the area of work, the contractor shall coordinate with the Department for a schedule of freight trains.

NOTICE TO CONTRACTOR - FEDERAL WAGE DETERMINATIONS (Davis Bacon Act)

The following Federal Wage Determinations are applicable to this Federal- Aid contract and are hereby incorporated by reference. During the bid advertisement period, it is the bidder's responsibility to obtain the latest Federal wage rates from the US Department of Labor website, as may be revised 10 days prior to bid opening. Any revisions posted 10 days prior to the bid opening shall be the wage determinations assigned to this contract.

Check Applicable WD# (DOT Use Only)	WD#	Construction Type	Counties
x	CT1	Highway	Fairfield, Litchfield, Middlesex, New Haven, Tolland, Windham
	CT2	Highway	New London
	CT3	Highway	Hartford
	CT5	Heavy Dredging (Hopper Dredging)	Fairfield, Middlesex, New Haven, New London
	CT6	Heavy Dredging	Statewide
	CT13	Heavy	Fairfield
	CT14	Heavy	Hartford
	CT15	Heavy	Middlesex, Tolland
	CT16	Heavy	New Haven
	CT17	Heavy	New London
	CT26	Heavy	Litchfield, Windham
	CT18	Building	Litchfield
	CT19	Building	Windham
	CT20	Building	Fairfield
	CT21	Building	Hartford
	CT22	Building	Middlesex
	CT23	Building	New Haven
	CT24	Building	New London
	CT25	Building	Tolland
	CT4	Residential	Litchfield, Windham
	CT7	Residential	Fairfield
	CT8	Residential	Hartford
	CT9	Residential	Middlesex
	CT10	Residential	New Haven
	CT11	Residential	New London
	CT12	Residential	Tolland

The Federal wage rates (Davis-Bacon Act) applicable to this Contract shall be the Federal wage rates that are current on the US Department of Labor website ([SAM.gov | Wage Determinations](https://sam.gov)) as may be revised 10 days prior to bid opening. The Department will no longer physically include revised Federal wage rates in the bid documents or as part of addenda documents. These applicable Federal wage rates will be incorporated in the final contract document executed by both parties.

If a conflict exists between the Federal and State wage rates, the higher rate shall govern.

To obtain the latest Federal wage rates, go to the US Department of Labor website (link above). Under Davis-Bacon Act, choose "Selecting DBA WDs" and follow the instruction to search the latest wage rates for the State, County and Construction Type.

NOTICE TO CONTRACTOR – EVERSOURCE METERED SERVICE

The Contractor is hereby notified that all service installations in Eversource territory will require the installation of an electric meter, unless otherwise noted on the plan(s). Any fees for service materials and equipment that are to be furnished and installed by Eversource shall be confirmed by the contractor and included in the price for item #1017032A – SERVICE (METERED). Refer to the special provision for pertinent details.

NOTICE TO CONTRACTOR – TREE CLEARING

The Contractor is hereby given notice that installation of sedimentation controls and tree clearing work under this Contract shall commence as soon as practicable on or after the Notice to Proceed and must be completed by April 15. No trimming, cutting or removal of trees with a 3" DBH or greater shall be allowed from April 15 to October 31.

NOTICE TO CONTRACTOR – HAZARDOUS MATERIALS INVESTIGATIONS

A limited hazardous materials site investigation has been conducted for the removal of the I-84 EB Exit 21 off-ramp in Waterbury, Connecticut, which included Bridge 03191F, Bridge No. 03196 (lighting improvements only) and traffic signals and pedestrian control equipment at all the Traffic Signal Intersections detailed in the provided 0151-0340 scope. The scope of the inspections was limited to the representative components projected for impact.

Results of the survey identified no detectable levels of lead on the painted structural steel/metal bridge components on the underside of Bridge No. 03191F; therefore, any paint waste generated would be considered non-hazardous, non-RCRA waste. However, lead paint was identified on the metal railing bridge components on Bridge No. 03191F. The projected paint waste debris from the painted metal railing bridge components are presently presumed as CTDEEP/RCRA hazardous lead waste.

Lead paint is **presently presumed** on various metal traffic components (i.e. traffic signals themselves, crosswalk hoods, crosswalk push buttons, span poles, controller cabinets, etc.) at all the listed Traffic Signal Intersections. Any paint waste generated from the lead painted metal traffic components at the Intersection Sites should be tested for TCLP lead to determine proper waste disposal (hazardous vs. non-hazardous). All span poles at the Intersection Sites were found to be galvanized (unpainted) with the exception of one span pole at Intersection No. 151-212.

Traffic lights, crosswalk hoods/connectors, crosswalk push buttons, controller cabinets, span poles, etc. with identified or presumed lead painted surfaces shall be removed in a manner so as to not impact the lead paint (i.e., unbolt, cut non-painted surfaces, etc.) and to not generate lead paint waste. If lead paint waste from those components is generated it shall be tested via TCLP (lead) for waste disposal characterization.

All steel and metal generated from work tasks (painted or not) shall be segregated and recycled as scrap metal at a scrap metal recycling facility. The recycling of scrap metal (regardless of lead paint concentration) is exempt from USEPA RCRA and CTDEEP Hazardous Waste Regulation.

Suspect white caulking (C2) around the base of metal railing posts on Bridge 03191F was sampled and found to contain asbestos. All other suspect caulking and bridge/sidewalk expansion joint materials/fillers at Bridge 03191F and the Intersection Sites were sampled and found to contain no detectable amounts of asbestos.

Potential universal waste (UW) and Connecticut Regulated Waste (CRW) items (i.e. Hg lamps/PCB ballasts and/or printed circuit boards) associated with the lighting on I-84 EB Exit 21 off-ramp/Bridge 03191F, lighting under Bridge No. 03196 and traffic lights, crosswalk signal hoods/buttons and controller cabinets at the Intersections are present at the Sites.

Bird/pigeon guano accumulations were identified/presumed on abutments, piers, and structural steel components at Bridge Nos. 03191F and 03196.

No homeless activity/bloodborne pathogen (BBP) concerns (i.e. needles, sharps, biohaz waste, etc.) were identified at any of the locations.

The Contractor is hereby notified that these hazardous materials requiring special management or disposal procedures will be encountered during various construction activities conducted within the project limits. The Contractor will be required to implement appropriate health and safety measures for all construction activities impacting these materials. These measures shall include, but are not limited to, air monitoring, engineering controls, personal protective equipment and decontamination, equipment decontamination and personnel training. **WORKER HEALTH AND SAFETY PROTOCOLS WHICH ADDRESS POTENTIAL AND/OR ACTUAL RISK OF EXPOSURE TO SITE SPECIFIC HAZARDS ARE SOLELY THE RESPONSIBILITY OF THE CONTRACTOR.**

The Department, as Generator, will provide an authorized representative to sign all manifests and waste profile documentation required by disposal facilities for disposal of hazardous materials.

The Sections which shall be reviewed by the Contractor include, but are not limited to, the following:

- Item No. 0020765A – Guano Abatement
- Item No. 0020801A – Asbestos Abatement
- Item No. 0020903A – Lead Compliance for Miscellaneous Exterior Tasks
- Item No. 0101143A – Handling and Disposal of Regulated Items

The Contractor shall review any lead paint requirements within the Contract documents.

The Contractor is alerted to the fact that a Department environmental consultant may be on site for abatement and related activities, to collect environmental samples (if necessary), and to observe site conditions for the State.

Information pertaining to the results of the limited hazardous materials investigation discussed can be found in the document listed below. This document shall be available for review electronically.

- HazMat Inspection – Removal of I-84 EB Exit 21 Off-Ramp, Waterbury, CT, TRC, March 24, 2025

NOTICE TO CONTRACTOR - QUALITY CONTROL PROGRAM

ITEM #0969055A - CONTRACTOR QUALITY CONTROL MANAGER AND QUALITY CONTROL PROGRAM LEVEL 1

This Contract includes the above-noted pay item and special provision for Contractor QC Manager and QC Program, developed to supplement Article 1.05.03 of the standard specifications.

A minimum lump sum bid amount is included within the special provision.

The Contractor must be aware that the special provision requires that the Quality Control Manager (QCM) be proposed to the Department within thirty (30) days after Contract Award and that the written QC Program be submitted to the Department within forty-five (45) days after Contract Award.

The Contractor must also be aware of the staffing, inspection, reporting and all other requirements of the special provision.

NOTICE TO CONTRACTOR - ELECTRONIC ENGINEERING DATA (EED)

The EED is an assembly of engineering data files that were used to produce the Contract plans.

Electronic Engineering Data (EED) is provided for information purposes only. In case of conflict between the EED and the Contract plans and specifications, the contract plans and specifications shall govern. The EED has been reviewed by the Department for quality control purposes, but it is the Contractor's responsibility to build the Project per the contract plans and specifications.

The EED is being provided to the Engineer for GPS/RTS inspection. The Contractor may use the EED to assist in bidding, layout, and Automated Machine Control/Guidance.

The EED includes geospatially correct 2D CAD files and may include horizontal and vertical alignment data files, 3D surface model files (break-line features and triangles) and a preference file. The data is being provided in one of the MicroStation versions, consisting of native and converted formats:

MicroStation CONNECT (OpenRoads)

- Native Format
 - Bentley CONNECT MicroStation CAD files (dgn – contains CAD graphics, OpenRoads alignments and terrain models)

For a complete list of EED files, see the EED file manifest (PDF) located in the EED_0151-0340.zip file (0151-0340 is the project number) which is posted with the contract PS&E's on the State Contracting portal. The EED zip file can also be found in the project COMPASS page in the *Contract Documents/100_Contract_Plans (PDF)* folder.

NOTICE TO CONTRACTOR - RAILROAD SPECIFICATIONS

The contractor is hereby notified that all railroad specifications contained elsewhere herein shall be made a part of this contract, and that the contractor shall be bound to comply with all requirements of such specifications. The requirements and conditions set forth in the subject specifications shall be binding on the contractor just as any other specification would be.

NOTICE TO CONTRACTOR - RIGHTS OF WAY RESTRICTIONS

The Contractor is hereby advised that at the time of advertising for bids not all the property may be acquired by the State, certain residences and/or business establishments had not been vacated, and asbestos removal by others from buildings to be disposed of had not been completed. A complete listing of the affected properties and the anticipated dates that they will become available is hereinafter provided. The Contractor is further advised that limitations, as enumerated herein below, are imposed which may interfere with the physical construction of the project. Following are statements which will set forth the restrictions on the right of entrance to property and conditions governing construction of the project.

1) The Contractor shall not occupy properties that are unacquired, perform any work thereon, or inhibit access thereto until the properties have been acquired and right of possession has been obtained. If the Contractor is allowed to proceed with the physical construction of the project, no action will be taken that will result in unnecessary inconvenience such as the discontinuance of utilities, the prevention of ingress and egress to the property, or will result in disproportionate injury or any action coercive in nature to occupants of residences (businesses, farms, or non-profit organization) who have not yet moved from the right-of-way.

2) It should be anticipated that each of the properties listed herein may be considered to have an effect upon construction operations.

3) The Contractor shall be aware that extensions of time will be granted, if necessary, for delays in construction operations caused by continued occupancy of residences, properties being unacquired or asbestos abatement concluding beyond the estimated time period.

The following is a complete listing of properties which have not been acquired, vacated and asbestos abated as of July 16, 2025 with the anticipated dates such properties will be acquired and/or vacated and abated.

Serial No.	Type	Name	Title Estimate	Location
001	Easement	Wesvest, Inc.	2/10/26	Between Stations 301+46 and 302+80 Left of Baseline
002	Easement	Home Depot U.S.A., Inc.	2/10/26	Between Stations 310+37 and 311+22 Right of Baseline, Stations 302+30 and 302+81 Right of Baseline, Stations 90+24 and 98+46 Left of Baseline
003	Easement	Riverbank Christian Worship Center, Inc.	2/10/26	Between Stations 90+20 and 93+31 Right of Baseline
004	Easement	Consolidated Rail Corporation	2/10/26	Between Stations 93+31 and 94+05 Right of Baseline
005	Easement	698 South Main Street Inc.	2/10/26	Between Stations 94+05 and 98+47 Right of Baseline
006	Easement	Enco Environmental Contracting & Demolition, LLC	10/31/25	Between Stations 98+86 and 99+86 Left of Baseline
008	Easement	Sanky Properties et al	11/28/25	Between Stations 99+26 and 99+66 Right of Baseline
009	Easement	Gawa Enterprises, LLC	11/28/25	Between Stations 99+66 and 100+06 Right of Baseline
010	Easement	Hipolito Loja Morocho et al	11/28/25	Between Stations 99+86 and 100+37 Left of Baseline
011	Easement	City of Waterbury	11/28/25	Between Stations 100+06 and 100+45 Right of Baseline
012	Easement	22 Jewelry LLC	11/28/25	Between Stations 100+45 and 100+74 Right of Baseline
014	Easement	Ronald H Grant	10/31/25	Between Stations 100+85 and 101+22 Right of Baseline
015	Easement	Stephen Parkosewich	10/31/25	Between Stations 101+22 and 101+61 Right of Baseline
016	Easement	Punima Harrynarine et al	11/28/25	Between Stations 101+61 and 101+99 Right of Baseline
018	Easement	Elvin Rodriguez	11/28/25	Between Stations 102+54 and 103+27 Left of Baseline
019	Partial Take/ Easement	594 South Main Street Associates, LLC	11/28/25	Between Stations 102+78 and 104+27 Right of Baseline
021	Easement	St. Vincent Depaul Mission of Waterbury, Inc.	10/31/25	Between Stations 10+79 and 11+73 Right of Baseline and Stations 105+23 and 106+50 Right of Baseline

023	Partial Taking/Easement	St. Vincent Depaul Mission of Waterbury, Inc.	2/10/26	Between Stations 12+21 and 13+41 Right of Baseline and Stations 105+21 and 106+16 Left of Baseline
024	Easement	Billy Carvalho	11/28/25	Between Stations 103+17 and 104+27 Left of Baseline and Stations 12+47 and 13+07 Left of Baseline
025	Easement	546 South Main Street, LLC	10/31/25	Between Stations 13+07 and 13+97 Left of Baseline
026	Easement	Domenic Buonomo, Trustee of the Trust for Thomas DeLeon	10/31/25	Between Stations 13+97 and 14+87 Left of Baseline
027	Easement	Lucky Dog Properties, LLC	10/31/25	Between Stations 14+00 and 14+51 Right of Baseline
028	Partial Taking	ALCP Holdings LLC	2/10/26	Between Stations 16+29 and 16+88 Left of Baseline
029	Partial Taking/Easement	City of Waterbury	2/10/26	Between Stations 72+15 and 72+60 Left of Baseline and Stations 120+17 and 120+58 Right of Baseline
030	Partial Taking/Easement	City of Waterbury	2/10/26	Between Stations 18+74 and 22+83 Right of Baseline
031	Easement	Housing Authority of the City of Waterbury	2/10/26	Between Stations 19+13 and 13+33 Left of Baseline
032	Partial Taking/Easement	J.P. Jarjura and Sons, Co.	2/10/26	Between Stations 22+45 and 23+14 Left of Baseline
033	Easement	Waterbury Note LLC Et Al	2/10/26	Between Stations 311+22 and 312+02 Right of Baseline
034	Partial Take/Easement	Alliance Energy LLC	2/10/26	Between Stations 500+22 and 501+81 Left of Baseline
037	Easement	Webster Bank National Association	10/31/25	Between Stations 510+61 and 512+70 Left of Baseline
037A	Partial Take	Webster Bank National Association	2/10/26	Between Stations 512+75 and 514+25 Left of Baseline
038	Easement	American-Republican, Incorporated	11/28/25	Between Stations 522+07 and 525+22 Left of Baseline

NOTICE TO CONTRACTOR

NOTICE TO CONTRACTOR - Federal Rail Safety Regulations (49 C.F.R. Part 219) Concerning Alcohol and Drug Testing

On October 16, 2008, the United States Congress enacted the Rail Safety Improvement Act of 2008 (RSIA). RSIA directs the Federal Railroad Administration (FRA) to promulgate new safety regulations related to railroad safety. The purpose of this NTC is to notify you of certain requirements recently promulgated by the FRA that may be applicable to work you are currently performing, or may in the future perform, for the Connecticut Department of Transportation (Department).

On June 10, 2016, the FRA published a final rule expanding the scope of its drug and alcohol testing regulations (FRA Regulations) to provide that “[e]ach railroad must ensure that a regulated employee is subject to being selected for random testing... whenever the employee performs regulated service on the railroad’s behalf.” 49 C.F.R. § 219.601. A “regulated employee” includes a contractor to a railroad or any individual who is performing activities for a railroad and includes those contractors, consultants or individuals who are deemed “maintenance-of-way” employees under 49 C.F.R. Part 219 (See 49 C.F.R. §219.5).

The term maintenance-of-way (MOW) employee, as used in 49 C.F.R. Part 219, is defined in 49 C.F.R. § 214.7 as “any employee...of a contractor to a railroad, whose duties include inspection, construction, maintenance or repair of railroad track, bridges, roadway, signal and communications systems, electric traction systems, roadway facilities or roadway maintenance machinery on or near track or with the potential of fouling a track, and flagmen and watchmen/lookouts.” (collectively, MOW Activities).

The final rule, which is effective June 12, 2017, requires contractors and consultants employing MOW employees to submit a Part 219 Compliance Plan to FRA prior to the effective date. Please consult the following link to the model drug and alcohol plan prepared by the FRA for guidance.

<https://www.fra.dot.gov/eLib/details/L02814>

The final rule mandates, among other things, the establishment of a random testing pool to ensure a testing rate of 50% of MOW employees for drugs and 25% of MOW employees for alcohol on an annual basis. For more information related to the requirements, please refer to:

<http://www.ecfr.gov/cgi-bin/text-idx?rgn=div5&node=49:4.1.1.1.14>

Every contractor or consultant that is performing MOW Activities must comply with its obligations under 49 C.F.R. Part 219 to ensure that all MOW employees are being randomly tested for drugs and alcohol. Failure of a contractor or consultant to timely comply with the FRA Regulations may subject that firm to civil penalties. In addition, MetroNorth Railroad (MNR) has stated that contractors or consultants who do not comply with the FRA regulations will not be able to work on MNR property.

The Department strongly urges all contractors and consultants to consult with their attorneys and/or to conduct their own independent due diligence regarding the requirements imposed by the new FRA Regulations to determine what steps are necessary to assure compliance. The information provided herein is advisory in nature and is offered without warranty of any kind. The Department does not accept any responsibility or liability for the accuracy, content, completeness, legality, or reliability of the information contained herein.

Any questions regarding the FRA Regulations concerning drug and alcohol testing should be directed to: Mr. Gerald Powers, Drug and Alcohol Program Manager, Office of Safety Enforcement, Federal Railroad Administration, 1200 New Jersey Avenue SE, Mail Stop 25, Washington, DC 20590 or via telephone (202) 493-6313.

NOTICE TO CONTRACTOR - UTILITY GENERATED SCHEDULE

The attached project specific utility work schedules were provided to the Connecticut Department of Transportation (Department) by the utility companies regarding their identified work on this project.

The utility scheduling information is provided to assist the Contractor in scheduling its activities. However, the Department does not ensure its accuracy and Section 1.05.06 of the Standard Specifications still is in force.

The utility scheduling information shall be incorporated into the Contractor's pre-award schedule in accordance with the Department's Bidding and Award Manual and Section 1.05.08 of the Contract.

After award, the Contractor shall conduct a utility coordination meeting or meetings to obtain contemporaneous scheduling information from the utilities prior to submitting its baseline schedule to the Department in accordance with Section *(insert 1.05.08 or Project Coordinator here)* of the Contract.

The Contractor shall incorporate the contemporaneous utility scheduling information into its baseline schedule submittal. The baseline schedule shall include Contractor predecessor and successor activities to the utility work in such detail as acceptable to the Engineer.

UTILITY WORK SCHEDULE Rev 08 02 2016			
CTDOT Project Number: 151-0340		Town: Waterbury	
Project Description: I-84 Exit 21 removal			
CTDOT Utilities Engineer: Matteo Volanti			
Phone:		Email: mvolanti@blcompanies.com	
Utility Company: Frontier Communications			
Prepared By: Don Bialecki		Date Prepared: 7/18/2025	
Phone: 203-575-6114		Email: donald.s.bialecki@ftr.com	
Scope of Work			
The following is a description of all utility work planned to be completed in conjunction with the CTDOT project. The narrative describes all work to be carried out by the utility or its contractor, including temporary and permanent work required by the project as well as any additional utility infrastructure work the utility intends on performing within the project limits during the construction of the project.			
Frontier will shift our facilities at various locations within the project limits. Frontier will also need to excavate and swing over our underground cable going to relocated EVS pole #6021. This relocation work is permanent.			
Special Considerations and Constraints			
The following describes the limiting factors that must be planned for in the scheduling and performance of the utility work. For example, restrictions on cut-overs, outages, limitations on customer service interruptions (e.g. nights, weekends, holidays), seasonal and environmental shutdown periods, long lead material procurements, etc..			

UTILITY WORK SCHEDULE Rev 3/2015

CTDOT Project Number: 151-0340

Utility Company: Frontier Communications

Prepared By: _____ Total Working Days: 40

Schedule

The following schedule identifies each major activity of utility work in sequential order to be performed by the utility or its contractor. The location of each activity of work is identified by the baseline stationing on the CTDOT plans. All activities identify the predecessor activity which must be completed before a utility work activity may progress. The duration provided is the number of working days required to complete the utility work activity based on historical information and production rates.

Location (Station to Station)	Description of Utility Work Activity	Predecessor Activity	Duration (working days)
Entire project	Attend preconstruction meeting, order materials and schedule construction crew.	Receive NTP	25
Entire project	Shift Frontier facilities at various location.	EVS poles are set and all other utilities are shifted to new poles	10
Pole #6021 Meadow S	Frontier to excavate and swing over under ground cable to new EVS pole.	New EVS pole set	5

UTILITY WORK SCHEDULE Rev 3/2015

CTDOT Project Number: **State Project No. 0151**

Utility Company: **EVERSOURCE ELECTRIC**

Prepared By: **MARK BOVAT**

Total Working Days: **29**

Schedule

The following schedule identifies each major activity of utility work in sequential order to be performed by the utility or its contractor. The location of each activity of work is identified by the baseline stationing on the CTDOT plans. All activities identify the predecessor activity which must be completed before a utility work activity may progress. The duration provided is the number of working days required to complete the utility work activity based on historical information and production rates.

Location (Station to Station)	Description of Utility Work Activity	Predecessor Activity	Duration (working days)
P#1858	request switching / reclosing thru our S.O.C.	WHEN GRASS ISLAND IS IN PLACE	21
P#1858	SET NEW POLE#1858	when switching is approved by our S.O.C.	3
P#1858	FRAME NEW POLE, SHIFT CONDUCTORS, AND REMOVE OLD POLE	WHEN NEW POLE GETS SET	5
NA			
NA			
NA			
NA			
NA			

UTILITY WORK SCHEDULE Rev 3/2015			
CTDOT Project Number:	0151-0340	Town:	Waterbury
Project Description:	Exit 21 removal		
CTDOT Utilities Engineer:	Derek Brown		
Phone:	N/A	Email:	Derek.Brown@ct.gov
Utility Company:	EVERSOURCE ELECTRIC		
Prepared By:	MARK BOVAT	Date Prepared:	6/27/2025
Phone:	860-496-5234	Email:	mark.bovat@eversource.com
Scope of Work			
The following is a description of all utility work planned to be completed in conjunction with the CTDOT project. The narrative describes all work to be carried out by the utility or its contractor, including temporary and permanent work required by the project as well as any additional utility infrastructure work the utility intends on performing within the project limits during the construction of the project.			
Eversource to relocate P#3783, P#4151, P#9543 & P#13482 approximately 6'-9' to the east on S. Main St. for road widening			
Special Considerations and Constraints			
The following describes the limiting factors that must be planned for in the scheduling and performance of the utility work. For example, restrictions on cut-overs, outages, limitations on customer service interruptions (e.g. nights, weekends, holidays), seasonal and environmental shutdown periods, long lead material procurements, etc..			

UTILITY WORK SCHEDULE Rev 3/2015

CTDOT Project Number: **0151-0340**

Utility Company: **Evesource Electric**

Prepared By: **Mark Bovat**

Total Working Days: **20**

Schedule

The following schedule identifies each major activity of utility work in sequential order to be performed by the utility or its contractor. The location of each activity of work is identified by the baseline stationing on the CTDOT plans. All activities identify the predecessor activity which must be completed before a utility work activity may progress. The duration provided is the number of working days required to complete the utility work activity based on historical information and production rates.

Location (Station to Station)	Description of Utility Work Activity	Predecessor Activity	Duration (working days)
1	set p#3783 approximately 6' to the east	when we get the okay to start our work	2
2	set p#F4151 approximately 8.5' to the east	same	2
3	set p#9543 approximately 9' to the east	same	2
4	set p#13482 approximately 9' to the east	same	2
5	shift all conductors and equipment to new poles	when poles are set	12
NA			
NA			
NA			
NA			

UTILITY WORK SCHEDULE Rev 3/2015

CTDOT Project Number: 0151-0340

Utility Company: EVERSOURCE ELECTRIC

Prepared By: MARK BOVAT

Total Working Days: 30

Schedule

The following schedule identifies each major activity of utility work in sequential order to be performed by the utility or its contractor. The location of each activity of work is identified by the baseline stationing on the CTDOT plans. All activities identify the predecessor activity which must be completed before a utility work activity may progress. The duration provided is the number of working days required to complete the utility work activity based on historical information and production rates.

Location (Station to Station)	Description of Utility Work Activity	Predecessor Activity	Duration (working days)
P#F6021	request switching / reclosing thru our S.O.C.	When we get the ok to start work	21
P#F6021	SET NEW POLE#F6021	when switching is approved by our S.O.C.	3
P#F6021	FRAME NEW POLE and SHIFT CONDUCTORS	WHEN NEW POLE GETS SET	5
p#F6021	Remove old pole butt	when all other utilitys are attached to the new p#F6021	1
NA			
NA			
NA			
NA			
NA			

NOTICE TO CONTRACTOR - WORK ON RAILROAD PROPERTY

The Contractor acknowledges that some of the work to be accomplished under this Contract is to be performed on Railroad territory, which consists of territory operated by Metro-North Commuter Railroad (Railroad). The Contractor's work must be accomplished simultaneously with ongoing daily railroad operations. Such operations include, but are not limited to, the passage of trains, storage of trains, flagging, inspection, repair, construction, reconstruction, and maintenance of the railroad right-of-way and facilities.

The Contractor is advised that the Railroad controls **all activity** in their respective right-of-way, and the Department expects that these conditions may cause delays and possibly a complete suspension of construction activity. If the Contractor is delayed or suspended in the completion of the work by railroad operations, the Contractor will be entitled to a time extension for every day that they can demonstrate that the delays affected the completion date of the Contract. This extension of time will be considered non-compensable. The Contractor will not be entitled to any additional compensation for damages incurred for all direct and indirect costs including, but not limited to, all delay and impact costs, and inefficiencies because of railroad operational delays. For delays the Contractor attributes to railroad operations, the Contractor shall notify the Engineer and the Railroad, within two days following the occurrence, of their intent to claim time for each delay. The actual claim filing shall be as per Section 1.11.

Additionally, the Contractor is advised, that this Contract contains periods reserved exclusively for work that must be performed by the Railroad and the Contractor will not be allowed on the tracks or to interfere with Railroad while that work is conducted. The Railroad shall notify the Engineer upon completion of their work and the Engineer shall notify the Contractor when work may resume.

The Contractor shall be responsible for the coordination of the work of their various subcontractors. The Contractor shall coordinate their operations with those of the Railroad in carrying out railroad force account work.

The Contractor's employees, and the employees of all subcontractors, who will be entering the jobsite within railroad territory, must undergo the on-line Railroad Safety Training Program. The Contractor is responsible for ensuring that all employees on the jobsite have been trained. No additional compensation will be allowed to the Contractor for employees' time for taking this training. Refer to the special provisions and to Article 1.05.06 entitled "Cooperation with Utilities (Including Railroads)."

The Contractor must make their own arrangements with the Railroad for the use of railroad equipment or changes in railroad facilities made solely to facilitate the Contractor's operations. The expense incurred by making such arrangements shall not be a part of this Contract.

Contractors who have worked directly for the Railroad and have outstanding railroad service charges from previous projects must discharge that indebtedness prior to starting work on this

Project, or the Railroad will not allow the Contractor onto railroad property. Requests for time extension(s) for any delay to the Contractor's operations caused by the Contractor's indebtedness to the Railroad will be denied.

All matters requiring Railroad Company approval or coordination shall be directed to:

Mr. David Willard
Deputy Director – Structures Engineering
Metro-North Railroad Company
525 Water Street, 3rd Floor
Bridgeport, CT 06604

GENERAL INSURANCE INFORMATION FOR THE NEW HAVEN LINE:

For the purpose of complying with Section 1.03, the following information is provided:

Normal speed of passenger trains is **30 mph** in the area of the work.

In the **WATERBURY** area, there are in a 24 hour weekday period:

(22) Scheduled Metro-North Passenger Trains
(4) Extra Trains

There are occasional Freight Trains in the area of work, the contractor shall coordinate with the Department for a schedule of freight trains.

SECTION 1.02 – PROPOSAL REQUIREMENTS AND CONDITIONS

1.02.01—Contract Bidding and Award:

After the first sentence of the third paragraph, add the Following:

In accordance with the provisions of the Construction Contract Bidding and Award Manual, bidders must be prequalified for **Group No. 9 – Intermediate Bridges,** to be eligible to bid on this project. Bidders that are not prequalified for this work classification will not be approved to bid on this project.

SECTION 1.03 - AWARD AND EXECUTION OF CONTRACT

Article 1.03.07 – Insurance - is supplemented as follows:

Add the following paragraphs after the second paragraph:

" In addition, the Contractor is required to file certificates of insurance with Metro-North Commuter Railroad at least 30 days prior to commencing any work within the Railroad right-of-way. Certificates are to be sent to:

Joshua Barksdale
Metro-North Railroad Risk and Insurance Management Department
2 Broadway, 21st floor, New York, NY, 10004
Phone: 646-252-1429
Email: Joshua.Barksdale1@mtahq.org
CC: luciana.ventimiglia@mtahq.org

If any insurance specified within this Article shall be provided on a claims-made basis, then in addition to coverage requirements, such policy shall provide that:

- 1) The policy retroactive date must coincide with or precede the Contractor's start of work (including subsequent policies purchased as renewals or replacements),
- 2) The Contractor shall maintain insurance for at least two years following Project completion,
- 3) If insurance is terminated for any reason, the Contractor agrees to purchase an extended reporting provision of at least two years to report claims arising from Work performed in connection with this Contract, and,
- 4) The policy must allow for reporting of circumstances or incidents that might give rise to future claims.

The Contractor shall assume all deductibles in the described insurance policies contained herein. Except as otherwise indicated in the detailed coverage paragraphs below, self-insured retentions and policy deductibles shall not exceed \$100,000, unless such increased deductible or retention is approved by the State and Metro-North Railroad/MTA.”

Revise the numbered paragraphs as follows:

1 - Worker's Compensation Insurance:

In the second paragraph, replace the first sentence "Employer's Liability...amounts not less than \$100,000 per accident....\$100,000 per employee..." with the following:

"Employer's Liability insurance shall be provided in amounts not less than \$2,000,000 which limit may be met by a combination of primary and excess insurance meeting the statutory limits of the laws of the state in which the work is performed, whichever is greater."

2 – Commercial General Liability Insurance:

Add the following to end of the first paragraph:

"Contractual Liability, Products and Completed Operations, Broad Form Property Damage and Independent Contractors coverages shall have all railroad exclusions deleted. The "named as an additional insured" shall be as noted in Subarticle 15." Any Umbrella/Excess Policy used to meet the minimum contract requirements must follow form of the underlying policy and be extended to "drop down" to become primary in the event the primary policy is exhausted."

Replace the "Limits of Coverage" chart with the following:

Contract Amount (\$)	Minimum Single Occurrence limit (\$)	Minimum Annual Aggregate Limit (\$)
0-10,000,000	3,000,000	4,000,000
>10,000,000	4,000,000	8,000,000

4 - Owner's and Contractor's Protective Liability Insurance for and in the Name of The State:

Replace the "Limits of Coverage" chart with the following:

Contract Amount (\$)	Minimum Single Occurrence limit (\$)	Minimum Annual Aggregate Limit (\$)
0-50,000,000	3,000,000	3,000,000
>50,000,000	4,000,000	4,000,000

10 – Umbrella Liability Insurance:

Following every occurrence of "...the State of Connecticut..." add "and the Railroad..."

12 - Copies of Policies:

Following every occurrence of "...the State..." add "and the Railroad..."

15 - State Named as Additional Insured:

Change the last sentence of the only paragraph as follows:

"Each policy shall waive right of recovery (waiver of subrogation) against the State of Connecticut or the Railroad and the described insurance shall be primary coverage."

After the only paragraph, add the following:

"For coverage provided under this Article, Subarticle 5 - Railroad Protective Liability Insurance, as amended herein, the names of the "Additional Insured" shall be as indicated below:

Metro-North Railroad (MNRR)
Metropolitan Transportation Authority (MTA)
State of Connecticut, Its Agents and Assigns
CSX Transportation, Inc. & New York Central Lines LLC
National Railroad Passenger Corporation (AMTRAK)

Providence and Worcester Railroad Company (P&W)
Housatonic Railway

Note: For projects with limits of construction that cross the Connecticut/New York State Line into New York, “American Premier Underwriters” shall also be shown as an additional insured.”

16 – Termination or Change of Insurance:

Following every occurrence of “...the Department...” add “and the Railroad...”

SECTION 1.05 – CONTROL OF THE WORK

Article 1.05.02 - Contractor Submittals are supplemented as follows:

Sub article 1.05.02 - (2) is supplemented by the following:

Traffic Signal Items:

When required by the contract documents or when ordered by the Engineer, The Contractor shall prepare and submit product data sheets, working drawings and/or shop drawings for all traffic signal items, except Steel Span Poles and Mast Arm Assemblies when applicable, to the City of Waterbury for review before fabrication. The packaged set of product data sheets, working drawings and/or shop drawings shall be submitted in an electronic portable document format (.pdf).

The packaged set submitted in an electronic portable document format (.pdf) shall be in an individual file with appropriate bookmarks for each item. The electronic files for product data sheets shall be created on ANSI A (8 ½" X 11"; letter) sheets. Working drawings and shop drawings shall be created on ANSI B (11" X 17"; ledger/tabloid) sheets.

Please send the pdf documents via email to:

Roy Cavanaugh – City of Waterbury City Engineer at
rcavanaugh@waterburyct.org

Steel Span Poles and Mast Arm Assemblies:

When these items are included in the project, the submission for Steel Span Poles and Mast Arm Assemblies shall follow the format and be sent to the "Engineer of Record" as described in the Steel Span Pole and Steel Mast Arm Assembly special provision.

Article 1.05.06—Cooperation with Utilities (Including Railroads) – is supplemented as follows:

Add the following after the last paragraph:

"Special Requirements Regarding Work in Metro-North territory:"

Description:

This section covers authority, definitions, regulatory requirements, traffic regulations and coordination of the Contractor's work schedule with the operation of train service, construction equipment and safety requirements for working within the Railroad right-of-way, and provisions for storage of materials and equipment and worker safety rules. After the Engineer's Pre-construction meeting and prior to commencement of Contract activities, a "Working on The Railroad" meeting will be held by the Engineer to emphasis these Specifications.

Permission to Enter Upon Railroad Property

Permission is hereby granted to the Contractor to enter property of the State, under the custody and control of the Department and managed by the Metro-North Railroad Company (hereinafter called the "Railroad"), a public benefit corporation and subsidiary of the Metropolitan Transportation Authority (hereinafter called "MTA"). The granting of this permission shall be solely for those involved in the work under this Contract and under the following terms and conditions:

- I. Location and Access. Permission is hereby granted to the Contractor and its subcontractor(s), if any, to enter the property within the Project Limits identified on the Contract Plans (hereinafter called the "Property").
- II. Liability. The Contractor covenants and agrees to at all times indemnify, protect and save harmless the "Additional Insureds", as defined under Article V, from and against any and all losses, damages, detriments, suits, claims, demands, costs, and charges which the "Additional Insureds" may directly or indirectly suffer, sustain, or be subjected to by or on account of the Contractor's entry upon, occupancy or use of the Property, or the conduct thereon of the Contractor, its subcontractors, officers, employees, agents or invitees, whether such loss or damage be suffered or sustained by the "Additional Insureds" directly or persons (including employees of "Additional Insureds" or Corporations who may seek to hold the "Additional Insureds" liable therefore), and whether attributable to the fault, failure or negligence of the "Additional Insureds" or otherwise.
- III. Consideration. The Contractor will pay to the Railroad, the sum of Zero Dollars (\$0.00) for the right to enter upon the Property.
- IV. Terms of Permit. The Railroad reserves the right to revoke this permission at any time. This permit shall begin with the Notice to Proceed and shall terminate at Contract Completion Date or the completion of all corrective work, whichever is later. Under no circumstances shall this temporary permission be construed as granting the Contractor any rights, title or interest of any kind or character in, on, or about the land or premises of the State, MTA or Railroad. The Permittee agrees to notify the Railroad when use of the Property is no longer required or when all work has been completed.
- V. Definitions of Terms and Permissible Abbreviations:

Authority of the Railroad Engineer - This supplements Article 1.05.01 in that all Contract work upon or affecting Railroad property, right-of-way or facilities, shall be subject to the approval of the Railroad's Chief Engineer or duly authorized representative through coordination with the Engineer.

Additional Insureds - Those individuals or entities appearing under Article 1.03.07, Paragraph 15 of the Specifications.

Conductor/Flagman - A Railroad employee qualified on the Rules of the Operating Department and qualified on the physical characteristics of the portion of the railroad involved. They are the contact employee qualified to obtain the use of track. Each Conductor/Flagman will have the proper flagging equipment, up-to-date Railroad Operating Rules, Timetables and Safety Rules. The Railroad's Conductor Flagman is also known as a Roadway Worker in Charge (RWIC).

Coordination of Work - This supplements Article 1.05.06 in that the Contractor shall be responsible for the coordination of the work of their subcontractors with respect to the railroad operations, use of property, right-of-way or facilities.

Fouling Track – Being in such proximity to track that an individual, tools or equipment could be struck by a moving train, other on-track equipment or is within 4 feet of the nearest rail.

Groundman - Class "A" employee of the Railroad's Power Department authorized to de-energize/re-energize and ground high tension power lines.

Minimum Roadway Horizontal Clearance Point - A point 9 feet from the centerline of a track.

Minimum Roadway Vertical Clearance Point - A point 22 feet and 6 inches above the top of a running rail unless otherwise authorized by the Railroad.

Obstruction - An entering of the traffic envelope.

Occupancy - Any use of track other than direct crossing.

On or Adjacent to - shall be interpreted to include space on, above and below the railroad right-of-way operated by the Railroad, as well as space on, above, and below adjacent property which the Railroad determines to affect the safe operations of service.

Qualified Railroad Employee - a Railroad employee qualified to remove track or tracks from service and provide on-track protection to Roadway Workers.

Railroad - Whenever the term "Railroad" is used without further qualification, it shall be taken to mean the Metro-North Railroad Company.

Right-of-Way - The limits of railroad property on either side of tracks and the State boundary limits around all facilities.

The Safety Rules - All work shall be performed in accordance with current rules, regulations, procedures, and safe practices of the Railroad, FRA, OSHA, NESC and all other government agencies having jurisdiction over this project.

Track - The space between the rails plus not less than 4 feet outside each rail.

Traffic Envelope - The area encompassed by the minimum roadway vertical and the minimum roadway horizontal clearance points.

Use of Track - Obtaining permission from the proper authority of the Railroad for track occupancy.

1 – Requirements for Performing Work on or Adjacent to the Railroad Right-of-Way

(a) General

- (1) The Contractor acknowledges that the Contract work involves construction operations on or adjacent to property owned by State and operated by the Railroad. When working near an operating railroad, great care must be exercised, and the Railroad's safety rules must be strictly observed.
- (2) While performing the work under this Contract, should the tracks or other Railroad facilities become endangered, the Contractor shall immediately do such work as directed by the Railroad, through the Engineer, to restore safety. Failure of the Contractor to carry out such orders immediately, may result in the Railroad taking any and all necessary actions to restore safe conditions. All costs to the Railroad for restoring safe conditions, or for any damage to the Railroad's trains, tracks or facilities caused by the Contractor's or subcontractor's operations, shall be considered chargeable against the Contractor, shall be paid for by the Contractor, or may be deducted from any monies due or that may become due to the Contractor, under this Contract.

(b) Rules and Regulations

- (1) Railroad traffic shall be maintained at all times, and the Contractor shall conduct all of its operations on or adjacent to the Railroad right-of-way under the rules, regulations, and requirements of the Railroad. The Contractor shall be responsible for acquainting itself with such requirements as the Railroad may demand. The Contractor shall include, in their bid, any expenses it anticipates from delays or interruptions of its work by reason of the operation or maintenance of the Railroad.
- (2) The Contractor shall obtain verification of the time and schedule of track occupancy from the Railroad before proceeding with any construction or demolition work on or adjacent to the Railroad right-of-way.
- (3) All work to be performed by the Contractor on or adjacent to the Railroad right-of-way shall be done in a manner satisfactory to the Railroad. The work shall be performed at such times and in such manner as to not interfere with the movement of trains or traffic upon the tracks of the Railroad. The Contractor shall use all necessary care to avoid accidents, damage, delay or interfere with operation of the Railroad and its facilities.

- (4) When the Railroad requires, a Railroad Inspector will be assigned to supervise the work of the Contractor or any subcontractor performed under this Contract while on Railroad property.
- (5) Before proceeding with any construction or demolition work on or adjacent to the Railroad Right-of-Way, a pre-construction meeting shall be held at which time the Contractor shall submit plans, engineering computations, and a detailed description of its methods and procedures for accomplishing the specific work required under this Contract, including methods of protecting Railroad traffic. When the submission contains engineering computations, the entire submittal package shall be prepared and stamped by Connecticut registered Professional Engineer for approval of the Railroad. Such approval shall not serve, in any way, to relieve the Contractor of its responsibility for the adequacy and safety of its methods and procedures for conducting the work.
- (6) The Contractor shall conduct its work and handle its equipment and materials in such manner that neither fouls a live track or wire line without the written permission of the Railroad.
- (7) Equipment shall be considered to be potentially fouling the track when located in such a position that its failure, with or without load, brings the equipment within the traffic envelope. No equipment shall be placed in this position without prior approval of the Railroad.
- (8) Equipment of the Contractor to be used:

(A) Equipment of the Contractor used adjacent to the tracks shall be maintained in "Like-New" condition to prevent failures of equipment that could cause delay in the operations of trains or damage to Railroad facilities. The equipment shall not be placed or put into operation adjacent to tracks without first obtaining permission from the Railroad. Under no circumstances shall any equipment or materials be placed or stored within 25 feet from the near rail of a track in operation, unless approved, in advance, by the Railroad.

(B) Contractor's High-Rail equipment, which will be used on the tracks, shall be subject to inspection and approval by the Railroad prior to its initial use on the project. This inspection will take place at the Railroad's North White Plains, NY facility and will be performed by Railroad inspectors. Reservations must be made in advance to schedule the inspection. Following the initial inspection, the equipment inspection must be renewed every three months until the equipment is no longer used on the project. Renewal inspections may be conducted either at the Bridgeport or New Haven facilities. All high rail equipment must meet current FRA regulations and Metro-North Railroad requirements.

(C) On track vehicles shall be equipped with a Railroad approved tow bar and coupler. Multiple vehicles shall move in tandem and be coupled when directed by the Railroad. Movement of on track vehicles shall proceed only under the direct supervision of a

Qualified Railroad Employee. Contractor to maintain Daily Inspection records of hi-rail equipment per Railroad requirement.

- (9) Materials and equipment belonging to the Contractor shall not be stored on Railroad property without first having obtained permission from the Engineer and Railroad. Such permission may be revoked by the Engineer and Railroad at any time and will not be liable for damage to such materials and equipment from any cause. The Contractor shall keep the tracks adjacent to the site clear of all refuse and debris that may accumulate from its operations and shall leave the Railroad property in the condition existing before the start of its operations. At the request of the Railroad, the Contractor must remove stored material when the area is needed for MNR operations or work at no cost to the Railroad.
- (10) The Contractor shall coordinate with the Engineer and the Railroad to determine the type of protection required to ensure safety and continuity of Railroad traffic incidental to the methods of operation and equipment to be used on the work.
- (11) The Railroad will require protection during all periods when the Contractor is working on, or over, the right-of-way of the Railroad, or as may be found necessary in the opinion of the Railroad. When protection is required, refer to Paragraph 1(g).
- (12) It shall be expressly understood that this Contract includes no work for which the Railroad is to be billed by the Contractor, and it shall be further understood that the Contractor is not to bill the Railroad for any work which he may perform, unless the Railroad gives a written request that such work be performed at the Railroad's expense.
- (13) Upon completion of the work, and before final payment is made, the Contractor shall remove, from within the limits of the Railroad's right-of-way, all machinery, equipment, surplus materials, falsework, rubbish and temporary buildings, and other property of the Contractor/subcontractor, and shall leave the right-of-way in a condition satisfactory to the Railroad.
- (c) **Railroad Protective Services** - will be provided in accordance with the Roadway Worker's Protective Act, Title 49, Part 214, Sub-part C. Railroad protective services will be provided to Roadway Workers when fouling the track. Other protective services may be provided to ensure safe operations of trains when construction work would, in the Railroad's opinion, be a hazard to Railroad operations.
- (d) **Definition of Hazard** – the Railroad has furnished the statements quoted below, explaining when they consider a hazard to operations exists:

“Protective services will be required whenever the Contractor is performing work on or adjacent to the Railroad tracks or right-of-way, such as excavating, sheeting, shoring, erection and removal of forms, handling materials, using equipment which by swinging or by failure could

foul the track, and when any other type of work being performed, in the opinion of the Railroad, requires such service.”

(e) Contractor Requirements for Work Affecting the Railroad

- (1) All matters requiring Railroad Company approval or coordination shall be directed to the Engineer or a duly authorized representative thereof for forwarding to the Railroad Engineer.
- (2) Detailed plans and appurtenant data and calculations for any operation which, in the opinion of the Railroad, affect the Railroad, must be submitted to the Engineer or a duly authorized representative thereof, for forwarding to the Railroad Engineer for approval prior to commencement of the work. All submissions shall comply with the submission requirements outlined in above Paragraph 1(b)(5).
- (3) Permissible Track Outages - are identified in the SECTION 1.08 – PROSECUTION AND PROGRESS – Article 1.08.04 – “Limitation of Operations” - Contractor Requirements for Work Affecting the Railroad contained within the General Provisions of the Contract. The times identified are the times that the track may be removed from service. **If power outages are required, that do not include substations, the de-energizing/re-energizing and grounding of the wires will subtract approximately forty-five minutes from the start and forty-five minutes at the end of the indicated outage period for a total of up to ninety minutes. If a substation is involved in the power outage request, the de-energizing/re-energizing and grounding of the wires will subtract approximately one hour and fifteen minutes from the start and one hour and fifteen minutes at the end of the indicated outage period for a total of up to two hours and thirty minutes.**
- (4) The Contractor shall maintain a minimum of 1 foot level shoulder from ends of ties to maintain lateral track support for all excavations and shall not excavate any slope steeper than 1 (vertical) on 2 (horizontal) from the edge of the shoulder. Sheeting shall be required on all excavations where the side of the excavation is intercepted by the Railroad live load influence line. The live load influence line is defined as a line originating at the bottom edge of tie and extending downward at a slope of 1 (vertical) on 1½ (horizontal). Such excavations must be designed to withstand, in addition to all common loads such as soil pressure and hydrostatic pressure, a railroad live load of Cooper E-80.
- (5) The Contractor shall be required to design and install protective scaffolding over the right-of-way where, at the sole discretion of the Railroad, such scaffolding is necessary to protect the Railroad from possible falling debris; paint or other materials; to protect personnel working about the right-of-way or to provide a platform for personnel, materials and/or equipment. Said scaffolding shall be designed for live load of 200 pounds per square foot applied uniformly over the entire structure and a 2 kip concentrated load placed anywhere on the structure. The two loads are not to be applied simultaneously for design purposes.

- (6) All excavation areas shall be located by the Contractor and inspected by the Railroad for the purpose of determining conflicts with underground facilities. Exploratory trenches, a minimum of 3.5 feet deep and 15 inches wide in the form of an "H" with outside dimensions matching and outside of sheeting dimensions are to be hand dug, as directed by the railroad. In some locations, excavations may exceed 3.5 feet in depth. Specialty excavations such as screw anchors, catenary pole foundations, etc. will require additional trenching to ensure all possible conflicts are located. These trenches are for exploratory purposes only and are to be backfilled and compacted immediately. For those deeper test excavations, any support of excavation (SOE) used shall be considered temporary and removed in its entirety prior to backfilling. All work outlined above must be done in the presence of a Railroad inspector.
- (7) Cavities adjacent to sheet piling, created by driving of sheet piling, shall be filled with sand and any disturbed ballast must be restored and compacted immediately.
- (8) Sheet piling shall be cut off at top of tie during construction and a minimum of 3 feet below bottom of tie when no longer required, prior to completion of back filling. Permanent Soil Nail Walls shall not extend above an elevation 3 feet below bottom of tie after construction and prior to completion of back filling. Temporary Soil Nail Walls will only be allowed up to an elevation to the top of tie if the entire wall section including the nails can be removed to a depth 3 feet below the bottom of tie.
- (9) Plans and calculations for all support of excavation systems and scaffolding must be submitted to the Engineer for forwarding to the Railroad for approval prior to construction. All submissions shall comply with the submission requirements outlined in above Paragraph 1(b)(5).

(f) Requirements for Erection, Demolition and Other Rigging Operations On or Adjacent to Railroad Right-of-Way

The Contractor will be required to furnish the following information to the Engineer or a duly authorized representative thereof, for forwarding to the Railroad Engineer for approval prior to the start of any rigging operation over or adjacent to the Railroad right-of-way:

- (1) Plans showing locations of cranes, boom length and rigging operating radii, with delivery or disposal locations shown.
- (2) Crane rating sheets showing crane(s) to be adequate for 150% of the lift. Crane and boom nomenclature are to be indicated.
- (3) Plans and computations showing weight of pick, picking capacities, out rigger loads, and details of mats, planking or special decking.

- (4) Location plan showing obstructions, indicating that the proposed swing is possible.
- (5) Written statement from the crane owner containing the date of last crane condition and safety inspection and the results of said inspection.
- (6) Data sheet listing number, type, size and arrangement of slings, spreader bars or other connecting equipment. Include copies of catalog or information sheets of specialized equipment. All such equipment shall be shown as adequate and capable of safely carrying 150% of the calculated loading.
- (7) A complete procedure is to be included, indicating the order of lifts and repositioning or re-hitching of the crane(s).
- (8) Temporary support of any components or intermediate stages is to be shown.
- (9) A time schedule of the various stages must be shown, as well as a schedule for the entire lifting procedure.
- (10) For each pick location, a separate and complete package containing erection, demolition and rigging plans along with all supporting calculations shall be submitted to the Engineer. All submissions shall comply with the submission requirements outlined in above Paragraph 1(b)(5).
- (11) Operations directly on or adjacent to the operating right-of-way will be performed only at times and under conditions specified by the Railroad's representative and in compliance with the Roadway Worker's Protective Act as stated in Paragraph 1(c).

(g) Ordering Protective Personnel

The Railroad will furnish Protective Service Personnel (conductors, flagmen, groundmen, inspectors, maintenance and/or other railroad personnel deemed necessary) to protect the operation of train traffic during the Contractor's construction activities. Railroad Protective Services will also be provided in conformance with the Roadway Worker's Protective Act as stated in Paragraph 1(c). There will be no charge to the Contractor for Railroad Protective Services provided. The providing or failing to provide Protective Services shall not relieve the Contractor from liability or payment for any damage caused by the Contractor or the subcontractor's operations.

- (1) The Contractor must obey all instructions from Railroad representatives on the job site promptly. Failure to follow instructions shall be deemed sufficient cause for closing the job site to the Contractor and its employees.
- (2) The Railroad will, at its sole discretion, determine the need for and the availability of protective personnel. The Railroad will provide protective personnel to the extent possible considering its operational and maintenance priorities. The Railroad does not guarantee that protective personnel will be available to meet the Contractor's

preferred schedule. No work will commence until the assigned Railroad representative affirmatively advises the Contractor that the necessary protective personnel are stationed and that he may proceed.

- (3) The assessment of need for protective services will be based upon a weekly Railroad Construction Coordination Meeting. At these meetings, the Contractor shall provide a current week and a Two Week Look Ahead Schedule. Based on those schedules, the Railroad will determine the Protective Services required for the two-week period. Protective Services will be reserved for the following week beginning on the Saturday and ordered for the second week of the schedule. It will be the Contractor's responsibility to perform work in accordance with the submitted schedule. Variations from the submitted schedule may result in additional and unnecessary costs to the Engineer, Railroad and Contractor.

(A) Unless otherwise stated elsewhere in the Contract, the Contractor shall base its operations on a 5 consecutive day work week. The hours of operation during this time shall remain constant. Multiple shifts may be worked.

(B) The Contractor must demonstrate maximum use of Protective Service Personnel ordered. Failure to do so may result in the inability to consistently obtain services.

(C) The Contractor shall be responsible for forwarding all Protective Service requests from its subcontractors and suppliers in its Two Week Look Ahead schedule submittal.

- (4) Contractor requests to cancel construction activities and the corresponding scheduled Protective Service Personnel, must be submitted at the weekly Railroad Construction Coordination Meeting. At these meetings, the previously scheduled Protective Services for the week beginning on the following Saturday may be cancelled. **This will be the only time for cancellation. Once cancelled, no re-ordering of Protective Services for the following week will be allowed.**
- (5) Weather conditions will be considered the only basis upon which the Railroad will accept the Contractor's cancellation of scheduled work and will only be recognized on items of work which have been clearly identified and determined to be weather dependent in the Contractor's schedule. Activities not presented on the Bi-weekly schedule at the weekly Railroad Construction Coordination Meeting will not be able to commence until it has been inserted into the schedule and presented at the next meeting.

- (6) Work that requires the support of Railroad personnel shall not be scheduled on the following days, unless the work is of an emergency nature:

Holiday's Observed:

- *New Year's Day
- *Martin Luther King Jr.
- *President's Day
- *Good Friday
- *Memorial Day
- *Independence Day
- *Thanksgiving Day
- *Day Following Thanksgiving Day
- *Labor Day
- *Christmas Eve
- *Christmas Day
- *New Year's Eve

* The Saturday and Sunday proceeding a Monday or Friday holiday.

* The Friday and Monday preceding and following a weekend holiday.

* There will be additional restrictions regarding the granting of weekend track outages and protective services beginning Thanksgiving Holiday to the second weekend of January to accommodate extra trains during holiday season.

(h) Requirements for Requesting Track Outages

Track outages as described in the plans and specifications must be requested at the weekly Railroad Construction Coordination Meeting.

- (1) All working plan procedures, material and equipment must be approved and on site prior to the Railroad accepting the track outage request(s). This applies to all track outage requests.
- (2) Track outages will be granted based on need for constructability not for convenience.
- (3) The Contractor must demonstrate the maximum use of track outages by coordinating its activities and work so that various elements and multiple activities are performed during approved outages. Failure to consistently utilize track outages may result in the denial of future requests for outages until such time as the Contractor demonstrates its ability to resume consistent utilization of track outages.
- (4) No new continuous track outages may be initiated the weekend preceding or following these holidays:

Thanksgiving, Christmas, and New Year's.

However, long-term continuous outages may extend through these periods.

(i) Catenary and Transmission Systems/Power Outages

- (1) Catenary and Transmission Systems** - The Contractor shall assume that all the wires on the Railroad Company are always energized and must be governed by the restrictions imposed by the Railroad with respect to such electrical circuits. In the opinion of the Railroad Engineer, should it be necessary to de-energize any wire or wires to insure safety of the operation, such wires will be de-energized by the Railroad only during such period(s) that will not interfere with the operation of the Railroad. The Groundman will arrange for de-energizing and re-energizing of wires when deemed necessary. The Contractor will be notified in writing by the Groundman when the wires have been de-energized and when said wires are to be re-energized. Both the Railroad and Contractor shall keep records of temporary grounds and shall be coordinated at the weekly Railroad Construction Coordination Meeting.

(A) The Contractor is advised that the overhead electrification will remain in place for the duration of the entire project, except where called for on the drawings and in the specifications.

(B) The Contractor is advised that the Track's rails are energized. The Contractor shall avoid contact between adjoining rails with any electrically conductive material whether the material is wet or dry. Care is necessary when any work involving the use of chains, steel rods, cables, pipes, etc., is done. The Contractor shall assume the wires and rails of the Railroad will be energized at all times.

(2) Power Outages

(A) Catenary Power Outages - A catenary power outage must be scheduled concurrently with a track outage for the track and is restricted to the same periods as specified in the plans and specifications.

(B) Railroad Power and Signal Distribution Feeder Outages - Outages for feeders may only be allowed during off-peak hours. These outages must be requested at the weekly Railroad Construction Coordination Meeting. One set of power and signal feeders, either the north or south side of the railroad, must always remain energized.

NOTE: During peak hours (5:00 a.m. to 10:00 a.m. and 3:30 p.m. to 10:00 p.m., Monday through Friday) of railroad traffic, both the north and south sets of power and signal feeders must be energized.

(j) Safety for Contractor's Employees Working on or Adjacent to the Right-of-Way of the Railroad

(1) Personal Protection Equipment

(A) Approved hard hats, reflectorized vests, safety footwear, safety eyewear and appropriate clothing must be worn by all Contractor employees while on the Right-of-Way, in yard, shop facilities, construction/work sites and in the operating control cab of a moving locomotive or train. Any exclusion must be jointly approved by Railroad's department head and Director of Safety.

(B) Other protective equipment such as goggles, face shields, safety belts, floatation vests, gloves and respirators shall be issued by the Contractor when required. Protection devices for hearing conservation may be used when determined necessary and safe to do so.

(2) Possession or Use of Intoxicants and Illegal Substances

The use of intoxicants, alcohol, narcotics, marijuana, amphetamines, hallucinogens, or other illegal substances while working within the Railroad Right-of-Way, is prohibited and is sufficient cause for immediate removal from the Railroad property. Contractor employees under medication before or while on duty, must be certain that such use will not affect the safe performance of their duties.

Every contractor or consultant that is performing MOW Activities must comply with its obligations under 49 C.F.R. Part 219 to ensure that all MOW employees are being randomly tested for drugs and alcohol. Failure of a contractor or consultant to timely comply with the FRA Regulations may subject that firm to civil penalties. In addition, the Railroad has stated that contractors or consultants who do not comply with the FRA regulations will not be able to work on railroad property.

The term maintenance-of-way (MOW) employee, as used in 49 C.F.R. Part 219, is defined in 49 C.F.R. § 214.7 as "any employee...of a contractor to a railroad, whose duties include inspection, construction, maintenance or repair of railroad track, bridges, roadway, signal and communications systems, electric traction systems, roadway facilities or roadway maintenance machinery on or near track or with the potential of fouling a track, and flagmen and watchmen/lookouts." (collectively, MOW Activities).

The final rule, effective June 12, 2017, requires contractors and consultants employing MOW employees to submit a Part 219 Compliance Plan to FRA **prior** to the effective date. Please consult the following link to the model drug and alcohol plan prepared by the FRA for guidance.

<https://www.fra.dot.gov/eLib/details/L02814>

The final rule mandates, among other things, the establishment of a random testing pool to ensure a testing rate of 50% of MOW employees for drugs and 25% of MOW employees for alcohol on an annual basis. For more information related to the requirements, please refer to:

<http://www.ecfr.gov/cgi-bin/text-idx?rgn=div5&node=49:4.1.1.1.14>

The contractor and consultants shall be required to submit copies of their 219 Compliance Plan submission confirmations and/or FRA issued approval letters to the State prior to starting any work on the railroad.

(3) Surveying Equipment

(A) Measuring tape must be non-metallic to avoid shunting the signal system electric circuits. This will occur when a metallic object is laid across the top of two rails of any track.

(B) Electrically rated fiberglass elevation rods must be used to avoid injury in the event contact is made with energized catenary or signal/communication lines. Elevations of catenary wires must be obtained by or under direct supervision of a qualified Railroad Groundman.

(4) Conduct On or About Track

(A) Contractor employees must not enter the track envelope unless it is absolutely necessary in performance of their duty. If it is deemed necessary, then the Contractor employees must walk on tracks or cross tracks only when accompanied by or with permission from a Qualified Railroad Employee. Always use approved walkways when available; otherwise identify and take the shortest safe route after looking in both directions. If more than one track is to be crossed, stop, and look before crossing each track.

(B) The possession of an umbrella on or about tracks is prohibited.

(C) Contractor employees must not rest any object on their shoulders while they are within the track fouling envelope.

(D) Expect equipment to move on any track, in any direction, at any time. Contractor employees must look in both directions and have permission from a Qualified Railroad Employee before:

1. Fouling track
2. Crossing track
3. Going between or around end of equipment or structure
4. Moving out from between or under equipment or structure
5. Getting on or off equipment
6. Performing any other applicable operation

(E) When required by a conductor/flagman or other Qualified Railroad Employee to vacate tracks, the Contractor employees must comply immediately.

(5) Catenary Electric Systems

(A) All overhead wires must be considered energized (LIVE) at all times unless the Groundman has notified the Contractor the wires have been de-energized, properly grounded, and what safety provisions have been provided. The Contractor must not approach within 10 feet of transmission system's wires, catenary system, or signal power wires.

(C) At the beginning of each tour of duty, the Groundman will instruct the Contractor foreman and Contractor employees of the dangers surrounding them, calling their attention to any hazards to be avoided in performance of the work.

(D) Whether due to inadequate knowledge of the English language or for any other reason, a Contractor employee who does not understand the instructions given, in the opinion of the Groundman, shall not be permitted to work or observe on railroad property, unless such employee is accompanied by a translator at all times. It shall be the contractor's responsibility to provide the translator.

(E) When clearances have been obtained and the wires, equipment or apparatus are all properly grounded, the Groundman will indicate to the Contractor foreman and the Contractor employees the location of wires, equipment or apparatus from which power has been removed and the location of the grounding devices applied. The Groundman must obtain on standard form, the signature of the Contractor foreman indicating that he and the Contractor employees have been so instructed and will confine their work within the limits as outlined to them by the Groundman.

(F) When the Groundman leaves the Contractor's crew for any reason, the Groundman must notify the Contractor foreman and the Contractor employees to stop all work in the vicinity of the wires, personally assuring himself that all Contractor personnel moved to a safe distance from the work area before his departure. The Groundman will obtain the signature of the Contractor foreman on standard form, that the Contractor and the Contractor employees have been informed the Groundman is leaving the gang and they will not resume work until advised to do so by the Groundman upon his return.

(G) When the clearances are to be released, the Groundman will inform the Contractor foreman and the Contractor employees and will personally observe that all Contractor personnel moved to a safe distance from the wires, equipment or apparatus to be energized, before removing the grounding devices. The Groundman will obtain the signature of the Contractor foreman, on a standard form, stating that the Contractor and the Contractor employees have been advised that the wires, equipment or apparatus have been energized, and that they will remain at a safe distance from them until informed otherwise by the Groundman.

(H) The Groundman will inform the Contractor foreman if any Contractor employee on the job is unsafe and will not comply with instructions. If trouble is

experienced with the Contractor foreman in maintaining safe working conditions, the Groundman will immediately notify his supervisor.

(6) Aerial Catenary Construction by Qualified Contractor Employees

(A) Aerial catenary work addressed in this Section shall include all overhead wire work shown in the contract.

(B) Aerial catenary work by the Contractor shall be performed in accordance with the Railroad's safety rules and in accordance with the National Electric Safety Code. Failure to comply with these rules could result in removal of "Qualified" privileges and or removal from the project.

(C) Due to the special nature of the work, limited construction periods available, and high quality of work required, the aerial catenary construction is to be done only by qualified Contractor employees (except as outlined in section (E)). Only Contractor employees that meet the requirements of the International Brotherhood of Electrical Worker's standards for Journeyman Lineman and have successfully completed a Metro-North Power Orientation class, shall be considered a Qualified Employee. The Power Orientation class will be given periodically and will require less than one-half day to complete. Approval for qualification shall be determined by Metro-North and that approval shall not be unreasonably withheld.

(D) Contractor Qualified Employees shall be issued identification by Metro-North as workers qualified to perform aerial catenary work. Contractor Qualified Employees shall work according to the Railroad's MN-290 Electrical Operating Instructions. Contractor Qualified Employees are authorized and expected to work within 3 feet of 13.5 kV energized overhead catenary. Contractor Qualified Employees shall not de-energize circuits, place initial grounds, or provide protection for others.

(E) Apprentice Lineman shall be permitted to assist Contractor Qualified Employees and work under their direct supervision within the following guidelines:

- i. The number of apprentice linemen allowed to work on the catenary will be one less than the total number of Groundmen assigned to each contractor work operation. Additional Groundmen will not be assigned to facilitate the use of Apprentices. (ex. 3-5 person crews are working a section of wire removal under the protection of two Groundmen, this contractor work operation may utilize one apprentice lineman.)
- ii. No additional track or power outages shall be granted for the protection of apprentice Linemen.
- iii. The Apprentice Linemen shall maintain an extended reach minimum approach distance of 10 feet to all railroad transmission wires, Catenary system, and signal power wires even when such wires are de-energized,

tested for potential, properly grounded, and proper protection afforded by a Groundman. Apprentice Linemen are prohibited from coming closer than 10 feet from all overhead wires or circuits regardless of whether they have been de-energized or not.

- iv. The Contractor and its Safety Officer shall enforce the minimum approach distances and submit to the Engineer a program to monitor and audit compliance of this procedure.

(7) Safety Program and Plan

- (A)** Prior to the commencement of work the Contractor shall submit a "Working on the Railroad Safety Plan" that will include a Program which implements the plan. The submission shall be made to the Engineer or a duly authorized representative and forwarded to the Railroad for compliance with this specification. This plan is separate from the Health and Safety Plan required for other aspects of the project (i.e., lead, excavations, etc.).
- (B)** Each employee of the Contractor, Subcontractor or others on site shall take and pass the Railroad Safety Training available on-line at www.contractororientation.com prior to being allowed to work on the project. In accordance with Section 3 below, there is no direct payment for all costs associated with this training process. Upon completing the on-line training, each employee will be able to print a temporary certification of completion. The temporary certificate will be valid for 60 Calendar Days. Trained Contractor Employees should receive their photo ID card in 7-10 business days. Until the ID card arrives, the employee must always carry the temporary certificate and be prepared to present it while on railroad property. No Contractor Employees are permitted on the Railroad Right-of-Way without evidence of this training. Contractor Employees shall be responsible for renewal of this training annually.
- (C)** All Contractor Employees entering the railroad right-of-way must attend the Daily Job Safety Briefings conducted by Contractor's Competent Person/Employee In Charge. The Flagman will conduct Job Safety Briefings and when track is taken out of service or there is planned fouling of the track, will also conduct the Roadway Worker Safety Briefings. All Contractor Employees must attend and acknowledge the Roadway Worker Safety Briefings.
- (D)** The Contractor shall hold "TOOL BOX" safety meetings for their employees at least once a week that will be documented and attendees listed.

2 – Insurance Requirements – Metro-North Railroad

The Contractor engaged in work on the project shall be required to comply with the requirements set forth under Article 1.03.07 – Insurance of the Standard Specifications, its supplements and special provisions contained herein.

3 – Cost Associated with this Specification

- (a) There shall be no direct payment for compliance to this specification. All costs associated with any regulatory requirements, traffic regulation, specification administration, coordination, materials, and incidentals required to fulfill the requirements of this specification will be considered as included in the general cost of the work and distributed in all items.
- (b) Any work, material's supplied, inspections and protective services by the Railroad as described in the plans and specification, expressly needed for the construction of the project, will be compensated to the Railroad by the Engineer under a separate agreement."

Add the following to the beginning of the first paragraph of Article 1.05.12:

1.05.12—Payrolls: The Contractor and all subcontractors shall use **AASHTOWare Project®** software in accordance with Article 1.05.25, with a Department-provided template, or by other means previously accepted by the Department, to electronically upload all Project payrolls, as directed herein.

Add the following to the end of Article 1.05.12:

These requirements shall be included in all subcontracts for this Project.

All costs for these requirements shall be included in the general cost of the work.

Add the following new Article 1.05.25:

1.05.25—Use of AASHTOWare Project® Software: The Contractor and all subcontractor(s) shall use the **AASHTOWare Project®** software for electronic submittal of all payrolls as outlined

in the Department's AASHTOWare Contractor's User Manual, found at the Department's [AASHTOWare Training](#) webpage, and as stated in the specifications.

The Contractor and all subcontractor(s) shall use the **AASHTOWare Project®** software for monthly verification of project payments at all tiers, as outlined in the Department's AASHTOWare Contractor's User Manual, found at the Department's [AASHTOWare Training](#) webpage, and as stated in the specifications. The Department will inform the Contractor of other deliverables to be similarly submitted, as required.

Within 10 days of execution of the Contract, the Contractor shall submit the name(s) of the **AASHTOWare Software Project Liaison** and required staff that will be using the Department's software for this work. Similarly, within 10 days after the Contractor (or a subcontractor) enters into a subcontractor agreement to sublet any work, they shall submit the name(s) of their **AASHTOWare Software Project Liaison** and required staff that will be using the Department's software for this work. The Contractor and subcontractors shall immediately notify the Department of any change in Project staff authorized to access the AASHTOWare system or of a need to revise the Project Liaison.

Training materials, such as videos and written guides are available on the Department website for Contractor use. The Contractor and all subcontractors shall be responsible to train their staff.

This **AASHTOWare Project®** software will require that the Contractor and all subcontractor(s) provide their staff with access to the internet, using devices suitable for this work, at their own expense, throughout the duration of the Project. The Department has obtained licensing that allows the Contractor and subcontractors to access (from the internet) and use of the **AASHTOWare Project®** software. The Department will provide the Contractor and subcontractors with usernames and passwords to access the **AASHTOWare Project®** software, at no cost.

The Department shall not be held responsible for delays, lack of processing, or responses to submittals that do not follow the specified guidelines in the Department's AASHTOWare Contractor's User Manual, found at the Department's [AASHTOWare Training](#) webpage.

These requirements shall be included in all subcontracts for this Project.

All costs for these requirements shall be included in the general cost of the work.

SECTION 1.06 – CONTROL OF MATERIALS

Article 1.06.01 – Source of Supply and Quality:

Add the following:

Traffic Signal Items:

For the following traffic signal items, the contractor shall submit a complete description of the item, shop drawings, product data sheets and other descriptive literature which completely illustrates such items presented for formal review. Such review shall not change the requirements for a certified test report and materials certificate as may be called for. All documents shall be grouped into one separate file for each group of items as indicated by the Roman numerals below (for example, one pdf file for all of the pedestal items). The documents for all of the traffic signal items shall be submitted at one time, unless otherwise allowed by the engineer.

- I. 10080XX – Rigid Metal Conduit
1108129 – 3” Polyvinyl Chloride Conduit in Trench
- II. 1017019A – Wireless Radio Assembly
- III. 1017032A – Service (Metered)
- IV. 11020XX – Aluminum Pedestals
- V. 11051XXA – Traffic Signals, Mast Arm Mounted – LEDs, Housings and Hardware
11054XXA – X Way, X Section Traffic Signal Polycarbonate
- VI. 11060XXA – Pedestrian Signals – LEDs, Housings, and Hardware
11070XXA – Accessible Pedestrian Signal & Detector – Button, Housings & Sign (Type)
- VII. 1108117A – Full Actuated Controller w/Actuated Pedestrian Phase (16 Phase)
- VIII. 1108660A – Ethernet Switch
- IX. 11XXXXXA – Optical Pre-Emption –Detector, Phase Selector and Chassis
- X. 11114XXA – Loop Detector Amplifier, Sealant, Wire and Lead in Wire
- XI. 11122XXA – Vehicle Detection – Camera Assembly, Processor and Monitor

- XII. 111339XA – Cable closure (Type)
- XIII. 1113XXXXA – Cable – Control Cable, Comm., CAT6, Detector Cable (optical),
360-Degree System Long Range Cable
- XIV. 1117104A – Wrong Way Detection and Warning System

Illumination:

For the following materials the Contractor shall submit a complete description of the item consisting of the latest manufacturer shop drawing(s) which completely illustrates the material presented for formal approval. The submitted shop drawing(s) shall clearly call-out all material and operational properties for the item specific to the project. Such approval shall not change the requirements for a certified test report and materials certificate as may be called for.

Light Standards	Precast Foundation
Conductors	Service Items
Luminaires	Temporary Illumination Unit
Conduit	Aerial Cable
Cable in Duct	Handhole
Fuses and Fuse Holders	Junction Box
Navigation Lights	

Required shop drawings for all items listed above shall be submitted in one package at the same time. Please note: the list of items above is a “general” list of items. Certain items listed may or may not be present in a specific project. Please consult the Detailed Estimate sheet for project specific items.

Article 1.06.07 - Certified Test Reports and Materials Certificate.

Add the following:

1) For the materials in the following items, a Certified Test Report will be required confirming their conformance to the requirements set forth in these plans or specifications or both. Should the consignee noted on a Certified Test Report be other than the Prime Contractor, then Materials Certificates shall be required to identify the shipment.

Light Standards
Conductors
Cable in Duct
Anchor Bolts
Aerial Cable
Temporary Illumination Unit

2) For materials in the following items, a Materials Certificate will be required confirming their conformance to the requirements set forth in these plans or specifications or both.

- Light Standards
- Conductors
- Cable In Duct
- Luminaires
- Conduit
- Anchor Bolts
- Aerial Cable
- Temporary Illumination Unit

Please note: the list of items above is a “general” list of items. Certain items listed may or may not be present in a specific project. Please consult the Detailed Estimate sheet for project specific items

SECTION 1.07 - LEGAL RELATIONS AND RESPONSIBILITIES

Article 1.07.13 - Contractor's Responsibility for Adjacent Property, Facilities and Services is supplemented as follows:

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

Mr. Mark Russo	Mr. Mark Bonjuklian
District 4 Electrical Supervisor	Eversource – Electric Distribution
Department of Transportation	9 Tindall Ave,
Southbury, Connecticut	Norwalk, CT 06851
(203) 264-9590	(203) 845-3456

Mr. Christopher Simeone	Mr. Mark Bonanno
Comcast of Connecticut, Inc.	Crown Castle Fiber, LLC
222 New Park Drive,	1800 West Park Drive, Suite 250
Berlin, CT 06037	Westborough, MA 01581
(860) 491-6701	(508) 616-7818

Ms. Lynne DeLucia	Mr. Ken Lane
Frontier Communications of Connecticut	GONETSPEED
1441 North Colony Road	30 South Trail
Meriden, CT 06450	Niantic, CT 06357
(203) 238-5000	(860) 874-4494

Mr. Nick Gonsalves	Mr. Richard Solitro
CoxCom, LLC	Teleport Communications America, LLC
9 JP Murphy Highway, 3 rd Floor	157 Green Street, Suite 2
West Warwick, RI 02893	Foxboro, MA 02035
(401) 895-0838	(508) 216-0033

Ms. Dawn Laffoon	Mr. Kenneth Ruel
Mobilitie	Enbridge
121 Innovation Drive, Suite 200	252 Shunpike Road,
Irvine, CA 92617	Cromwell, CT 06416
(949) 698-6954	(860) 894-1600 ext. 1608

Mr. Kenneth Cook	Mr. Bradley Malay
Eversource Energy – Gas	City of Waterbury Bureau of Water
107 Sheldon Street, Mail Stop NUE2	21 East Aurora Street,
Berlin, CT 06037	Waterbury, CT 06708
(860) 978-5465	(203) 574-8251

The following Department representative shall be contacted by the Inspector or Field Engineer to coordinate an inspection of the service entrance into the controller/flasher cabinet for controllers within the State right-of-way. When ready for inspection, the Contractor should be present for the release of the connection of electrical service. The local Building Department

shall be contacted for electrical service inspections for controllers located on Town roads located within the respective municipality.

Mr. Frank Baker
Acting Building Inspector
City of Waterbury
185 South Main Street, 5th Floor
Fbaker@waterburyct.org
203-574-6832

Please provide the electrical service request number provided by the power company. This is a Work Request (WR) Number provided by Eversource (formerly Northeast Utilities [CL&P]).

SECTION 1.08 PROSECUTION AND PROGRESS

Add the following to the beginning of the first paragraph of Article 1.08.01:

1.08.01—Transfer of Work or Contract: The Contractor and all subcontractors shall use the *AASHTOWare Project*® software in accordance with Article 1.05.25, for monthly verification of project payments at all tiers, in accordance with the Department's AASHTOWare Contractor's User Manual, found at the Department's [AASHTOWare Training](#) webpage, and as stated in the specifications.

Add the following to the end of Article 1.08.01:

All costs for the requirements of this Article shall be included in the general cost of the work.

Article 1.08.03 - Prosecution of Work:

Add the following:

The Contractor shall stake the limits of the concrete sidewalks and ramps in conjunction with staking the locations of foundations to ensure that pedestrian push buttons will be located appropriately and will be accessible from a landing area.

The Contractor will not be allowed to install traffic signal or pedestrian heads until the controllers are on hand and ready for installation. Once installation of this equipment commences, the Contractor shall complete this work in a most expeditious manner.

The Contractor shall notify Roy Cavanaugh – City of Waterbury City Engineer at rcavanaugh@waterburyct.org at least forty-five (45) days prior to starting work.

The above notice will initiate work to be completed by the City of Waterbury. The Contractor shall be responsible for any timely updates that need to be reported to this City for the successful coordination of work.

The Contractor will abide by the following list scheduling the work. This list reflects the order in which the traffic signals shall be installed. The schedule is subject to change upon notice to the Contractor from the Engineer.

Town	State Intersection #	City Intersection #	Location
Waterbury	N/A	#51	Bank Street at West Liberty Street
Waterbury	151-278	#49	Meadow Street at Bank Street and Plaza Drive
Waterbury	N/A	#50	Meadow Street at I-84 EB On-Ramp
Waterbury	N/A	#48	Meadow Street at Field Street

Waterbury	151-236	#16A/#16B	SR 847 at Meadow St/Freight St/Private Dr
Waterbury	151-229	#20	S Main Street at W Liberty Street/E Liberty Street
Waterbury	151-212	#19	SR 847 at S Elm St/E Clay St/W Clay St
Waterbury	151-256	#23	S Main St at I-84 EB Exit 22 Off-Ramp/Market Sq/McMahon St

Note: Intersection's noted with "N/A" in the State Intersection # column indicates there is not a state intersection number associated with this intersection, only a city intersection number.

The Contractor shall notify the Project Engineer on construction projects, or the District Permit Agent on permit jobs, when all traffic signal work is completed. This will include all work at signalized intersections including loop replacements, adjusting existing traffic signals or any relocation work including handholes. The Project Engineer or District Permit Agent will notify the City of Waterbury to coordinate a field inspection of all work. Refer to Section 10.00 – General Clauses For Highway Illumination And Traffic Signal Projects, Article 10.00.10 and corresponding special provision.

The project shall be constructed in various phases as described herein.

Phase 1 – Organization Phase up to (168) Calendar Days.

The first phase is to afford the Contractor time for the administrative/engineering/procurement function required for the project. This would include such items as performing construction staking, digging test pits, submitting catalog cuts or shop drawings and purchasing materials. Actual construction is not permitted during this phase. The Contractor is to use this time to fully prepare for the successive phases so that construction can proceed quickly and efficiently. During the phase, after the construction staking is complete and underground utilities are marked out by the Contractor's professional underground utility locator, the designer and the Engineer will hold an on-site utility meeting to determine if there are test pits necessary or if there are any apparent conflicts with private property, utilities, or other roadside appurtenances such as obstructions, rocks, large trees, etc. Those conflicts will be resolved prior to ordering equipment for the specific area where the conflict exists. Refer to the Standard Specification for Roads, Bridges, Facilities and Incidental Construction, Form 819 with Supplements January 2025, Section 9.80-Construction Surveying for pertinent details. Calendar days for this phase will run through the winter shutdown (December 1 through March 31 of the following year) per 1.08.07 below.

Phase 2 – Construction Phase

When all apparent conflicts have been identified and resolved, and written commitments have been received from suppliers that all equipment and materials will be received within 30 days, the Contractor may request that the Construction phase begin. Once commencement of Construction begins, as and when approved by the Engineer, the Contractor will have the remaining Contract calendar days to complete the work, including cleanup. That work, once started, must be completed within the time established for the original Contract, and Liquidated Damages, as specified elsewhere in the Contract, will be assessed against the Contractor per calendar day from that day until the date on which the work is complete. If unforeseen situations arise, the Contractor may request an extension of time for an individual location and, if justified,

the Engineer may grant an extension of time for that location. Granting an extension of time for one location will not entitle the Contractor to extensions of time for other locations in the Project.

Phase 2 will not start prior to the conclusion of Phase 1, without the written permission of the Engineer. If Phase 1 is completed during the winter period, Phase 2 will begin on the following April 1. The Contractor may begin Phase 2 only with prior written permission from the Engineer to do so, unless all the work allotted for this phase can be completed prior to the winter period. If the Project will not be completed in one construction season, the Contractor shall complete all work started at or between intersections, including cleanup, prior to the winter shutdown.

New Work

Additional work, including work at a separate location, may be added to the Contract in accordance with Article 1.04.05 of the Standard Specifications. This work may result in a Contract extension, which would require an Organization Phase and a Construction Phase for the new location. If a Contract extension is granted for the additional work, Liquidated Damages for this portion of the work will be negotiated with the Contractor. Such an extension of time would not affect the time allowed for the original work in the contract. Original work, once started, must be completed within the original Construction Phase, and Liquidated Damages will be assessed for any days beyond that Phase which the Contractor takes to complete the original work.

Stage Construction along Meadow Street

Stage 1

1. Install temporary pavement markings as shown on Stage 1 MPT Plans.
2. Install temporary barrier and Temporary Sand Barrels (TSBs).
3. Remove raised curb area in median island (both locations) and replace with temporary pavement (for vehicle travel lane use in future stages).

Stage 2

1. Shift traffic and install temporary pavement markings as shown on Stage 2 MPT Plans.
2. Relocate temporary barrier and TSBs from Stage 1.
3. Complete roadway widening work on the easterly side of Meadow Street between Bank Street and I-84 EB On Ramp.

Stage 3

1. Maintain temporary pavement markings, temporary barrier, and TSBs along Meadow Street SB from Stage 2 for use in Stage 3.
2. Shift traffic along Meadow Street NB and install temporary pavement markings as shown on Stage 3 MPT Plans.
3. Relocate temporary barrier and TSBs from Stage 2.
4. Complete full depth reconstruction work along Meadow Street as shown on the plans.
5. Complete median island work along Meadow Street at I-84 EB On Ramp.

Stage 4

1. Shift traffic along Meadow Street and install temporary pavement markings as shown on Stage 4 MPT Plans.
2. Relocate temporary barrier and TSBs from Stage 3.
3. Complete full depth reconstruction work along Meadow Street as shown on the plans.
4. Install proposed raised median along Meadow Street, between Field Street and Proposed Multiuse Trail. Beyond the proposed raised median, traffic drums used to protect for the extension of the Multiuse Trail to approximately 515+00.

Stage 5

1. Shift traffic along Meadow Street and install temporary pavement markings as shown on Stage 5 MPT Plans.
2. Relocate temporary barrier and TSBs from Stage 4. This stage is required to come after Stage 4, involving the installation of the proposed raised median along Meadow Street.
3. Complete full depth reconstruction and proposed Multiuse Trail.
4. Complete Meadow Street full depth reconstruction on the easterly side of Meadow Street, as shown on the plans.
5. Complete Meadow Street full depth reconstruction on the easterly side of Meadow Street, as shown on the plans.

Stage 6

1. Shift traffic along Meadow Street and install temporary pavement markings as shown on Stage 6 MPT Plans.
2. Relocate temporary barrier and TSBs from Stage 5.
3. Complete full depth reconstruction along Meadow Street and Field Street, as well as on the southern side of Field Street, as shown on the plans.

West Liberty Street (at Bank Street)

1. Shift traffic along the intersection of West Liberty Street / Bank Street and install temporary pavement markings as shown on the MPT plans.
2. Relocate temporary barrier and TSBs from previous stage, to provide for extension of Multiuse Trail at this intersection.

The I-84 EB Exit 21 Off-Ramp structure may be removed during any stage of Meadow Street noted above, provided that it does not conflict with the proposed work being performed during that stage and is not done in conjunction with any other Detour Plan.

Article 1.08.04 - Limitation of Operations - Add the following:

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:

I-84 Eastbound

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

- A. On the following State observed Legal Holidays:
 - New Year's Day Labor Day
 - Good Friday Thanksgiving Day
 - Memorial Day Christmas Day
 - Independence Day
- B. During the following Legal Holiday Periods:
 - i. When an above Legal Holiday is celebrated on a Sunday or Monday: From 6:00 a.m. the immediately preceding Friday to 6:00 a.m. the immediately following Tuesday.
 - ii. When an above Legal Holiday is celebrated on a Tuesday, Wednesday, or Thursday: From 6:00 a.m. the day before to 6:00 a.m. the day after, except Thanksgiving (see below for Thanksgiving specific restrictions).
 - iii. When an above Legal Holiday is celebrated on a Friday or Saturday: From 6:00 a.m. the immediately preceding Thursday to 6:00 a.m. the immediately following Monday.
 - iv. Thanksgiving: From 6:00 a.m. the Wednesday before to 6:00 a.m. the Monday after.

During all other times:

- A. The Contractor shall maintain and protect traffic as shown on the accompanying "Limitation of Operations" charts, which dictate the maximum number of lanes allowed to be closed and the allowable hours for implementing a rolling roadblock operation for each day of the week.
- B. The Contractor will be allowed to halt traffic for a period not to exceed 10 minutes to actively perform installing overhead signs on existing sign supports, as approved by the Engineer, between 12:01 a.m. and 5:00 a.m. during all non-Legal Holiday Periods.

I-84 EB On-Ramp at Meadow Street, I-84 WB On-Ramp at Bank Street

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

Additional Restrictions:

- A. The Contractor shall be permitted to close I-84 EB On-Ramp at Meadow Street and detour vehicular traffic per the I-84 EB On-Ramp Closure Detour Plan (DTR-02) for four (4) night shifts between 8:00 pm and 6:00 am. The Contractor shall be permitted to close the I-84 WB On-Ramp at Bank Street and detour vehicular traffic per the I-84 WB On-Ramp Closure Detour Plan (DTR-03) for six (6) night shifts between 8:00 pm and 6:00 am.
- B. The Contractor shall provide a schedule of the closure period(s) to the Engineer for approval at least 14 days prior to the scheduled closure period(s). The I-84 EB On-Ramp Closure Detour Plan (DTR-02) shall be in effect during Stages 4 and/or 5.
- C. The Contractor will be allowed to halt traffic for a period not to exceed 10 minutes to actively perform installing overhead signs on existing sign supports, as approved by the Engineer, between 12:01 a.m. and 5:00 a.m. during all non-Legal Holiday Periods.
- D. The Contractor shall not be allowed to close the I-84 EB On-Ramp at Meadow Street & I-84 WB On-Ramp at Bank Street and detour traffic during a Legal Holiday or Legal Holiday Period.

Meadow Street

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.

Additional Restrictions:

- A. The Contractor shall be permitted to close Meadow Street and detour vehicular traffic, bicycles, and pedestrians per the Meadow Street Closure Detour Plan (DTR-01) for four (4) night shifts between 7:00 p.m. and 6:00 a.m.
- B. The Contractor shall provide a schedule of the closure period(s) to the Engineer for approval at least 14 days prior to the scheduled closure period(s).
- C. The Contractor will be allowed to halt traffic for a period not to exceed 10 minutes to actively perform installing overhead signs on existing sign supports, as approved by the Engineer, between 12:01 a.m. and 5:00 a.m. during all non-Legal Holiday Periods.

Field Street

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.

Additional Restrictions:

- A. The Contractor shall be allowed to close eastbound Field Street and detour traffic:
 - i. Monday through Friday between 8:00 p.m. and 6:00 a.m.
 - ii. Contractor to supply a schedule with proposed closure dates of eastbound Field Street per the Field Street Closure Detour Plan (DTR-04) during Stage 6 a minimum of fourteen (14) days prior to the implementation of any closure. The schedule is subject to approval by the Engineer. It is anticipated that the duration of closure of eastbound Field Street would be thirty (30) full working shifts. This closure shall only affect vehicular traffic, as shown on the Field Street Closure Detour Plan (DTR-04).
 - iii. Contractor to supply a schedule with proposed closure dates of westbound Field Street for trucks per the Field Street Closure Truck Detour Plan (DTR-05) during Stages 4 and/or 6 a minimum of fourteen (14) days prior to the implementation of any closures. The schedule is subject to approval by the Engineer. This closure shall only affect truck traffic along westbound Field Street, as shown the Field Street Closure Truck Detour Plan (DTR-05).

Bank Street and South Main Street

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.

All Other Roadways

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.

All construction on all other roadways affecting existing traffic operations shall be coordinated with the Engineer and the City of Waterbury.

Additionally, the Contractor shall notify the City of Waterbury, at least 14 days in advance of any work on all other roadways.

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.

Contractor will be required to temporary stopwork above the railroad right-of-way whenever a train is passing through the area.

Railroad Flagmen will be required to be used when the Contractor needs to access Pier 6 and when beams from the existing ramp are picked and removed.

Contractor is required to coordinate with the Railroad for approval of short term duration track outages or night-time track outages. There are currently no planned short term track outages or planned night time track outages as part of the project.

Article 1.08.07 – Determination of Contract Time:

Delete the second, third and fourth paragraphs and replace them with the following:

When the Contract time is on a calendar day basis, it shall be the number of consecutive calendar days stated in the Contract, INCLUDING the time period from December 1, 20XX through March 31, 20XX for Phase 1 (Organization Phase) only. The Contract time will begin on the effective date of the Engineer's Notice to Proceed, and it will be computed on a consecutive day basis, including all Saturdays, Sundays, Holidays, and non-working days. After March 31, 20XX, the Contract time shall be on a calendar day basis, including all Saturdays, Sundays,

Holidays, and non-work days which shall be the number of consecutive days stated in the Contract, EXCLUDING the time period from December 1 through March 31.

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 one or more State and/or federally listed species of bat has been documented within the Project limits. In Connecticut, the Eastern small-footed bat (*Myotis leibii*), tri-colored bat (*Perimyotis subflavus*), little brown bat (*Myotis lucifugus*), Northern long-eared bat (*Myotis septentrionalis*) and the Indiana bat (*Myotis sodalis*) are listed as State endangered; while the silver-haired bat (*Lasionycteris noctivagans*), hoary bat (*Lasiurus cinereus*) and the red bat (*Lasiurus borealis*) are listed as State species of special concern. The Northern long-eared bat, tri-colored bat, and the Indiana bat are also federally listed endangered species. Bats are the only mammals capable of actual flight and are primarily nocturnal. During the daylight, bats roost in trees and caves, but many have now adapted to roost in or on buildings including barns, houses, tunnels, and bridges. Within the Project limits, bats will use the snags, cavities, and underside of bark to roost and raise young. **This Project will have a Time of Year restriction for tree clearing, trimming and removal to protect the bat species listed.**

The Contractor shall, through the Engineer and at least 10 days prior to the commencement of any construction activities, arrange a meeting with the District Environmental Coordinator (DEC) and Office of Environmental Planning (OEP) (or their authorized delegate) to discuss proper protocol for maintaining environmental commitments made for the protection of these bat species and their habitat. OEP will provide oversight through the DEC and Engineer to ensure that the following protocols are followed and maintained during the Project:

- a. The Contractor, through the Engineer, shall arrange a pre-construction tree-clearing Site walk to review all trees proposed to be removed for the Project.
- b. Clearing, trimming or removal of any tree three (3) inches diameter at breast height (DBH) or greater will be prohibited between April 15 and October 31.
- c. This restriction shall also apply to invasive species removal work and shall be reflected in the Contractor's Invasive Vegetation Removal Plan, if applicable.

These practices will be applied to the entire Project unless a specified location is identified within the Project plans, which denotes specific areas of concern.

If any bats are observed in or around the Project area, the Engineer will notify the DEC to facilitate further coordination with OEP's Environmental Resource Compliance Unit. If the DEC is unable to be reached, notify OEP at Andrew.Piraneo@ct.gov or at Marilyn.Gould@ct.gov.

The OEP will be responsible for completing and submitting the Natural Diversity Data Base (NDDDB) Vertebrate Sheet (<https://portal.ct.gov/DEEP/Endangered-Species/Contributing-Data>). This completed document allows CTDEEP to update their database.

All listed bat species are protected by federal and/or State laws which prohibit killing, harming, taking, harassing, or keeping them in your possession. A CTDEEP fact sheet(s) for the listed bats noted above shall be posted in the Contractor's and Inspection field offices and can be downloaded at the link below.

CTDEEP's Fact Sheet for Bats:

[Bat Fact Sheet](#)

15. The peregrine falcon (*Falco peregrinus*) is a State threatened species and Connecticut's largest falcon, measuring up to 20 inches. Adults are slate gray above and pale underneath with fine bars and spots of black; they have long pointed wings with a narrow tail. Young peregrine falcons have the same composition but are darker underneath and brown all over. Peregrine falcons have adapted to life in urban settings. In Connecticut, they sometimes utilize bridges for nesting and brood rearing purposes. Peregrine falcons will actively and aggressively defend the nest. The peregrine falcon will attack anyone or anything that comes within the area of its nest. The peregrine falcon nesting season occurs between the months of April and July. For this reason, special conditions regarding the timing of work within the Project limits, and immediate area that have nesting peregrine falcons must be adhered to by the Contractor.

In order to protect this species and project personnel, the Contractor shall not introduce new work activities and staging areas within 330-foot radius of an active nest that is out of line of sight, or within a 660-foot radius from an active nest that is in the line of sight of work during nesting season (April 1 - July 31). Any change in construction sequencing, scheduling, or timing affecting work within a 330-foot radius or 660-foot radius of a known nest shall not be permitted.

The Contractor shall, through the Engineer, at least 10 days prior to the commencement of any construction activities, arrange for a CT DOT Environmental Inspector from the Office of Environmental Planning (OEP) or their authorized delegate to be available to meet and identify the nest location as well as discuss proper protocol for maintaining environmental commitments made to the protection of this species and habitat.

The peregrine falcon is protected by State laws which prohibit killing, harming, taking, or keeping them in your possession. Workers shall be notified of the existence of peregrine falcons in the area and be apprised of the laws protecting them. Fact sheet of the peregrine falcon shall be posted in the Contractor's and inspection field offices.

If any peregrine falcons are observed in or around the Project area, the OEP must be notified at Andrew.Piraneo@ct.gov or at Marilyn.Gould@ct.gov. If OEP staff cannot be reached at either of the above referenced emails, the District Environmental Coordinator will need to be contacted to facilitate further coordination with OEP's Environmental Resource Compliance Unit.

CTDEEP's Fact Sheet for the peregrine falcon:

[Peregrine Falcon Fact Sheet](#)

In Article 1.10.06- Protection of Archaeological and Paleontological Remains and Materials:

Add the following after the last paragraph:

The Contractor is hereby notified of an area of elevated environmental sensitivity within the Project limits. Saint Anne Roman Catholic Church, located at 515 S Main St, Waterbury, CT 06706, was determined to be potentially eligible for listing on the National Register of Historic Places through the environmental review process associated with either Section 106 of the National Historic Preservation Act (36 CFR Part 800) or cultural resource provisions of the Connecticut Environmental Policy Act (C.G.S. Sect. 22a-1 *et seq.*), or both, which are State and federal mandated legal protections by law. Certain activities within the Project limits will therefore require oversight from the Office of Environmental Planning (OEP).

If there are Project scope or design changes after award, the Engineer will notify the District Environmental Coordinator (DEC) to immediately contact OEP to review the changes to ensure that impacts to cultural resources have been properly considered throughout the duration of the Project. If the changes have potential negative impact to the area of environmental sensitivity, OEP will need to coordinate these changes with the State Historic Preservation Office and get concurrence prior to ground disturbing activities within or near the location requiring protection.

At least 10 days prior to the commencement of any construction activities, the Contractor shall, through the Engineer, arrange for the OEP to meet in the field and discuss proper protocol for work being performed within the Project limits including the following:

OEP will inform the Contractor and Engineer regarding general issues concerning cultural resource sensitivity within the Project limits.

- a. The Contractor shall submit a Protection Plan identifying the means and methods for protecting the existing stone masonry wall at Saint Anne Roman Catholic Church, as shown on the Plans, during construction. The Protection Plan shall be submitted through the Engineer and District Environmental Coordinator (DEC), for OEP review and acceptance.
- b. OEP will verify the limits of the area of elevated environmental sensitivity. If there are any adjustments or additional areas that require protection, OEP will coordinate with the Engineer and provide guidance.
- c. If areas outside of the proposed Project limits or work areas not identified on the Project plans require clearing or other ground disturbing activities, additional coordination with

OEP will be required to review these areas(s) and if required, follow the procedures as outlined above.

- d. If staging, laydown, or WSA areas were not identified in the Project plans, the Engineer shall submit to OEP the Contractor's proposed areas for additional screening for any potential impact to an elevated environmental sensitivity area.
- e. OEP will be responsible to take pre and post construction photographs of the area(s) of elevated environmental sensitivity to document the outcome of the commitments made to protect the Site(s).
- f. The Contractor shall immediately notify the Engineer should any damage occur to property within the identified area(s) of environmental sensitivity. The Engineer will contact the DEC to coordinate a meeting with OEP to determine if the damages have a detrimental impact to the area of elevated environmental sensitivity. If repairs are required, the Engineer will direct the Contractor to mitigate damages to the satisfaction of the OEP at no cost to the State.
- g. In the event damage occurs to property within the identified area(s) of environmental sensitivity as a result of unforeseen circumstances through no fault of the Contractor, the Engineer must be notified immediately and supporting documentation provided demonstrating such.

WILDLIFE IN CONNECTICUT

STATE-LISTED SPECIES

Bats

Background

Bats are among the world's most fascinating, beneficial and likeable animals, yet people often fear and misunderstand them. They are the only mammals capable of true flight. There are over 1,300 different species of bats in the world – nine different species of bats can be found in Connecticut, and all but one of them (the big brown bat) are on Connecticut's List of Endangered, Threatened and Special Concern Species.

The little brown and big brown bats were the most common bat species found in Connecticut until white-nose syndrome (WNS) was documented in the state in 2008. Several Connecticut bat populations have been devastated by WNS. The affected species, known as “cave bats”, have declined so dramatically that several were added to Connecticut's List of Endangered, Threatened and Special Concern Species in 2015. The big brown bat is considered a Species of Greatest Conservation Need (GCN) in Connecticut's Wildlife Action Plan, along with all of the state-listed bat species.

The three species of tree-roosting bats – silver-haired, hoary, and red bat – are not adversely affected by WNS, but their populations have declined from historical levels in eastern woodlands. They occur in relatively low numbers throughout Connecticut. All three have been



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Little brown bats hanging from the ceiling of a cave during hibernation. They are now considered rare in many parts of their original range and listed as endangered in Connecticut and across much of the Northeast.

listed as species of special concern in Connecticut since the first official list was released in 1992.

White-nose Syndrome

White-nose syndrome (WNS) is an epidemic in cave-roosting bat species that is causing tragic and extensive mortality in hibernating bats in eastern and midwestern

Bats of Connecticut

Common Name	Scientific Name	CT Status (2015)	Federal Status
Big brown bat	<i>Eptesicus fuscus</i>	GCN	
Little brown bat	<i>Myotis lucifugus</i>	E, GCN	
Northern long-eared bat	<i>Myotis septentrionalis</i>	E, GCN	T
Eastern small-footed bat	<i>Myotis leibii</i>	E, GCN	
Indiana bat	<i>Myotis sodalis</i>	E, GCN	E
Tri-colored bat	<i>Perimyotis subflavus</i>	E, GCN	
Silver-haired bat	<i>Lasionycteris noctivagans</i>	SC, GCN	
Eastern red bat	<i>Lasiurus borealis</i>	SC, GCN	
Hoary bat	<i>Lasiurus cinereus</i>	SC, GCN	

GCN: Greatest Conservation Need
E: Endangered
SC: Special Concern
T: Threatened



Little brown bats clustering in a hibernacula for winter. Bats will often cluster in small groups during hibernation potentially to minimize heat loss during the brief periods that they awaken.

North America. The U.S. Fish and Wildlife Service estimated in 2012 that 5.7 million to 6.7 million bats had perished in the eastern United States and Canada since WNS was discovered in New York in 2006. For certain species, mortality has reached 90 to 100 percent. In Connecticut, dramatic losses have been documented for the northern long-eared bat, little brown bat, and tri-colored bat. While the big brown bat and eastern small-footed bat have also experienced significant declines due to WNS, losses are not as severe as those experienced by other species.

Researchers have determined that WNS is caused by a fungus, *Pseudogymnoascus destructans* (*Pd*), which is visible as a white powdery growth on the muzzle and skin of hibernating bats. This fungus thrives in the cold and humid conditions characteristic of caves and mines bats use for hibernation. WNS is transmitted primarily from bat to bat, particularly where bats gather in clusters to over-winter in their underground hibernation sites. In addition, people may inadvertently carry fungal spores from cave to cave on their clothing and gear when visiting the caves.

The *Pd* fungus infects the muzzle and wings of bats during hibernation when metabolism and immune systems in bats are largely shut down. Research indicates that bats infected with the *Pd* fungus awaken more frequently from hibernation and burn their precious fat reserves. Bats with depleted energy reserves do not make it through winter, and are sometimes observed desperately searching for food and water in the winter months, only to perish due to exposure and lack of food.

Since 2007, the DEEP Wildlife Division has been an active participant in the WNS response. Biologists continue to monitor hibernating bats for signs of WNS to document mortality. They also are tracking summer

maternity colonies closely to see whether WNS is having a negative effect on bat survival and reproduction.

Guided by the White-nose Syndrome National Plan, published in 2010, biologists and researchers across North America are working to curb the spread of WNS and develop ways to safely treat or control the *Pd* fungus. Many of these efforts have been supported by the State Wildlife Grants program, an important source of funding for addressing urgent wildlife disease issues.

More information on white-nose syndrome and related conservation efforts can be found at www.whitenosesyndrome.org.

What You Can Do

DEEP encourages residents to help monitor Connecticut's bat populations. Bats found outdoors from mid-November through mid-March should be reported to the Wildlife Division. While the characteristic white fuzzy fungal growth may not be readily visible on a bat's nose, bats seen flying during the day or clinging to the outside of a building during winter are a sign that white-nose syndrome may be at work. Sighting details, including the date, location, what you observed, and digital photos if possible, may be submitted by email to the DEEP Wildlife Division at deep.batprogram@ct.gov or by calling 860-424-3011.

Bat Houses

One of the best ways to help bats is to provide an artificial roost site by installing a specially-made bat house on your property. Pre-made bat houses can be purchased or you can build your own. The following factors are critical to the success of bat houses: maintaining suitable temperature ranges, the distance to food and water, the size and shape of inner roosting

Small Bat House

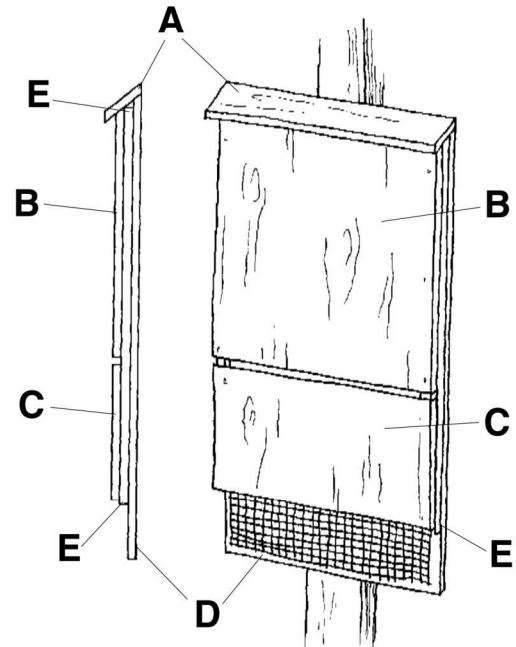
Use rough-cut lumber or exterior grade plywood ($\frac{1}{2}$ " thick minimum). The furring strips (E) should have a finished thickness of approximately $\frac{3}{4}$ ".

Staple $\frac{1}{8}$ " mesh (HDPE plastic) netting to back and front 2 sections. Make sure mesh extends to bottom of back.

Caulk all pieces and assemble with drywall screws to prevent wood from splitting. Apply additional caulk to outside joints as needed.

Apply dark stain to exterior surfaces and use tar paper or shingles on the roof and the top half of the bat house to increase interior temperatures.

- A Roof 4"x14"
- B Upper front 12"x20"
- C Lower front 12"x10"
- D Back 12"x36"
- E Spacers (1) 2"x12", (2) 2"x30 $\frac{1}{2}$ "



Large Bat House

Use $\frac{1}{2}$ " exterior grade plywood for front and back sections; $\frac{1}{4}$ " for all partitions. Sides are 1"x6" stock.

Staple $\frac{1}{8}$ " mesh (HDPE plastic) netting to all partitions and the back panel. Apply caulk to all joints.

Begin assembly by screwing the back to the sides. Attach 31" spacers to inside corners.

Place a partition on top of the spacers to within about $\frac{1}{2}$ " of the roof. Put the next set of spacers (26") on top of the partition and screw into the first spacers.

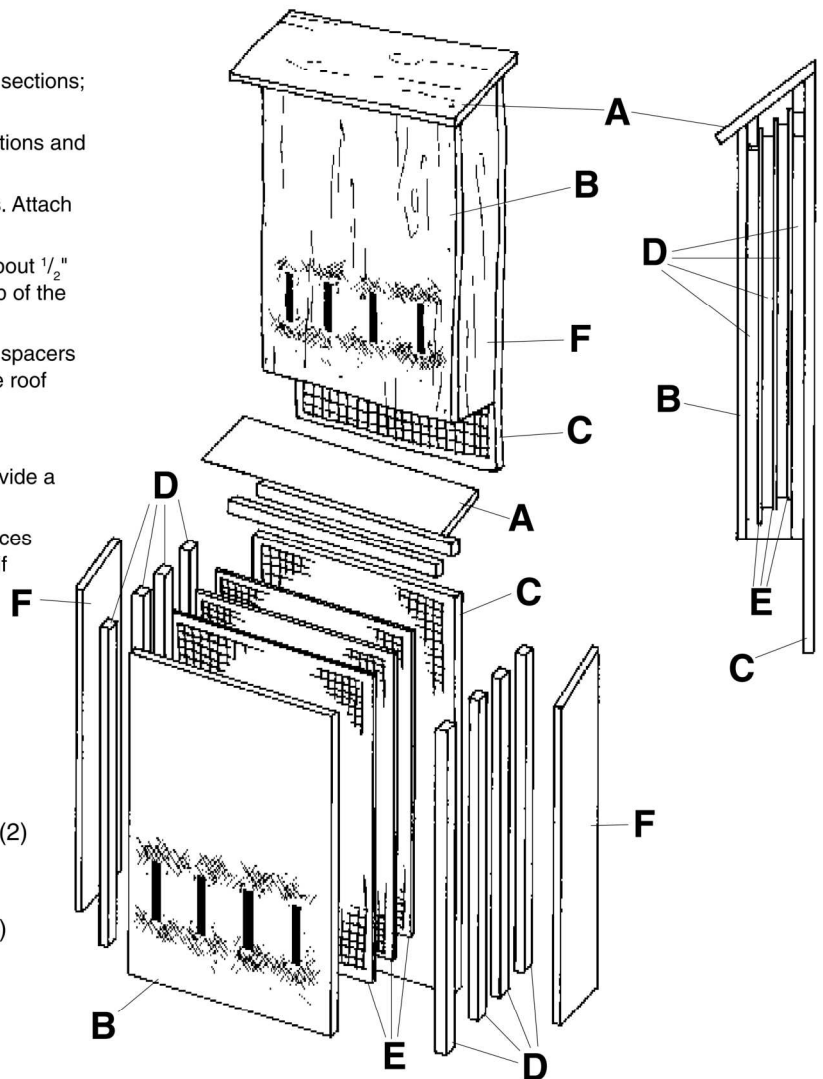
Repeat for remaining partitions ending with 28 $\frac{3}{4}$ " spacers (flush to roof line). Screw front to sides. Make sure roof angles are aligned.

Screw roof in place and caulk all exterior joints.

Scratch or roughen the front near the vents to provide a toe hold for bats landing on the box.

A dark stain should be applied to all exterior surfaces and tarpaper or shingles to the roof and upper half of the house to increase interior temperatures.

- A Roof 6"x28"
- B Front 24"x28 $\frac{3}{4}$ " (cut slots for vents, 5" above bottom edge)
- C Back 24"x36"
- D Spacers 1"x2" (4) 26" long, (2) 31" long, (2) 28 $\frac{3}{4}$ " long
- E Partitions $\frac{1}{4}$ " thick, $\frac{3}{4}$ " apart, 26" long
- F Sides 4"x28 $\frac{3}{4}$ "x31" (angle-cut top edges)





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Connecticut's three species of migratory "tree" bats - (from l to r) eastern red bat, hoary bat, and silver haired bat - typically roost solitarily on the outside of trees, underneath shedding bark, in the foliage, or in tree cavities.

spaces, and roughness of clinging surfaces.

Bat house designs range from simple and small-scale to large and complex. Two of the simpler designs are shown here. The small bat house provides only one size roosting space and accommodates fewer bats. The large bat house provides many roosting options and is ideal for larger nursery colonies of females and young. Following are tips for constructing and installing a bat house:

1. Use the roughest sides of the wood on the inner areas of the house. It also is a good idea to horizontally groove inner surfaces for footholds or attach non-metal screening to provide toe holds. This is also important for landing areas below the entrance.
2. Caulk all outside seams to limit air flow. This helps trap the bats' body heat inside the house. Sealants approved for aquarium or kitchen use are best.
3. Place tar paper or dark shingles on the top of the box and 4 to 6 inches down the sides to increase inside temperatures. Nursery roosts often require temperatures of 90 degrees F or more. A dark stain also helps increase the temperature.
4. Hang houses 10 to 15 feet above ground. South and southeast exposures are best for providing maximum thermal gain. Bats prefer houses that get at least 6 hours of sunlight a day.
5. If possible, protect the house from prevailing winds and provide an unobstructed approach.

Bat houses attached to the sides of buildings have had the greatest reported success. Free-standing poles in open areas also work, but tree-mounted houses generally remain unused. Bat houses placed near water or wetland areas often are most successful. Installing a bat house before April improves the chance of occupancy. Do not be discouraged if bats do not immediately move into their

new home. It is not unusual for a house to stand empty for at least a year before it is used.

To assist in conservation efforts, please report any bat house successes or failures to the DEEP Wildlife Division at deep.batprogram@ct.gov or 860-424-3011.

Natural History of Bats

Bats are furred, warm-blooded mammals with body lengths of 3 to 6 inches on average and wingspans ranging from 8 to 16 inches. The bones in a bat's wing are similar to those in human arms and hands. The fingers are extended and connected by leathery, elastic skin that grows from the sides of a bat's body. The thumbs are free from the wing membrane and have claws for grasping.

Bats have good eyesight and rely on vision for long-distance orientation. For short-distance navigation and catching food at night, they use echolocation. This sonar system helps bats, like dolphins, locate targets and background objects from the echoes of ultrasonic pulses. The tempo of these pulses are slow when a bat is foraging and quicken as the bat pursues and captures an insect. Detection, pursuit, and capture of an insect take about one second.

Connecticut's bats are primarily insect eaters. An exception is the hoary bat, which also eats other bats, namely the tri-colored bat. Bats are mostly nocturnal and almost always feed "on the wing." They use their wings, the skin around their tails, and their mouths to catch insects in flight. Bats are the only major predators of night-flying insects, making them beneficial in several ways. They consume many agricultural pests, such as cutworm and corn borer moths, potato beetles, and grasshoppers. Mosquitoes and similar human pests are eliminated much more efficiently by bats than by birds or expensive bug zappers.

Interesting Facts

- In general, bats are not dangerous. Like any other mammal, they can carry rabies, although less than one percent of all bats are infected with the virus. More people die annually from dog attacks, bee stings, lightning, and household accidents than from bat-transmitted rabies.
- Bats are not flying mice. They are the only mammal capable of true flight and are more closely related to primates (and people) than to rodents.
- Bats do not get caught in people's hair. They are adept fliers and rely on sensitive sonar (echolocation) to navigate night skies. Bats that swoop near people are after insects like mosquitoes and moths.
- Bats are not blind. They have good eyesight, but rely on echolocation to master night flight.
- Bats are not filthy or covered with parasites. Clean wings are essential for executing intricate flight patterns, so bats spend great amounts of time grooming themselves.
- Worldwide there are over 1,300 kinds of bats; Connecticut has only nine native species.
- Only 3 species of bats feed on animal blood. These vampire bats prefer to drink cattle or bird blood and are only found in Latin America.
- The smallest bat is the size of a small mouse; the largest, a fruit eater, has a 6-foot wingspan.
- A single little brown bat can eat 1,200 mosquitoes and night-flying insects in an hour.
- Bats have varied diets: 70 percent eat insects; many tropical species eat fruit or drink flower nectar; and some bats even catch frogs and fish.

Nuisance Problems

The presence of bats in buildings can be detected in several ways. At dusk, when bats leave roosts to feed, they may be seen exiting through eaves, vents, or from behind shutters or siding. Noise from large colonies may also announce their presence. Droppings and dark brown stains may appear near eaves and beneath entrance holes and roosts. Bat droppings (guano) are easily crushed, revealing shiny bits of undigested insects. Droppings are never white or chalky in appearance, like the droppings of birds.

The 2 most common bats involved in nuisance complaints are the little brown bat and big brown bat. The little brown bat ranges from 3.1 to 3.7 inches in length and has a wingspan of 8.6 to 10.5 inches. Big brown bats range from 4.1 to 4.8 inches in length, with a wingspan of 12.1 to 12.9 inches. Big brown bats can readily be distinguished from little brown bats in flight by their larger size, slow wingbeats, and audible chatter.



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Big brown bats are very common in Connecticut and across North America and often form maternity colonies in man-made structures such as barns, attics, and in the eaves of houses.

Removing a single bat: A bat that enters a home can often be removed easily. Closing off doorways to the room containing the bat and opening a window will usually prompt the bat to fly outside. A large jar or cardboard box may also be used to remove a bat. Move toward the bat slowly so that it is not startled and gently place the can over it. Slide stiff paper or cardboard under the opening, using it as a lid when removing the bat. Wear heavy leather gloves when removing a bat by hand. Bats, like all wild animals, may bite when handled and should not be removed bare-handed. Remember that bats, like other mammals, may be a source of rabies. The rabies virus is found in saliva and may be transmitted through the bite of an infected animal. If you are accidentally bitten while handling a bat, make sure the bat is saved for examination. Immediately wash the bite with soap and water and seek prompt medical advice. Non-bite exposures can also occur and should be treated in the same manner as a bite. A non-bite exposure occurs when saliva or brain tissue from an infected animal enters scratches, abrasions, open wounds, or mucous membranes (nose, mouth, eyes).

Dealing with a Bat Colony: Most colonies of bats are small and often remain unnoticed for many years. Large colonies residing in an attic or wall may become a nuisance because of noise and unsightly guano accumulations. Eviction and exclusion of roosting bats are the only safe, permanent solutions to a nuisance problem.

Exclusion and Bat-proofing: One of the simplest techniques for solving nuisance problems is letting the bats exit on their own and then preventing their re-entry to the roost. Little brown bats do not spend the winter in buildings, so bat-proofing can be done after they travel to their winter roost site. Big brown bats usually travel to other roosts also, but they have been known to use building roosts in winter. If nuisance problems involve big brown bats or if rapid exclusion is necessary, the first step is to find the exit(s) by watching the bats emerge



The northern long eared bat has experienced dramatic declines due to white-nose syndrome and is now extremely rare in Connecticut and across most of their range and are considered threatened at the federal level.

at dusk. Stains from body oils or droppings may help pinpoint exits. Exclusion should not be done from June through mid-August, as flightless young may be trapped and die in the roost, causing severe odor problems.

A simple one-way exclusion gate can be made using half-inch polypropylene structural-grade bird netting. During the day, hang the netting around the exits, using staples or duct tape. The netting should be attached several inches above the exits and extend at least 2 feet to either side and below the exit. The sides may be attached, but the bottom must hang free. As bats leave to feed, they will drop out of the roost unhindered. When they return, they will be unable to fly directly into the roost. These exclusion nets should be left in place for 3 or 4 nights to insure that no bats remain in the roost. After exclusion, the openings can be repaired when convenient. Caulk, fine screen, and oakum (petroleum-soaked rope) are all easy items to use for sealing openings.

Another simple one-way excluder can be made from plastic strips. In a section of flexible plastic, cut small strips (about 1-inch wide) that will serve as tiny door flaps. The bats can push past them to exit, but the strips will not flex inward to allow re-entry. This excluder should be installed in the same manner as the bird netting.

Exclusion of bats from Spanish or concrete tile roofs is often as simple as installing a rain gutter. The gutters should be installed flush against the attachment surface. The upper edge of the gutter should be even with the lower edge of the tile, extending outward about 8 inches. This exclusion can be done any time because the bats are still able to leave. Bats dislike

climbing over the slippery metal gutter and usually will not return.

If you prefer to hire someone to exclude and bat-proof your home, it is best to seek a specialist. If the bats need to be trapped or handled, the specialist must be licensed by the DEEP Wildlife Division. As with any business dealing, it is advisable to get more than one estimate for the job. Beware of scare tactics, and remember:

- Bats do not multiply like rabbits.
- Even sick bats rarely attack people or pets.
- Bats are not attracted in hordes by the scent of other bats.
- Bats have very few parasites, so additional spraying for parasites is not necessary.
- Permanent physical exclusion is essential for any bat control job.
- The use of poisons to eliminate a bat colony is illegal without a special permit.
- Bat guano is not "toxic."
- Rabies rates in bat populations are not increasing.



Little brown bats exhibiting signs of infection by white-nose syndrome. The conspicuous white growth around the muzzle is due to the pathogen *Psuedogymnoascus destructans* and gives the disease its namesake.



State of Connecticut
Department of Energy & Environmental Protection
Bureau of Natural Resources
Wildlife Division
<https://portal.ct.gov/DEEPWildlife>



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9/2021

SECTION 10.00 GENERAL CLAUSES FOR HIGHWAY ILLUMINATION AND TRAFFIC SIGNAL PROJECTS

This section is supplemented and amended as follows:

Article 10.00.03—Plans:

In the first paragraph, replace the 2nd, 3rd, and 4th sentences with the following:

The Contractor shall digitally mark, in red, any changes on the Plan(s) using a pdf program. Markups shall also include field-obtained GPS coordinates for installed span pole, mast arm assembly, controller, and light standard locations.

1. The GPS technology used shall provide coordinates that are within 12 inches of accuracy.
2. Coordinates provided are to be as accurate as possible for locations where satellite coverage is compromised by tree canopies, buildings, etc.

The Contractor shall submit the digital pdf file(s) to the Engineer and to rcavanaugh@waterburyct.org, for Traffic Signals, prior to requesting the Functional Inspection. Also prior to requesting the Functional Inspection, the Contractor shall deliver to the Engineer the following:

In Subarticle 1, replace “Four (4) paper prints” with “Three (3) paper prints and one electronic PDF file sent to rcavanaugh@waterburyct.org” [of schematics and wiring diagrams...].

Add Subarticle 4 as follows:

4. Digital field pictures, in .JPG format and labeled appropriately, of the following constructed items:
 - a. Signals heads facing each approach. The pictures are to be taken along each intersection approach in order to observe the relation between the signal faces and the approach centerline, lane line(s), and edge line.
 - b. Inside of hand holes
 - c. Inside of the controller cabinet
 - d. Traffic foundations (Span poles, Mast Arm Assemblies, Controller Cabinet, Light Standards, Pedestals)
 - e. Video detector locations and mountings
 - f. Utility Clearances from span wire and MAAs
 - g. Screen shots of detection zones

Article 10.00.10—Tests: Preliminary and Final:

In Subarticle 2. Traffic Signal Projects, a) Detector Acceptance Test, add the following:

4. **360-Degree Video Detection System Tests:** The following tests shall be performed on all traffic signals with 360-Degree Video Detection Systems. The test results shall be recorded and submitted to the Engineer prior to the functional inspection of the traffic signal. Refer

to the "Quality Best Practices" attached to the special provision for Item #1112287A "360 DEGREE VIDEO DETECTION PROCESSOR."

- a) **Cabinet Grounding Test:** The cabinet ground shall be tested with a clamp-on ground meter in accordance with the detection system manufacturer's recommendations to ensure a ground reading of a maximum of 25 Ohms. The results of this test shall be recorded.
- b) **AC Power Test:** The AC outlet for the processor shall be checked with a digital voltmeter according to the detection system manufacturer's recommendations to ensure that all three connections for the outlet are properly connected and to verify that the AC voltage from the line to neutral and the line to ground is 120VAC. The results of this test shall be recorded.
- c) **Ethernet Cable Test:** Each Ethernet cable shall be tested with a digital Ethernet cable tester in accordance with the detection system manufacturer's recommendations to ensure the cable length does not exceed 300 feet, and ensure a Real World Certification of at least 100 MB. The results of this test shall be recorded.
- d) **Drain Wire Resistance Test:** Each Ethernet cable drain wire shall be checked with a digital voltmeter in accordance with detection system manufacturer's recommendations to ensure that the resistance between the drain wire grounding post and the cabinet ground rod equals 0 Ohms. The results of this test shall be recorded.

In Subarticle 2. Traffic Signal Projects, b) Intersection Acceptance Test, 3. Functional Inspection, in the first paragraph, after the 2nd sentence ("A qualified representative... ..during the Functional Inspection."), add the following:

Prior to the Functional Inspection, the Contractor shall verify with the CTDOT Traffic Signal Lab that each detection camera is operating properly. In instances where the existing traffic control equipment is being revised or replaced, the verification with the CTDOT Traffic Signal Lab shall be prior to the required Preliminary Functional Test. The Contractor shall have a bucket truck with crew on Site during the Functional Inspection to make any necessary aerial signal and detection equipment adjustments as directed by the Engineer.

In the same Subarticle, after the fourth paragraph, add the following:

Upon the successful completion of the Functional Inspection and once all corrections and adjustments resulting from the Functional Inspection are completed, the Contractor shall update as-built plans and pictures to reflect any changes made and submit as required in Article 10.00.03 within 7 days of the completion of the 30-day test.

Article 10.00.12—Negotiations with Utility Company:

Add the following:

The Contractor shall notify utility companies a minimum of 30 days prior to required work or services. Refer to special provision Section 1.07 – Legal Relations and Responsibilities for the list of utility companies and representatives.

The Contractor shall perform all work in conformance with Rules and Regulations of the Public Utility Regulatory Authority (PURA) concerning Traffic Signals attached to Public Service Company Poles. The Contractor is cautioned that there may be energized wires in the vicinity of the specified installations. In addition to ensuring compliance with NESC and OSHA regulations, the Contractor and/or its Sub-Contractors shall coordinate with the appropriate utility company for securing/protecting the Site during the installation of traffic signal mast arms, span poles or illumination poles.

When a span is attached to a utility pole, the Contractor shall ensure the anchor is in line with the proposed traffic signal span wire. More than 5-degree deviation will lower the holding strength and is not allowed. The Contractor shall provide any necessary assistance required by the utility company and ensure the anchor and guy have been installed and properly tensioned prior to attaching the span wire to the utility pole.

SECTION 12.00 – GENERAL CLAUSES FOR HIGHWAY SIGNING

Description:

Work under this item shall conform to the requirements of Section 12.00 supplemented as follows:

12.00.07 – Global Positioning System (GPS) coordinates for signs:

The Contractor shall obtain and provide to the Engineer sign installation data, including Global Positioning System (GPS) latitude and longitude coordinates, for all new permanent State owned and maintained signs (temporary and construction signs are not to be included) installed in the project. The Engineer shall forward the sign data to the Division of Traffic Engineering for upload into the Highway Sign Inventory and Maintenance Management Program (SIMS). Sign data submissions or questions relating to SIMS or GPS shall be sent to DOT-SignInventory@ct.gov.

The horizontal datum is to be set to the State Plane Coordinate System, North American Datum of 1983 (NAD83) in feet. The minimum tolerance must be within 10 feet. The format of the GPS information shall be provided in a Microsoft Office compatible spreadsheet (Excel) file with data for each sign. The record for each sign installed is to be compatible with the anticipated CTDOT Sign Inventory and Management System (CTSIMS). The following format shall be used. However, the data fields noted by “#” are not required for the project submission. These entries will be completed as part of the Traffic Engineering CTSIMS data upload.

The cost of this work shall be included in the cost of the respective sign face – sheet aluminum and sign face – extruded aluminum items. The receipt of this electronic database must be received and accepted by the Engineer prior to final payment for items involving permanent highway signing. The electronic database information shall detail information regarding the sign actually installed by the project.

Field Number	Type	size	Description
1	text	20	Record Number (starting at 1...)
2	text	20	Sign Catalog Number
# 3	text	10	Size Height
# 4	text	10	Size Width
5	text	25	Legend
# 6	text	10	Background Color
# 7	text	10	Copy Color
8	Link	25	Material (see acceptable categories)
9	text	30	Comments if any
# 10	text	20	MUTCD Type
11	text	15	Town

	12	text	5	Route
	13	text	5	Route direction
#	14	text	10	Highway Log Mileage
	15	text	15	Latitude
	16	text	15	Longitude
	17	text	25	Mounting Type
	18	text	25	Reflective Sheeting Type
	19	date	25	Date Installed
	20	text	10	Number of Posts
	21	text	255	Sheeting Manufacturer name and address
	22	text	15	State Project Number (or)
	23	text	15	Encroachment Permit number.
	24	Graphic	*	Sign Picture Graphic.

* Graphics provided shall be representative of the sign supplied and be in color. Graphic formats shall be either JPG or TIFF and provided with a recommended pixel density of 800 x 600. The graphic shall be inserted in the supplied media in field 24 for each sign.

SECTION 12.03 – SIDE MOUNTED SIGN FOUNDATION

Replace Section 12.03 with the following:

12.03.01—Description: Work under this item shall consist of constructing reinforced concrete drilled shaft foundations for side mounted sign structures at the locations and to the details shown on the Plans.

12.03.02—Materials: The reinforcing steel shall be uncoated, ASTM A615, Grade 60 reinforcement meeting the requirements of M.06.01.

Concrete shall be Class PCC03340 meeting the requirements of Section 6.01 and Section M.03.

The slurry, if used, shall be Contractor designed mineral or polymer slurry that meets the range of values listed herein.

Topsoil shall meet the requirements of M.13.01.

Fertilizer shall meet the requirements of M.13.03.

Seed mixture shall meet the requirements of M.13.04, or the seed mix specified on the Plans.

Mulch shall meet the requirements of M.13.05.

Erosion control matting shall meet the requirements of M.13.09.

All other material shall meet the requirements shown on the Plans.

12.03.03—Construction Methods:

1. Subsurface Conditions for Bidding: For bidding this item of work, due to the potential for varying subsurface conditions at each foundation location, the Contractor shall assume that each drilled shaft foundation will be excavated and constructed entirely in soil overburden and that cobbles and small boulders will be encountered.

The excavation of rock, as defined in the Basis of Payment, will be paid for under the item "Rock in Foundation Excavation."

During excavation and construction of each foundation, should the Contractor encounter subsurface conditions that differ materially from those assumed at the time of bid, the Contractor shall notify the Engineer. All matters regarding increased cost relating to an agreed upon change in subsurface conditions will be handled per "1.04.04 – Differing Site Conditions."

2. Submittals:

- a) **Reinforcement:** The submittal of Shop Drawings is **not** required for reinforcement that is fabricated, furnished, assembled, and installed in accordance with these specifications and the details shown on the Plans.
- b) **Concrete Mix Design:** The Contractor shall submit the concrete mix design, including admixtures, for review in accordance with 1.05.02 and M.03.02.
- c) **Slurry Mix Design:** The Contractor shall submit the slurry mix design, including admixtures, for review in accordance with 1.05.02.
- d) **Foundation Construction Procedure:** The Contractor shall submit a written foundation construction procedure outlining: the equipment; drilling methods for soil and rock excavation, including removal of obstructions and how spoils will be handled; temporary casing materials, placement and removal; slurry placement; reinforcement, anchorage placement; concrete placement and water containment required for the drilled shaft foundation construction for review in accordance with 1.05.02. The procedure shall include contingencies for the various soil, rock and subsurface water conditions that may be encountered during the foundation construction.

All procedures accepted by the Engineer shall be subject to trial in the field and shall not relieve the Contractor of the responsibility to satisfactorily complete the work as detailed in the Plans and specifications. The Contractor shall not commence construction of the drilled shafts until the Engineer has accepted the foundation construction procedure.

The foundation construction procedure may be submitted to the Engineer for review without inclusion of slurry if the Contractor chooses. However, a slurry procedure and slurry mix design shall be required if the Contractor chooses to advance excavation ahead of the casings or if the Engineer determines that application of slurry is required to maintain soil stability. The Contractor shall be responsible for any delays to the Project resulting from slurry construction procedure and mix design reviews submitted after approval of a dry and permanent or temporary casing method.

3. Excavation and Construction Methodologies:

Excavations required for shafts shall be performed through whatever materials are encountered, to the dimensions and elevations shown on the Plans for each side mounted sign structure. The methods and equipment used shall be suitable for the intended purpose, materials encountered, and site conditions allowing the foundation concrete to be placed against undisturbed soil, undisturbed rock, or a casing that the Contractor chooses to leave in place. The Contractor is responsible for maintaining the stability of the shaft excavation during all phases of construction. Generally, excavation shall be performed using one of the following construction methodologies:

- a) **Dry Construction Method:** The dry construction method consists of drilling the shaft excavation, removing accumulated water and loose material from the excavation, and placing the shaft concrete in a relatively dry excavation. The dry construction method shall be used only at sites where the groundwater table and site conditions are suitable to permit construction of the shaft in a relatively dry excavation, and where the sides and bottom of the shaft excavation are stable, there are no facilities adjacent to the shaft requiring support, and the excavation's sides and bottom may be visually inspected prior to placing the concrete. The use of the dry construction method is permitted if less than one foot of water accumulates in the bottom of a hole without pumping over a 1 hour period, the excavation remains stable and any loose material and water can be removed prior to placement of concrete.
- b) **Wet Construction Method:** The wet construction method shall be used at sites where a dry excavation cannot be maintained for placement of the shaft concrete. Wet construction methods consist of using a polymer or mineral slurry to maintain stability of the hole perimeter while advancing the excavation to final depth, placing the reinforcing cage and shaft concrete. This procedure may require desanding and cleaning the slurry; final cleaning of the excavation by means of a bailing bucket, air lift, submersible pump or other devices; and placing the shaft concrete with a tremie. Unless it is demonstrated to the satisfaction of the Engineer that the surface casing is not required, temporary surface casings shall be provided to aid shaft alignment and position, and to prevent sloughing of the top of the shaft excavation. Surface casing is defined as the amount of casing required from the ground surface to a point in the shaft excavation where sloughing of the surrounding soil does not occur.
- c) **Temporary Casing Construction Method:** The temporary casing construction method shall be used in lieu of the dry or wet construction methods or where the dry or wet construction methods are inadequate to prevent shaft caving, excessive deformation of the shaft or when temporary support of adjacent facilities is required. Temporary casing construction method consists of advancing the excavation through caving material with or without slurry. Temporary casing may be installed by either placing it in a predrilled shaft or twisting, driving or vibratory procedures in advance of excavation to the lower limits of the caving material. When a nearly impervious formation is reached, a casing is placed in the hole and sealed in the nearly impervious formation. After the drilling fluid is removed from the casing, drilling may proceed as with the dry method except that the casing is withdrawn when the shaft concrete is placed. If seepage conditions prevent use of the dry method, excavation is completed using the wet method. Slurry may be omitted if the casing is advanced ahead of drilling and only if minor caving of the hole is observed. Slurry shall be used in installation if drilling is to advance ahead of the casing or if the Engineer determines that the application of the slurry is required in order to maintain soil stability around the hole.

The use of a temporary casing is mandatory if shown on the Plans for a specific foundation location.

If an obstruction or rock is encountered, the Engineer shall be notified to inspect and determine the elevation of the top and bottom of the obstruction or elevation of the top of competent rock.

Obstructions are defined as impenetrable objects that (a) cannot be removed or excavated using conventional augers fitted with soil or rock teeth, underreaming tools, or drilling buckets; or (b) cause a significant decrease in the rate of excavation advancement, relative to the rate of advancement for the rest of the shaft excavation within the particular strata where the obstruction is located that had been achieved using the techniques and equipment that had previously been used successfully to excavate the shaft.

The Engineer will be the sole judge of the significance of any reduced rate of shaft advancement and of the classification of obstruction excavation. The Engineer will be present at the site of the obstruction in order to evaluate obstructions, to authorize measures for dealing with them, and to approve the designation each obstruction. Shallow obstructions are obstructions located within 5 feet of the top level of the shaft. Shallow obstructions at shaft locations shall be removed at the Contractor's expense.

Excavated materials which are removed from the shaft excavation, ground water, and any supplemental materials required for the excavation methodology used by the Contractor, such as drilling fluids, shall be disposed of by the Contractor as directed by the Engineer and in accordance with Section 1.10.

Casings shall be metal, smooth, clean, watertight, and of ample strength to withstand both handling and driving stresses and the pressure of both concrete and the surrounding earth materials. The outside diameter of casing shall not be less than the specified size of the shaft. Temporary casings shall be removed while the concrete remains workable (i.e., a slump of 4.0 inches or greater). Before the casing is withdrawn and while the casing is being withdrawn, a 5.0 foot minimum head of fresh concrete in the casing shall be maintained so that all the fluid trapped behind the casing is displaced upward without contaminating the shaft concrete. The required minimum concrete head may have to be increased to counteract groundwater head outside the casing. Separation of the concrete by hammering or otherwise vibrating the casing, during withdrawal operations, is prohibited unless allowed by the Engineer. Casing extraction shall be at a slow, uniform rate with the pull in line with the shaft axis.

Temporary casings that the Contractor chooses to leave in place shall be removed a minimum of 12 inches below the finished grade.

Slurry used in the drilling process shall be a mineral or polymer slurry. The slurry shall have both a mineral grain size that will remain in suspension and sufficient viscosity and gel characteristics to transport excavated material to a suitable screening system. The percentage and specific gravity of the material used to make the suspension shall be sufficient to maintain the stability of the excavation and to allow proper concrete placement. The level of the slurry shall be maintained at a height sufficient to prevent caving of the hole.

The slurry shall be premixed thoroughly with clean fresh water at a temperature above 41° F and

adequate time shall be allotted for hydration prior to introduction into the shaft excavation. The elevation of the slurry within the shaft foundation shall be maintained within 24.0 inches of the top casing and at least 48.0 inches above the existing water level during drilling and until the concrete placement is essentially complete. The slurry properties shall be maintained at all times, including non-working periods and stoppages. The slurry shall be circulated and agitated, continuously, if necessary, to maintain the slurry properties and to prevent it from setting up in the shaft.

The Contractor, in the presence of the Engineer, shall perform control tests on the slurry to ensure that the density, viscosity, and pH fall within the acceptable limits tabulated below. The Contractor shall provide all equipment required to perform the tests. If desanding is required, sand content shall not exceed 4% (by volume) at any point in the shaft excavation as determined by the American Petroleum Institute sand content test.

Range of Values (at 68°F)

Property (Units)	Time of Slurry Introduction	Time of Concreting (in Hole)	Test Method
Density (pcf)	64.3 to 69.1	64.3 to 75.0	Density Balance
Viscosity (seconds per quart)	28 to 45	28 to 45	Marsh Cone
pH	8 to 11	8 to 11	pH paper or meter

The control tests to determine unit weight (density), viscosity, and pH values of the slurry shall be done during the shaft excavation to establish a consistent working pattern.

Prior to placing shaft concrete, slurry samples shall be taken from the bottom and at intervals not exceeding 10.0 feet for the full height of slurry. Any heavily contaminated slurry that has accumulated at the bottom of the shaft shall be eliminated. The slurry shall be within specification requirements immediately before shaft concrete placement.

After completing the shaft excavation, all loose material existing at the bottom of the hole shall be removed.

The excavated holes shall be covered when left unattended.

4. Reinforcement Assembly and Installation: The reinforcing steel shall be fabricated and assembled in accordance with 6.02.03. All reinforcement shall be assembled with wire ties. All reinforcing bar intersections shall be tied. Welding to assemble the reinforcement is not permitted.

Immediately after the shaft excavation has been inspected and approved by the Engineer and prior to placement of the concrete, the assembled reinforcing steel cage, including cage stiffener

bars, spacers, centralizers, and other necessary appurtenances, shall be carefully placed into the shaft excavation as a unit. Dropping or forcing cages into the shaft will not be allowed. The reinforcing steel in the shaft shall be tied and supported so that the reinforcing steel will remain within allowable tolerances of its intended position until the concrete will support the reinforcing steel. When concrete is placed by tremie methods, temporary hold-down devices shall be used to prevent uplifting of the reinforcing steel cage during concrete placement. After placement of the reinforcing cage, the Engineer will inspect the shaft to ensure that it has remained clean. If the inspection indicates that loose material has accumulated at the bottom of shaft excavation, the Contractor shall remove the reinforcing cage and reclean the shaft excavation.

5. Concrete Placement: Concrete construction shall meet the requirements of 6.01.03.

The top of the foundation shall be formed as shown on the Plans. Embedded anchors, anchor rods, and stub post assemblies for side mounted sign structures shall be placed as shown on the Plans and supported on the forms. A temporary template plate shall be used to hold the anchorage materials in the correct position. All anchorage materials shall be installed plumb.

Concrete shall be placed in the shaft excavation as soon as possible after placement of the reinforcing steel cage. Concrete shall be monolithically placed in a continuous operation to the top of the shaft. Concrete construction joints are not permitted. The concrete level shall be horizontal during the placement operations. Concrete placement shall continue after the shaft is full and good quality concrete is evident at the top of the shaft.

In dry construction, concrete shall be placed in a single continuous operation with the freefall flow of concrete down the center of the shaft excavation so as to consolidate the concrete on impact. During placement operations, the concrete is not permitted to hit the reinforcing steel. A drop chute, consisting of a hopper and flexible hose, shall be used to direct the concrete down the center of the foundation and prevent the concrete from hitting the reinforcing steel. Accumulated water shall be removed before placing the concrete. At the time of concrete placement, no more than 2.0 inches of water may exist at the bottom of the excavation and loose sediment no more than 0.5 inches over one-half the base is acceptable.

If water accumulates in the excavation such that the concrete cannot be placed meeting the requirements of dry construction, the concrete placement shall meet the wet construction requirements. In wet construction, concrete is to be placed by the tremie method, where the concrete displaces the water or slurry from bottom of the excavation to the top. The tremies used to place concrete shall consist of a tube of sufficient length, weight, and diameter to discharge concrete at the shaft base. The tremie shall not contain aluminum parts that may come in contact with the concrete. The tremie's inside diameter shall be at least 6 times the maximum size of aggregate used in the concrete mix but shall not be less than 10 inches. The inside and outside surfaces of the tremie shall be clean and smooth in order to permit flow of concrete and unimpeded withdrawal during concrete placement. The wall thickness of the tremie shall be adequate to prevent crimping or sharp bends, which would restrict concrete placement.

The tremie shall be watertight. Underwater placement shall not begin until the tremie is placed

to the shaft base, and the concrete shall be kept completely separated from the water or slurry prior to the time that it is discharged. Valves, bottom plates or plugs may be used for this purpose only if concrete discharge can begin within 1 tremie diameter of the base of the drilled shaft excavation. Plugs shall either be removed from the excavation or be of a material approved by the Engineer that will not cause a defect in the shaft if not removed. The discharge end of the tremie shall be constructed to permit the free radial flow of concrete during placement operations. The tremie discharge end shall be immersed at least 5 feet in concrete at all times after starting the flow of concrete. The flow of the concrete shall be continuous. The level of the concrete in the tremie shall be maintained above the level of slurry or water in the excavation at all times, in order to prevent water intrusion into the shaft concrete.

The shaft concrete shall be vibrated or rodded to a depth of 5.0 feet below the ground surface except where soft uncased soil in the excavation will possibly mix with the concrete.

Exposed concrete shall be cured and finished in accordance with 6.01.03.

No construction operations that would cause soil movement adjacent to the shaft, other than mild vibration, shall be conducted for at least 48 hours after shaft concrete has been placed.

6. Backfilling: The top of the foundations shall be backfilled, and the adjacent disturbed ground surfaces restored to match the surrounding area after the concrete has cured and the forms are removed. The Engineer will determine the type, thickness and horizontal limits of the surfaces to be restored. Placement of topsoil shall meet the requirements of 9.44.01 and 9.44.03. Seeding shall meet the requirements of 9.50.03 or the Contract special provisions.

The posts shall not be erected on the foundation until the concrete in the shaft has attained a compressive strength, f'_c , greater than or equal to 3,000 psi.

12.03.04—Method of Measurement: The work for the side mounted sign foundations will be measured for payment by the number of each foundation unit completely installed and accepted.

The work to remove rock from the foundation excavation will be measured from the top of competent rock, as determined by the Engineer, to the bottom of rock excavation.

12.03.05—Basis of Payment: This work will be paid for at the Contract unit price each for "Side Mounted Sign Foundation," completed and accepted in place, which price shall include all equipment, material, tools and labor incidental to the fabrication and construction including excavation, disposal of excavation spoils, reinforcement, concrete forms, and concrete for the foundations at the locations specified on the Plans.

When rock is encountered within the limits of excavation, its removal will be paid for at the Contract unit price per vertical foot for "Rock in Foundation Excavation," which price shall include any additional excavation to remove the rock and any additional concrete required to fill the excavation beyond the specified foundation hole dimensions. Rock, in so far as it applies to "Rock in Foundation Excavation," shall be defined as rock in definite ledge formation, boulders,

or portions of boulders, cement masonry structures, concrete structures or Portland cement concrete pavement which has a cross-sectional area that exceeds 50% of the cross-sectional area of the specified foundation hole.

No additional payment will be made for temporary casings.

No additional payment will be made for the Contractor to test the slurry when it is used to construct a drilled shaft foundation

Backfilling and restoration of adjacent ground surfaces (slope protection, topsoil and seed, etc.) in all areas disturbed by the work will not be paid for separately but will be included as part of the work.

Pay Item	Pay Unit
Side Mounted Sign Foundation	ea.
Rock in Foundation Excavation	v.f.

D.B.E. SUBCONTRACTORS AND MATERIAL SUPPLIERS OR MANUFACTURERS

January 2013

I. ABBREVIATIONS AND DEFINITIONS AS USED IN THIS SPECIAL PROVISION

A. *CTDOT* means the Connecticut Department of Transportation.

B. *USDOT* means the U.S. Department of Transportation, including the Office of the Secretary, the Federal Highway Administration (“FHWA”), the Federal Transit Administration (“FTA”), and the Federal Aviation Administration (“FAA”).

C. *Broker* means a party acting as an agent for others in negotiating Contracts, Agreements, purchases, sales, etc., in return for a fee or commission.

D. *Contract, Agreement or Subcontract* means a legally binding relationship obligating a seller to furnish supplies or services (including but not limited to, construction and professional services) and the buyer to pay for them. For the purposes of this provision, a lease for equipment or products is also considered to be a Contract.

E. *Contractor* means a consultant, second party or any other entity under Contract to do business with CTDOT or, as the context may require, with another Contractor.

F. *Disadvantaged Business Enterprise (“DBE”)* means a for profit small business concern:

1. That is at least 51 percent owned by one or more individuals who are both socially and economically disadvantaged or, in the case of a corporation, in which 51 percent of the stock is owned by one or more such individuals; and
2. Whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it; and
3. Certified by CTDOT under Title 49 of the Code of Federal Regulations, Part 26, (Title 49 CFR Part 23 of the Code of Federal Regulations for Participation of Disadvantaged Business Enterprise in Airport Concessions)

G. *USDOT-assisted Contract* means any Contract between CTDOT and a Contractor (at any tier) funded in whole or in part with USDOT financial assistance.

H. *Good Faith Efforts (“GFE”)* means all necessary and reasonable steps to achieve a DBE goal or other requirement which by their scope, intensity, and appropriateness to the objective, can reasonably be expected to fulfill the program requirement.

I. *Small Business Concern* means, with respect to firms seeking to participate as DBEs in USDOT-assisted Contracts, a small business concern as defined pursuant to Section 3 of the Small Business Act and Small Business Administration (“SBA”) regulations implementing it (13 CFR Part 121) that also does not exceed the cap on average annual gross receipts in 49 CFR Part 26, Section 26.65(b).

J. *Socially and Economically Disadvantaged Individual* means any individual who is a citizen (or lawfully admitted permanent resident) of the United States and who is:

1. Any individual who CTDOT finds, on a case-by-case basis, to be a socially and economically disadvantaged individual.
2. Any individuals in the following groups, members of which are rebuttably presumed to be socially and economically disadvantaged:
 - “Black Americans”, which includes persons having origins in any of the Black racial groups of Africa;
 - “Hispanic Americans”, which includes persons of Mexican, Puerto Rican, Cuban, Dominican, Central or South American, or other Spanish or Portuguese culture or origin, regardless of race;
 - “Native Americans”, which includes persons who are American Indians, Eskimos, Aleuts, or Native Hawaiians.
 - “Asian-Pacific Americans”, which includes persons whose origins are from Japan, China, Taiwan, Korea, Burma (Myanmar), Vietnam, Laos, Cambodia (Kampuchea), Thailand, Malaysia, Indonesia, the Philippines, Brunei, Samoa, Guam, the U.S. Trust Territories of the Pacific Islands (Republic of Palau), the Commonwealth of the Northern Marianas Islands, Macao, Fiji, Tonga, Kiribati, Juvalu, Nauru, or Federated States of Micronesia;
 - “Subcontinent Asian Americans”, which includes persons whose origins are from India, Pakistan, Bangladesh, Bhutan, the Maldives Islands, Nepal or Sri Lanka;
 - Women;
 - Any additional groups whose members are designated as socially and economically disadvantaged by the SBA, at such time as the SBA designation becomes effective.

K. *Commercially Useful Function (“CUF”)* means the DBE is responsible for the execution of the work of the contract and is carrying out its responsibilities by actually performing, managing, and supervising the work involved with its own forces and equipment. The DBE must be responsible for procuring, determining quantity, negotiating price, determining quality and paying for all materials (where applicable) associated with their work. The DBE must also perform at least 30% of the total cost of its contract with its own workforce.

II. ADMINISTRATIVE REQUIREMENTS

A. General Requirements

A DBE goal percentage equaling 5 percent (%) of the Contract value has been established for this Contract. This DBE goal percentage will be applied to the final Contract value to ultimately determine the required DBE goal. If additional work is required, DBE firms should be provided the appropriate opportunities to achieve the required DBE goal.

In order to receive credit toward the Contract DBE goal, the firms utilized as DBE subcontractors or suppliers must be certified as DBEs in the type of work to be counted for credit by CTDOT’s Office of Contract Compliance prior to the date of the execution of the subcontract. Neither CTDOT nor the State of Connecticut’s Unified Certification Program (UCP) makes any representation as to any DBE’s technical or financial ability to perform the work. Prime contractors are solely responsible for performing due diligence in hiring DBE subcontractors.

All DBEs shall perform a CUF for the work that is assigned to them. The Contractor shall monitor and ensure that the DBE is in compliance with this requirement. The Connecticut DBE UPC Directory of certified firms can

be found on the CTDOT website <http://www.ct.gov/dot>. The directory lists certified DBE firms with a description of services that they are certified to perform. Only work identified in this listing may be counted towards the project's DBE goal. A DBE firm may request to have services added at any time by contacting CTDOT's Office of Contract Compliance. No credit shall be counted for any DBE firm found not to be performing a CUF.

Once a Contract is awarded, all DBEs that were listed on the pre-award DBE commitment document must be utilized. The Contractor is obligated to provide the value and items of the work originally established in the pre-award documentation to the DBE firms listed in the pre-award documentation. Any modifications to the pre-award commitment must follow the procedure established in Section II-C.

The Contractor shall designate a liaison officer who will administer the Contractor's DBE program. Upon execution of this Contract, the name of the liaison officer shall be furnished in writing to CTDOT's unit administering the Contract, CTDOT's Office of Contract Compliance and CTDOT's Office of Construction ("OOC"). Contact information for the designated liaison officer shall be furnished no later than the scheduled date for the pre-construction meeting.

The Contractor shall submit a bi-monthly report to the appropriate CTDOT unit administering the Contract. This report shall indicate what work has been performed to date, with the dollars paid and percentage of DBE goal completed.

Verified payments made to DBEs shall be included in this bi-monthly report. A sample form is included on the CTDOT website.

In addition, the report shall include:

1. A projected time frame of when the remaining work is to be completed for each DBE.
2. A statement by the Contractor either confirming that the approved DBEs are on schedule to meet the Contract goal, or that the Contractor is actively pursuing a GFE.
3. If retainage is specified in the Contract specifications, then a statement of certification that the subcontractors' retainage is being released in accordance with 1.08.01 (Revised or supplemented).

Failure by the Contractor to provide the required reports may result in CTDOT withholding an amount equal to one percent (1%) of the monthly estimate until the required documentation is received.

The Contractor shall receive DBE credit when a DBE, or any combination of DBEs, perform work under the Contract in accordance with this specification.

Only work actually performed by and/or services provided by DBEs which are certified for such work and/or services, as verified by CTDOT, can be counted toward the DBE goal. Supplies and equipment a DBE purchases or leases from the Contractor or its affiliate cannot be counted toward the goal.

Monitoring of the CUF will occur by CTDOT throughout the life of the project. If it is unclear that the DBE is performing the work specified in its subcontract with the prime Contractor, further review may be required. If it is determined that the DBE is not performing a CUF, then the work performed by that DBE will not be counted towards the DBE goal percentage.

B. Subcontract Requirements

The Contractor shall submit to CTDOT's OOC all requests for subcontractor approvals on the standard CLA-12 forms provided by CTDOT. The dollar amount and items of work identified on the CLA-12 form must, at minimum, equal the dollar value submitted in the pre-award commitment. CLA-12 forms can be found at <http://www.ct.gov/dot/construction> under the "Subcontractor Approval" section. All DBE subcontractors must be identified on the CLA-12 form, regardless of whether they are being utilized to meet a Contract goal percentage. A copy of the legal Contract between the Contractor and the DBE subcontractor/supplier, a copy of the Title VI Contractor Assurances and a copy of the Required Contract Provision for Federal Aid Construction Contracts (Form FHWA-1273) (Federal Highway Administration projects only) must be submitted along with a request for subcontractor approval. These attachments cannot be substituted by reference.

If retainage is specified in the Contract specifications, then the subcontract agreement must contain a prompt payment mechanism that acts in accordance with Article 1.08.01 (Revised or supplemented).

If the Contract specifications do not contain a retainage clause, the Contractor shall not include a retainage clause in any subcontract agreement, and in this case, if a Contractor does include a retainage clause, it shall be deemed unenforceable.

In addition, the following documents are to be included with the CLA-12, if applicable:

- An explanation indicating who will purchase material.
- A statement explaining any method or arrangement for utilization of the Contractor's equipment.

The subcontract must show items of work to be performed, unit prices and, if a partial item, the work involved by all parties. If the subcontract items of work or unit prices are modified, the procedure established in Section II-C must be followed.

Should a DBE subcontractor further sublet items of work assigned to it, only lower tier subcontractors who are certified as a DBE firm will be counted toward the DBE goal. If the lower tier subcontractor is a non-DBE firm, the value of the work performed by that firm will not be counted as credit toward the DBE goal.

The use of joint checks between a DBE firm and the Contractor is acceptable, provided that written approval is received from the OOC prior to the issuance of any joint check. Should it become necessary to issue a joint check between the DBE firm and the Contractor to purchase materials, the DBE firm must be responsible for negotiating the cost, determining the quality and quantity, ordering the material and installing (where applicable), and administering the payment to the supplier. The Contractor should not make payment directly to suppliers.

Each subcontract the Contractor signs with a subcontractor must contain the following assurance:

"The subcontractor/supplier/manufacture shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor/subcontractor/supplier/manufacture to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate."

C. Modification to Pre-Award Commitment

Contractors may not terminate for convenience any DBE subcontractor or supplier that was listed on the pre-award DBE commitment without prior written approval of the OOC. This includes, but is not limited to, instances

in which a Contractor seeks to perform work originally designated for a DBE subcontractor with its own forces or those of an affiliate, a non-DBE firm, or with another DBE firm. Prior to approval, the Contractor must demonstrate to the satisfaction of the OOC, that it has good cause, as found in 49CFR Part 26.53 (f)(3), for termination of the DBE firm.

Before transmitting its request for approval to terminate pre-award DBE firms to the OOC, the Contractor must give written notice to the DBE subcontractor and include a copy to the OOC of its notice to terminate and/or substitute, and the reason for the notice.

The Contractor must provide five (5) days for the affected DBE firm to respond. This affords the DBE firm the opportunity to advise the OOC and the Contractor of any reasons why it objects to the termination of its subcontract and why the OOC should not approve the Contractor's action.

Once the Contract is awarded, should there be any amendments or modifications of the approved pre-award DBE submission other than termination of a DBE firm, the Contractor shall follow the procedure below that best meets the criteria associated with the reason for modification:

1. If the change is due to a scope of work revision or non-routine quantity revision by CTDOT, the Contractor must notify CTDOT's OOC in writing or via electronic mail that their DBE participation on the project may be impacted as soon as they are aware of the change. In this case, a release of work from the DBE firm may not be required; however the Contractor must concurrently notify the DBE firm in writing, and copy the OOC for inclusion in the project DBE file. This does not relieve the Contractor of its obligation to meet the Contract specified DBE goal, or of any other responsibility found in this specification.
2. If the change is due to a factor other than a CTDOT directive, a request for approval in writing or via electronic mail of the modification from the OOC must be submitted, along with an explanation of the change(s), prior to the commencement of work. The Contractor must also obtain a letter of release from the originally named DBE indicating their concurrence with the change, and the reason(s) for their inability to perform the work. In the event a release cannot be obtained, the Contractor must document all efforts made to obtain it.
3. In the event a DBE firm that was listed in the pre-award documents is **unable** or **unwilling** to perform the work assigned, the Contractor shall:
 - Notify the OOC Division Chief immediately and make efforts to obtain a release of work from the firm.
 - Submit documentation that will provide a basis for the change to the OOC for review and approval prior to the implementation of the change.
 - Use the DBE Directory to identify and contact firms certified to perform the type of work that was assigned to the unable or unwilling DBE firm. The Contractor should also contact CTDOT's Office of Contract Compliance for assistance in locating additional DBE firms to the extent needed to meet the contract goal.

Should a DBE subcontractor be terminated or fail to complete work on the Contract for any reason, the Contractor must make a GFE to find another DBE subcontractor to substitute for the original DBE. The DBE replacement shall be given every opportunity to perform at least the same amount of work under the Contract as the original DBE subcontractor.

If the Contractor is unable to find a DBE replacement:

- The Contractor should identify other contracting opportunities and solicit DBE firms in an effort to meet the Contract DBE goal requirement, if necessary, and provide documentation to support a GFE. (Refer to GFE in Section III.)
- The Contractor must demonstrate that the originally named DBE, who is unable or unwilling to perform the work assigned, is in default of its subcontract, or identify other issues that affected the DBE firm's ability to perform the assigned work. **The Contractor's ability to negotiate a more advantageous agreement with another subcontractor is not a valid basis for change.**

III. GOOD FAITH EFFORTS

The DBE goal is **NOT** reduced or waived for projects where the Contractor receives a Pre-Award GFE determination from the Office of Contract Compliance prior to the award of the Contract. It remains the responsibility of the Contractor to make a continuing GFE to achieve the specified Contract DBE goal. The Contractor shall pursue every available opportunity to obtain additional DBE firms and document all efforts made in such attempts.

At the completion of all Contract work, the Contractor shall submit a final report to CTDOT's unit administering the Contract indicating the work done by and the dollars paid to DBEs. Only verified payments made to DBEs performing a CUF will be counted towards the Contract goal.

Goal attainment is based on the total Contract value, which includes all construction orders created during the Contract. If the Contractor does not achieve the specified Contract goal for DBE participation or has not provided the value of work to the DBE firms originally committed to in the pre-award submission, the Contractor shall submit documentation to CTDOT's unit administering the Contract detailing the GFE made during the performance of the Contract to satisfy the goal.

A GFE should consist of the following, where applicable (CTDOT reserves the right to request additional information):

1. A detailed statement of the efforts made to replace an unable or unwilling DBE firm, and a description of any additional subcontracting opportunities that were identified and offered to DBE firms in order to increase the likelihood of achieving the stated goal.
2. A detailed statement, including documentation of the efforts made to contact and solicit bids from certified DBEs, including the names, addresses, and telephone numbers of each DBE firm contacted; the date of contact and a description of the information provided to each DBE regarding the scope of services and anticipated time schedule of work items proposed to be subcontracted and the response from firms contacted.
3. Provide a detailed explanation for each DBE that submitted a subcontract proposal which the Contractor considered to be unacceptable stating the reason(s) for this conclusion.
4. Provide documentation, if any, to support contacts made with CTDOT requesting assistance in satisfying the specified Contract goal.

5. Provide documentation of all other efforts undertaken by the Contractor to meet the defined goal. Additional documentation of efforts made to obtain DBE firms may include but will not be limited to:
 - Negotiations held in good faith with interested DBE firms, not rejecting them without sound reasons.
 - Written notice provided to a reasonable number of specific DBE firms in sufficient time to allow effective participation.
 - Those portions of work that could be performed by readily available DBE firms.

In instances where the Contractor can adequately document or substantiate its GFE and compliance with other DBE Program requirements, the Contractor will have satisfied the DBE requirement and no administrative remedies will be imposed.

IV. PROJECT COMPLETION

At the completion of all Contract work, the Contractor shall:

1. Submit a final report to CTDOT's unit administering the Contract indicating the work done by, and the dollars paid to DBEs.
2. Submit verified payments made to all DBE subcontractors for the work that was completed.
3. Submit documentation detailing any changes to the DBE pre-award subcontractors that have not met the original DBE pre-award commitment, including copies of the Department's approvals of those changes.
4. Retain all records for a period of three (3) years following acceptance by CTDOT of the Contract and those records shall be available at reasonable times and places for inspection by authorized representatives of CTDOT and Federal agencies. If any litigation, claim, or audit is started before the expiration of the three (3) year period, the records shall be retained until all litigation, claims, or audit findings involving the records are resolved.

If the Contractor does not achieve the specified Contract goal for DBE participation in addition to meeting the dollar value committed to the DBE subcontractors identified in the pre-award commitment, the Contractor shall submit documentation to CTDOT's unit administering the Contract detailing the GFE made during the performance of the Contract to satisfy the goal.

V. SHORTFALLS

A. Failure to meet DBE goals

As specified in (II-A) above, attainment of the Contract DBE goal is based on the final Contract value. The Contractor is expected to achieve the amount of DBE participation originally committed to at the time of award; however, additional efforts must be made to provide opportunities to DBE firms in the event a Contract's original value is increased during the life of the Contract.

The Contractor is expected to utilize the DBE subcontractors originally committed in the DBE pre-award documentation for the work and dollar value that was originally assigned.

If a DBE is terminated or is unable or unwilling to complete its work on a Contract, the Contractor shall make a GFE to replace that DBE with another certified DBE to meet the Contract goal.

The Contractor shall immediately notify the OOC of the DBE's inability or unwillingness to perform, and provide reasonable documentation and make efforts to obtain a release of work from the firm.

If the Contractor is unable to find a DBE replacement, then the Contractor should identify other contracting opportunities and solicit DBE firms in an effort to meet the Contract DBE goal requirement, if necessary, and provide documentation to support a GFE.

When a DBE is unable or unwilling to perform, or is terminated for just cause, the Contractor shall make a GFE to find other DBE opportunities to increase DBE participation to the extent necessary to at least satisfy the Contract goal.

For any DBE pre-award subcontractor that has been released appropriately from the project, no remedy will be assessed, provided that the Contractor has met the criteria described in Section II-C.

B. Administrative Remedies for Non-Compliance:

In cases where the Contractor has failed to meet the Contract specified DBE goal or the DBE pre-award commitment, and where no GFE has been demonstrated, then one or more of the following administrative remedies will be applied:

1. A reduction in Contract payments to the Contractor as determined by CTDOT, not to exceed the shortfall amount of the **DBE goal**. The maximum shortfall will be calculated by multiplying the Contract DBE goal (adjusted by any applicable GFE) by the final Contract value, and subtracting any verified final payments made to DBE firms by the Contractor.
2. A reduction in Contract payments to the Contractor determined by CTDOT, not to exceed the shortfall amount of the **pre-award commitment**. The maximum shortfall will be calculated by subtracting any verified final payments made by the Contractor to each DBE subcontractor from the amount originally committed to that subcontractor in the pre-award commitment.
3. A reduction in Contract payments to the Contractor determined by CTDOT for any pre-award DBE subcontractor who has not obtained the dollar value of work identified in the DBE pre-award commitment and has not followed the requirements of Section II-C or for any DBE firm submitted for DBE credit that has not performed a CUF.
4. The Contractor being required to submit a written DBE Program Corrective Action Plan to CTDOT for review and approval, which is aimed at ensuring compliance on future projects.
5. The Contractor being required to attend a Non-Responsibility Meeting on the next contract where it is the apparent low bidder.
6. The Contractor being suspended from bidding on contracts for a period not to exceed six (6) months.

VI. CLASSIFICATIONS OTHER THAN SUBCONTRACTORS

A. Material Manufacturers

Credit for DBE manufacturers is 100% of the value of the manufactured product. A manufacturer is a firm that operates or maintains a factory or establishment that produces on the premises the materials or supplies obtained by the Contractor.

If the Contractor elects to utilize a DBE manufacturer to satisfy a portion of, or the entire specified DBE goal, the Contractor must provide the OOC with:

- Subcontractor Approval Form (CLA-12) indicating the firm designation,
- An executed "Affidavit for the Utilization of Material Suppliers or Manufacturers" (sample attached), and
- Substantiation of payments made to the supplier or manufacturer for materials used on the project.

B. Material Suppliers (Dealers)

Credit for DBE dealers/suppliers is limited to 60% of the value of the material to be supplied, provided such material is obtained from an approved DBE dealer/supplier.

In order for a firm to be considered a regular dealer, the firm must own, operate, or maintain a store, warehouse, or other establishment in which the materials, supplies, articles or equipment of the general character described by the specifications and required under the contract are bought, kept in stock, and regularly sold or leased to the public in the usual course of business. At least one of the following criteria must apply:

- To be a regular dealer, the firm must be an established, regular business that engages, as its principal business and under its own name, in the purchase and sale or lease of the products in question.
- A person may be a regular dealer in such bulk items as petroleum products, steel, cement, gravel, stone, or asphalt without owning, operating or maintaining a place of business if the person both owns and operates distribution equipment for the products. Any supplementing of the regular dealers' own distribution equipment shall be by long term lease agreement, and not on an ad hoc or contract to contract basis.
- Packagers, brokers, manufacturers' representatives, or other persons who arrange or expedite transactions are not regular dealers within the meaning of this paragraph.

If the Contractor elects to utilize a DBE supplier to satisfy a portion or the entire specified DBE goal, the Contractor must provide the OOC with:

- Subcontractor Approval Form (CLA-12) indicating the firm designation,
- An executed "Affidavit for the Utilization of Material Suppliers or Manufacturers" (sample attached), and
- Substantiation of payments made to the supplier or manufacturer for materials used on the project.

C. Brokering

- Brokering of work for DBE firms who have been listed by the Department as certified brokers is allowed. Credit for those firms shall be applied following the procedures in Section VI-D.
- Brokering of work by DBEs who have been approved to perform subcontract work with their own workforce and equipment is not allowed, and is a Contract violation.

- Firms involved in the brokering of work, whether they are DBEs and/or majority firms who engage in willful falsification, distortion or misrepresentation with respect to any facts related to the project shall be referred to the U.S. DOT, Office of the Inspector General for prosecution under Title 18, U.S. Code, Part I, Chapter 47, Section 1020.

D. Non-Manufacturing or Non-Supplier DBE Credit

Contractors may count towards their DBE goals the following expenditures with DBEs that are not manufacturers or suppliers:

- Reasonable fees or commissions charged for providing a bona fide service such as professional, technical, consultant or managerial services and assistance in the procurement of essential personnel, facilities, equipment materials or supplies necessary for the performance of the Contract, provided that the fee or commission is determined by the OOC to be reasonable and consistent with fees customarily allowed for similar services.
- The fees charged only for delivery of materials and supplies required on a job site when the hauler, trucker, or delivery service is a DBE, and not the manufacturer, or regular dealer of the materials and supplies, and provided that the fees are determined by the OOC to be reasonable and not excessive as compared with fees customarily allowed for similar services.
- The fees or commissions charged for providing bonds or insurance specifically required for the performance of the Contract, provided that the fees or commissions are determined by CTDOT to be reasonable and not excessive as compared with fees customarily allowed for similar services.

E. Trucking

While technically still considered a subcontractor, the rules for counting credit for DBE trucking firms are as follows:

- The DBE must own and operate at least one fully licensed, insured, and operational truck used on the Contract.
- The DBE receives credit for the total value of the transportation services it provides on the Contract using trucks it owns, insures and operates using drivers it employs.
- The DBE may lease trucks from another DBE firm, including an owner-operator who is certified as a DBE. The DBE who leases trucks from another DBE receives credit for the total value of the transportation services the lessee DBE provides on the Contract.
- The DBE may lease trucks from a non-DBE firm; however the DBE may only receive credit for any fees or commissions received for arranging transportation services provided by the non-DBE firms. Additionally, the DBE firm must demonstrate that they are in full control of the trucking operation for which they are seeking credit.

VII. Suspected DBE Fraud

In appropriate cases, CTDOT will bring to the attention of the USDOT any appearance of false, fraudulent, or dishonest conduct in connection with the DBE program, so that USDOT can take the steps, e.g. referral to the

Department of Justice for criminal prosecution, referral to USDOT Inspector General, action under suspension and debarment or Program Fraud and Civil Penalties rules provided in 49 CFR Part 31.

**CONNECTICUT DEPARTMENT OF TRANSPORTATION
(OFFICE OF CONSTRUCTION)
BUREAU OF ENGINEERING AND CONSTRUCTION**

This affidavit must be completed by the State Contractor's DBE notarized and attached to the contractor's request to utilize a DBE supplier or manufacturer as a credit towards its DBE contract requirements; failure to do so will result in not receiving credit towards the contract DBE requirement.

State Contract No.

Federal Aid Project No.

Description of Project

I, _____, acting in behalf of _____,
(Name of person signing Affidavit) (DBE person, firm, association or corporation)

of which I am the _____ certify and affirm that _____
(Title of Person) (DBE person, firm, association or corporation)

is a certified Connecticut Department of Transportation DBE. I further certify and affirm that I have read and understand 49 CFR, Sec. 26.55(e)(2), as the same may be revised.

I further certify and affirm that _____ will assume the actual and
(DBE person, firm, association or Corporation)
for the provision of the materials and/or supplies sought by _____.

If a manufacturer, I operate or maintain a factory or establishment that produces, on the premises, the materials, supplies, articles or equipment required under the contract an of the general character described by the specifications.

If a supplier, I perform a commercially useful function in the supply process. As a regular dealer, I, at a minimum, own and operate the distribution equipment for bulk items. Any supplementing of my distribution equipment shall be by long-term lease agreement, and not on an ad hoc or contract-by-contract basis.

I understand that false statements made herein are punishable by Law (Sec. 53a-157), CGS, as revised).

(Name of Corporation or Firm)

(Signature & Title of Official making the Affidavit)

Subscribed and sworn to before me, this _____ day of _____ 20 _____.

Notary Public (Commissioner of the Superior Court)

My Commission Expires _____

CERTIFICATE OF CORPORATION

I, _____, certify that I am the _____
(Official) (President)

of the Corporation named in the foregoing instrument; that I have been duly authorized to affix the seal of the Corporation to such papers as require the seal; that _____, who signed said instrument on behalf of the Corporation, was then _____ of said corporation; that said instrument was duly signed for and in behalf of said Corporation by authority of its governing body and is within the scope of its corporation powers.

(Signature of Person Certifying)

(Date)

ITEM #0020765A GUANO ABATEMENT

Description:

Work under this item shall include the abatement of accumulations of pigeon, bat, bird or other rodent/animal guano and associated work by persons who are knowledgeable, qualified, and trained in the abatement of guano and the subsequent cleaning of the affected environment.

These Specifications govern all work activities that disturb guano. All activities shall be performed in accordance with, but not limited to, the current revision of the OSHA General Duty Clause 29 CFR 1910 Section 5(a)(1), OSHA Respiratory Protection Standard 29 CFR 1910.134, OSHA Construction Standards 29 CFR 1926 and applicable Industry Standards and Guidelines on Guano/Microbial Remediation, such as; ACGIH *Bioaerosols: Assessment and Control*, OSHA SHIB 03-10-10 *A Brief Guide to Mold in the Work Place*, and NIOSH Publication 97-146 *Histoplasmosis: Protecting Workers at Risk*.

The guano abatement work shall include the removal and disposal of all guano accumulations as identified on the Contract Plans and Specifications or as directed by the Engineer.

Deviations from these Specifications require the written approval of the Engineer.

Materials:

All materials shall be delivered to the job site in the original packages, containers, or bundles bearing the name of the manufacturer, the brand name and product technical description.

No damaged or deteriorating materials shall be used. If material becomes contaminated with guano, the material shall be decontaminated or disposed of as guano waste material. The cost to decontaminate and dispose of this material shall be at the expense of the Contractor.

Fire retardant polyethylene sheet shall be in roll size to minimize the frequency of joints, with factory label indicating four (4) or six (6) mil thickness.

Six (6) mil polyethylene disposable bags.

Tape (or equivalent) capable of sealing joints in adjacent polyethylene sheets and for the attachment of polyethylene sheets to finished or unfinished surfaces must be capable of adhering under both dry and wet conditions.

Cleaning detergents, both non-toxic and biodegradable.

Spray equipment must be capable of mixing necessary chemical agents with water, generating sufficient pressure and volume; and equipped with adequate hose length to access all necessary work areas.

Sanders, grinders, wire brushes and needle-gun type removal equipment shall be equipped with a High Efficiency Particulate Air (HEPA) filtered vacuum dust collection system.

Containers for storage, transportation and disposal of guano waste material shall be impermeable and both air and watertight.

Any planking, bracing, shoring, barricades and/or temporary sheet piling, necessary to appropriately perform work activities shall conform to all applicable federal, state and local regulations.

Air filtration devices and vacuum units shall be equipped with HEPA filters.

Construction Methods:

(1) Pre-Abatement Submittals and Notices

- (a) Fifteen (15) working days prior to the commencement of guano abatement work, the Contractor shall submit to the Engineer for review and acceptance and/or acknowledgment of the following:
 - 1. Documentation dated within the previous twelve (12) months, certifying that all employees have received hazard communication training and understand the use and limits of respiratory equipment to be used; on an initial and annual basis.
 - 2. Documentation dated within the previous twelve (12) months, from a physician certifying that all employees who may be exposed to airborne guano and mold spores in excess of background level have been provided with an opportunity to be medically monitored to determine whether they are physically capable of working while wearing the respirator required without suffering adverse health affects. Employees shall also be informed of the specific types of respirators they shall be required to wear and the work he/she will be required to perform as well as special workplace conditions such as high temperature, high humidity and chemical contaminants to which he/she may be exposed.
 - 3. Documentation dated within the previous twelve (12) months, of respiratory fit testing for all employees who must don a tight-fitting face piece respirator in order to perform guano abatement activities. This fit testing shall be in accordance with qualitative procedures as detailed in 29 CFR 1910.134.
 - 4. Project time schedule for each phase of work.

5. Name and qualifications of the OSHA Competent Person for the guano abatement activities, shall have a minimum of three years working experience as an environmental abatement site supervisor, shall be capable of identifying existing guano hazards and shall have the authority to implement corrective measures to eliminate such hazards. The OSHA Competent Person shall be on-site at all times guano abatement is occurring, shall comply with applicable Federal, State and Local regulations which mandate work practices, and shall be capable of performing the work of this contract.
- (b) No abatement shall commence until a copy of all required submittals have been received and found acceptable to the Engineer. Those employees added to the Contractor's original list will be allowed to perform work only upon submittal to, and receipt of, all required paperwork by the Engineer.

(2) Guano Abatement Provisions:

(a) General Requirements

The Abatement Contractor/Subcontractor shall have an OSHA Competent Person on site and in control on the job site at all times during abatement work.

All labor, materials, tools, equipment, services, testing, insurance (with specific coverage for work on guano/spores), and incidentals which are necessary or required to perform the work in accordance with applicable governmental regulations, industry standards and codes, and these Specifications shall be provided by the Contractor. The Contractor shall be prepared to work all shifts and weekends throughout the course of this project as directed by the Engineer.

Prior to beginning work, the Contractor shall perform a visual survey of each work area and review conditions at the site for safety reasons. In addition, the Contractor shall instruct all workers in all aspects of personnel protection, work procedures, emergency evacuation procedures and use of equipment including procedures unique to this project.

The Contractor shall:

Shutdown and isolate heating, cooling, and ventilating air systems to prevent contamination and spore dispersal to the other areas of the building.

Shut down and lock out/tag out electrical power, including all receptacles and light fixtures, when feasible. The use or isolation of electrical power will be coordinated with all other ongoing uses of electrical power at the site.

Coordinate all power and fire alarm isolation with the appropriate representatives.

When necessary, provide temporary power and adequate lighting and ensure safe installation of electrical equipment, including ground fault protection and power cables, in compliance with applicable electrical codes and OSHA requirements. The Contractor is responsible for proper connection and installation of electrical wiring.

If sufficient electrical service is unavailable, the Contractor may need to supply electrical power to the site by fuel operated generator(s). Electrical power supply shall be sufficient for all equipment required for this project in operation throughout the duration of the project.

In each interior work area, negative pressure must be continuously maintained until the area achieves satisfactory reoccupancy criteria and is approved by the Project Monitor to be deregulated. If interior work phases cannot be subdivided into manageable work areas that can be completed within one shift, negative air pressure must be maintained twenty-four (24) hours per day and the Contractor shall establish temporary electrical service to the site, rather than utilize generators.

Water service may not be available at the site. Contractor shall supply sufficient water for each shift to operate the decontamination shower units as well as to maintain the work areas adequately wet.

Ladders and/or scaffolds shall be in compliance with OSHA requirements, and of adequate length, strength and sufficient quantity to support the scope of work. Use of ladders/scaffolds shall be in conformance with OSHA 29 CFR 1926 Subpart L and X requirements.

Work performed at heights exceeding six feet (6') shall be performed in accordance with the OSHA Fall Protection Standard 29 CFR 1926 Subpart M including the use of fall arrest systems as applicable.

Any data provided to the Contractor regarding guano accumulations identified throughout the structure(s) is for informational purposes only. Under no circumstances shall this information be the sole means used by the Contractor for determining the presence and location of all guano accumulations. Prior to commencement of work, the **Contractor shall verify all field conditions and quantities affecting performance/completion of the work** as described in these Specifications in accordance with OSHA, USEPA, USDOT, DEP standards. Compliance with the applicable requirements is solely the responsibility of the Contractor.

The Engineer will provide a Project Monitor to oversee the activities of the Contractor. No abatement work shall be performed until the Project Monitor is on-site. Environmental sampling may be conducted as deemed necessary by the Project Monitor.

Warning signs shall be posted at each entrance to the work area which clearly indicates the area has been regulated as a MICROBIAL REMEDIATION WORK AREA – AUTHORIZED PERSONNEL ONLY.

(b) Worker Decontamination Enclosure System

The Contractor shall establish contiguous to the Regulated Work Area, a Worker Decontamination Enclosure System consisting of Equipment Room and Clean Room in series, as detailed below. Access to the Regulated Area shall only be through this enclosure.

Access between rooms in the Worker Decontamination Enclosure System shall be through airlocks. Other effective designs are permissible. The Clean Room and Equipment Room located within the Worker Decontamination Enclosure, shall be contiguously connected with taped airtight edges, thus ensuring the sole source of airflow originates from outside the regulated areas, once a negative pressure differential within Interior Regulated Areas is established.

The Clean Room shall be adequately sized to accommodate workers and shall be equipped with a suitable number of hooks, lockers, shelves, etc., for workers to store personal articles and clothing. Changing areas of the Clean Room shall be suitably screened from areas occupied by the public.

The Equipment Room shall be of sufficient capacity to accommodate the number of workers. The Equipment Room shall be utilized by personnel to remove protective clothing, decontaminate through the use of HEPA vacuums and a wash facility, and clean off sealed waste containers ready for removal from the work area. No worker or other person shall leave a Regulated Area without decontaminating.

(c) Containment of Interior Work Areas

Pre-clean the work areas using HEPA filtered equipment (vacuum) and/or wet methods as appropriate, collecting and properly containing all dust and debris as guano contaminated waste. Vacuum units, of suitable size and capabilities for the project, shall have HEPA filters capable of trapping and retaining at least 99.97 percent of all monodispersed particles of three micrometers in diameter or larger. Do not use methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters.

After pre-cleaning, movable objects not designated for relocation by others shall be removed from the work areas with the utmost care to prevent damage of any kind and relocated to a temporary storage location coordinated with the Engineer. The Contractor is responsible for protecting all fixed objects that are permanent fixtures or are too large to remove and remain inside the Regulated Area. Fixed objects shall be enclosed with one layer of six (6) mil polyethylene sheeting sealed with tape.

Engineering controls must be implemented to ensure that debris is not dispersed outside of the work area during cleaning/removal process. Such controls involve source containment, limited critical barriers, full poly containment enclosures and/or negative pressure enclosures, based on

the size and magnitude of contamination, as directed by the Engineer, and in accordance with Industry Standards and Guidelines.

Critical barriers consisting of a minimum of one (1) layer of six (6) mil polyethylene sheeting, secured at the edges with duct tape, shall be installed to seal off all windows, doorways, skylights, ducts, grilles, diffusers, vents, light fixtures, suspended ceiling tile systems and any other openings between the Regulated Work Areas and the surrounding uncontaminated areas, including the outside of the building. Complete isolation of the work area from adjacent areas using a minimum of one (1) layer of six (6) mil polyethylene sheeting to create an enclosure and seal with duct tape. HVAC systems within the work area cannot be operating.

HEPA filtered negative air filtration units will be used with the intake in the general work area and exhaust outdoors during removal/cleaning of large or extensive contamination areas, and/or as directed by the Engineer, so as to provide local exhaust ventilation and create a negative pressure enclosure work area. Negative pressure must be maintained continuously in each work area until the area achieves satisfactory verification criteria and is approved by the Engineer for deregulation. A sufficient number of negative air filtration units shall be utilized in each work area to create a negative pressure differential in the range of 0.02 to 0.04 inches of water column between the Regulated Area and surrounding areas, and allow a sufficient flow of air through the area to provide four (4) air changes per hour. Negative air filtration units shall be equipped with four stages of filtration, with the final stage being High Efficiency Particulate Air (HEPA) filtration, and incorporate an automatic warning system to indicate pressure drop or unit failure. Negative pressure shall be measured in each work area by a recording manometer, during the entire project.

Following construction of the containment work area, the containment shall pass a pre-abatement visual inspection by the Competent Person and the Project Monitor prior to commencement of abatement work.

(d) Alternate work area containment requirements for exterior abatement procedures

In lieu of the establishment of a negative pressure enclosure (NPE) system as described above, guano accumulations will be removed from exterior work areas within an outdoor Regulated Area(s). The regulated work areas will be established by the use of appropriately labeled barrier tape and postings, as well as source containment, poly drop cloths and local HEPA exhaust ventilation. A remote personnel decontamination unit will also be required.

(e) Personnel Protection

The Contractor shall utilize all appropriate engineering controls and safety and protective equipment while performing the work in accordance with applicable standards and guidelines.

Abatement workers should have received hazard communication awareness training on safe work practices associated with guano/microbial abatement, and health effects of guano/microbial

spore exposure, be medically approved to perform such work and have received fit testing for respirator use.

Abatement workers conducting the cleaning/removal and all personnel entering the work areas will be required to wear personal protective equipment including the following minimum. The Contractors Competent Person shall ultimately make the exposure/hazard assessment judgement on whether upgraded PPE is required.

1. Negative Pressure Respirators equipped with N-95 filter cartridges
2. Disposable coveralls with a hood
3. Eye protection
4. Appropriate gloves

Respiratory protection shall be provided and shall meet the requirements of OSHA as required in 29 CFR 1910.134. A formal respiratory protection program must be implemented in accordance with 29 CFR 1910.134. The Contractor shall provide respirators from among those approved as being acceptable for protection by the National Institute for Occupational Safety and Health (NIOSH) under the provisions of 30 CFR Part 11.

All other necessary personnel protective equipment (i.e. hardhat, work boots, safety glasses, hearing protection, etc.) required to perform the abatement work activities, as deemed necessary by the Competent Person, shall conform to all applicable federal, state and local regulations.

All other qualified and authorized persons entering into a Regulated Area (i.e. Project Monitor, Regulatory Agency Representative) shall adhere to the requirements of personnel protection as stated in this section.

Contractor shall ensure that all workers and authorized persons who enter and leave the work area use a personnel decontamination system.

Contractor shall ensure HEPA filtered local exhaust ventilation is provided in all areas where extensive guano accumulations are to be cleaned/removed to reduce the potential for airborne exposure to spores.

Non-abatement workers shall be kept out of the immediate areas where abatement is ongoing.

(f) Removal and Cleaning Methods

The general cleaning/removal procedures specified herein are to be used as a guideline throughout the project. Deviations from specified methods of removal/cleaning must be approved in writing by the Engineer prior to their implementation.

The following details the extent of each phase of operation designated for this project. Phase areas may be combined or divided at the direction of the Engineer. Proceed through the sequencing of the work phases under the direction of the Engineer.

Bridge No. 03191F, I-84 EB Exit 21 Off-Ramp, Waterbury, CT

Bridge No. 03196, I-84 over South Main Street, Waterbury, CT

Abutments, Beams, Piers on Underside of Bridges

Using trained and appropriately protected staff, remove and dispose of all accumulations of guano, feathers, carcasses, etc. as directed by the Engineer. Clean the areas where removal occurs using biodegradable/non-toxic detergent solutions and HEPA vacuuming. Regulated area(s) shall be established at the perimeter of the work area(s), and access shall be controlled by the Contractor. Utilize dust suppression methods such as misting (not soaking) materials prior to abatement. Poly drop cloths should be used as appropriate to protect objects in direct proximity to the work areas from contamination, and prevent the release of contamination/debris to outside areas. After cleaning the area(s) should be left dry and visibly free from contamination and debris. Utilize damp wiping and HEPA filtered vacuuming techniques for final area cleanup. A remote personnel decontamination unit shall also be utilized. Waste generated from the cleaning process should be removed from the work space in sealed plastic bags to prevent dispersal of spores to non-affected building/work spaces and disposed of as general bulky C&D waste debris. Removal shall be undertaken in accordance with Industry Guidelines. Care should be exercised during guano removal/cleaning to not disturb or release any underlying lead paint which may be present. *Contractor shall be responsible for the erection and safe maintenance of any and all necessary apparatus/equipment to gain access to the work areas and perform the required abatement.*

Contractor shall wet mist all materials/accumulations/surfaces scheduled for removal/cleaning prior to commencing work to minimize airborne dust/spore generation and use damp methods throughout the removal/cleanup process.

Contaminated materials, accumulations and debris that are to be removed must be removed with as little disturbance as possible.

The Contractor shall promptly place the removed material in disposal containers (six (6) mil polyethylene bags, fiber drums, etc.) as it is removed. Large components removed intact may be wrapped in two (2) layers of six (6) mil polyethylene sheeting secured with tape. As the disposal containers are filled, the Contractor shall promptly seal the containers and clean the containers before removal from the work area. Bags shall be securely sealed to prevent accidental opening and leakage by taping in gooseneck fashion. Materials with sharp-edged components (e.g. nails, screws, metal lath, tin sheeting) which could tear polyethylene bags and sheeting shall be placed in clean drums and sealed with locking ring tops. All waste containers shall be leak-tight, (typically consisting of two layers of 6 mil poly (or bags)). Containers shall be decontaminated by wet cleaning and HEPA vacuuming within the decontamination area prior to exiting the regulated area. On site storage of waste containers shall be as dictated and allowed by the

Engineer within the extent of construction operations. On site storage of waste containers in public areas, outside of construction containment areas shall not be allowed.

Following material/accumulation removal, Contractor shall thoroughly clean the work area. Cleaning of surfaces and content items, shall utilize wet/damp wiping coupled with a non-toxic, biodegradable detergent wash. Following cleaning, the areas shall be dried and HEPA vacuumed to remove all associated dirt and debris.

The use of biocides, including chlorine bleach, is not recommended during guano/microbial abatement. Biocides are toxic to humans and may cause damage to underlying building substrates. Any use of biocides, fungicides, disinfectants or encapsulants can be done only with the written approval of the Engineer.

After cleaning, the Competent Person and Project Monitor shall perform a post remediation visual inspection of each work area to ensure remediation is complete, that no dust or debris remains on surfaces in the work areas as the result of removal/cleaning operations and the areas have been dried. All surfaces within the Regulated Work Areas, including but not limited to ledges, beams, and hidden locations shall be inspected for visible residue. Evidence of guano/microbial accumulations/contamination and/or debris identified during this inspection will necessitate further cleaning as heretofore specified. The area shall be re-cleaned at the Contractor's expense, until the standard of cleaning is achieved.

If at any time, the Project Monitor should suspect contamination of areas outside the Regulated Area, the Contractor shall immediately stop all abatement work and take steps to decontaminate these areas and eliminate causes of such contamination.

(g) Quality Assurance/Verification

At a minimum, the affected areas shall be free of visible guano accumulations and debris, free of moldy odors and be left dry.

Surface and airborne types and levels of microbial spores may be tested by the Project Monitor upon completion of the cleaning and sanitizing to assure that the affected areas have been returned to a level equivalent to non-affected/ambient areas. Where samples are collected, acceptable results shall be considered levels less than background (interior non-affected and/or ambient) areas for all microbial genera with similar microbial types and rank order and which do not indicate amplification. Any samples collected shall be analyzed at a laboratory accredited by the AIHA EMPAT program. When sampling is performed, it shall be conducted no less than 1 hour after abatement cleanup work has been completed.

The Engineers on-site Project Monitor will verify compliance with these specifications, conduct post-abatement work area inspections and/or collect post abatement samples, photographs, and/or videos of the cleaned surfaces/work areas as deemed necessary.

If any areas fail inspection/testing, the failed area shall be recleaned by the Contractor and retested at no cost to the Engineer.

(h) Post Abatement Work Area Deregulation

The Contractor shall remove all remaining polyethylene, including critical barriers, and Decontamination Enclosure Systems leaving negative air filtration devices in operation as long as feasible. HEPA vacuum and/or wet wipe any visible residue which is uncovered during this process. All waste generated during this disassembly process shall be discarded as abatement waste.

A final visual inspection of the work area shall be conducted by the Competent Person and the Project Monitor to ensure that all visible accumulations of suspect materials have been removed and that no equipment or materials associated with the abatement project remain.

The Contractor shall restore all work areas and auxiliary areas utilized during work to conditions equal to or better than original. Any damage caused during the performance of the work activity shall be repaired by the Contractor at no additional expense to the Engineer.

(i) Waste Disposal

Waste generated from the removal of guano, while an environmental health hazard, is not classified as a biological waste or hazardous waste. All waste materials generated during abatement shall be disposed of as bulky C&D waste in accordance with CTDEP Solid Waste Management requirements. Contractor shall supply to the Engineer completed shipping papers for each load of waste transported for disposal, indicating the solid waste landfill name and location and quantity of waste disposed of.

(3) Project Closeout Data:

The Contractors site supervisor shall keep a logbook to document daily site activity. The log book shall document the preparation tasks, schedule, engineering controls utilized, abatement work conducted, daily lists of employees on site, exposure/hazard assessment judgements, negative pressure manometric measurement readings, PPE utilized, waste shipping papers, etc.

The Contractor will submit the original log book and any other related documentation to the Engineer within 30 days of completion of work.

Final payment to the Contractor shall not be approved without submission of the reporting materials.

Method of Measurement:

The quantity of guano abatement shall be the actual number of cubic feet removed for disposal, completed and accepted, within the lines of the work area as shown on the plans or as ordered by the Engineer.

Basis of Payment:

The work will be paid for at the contract unit price per cubic foot for “Guano Abatement”, completed, which price shall include the specialty services of the Guano Removal Contractor including: labor, materials, equipment, insurance, submittals, personal protective equipment, temporary enclosures, apparatus/equipment necessary for work area access, utility costs, incidentals, fees and labor incidental to the removal, transport and disposal of guano, including close out documentation.

Final payment for guano abatement will not be made until all the project closeout data submittals have been completed and provided to the Engineer. Once the completed package has been received in its entirety, the Engineer will make the final payment to the Contractor.

<u>Pay Item</u>	<u>Pay Unit</u>
Guano Abatement	Cubic Foot

ITEM #0020801A – ASBESTOS ABATEMENT

Description:

Work under this item shall include the abatement of asbestos containing materials (ACM) and associated work by persons who are knowledgeable, qualified, trained and licensed in the removal, treatment, handling, and disposal of ACM and the subsequent cleaning of the affected environment. ACM shall include material composed of any type of asbestos in amounts greater than one percent (1%) by weight. The Contractor performing this work shall possess a valid Asbestos Abatement Contractor license issued by the Connecticut Department of Public Health (CTDPH).

These Specifications govern all work activities that disturb asbestos containing materials. All activities shall be performed in accordance with, but not limited to, the current revision of the OSHA General Industry Standard for Asbestos (29 CFR 1926.1001), the OSHA Asbestos in Construction Regulations (29 CFR 1926.1101), the USEPA Asbestos National Emission Standards for Hazardous Air Pollutants (NESHAP) Regulations (40 CFR Part 61 Subpart M), the CTDPH Standards for Asbestos Abatement, Licensure and Training (19a-332a-1 through 16, 20-440-1 through 9 & 20-441), and the CTDEEP Special Waste Disposal Regulations (22a-209-8(i)).

The asbestos abatement work shall include the removal and disposal of all ACM as identified on the Contract Plans and Specifications prior to the planned renovation/demolition project. This Item 0020801A – Asbestos Abatement was designed by Mr. Stephen Arienti, a State of Connecticut licensed Asbestos Project Designer (#000284).

Deviations from these Specifications require the written approval of the Engineer.

Materials:

All materials shall be delivered to the job site in the original packages, containers, or bundles bearing the name of the manufacturer, the brand name and product technical description.

No damaged or deteriorating materials shall be used. If material becomes contaminated with asbestos, the material shall be decontaminated or disposed of as asbestos-containing waste material. The cost to decontaminate and dispose of this material shall be at the expense of the Contractor.

Fire retardant polyethylene sheet shall be in roll size to minimize the frequency of joints, with factory label indicating four (4) or six (6) mil thickness.

Six (6) mil polyethylene disposable bags shall have pre-printed OSHA/EPA/DOT labels and shall be transparent.

Tape (or equivalent) capable of sealing joints in adjacent polyethylene sheets and for the attachment of polyethylene sheets to finished or unfinished surfaces must be capable of adhering under both dry and wet conditions.

Surfactant is a chemical wetting agent added to water to improve penetration and shall consist of fifty (50) percent polyoxyethylene ether and fifty (50) percent polyoxyethylene ester, or equivalent. The surfactant shall be mixed with water to provide a concentration one (1) ounce surfactant to five (5) gallons of water, or as directed by the manufacturer.

Spray equipment must be capable of mixing necessary chemical agents with water, generating sufficient pressure and volume; and equipped with adequate hose length to access all necessary work areas.

Drills, saws, sanders, grinders, wire brushes and needle-gun type removal equipment shall be equipped with a High Efficiency Particulate Air (HEPA) filtered vacuum dust collection system.

Containers for storage, transportation and disposal of asbestos containing waste material shall be impermeable and both air and watertight.

Labels and warning signs shall conform to OSHA 29 CFR 1926.1101, USEPA 40 CFR Part 61.152, and USDOT 49 CFR Part 172 as appropriate.

Encapsulant, a material used to chemically entrap asbestos fibers to prevent these fibers from becoming airborne, shall be of the type which has been approved by the Engineer. Use shall be in accordance with manufacturer's printed technical data. The encapsulant shall be clear and must be compatible with new materials being installed, if any.

Any planking, bracing, shoring, barricades and/or temporary sheet piling, necessary to appropriately perform work activities shall conform to all applicable federal, state and local regulations.

Air filtration devices and vacuum units shall be equipped with HEPA filters.

Construction Methods:

(1) Pre-Abatement Submittals and Notices

- (a) The scope of work for this project includes the removal of exterior non-friable ACM, which is not defined as "Asbestos Abatement" under the CTDPH Asbestos Abatement Standards (19a-332a-1) nor as Regulated asbestos containing materials (RACM) under the EPA Asbestos NESHAP. Therefore, the Contractor is **not required to submit an Asbestos Abatement Notification to CTDPH or EPA, prior to the commencement of work, so long as work practices will not render more than 25 square feet (SF) (CTDPH) or 160 SF (EPA) of the exterior non-friable ACM into a friable state.**
- (b) Fifteen (15) working days prior to the commencement of asbestos abatement work, the Contractor shall submit to the Engineer for review and acceptance and/or acknowledgment of the following:
 - 1. Permits and licenses for the removal of asbestos-containing or contaminated materials, including a CTDPH valid asbestos removal contractor's license.

2. Documentation dated within the previous twelve (12) months, certifying that all employees have received USEPA Model Accreditation Plan approved asbestos worker/supervisor training in the proper handling of materials that contain asbestos; understand the health implications and risks involved, including the illnesses possible from exposure to airborne asbestos fibers; understands the use and limits of respiratory equipment to be used; and understands the results of monitoring of airborne quantities of asbestos as related to health and respiratory equipment as indicated in 29 CFR 1926.1101 on an initial and annual basis, and copies of all employees CTDPH asbestos worker and/or supervisor licenses.
 3. Documentation from the Contractor, typed on company letterhead and signed by the Contractor, certifying that all employees listed therein have received the following:
 - a. medical monitoring within the previous twelve (12) months, as required in 29 CFR 1926.1101;
 - b. respirator fit testing within the previous twelve (12) months as detailed in 29 CFR 1910.134 (for all employees who must also don a tight-fitting face piece respirator).
 4. Copies of the EPA/State-approved certificates for the proposed asbestos landfill.
- (c) No abatement shall commence until a copy of all required submittals have been received and found acceptable to the Engineer. Those employees added to the Contractor's original list will be allowed to perform work only upon submittal to, and receipt of, all required paperwork by the Engineer.

(2) Asbestos Abatement Provisions:

(a) General Requirements

The Abatement Contractor/Subcontractor shall possess a valid State of Connecticut Asbestos Contractor License. Should any portion of the work be subcontracted, the subcontractor must also possess a valid State of Connecticut Asbestos Contractor License. The Asbestos Abatement Site Supervisor employed by the Contractor shall be in control on the job site at all times during asbestos abatement work. All employees of the Contractor who shall perform work (i.e. Asbestos Abatement Site Supervisor, Asbestos Abatement Worker) shall be properly certified/licensed by the State of Connecticut to perform such duties.

All labor, materials, tools, equipment, services, testing, insurance (with specific coverage for work on asbestos), and incidentals which are necessary or required to perform the work in accordance with applicable governmental regulations, industry standards and codes, and these Specifications shall be provided by the Contractor. The Contractor shall be prepared to work all shifts and weekends throughout the course of this project.

Prior to beginning work, the Engineer and Contractor shall perform a visual survey of each work area and review conditions at the site for safety reasons. In addition, the Contractor shall instruct

all workers in all aspects of personnel protection, work procedures, emergency evacuation procedures and use of equipment including procedures unique to this project.

The Contractor shall, when necessary, provide temporary power and adequate lighting and ensure safe installation of electrical equipment, including ground fault protection and power cables, in compliance with applicable electrical codes and OSHA requirements. The Contractor is responsible for proper connection and installation of electrical wiring.

If sufficient electrical service is unavailable, the Contractor may need to supply electrical power to the site by fuel operated generator(s). Electrical power supply shall be sufficient for all equipment required for this project in operation throughout the duration of the project.

Water service may not be available at the site. Contractor shall supply sufficient water for each shift to operate the decontamination shower units as well as to maintain the work areas adequately wet.

Ladders and/or scaffolds shall be in compliance with OSHA requirements, and of adequate length, strength and sufficient quantity to support the scope of work. Use of ladders/scaffolds shall be in conformance with OSHA 29 CFR 1926 Subpart L and X requirements.

Work performed at heights exceeding six feet (6') shall be performed in accordance with the OSHA Fall Protection Standard 29 CFR 1926 Subpart M including the use of fall arrest systems as applicable.

Data provided regarding asbestos sampling conducted throughout the structure(s) is for informational purposes only. Under no circumstances shall this information be the sole means used by the Contractor for determining the presence, location and/or quantity of all asbestos containing materials. The Contractor shall verify all field conditions affecting performance of the work as described in these Specifications in accordance with OSHA, USEPA, USDOT, DEEP standards. Compliance with the applicable requirements is solely the responsibility of the Contractor.

The Engineer will provide a Project Monitor to oversee the activities of the Contractor. No asbestos work shall be performed until the Project Monitor is on-site. Pre-abatement, during abatement and post-abatement air sampling will be conducted as deemed necessary by the Project Monitor. Waste stream testing will be performed, as necessary, by the Project Monitor prior to waste disposal.

(b) Set-Up

Pre-clean the work areas using HEPA filtered equipment (vacuum) and/or wet methods as appropriate, collecting and properly containing all loose debris as asbestos-containing/asbestos contaminated waste. Vacuum units, of suitable size and capabilities for the project, shall have HEPA filters capable of trapping and retaining at least 99.97 percent of all monodispersed particles of three micrometers in diameter or larger. Do not use methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters.

The Contractor shall establish a remote Worker Decontamination Enclosure System consisting of Equipment Room, Shower Room and Clean Room in series, as detailed below. Access to the Regulated Area shall only be through this enclosure.

Access between rooms in the Worker Decontamination Enclosure System shall be through airlocks. Other effective designs are permissible. The Clean Room, Shower Room and Equipment Room located within the Worker Decontamination Enclosure, shall be contiguously connected with taped airtight edges.

The Clean Room shall be adequately sized to accommodate workers and shall be equipped with a suitable number of hooks, lockers, shelves, etc., for workers to store personal articles and clothing. Changing areas of the Clean Room shall be suitably screened from areas occupied by the public.

The Shower Room shall be of sufficient capacity to accommodate the number of workers. One shower stall shall be provided for each eight (8) workers. Showers shall be equipped with hot and cold or warm running water through the use of electric hot water heaters supplied by the Contractor. No worker or other person shall leave a Regulated Area without showering. Shower water shall be collected and filtered using best available technology and disposed of in an approved sanitary drain. Shower stalls and plumbing shall include sufficient hose length and drain system or an acceptable alternate.

The Contractor shall ensure that no personnel or equipment be permitted to leave the Regulated Area until proper decontamination procedures (including HEPA vacuuming, wet wiping and showering) to remove all asbestos debris have occurred.

Post warning signs meeting the specifications of OSHA 29 CFR 1910.1001 and 29 CFR 1926.1101 at each Regulated Area. In addition, signs shall be posted at all approaches to Regulated Areas so that an employee may read the sign and take the necessary protective steps before entering the area. Additional signs may require posting following construction of workplace enclosure barriers.

Alternate set up requirements for exterior non-friable asbestos abatement procedures

In lieu of the establishment of a negative pressure enclosure (NPE) system as described by CTDPH Sections 19a-332a-5(c), 5(d), 5(e), and 5(h), non-friable ACM will be removed from exterior work areas within an outdoor Regulated Area(s). The regulated work area will be established by the use of appropriately labeled barrier tape and postings in compliance with CTDPH 19a-332a-5(a) as well as OSHA 29 CFR 1926.1101. A remote personnel decontamination unit as specified in Section 19a-332a-6 will be required. This method shall only be utilized provided exposure assessment air sampling data collected during the removal of the exterior non-friable materials indicates that the exposure levels during removal of such materials do not exceed 0.1 asbestos f/cc. Should exposure assessment air sampling data exceed this level, and engineering efforts to reduce the airborne fiber levels not be successful in reducing the levels to less than 0.1 f/cc, removal shall occur within these areas under full containment conditions.

(c) Personnel Protection

The Contractor shall utilize all appropriate engineering controls and safety and protective equipment while performing the work in accordance with OSHA, USEPA, USDOT, CTDEEP and CTDPH regulations.

The Contractor shall provide and require all workers to wear protective clothing in the Regulated Areas where asbestos fiber concentrations may reasonably be expected to exceed the OSHA established Permissible Exposure Limits (PEL) or where asbestos contamination exists. Protective clothing shall include impervious coveralls with elastic wrists and ankles, head covering, gloves and foot coverings.

Respiratory protection shall be provided and shall meet the requirements of OSHA as required in 29 CFR 1910.134, and 29 CFR 1926.1101 as well as the requirements of the CTDPH regulations. A formal respiratory protection program must be implemented in accordance with 29 CFR 1926.1101 and 29 CFR 1910.134. The Contractor shall provide respirators from among those approved as being acceptable for protection by the National Institute for Occupational Safety and Health (NIOSH) under the provisions of 30 CFR Part 11.

All other necessary personnel protective equipment (i.e. hardhat, work boots, safety glasses, hearing protection, etc.) required to perform the asbestos abatement work activities shall conform to all applicable federal, state and local regulations.

All other qualified and authorized persons entering into a Regulated Area (i.e. Project Monitor, Regulatory Agency Representative) shall adhere to the requirements of personnel protection as stated in this section.

(d) Asbestos Abatement Procedures

The Asbestos Abatement Site Supervisor, as the OSHA Competent Person shall be at the site at all times.

The Contractor shall not begin abatement work until authorized by the Project Monitor, following a pre-abatement visual inspection.

All workers and authorized persons shall enter and leave the Regulated Area through the Worker Decontamination Enclosure System, leaving contaminated protective clothing in the Equipment Room for reuse or disposal of as asbestos contaminated waste. No one shall eat, drink, smoke, chew gum or tobacco, or apply cosmetics while in a Regulated Area.

The following details the extent of each phase of operation designated for this project. Phase areas may be combined or divided at the direction of the Engineer. Proceed through the sequencing of the work phases under the direction of the Engineer.

Removal of I-84 EB Exit 21 off-Ramp, Waterbury, CT

Bridge No. 03191F, I-84 EB Exit 21 off-Ramp, Waterbury, CT

- **White caulk around base of metal railing supports**

A regulated area(s) shall be established at the perimeter of the work area(s), and access shall be controlled by the Contractor. A remote personnel decontamination unit shall be utilized. Removal shall be undertaken in accordance with OSHA Class II and USEPA Asbestos NESHAP requirements.

During removal, the Contractor shall spray asbestos materials with amended water using airless spray equipment capable of providing a "mist" application to reduce the release of airborne fibers. Spray equipment shall be capable of mixing wetting agent with water and capable of generating sufficient pressure and volume. Hose length shall be sufficient to reach all of the Regulated Area. Do not "flood" the area with hose type water supply equipment with the potential to create water releases and/or run-off from the regulated area.

The Contractor shall continue to spray the asbestos materials with amended water, as necessary, throughout removal activities to ensure the asbestos materials remain adequately wet. The asbestos materials shall not be allowed to dry out.

In order to minimize airborne asbestos concentrations inside the Regulated Area, the Contractor shall remove the adequately wetted asbestos in manageable sections. In addition, asbestos materials removed from any elevated level shall be carefully lowered to the floor.

The Contractor shall promptly place the adequately wet asbestos material in disposal containers (six (6) mil polyethylene bags/fiber drum/poly-lined dumpsters, etc.) as it is removed. Large components removed intact may be wrapped in two (2) layers of six (6) mil polyethylene sheeting secured with tape. As the disposal containers are filled, the Contractor shall promptly seal the containers, apply caution labels and clean the containers before transportation from the regulated area. Bags shall be securely sealed to prevent accidental opening and leakage by taping in gooseneck fashion. Small components and asbestos-containing waste with sharp-edged components (e.g. nails, screws, metal lath, tin sheeting) which could tear polyethylene bags and sheeting shall be placed in clean drums and sealed with locking ring tops. All waste containers shall be leak-tight, (typically consisting of two layers of 6 mil poly (or bags)), and shall be properly labeled and placarded with OSHA Danger labels, DOT shipping labels, markings and placards and USEPA NESHAP generators labels. Containers shall be decontaminated by wet cleaning and HEPA vacuuming prior to exiting the regulated area.

If at any time during asbestos removal, the Project Monitor should suspect contamination of areas outside the Regulated Area, the Contractor shall immediately stop all abatement work and take steps to decontaminate these areas and eliminate causes of such contamination. Unprotected individuals shall be prohibited from entering contaminated areas until air sampling and/or visual inspections determine decontamination.

After completion of abatement work, all surfaces from which asbestos has been removed shall be wet brushed, using a nylon brush, wet wiped and sponged or cleaned by an equivalent method to remove all visible material (wire brushes are not permitted). During this work the surfaces being cleaned shall be kept wet. Cleaning shall also include the use of HEPA filtered vacuum equipment.

The Contractor shall also remove and containerize all visible accumulations of asbestos-containing and/or asbestos-contaminated debris which may have splattered or collected on the polyethylene engineering controls/barriers.

The Contractor shall remove contamination from the exteriors of the scaffolding, ladders, extension cords, hoses and other equipment inside the Regulated Area. Cleaning may be accomplished by brushing, HEPA vacuuming and/or wet cleaning. The Contractor shall wet wipe the Regulated Area using cotton rags or lint free paper towels. Rags and towels shall be disposed of after each use. Workers should avoid the use of dirty rags to insure proper cleaning of surfaces. Waste water shall be filtered using best available technology into leak-proof containers prior to being transported to a sanitary sewer for discharge.

Once the Regulated Area surfaces have dried, the Project Monitor shall perform a thorough post abatement visual inspection utilizing protocols from the ASTM Standard E1368-90 *Standard Practice for Visual Inspection of Asbestos Abatement Projects*. All surfaces within the Regulated Area, including but not limited to ledges, beams, and hidden locations shall be inspected for visible residue. Evidence of asbestos contamination identified during this inspection will necessitate further cleaning as heretofore specified. The area shall be re-cleaned at the Contractor's expense, until the standard of cleaning is achieved.

Once the area has received a satisfactory post-abatement visual inspection, any equipment, tools or materials not required for completion of the work, shall be removed by the Contractor from the Regulated Area.

(e) Air Monitoring Requirements

1. The Contractor shall:
 - a. Provide air monitoring equipment including sample filter cassettes of the type and quantity required to properly monitor operations and personnel exposure surveillance throughout the duration of the project.
 - b. Conduct personnel exposure assessment air sampling, as necessary, to assure that workers are using appropriate respiratory protection in accordance with OSHA Standard 1926.1101. Documentation of air sampling results must be recorded at the work site within twenty-four (24) hours and shall be available for review until the job is complete.
2. The Project Monitor, acting as the representative of the Engineer during abatement activities, will:
 - a. Collect air samples in accordance with the current revision of the NIOSH 7400 Method of Air Sampling for Airborne Asbestos Fibers while overseeing the activities of the Abatement Contractor. Frequency and duration of the air sampling during abatement will be representative of the actual conditions at the abatement site. The size and configuration of the asbestos project will be a factor in the number of samples required to monitor the abatement activities and shall be determined by the Project

Monitor. The following schedule of samples may be collected by the Project Monitor:

1. Pre-Abatement (Optional)
 - a. Background areas
 - b. Area(s) adjacent to Work Area(s)
 - c. Work Area(s)
2. During Abatement (Optional)
 - a. Within Regulated Area(s)
 - b. Area(s) adjacent to Regulated Areas(s)
(exterior to critical barriers)
 - c. At the Decontamination Enclosure System

Abatement Activity	Pre- Abatement	During Abatement	Post- Abatement
Exterior Friable/Non-Friable	---	PCM	---

If air samples collected outside of the Regulated Area during abatement activities indicate airborne fiber concentrations greater than original background levels, or greater than 0.1 f/cc, as determined by Phase Contrast Microscopy, whichever is larger, an examination of the Regulated Area perimeter shall be conducted, and the integrity of barriers shall be restored. Cleanup of surfaces outside the Regulated Area using HEPA vacuum equipment or wet cleaning techniques shall be done prior to resuming abatement activities.

(f) Post Abatement Work Area Deregulation

The Contractor shall remove all remaining polyethylene, including critical barriers, drop-cloths, and Decontamination Enclosure Systems. HEPA vacuum and/or wet wipe any visible residue which is uncovered during this process. All waste generated during this disassembly process shall be discarded as ACM waste.

A final visual inspection of the work area shall be conducted by the Competent Person and the Project Monitor to ensure that all visible accumulations of suspect materials have been removed and that no equipment or materials associated with the abatement project remain.

The Contractor shall restore all work areas and auxiliary areas utilized during work to conditions equal to or better than original. Any damage caused during the performance of the work activity shall be repaired by the Contractor at no additional expense to the Engineer.

(g) Waste Disposal

Unless otherwise specified, all removed materials and debris resulting from execution of this project shall become the responsibility of the Contractor and removed from the premises. Materials not scheduled for reuse shall be removed from the site and disposed of in accordance with all applicable Federal, State and Local requirements.

Waste removal dumpsters and cargo areas of transport vehicles shall be lined with a layer of six (6) mil polyethylene sheeting to prevent contamination from leaking or spilled containers. Floor sheeting shall be installed first and shall be extended up sidewalls 12-inches. Wall sheeting shall overlap floor sheeting 24-inches and shall be taped into place.

OSHA “Danger” signs must be attached to vehicles used to transport asbestos-containing waste prior to loading ACM waste. The signs must be posted so that they are plainly visible.

Ensure all waste containers (bags, drums, etc.) are properly packed, sealed and labeled with USEPA NESHAP generator labels, OSHA danger labels and DOT shipping labels. For each shipment of ACM waste, the Contractor shall complete an EPA-approved asbestos waste shipment record.

Authorized representatives signing waste shipment records on behalf of the generator must have USDOT Shipper Certification training in accordance with HMR 49 CFR Parts 171-180.

Transport vehicles hauling ACM waste shall have appropriate USDOT placards visible on all four (4) sides of the vehicle.

The Contractor shall dispose of asbestos-containing and/or asbestos contaminated material at an EPA authorized site and must be in compliance with the requirements of the Special Waste Provisions of the Office of Solid Waste Management, Department of Energy & Environmental Protection, State of Connecticut, or other designated agency having jurisdiction over solid waste disposal.

Any asbestos-containing and/or asbestos-contaminated waste materials which also contain other hazardous contaminants shall be disposed of in accordance with the EPA’s Resource Conservation and Recovery Act (RCRA), CTDEEP and ConnDOT requirements. Materials may be required to be stored on-site and tested by the Project Monitor to determine proper waste disposal requirements.

(h) Project Closeout Data:

1. Provide the Engineer, within 30 days of completion of asbestos abatement, a compliance package; which shall include, but not be limited to, the following:
 - a. Asbestos Abatement Site Supervisor job log;
 - b. OSHA personnel air sampling data;
 - c. Completed waste shipment records.

The Contractor shall submit the original completed waste shipment records to the Engineer.

Method of Measurement:

No measurement will be made for the work in this Section. The completed work shall be paid as a lump sum.

Basis of Payment:

The lump sum bid price for this item shall include the specialty services of the Asbestos Removal Contractor including: labor, materials, equipment, insurance, permits, notifications, submittals, personal air sampling, personal protection equipment, temporary enclosures, utility costs, incidentals, fees and labor incidental to the removal, transport and disposal of ACM, including close out documentation.

Final payment for asbestos abatement will not be made until all the project closeout data submittals have been completed (including waste shipment record(s) signed by an authorized disposal facility representative) and provided to the Engineer. Once the completed package has been received in its entirety, the Engineer will make the final payment to the Contractor.

<u>Pay Item</u>	<u>Pay Unit</u>
Asbestos Abatement	Lump Sum

ITEM #0020903A – LEAD COMPLIANCE FOR MISCELLANEOUS EXTERIOR TASKS

Description:

Work under this item shall include the special handling measures and work practices required for miscellaneous exterior tasks that impact materials containing or covered by lead paint. Lead paint includes paint found to contain **any** detectable amount of lead by Atomic Absorption Spectrophotometry (AAS) or X-Ray Fluorescence (XRF). Examples of typical miscellaneous exterior tasks includes; work impacting signs, guiderails, minor bridge rehabilitation, catenary structures, canopy structures, spot/localized paint removal, etc.

All activities shall be performed in accordance with the OSHA Lead in Construction Regulations (29 CFR 1926.62), the USEPA RCRA Hazardous Waste Regulations (40 CFR Parts 260 through 274), and the CTDEEP Hazardous Waste Regulations (RCSA 22a-209-1 and 22a-449(c)).

All activities shall be performed by individuals with appropriate levels of OSHA lead awareness and hazard communication training and shall supervised by the Contractors Competent Person on the job site at all times. The Contractors Competent Person is one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Deviations from these Specifications require the written approval of the Engineer.

Materials:

All materials shall be delivered to the job site in the original packages, containers, or bundles bearing the name of the manufacturer, the brand name and product technical description, with MSDS sheets as applicable.

No damaged or deteriorating materials shall be used. If material becomes contaminated with lead, the material shall be decontaminated or disposed of as lead-containing waste material. The cost to decontaminate and dispose of this material shall be at the expense of the Contractor.

The following material requirements are to be met if to be used during the work:

Fire retardant polyethylene sheet shall be in roll size to minimize the frequency of joints, with factory label indicating minimum six (6) mil thickness.

Polyethylene disposable bags shall be minimum six (6) mils thick.

Tape (or equivalent) product capable of sealing joints in adjacent polyethylene sheets and for the attachment of polyethylene sheets to finished or unfinished surfaces must be capable of adhering under both dry and wet conditions.

Cleaning Agents and detergent shall be lead specific, such as TriSodium Phosphate (TSP).

Chemical strippers and chemical neutralizers shall be compatible with the substrate as well as with each other. Such chemical stripper shall contain less than 50% Volatile Organic Compounds (VOCs) by weight in accordance with RCSA 22a-174-40 Table 40-1.

Labels and warning signs shall conform to 29 CFR 1926.62, 40 CFR 260 through 274 and 49 CFR 172 as appropriate.

Air filtration devices and vacuum units shall be equipped with High-Efficiency Particulate Air (HEPA) filters.

Construction Methods:

(1) Pre-Abatement Submittals and Notices

A. Prior to the start of any work on a contiguous per site basis that will generate hazardous lead waste above conditionally exempt small quantities (greater than 100 kg/month or greater than 1000 kg at any time), the Contractor shall obtain from the Engineer on a contiguous per site basis a temporary EPA Hazardous Waste Generators ID number, unless otherwise directed by the Engineer. Temporary EPA ID numbers are good for six months from the date they are issued and can be extended once, for a maximum of six months and can't be used for longer than one year. The Contractor will be responsible for notifying the Engineer when an extension is needed.

B. Fifteen (15) working days prior to beginning work that impacts lead paint, the Contractor shall submit the following to the Engineer:

1. Work plan for work impacting lead paint including engineering controls, methods of containment of debris and work practices to be employed, as needed, to minimize employee exposure and prevent the spread of lead contamination outside the Regulated Area.
2. Copies of all employee certificates, dated within the previous twelve (12) months, relating to OSHA lead awareness and hazard communication training and training in the use of lead-safe work practices. SSPC training programs may be accepted as meeting these requirements if it can be demonstrated that such training addressed all required topics.

This information shall be updated and resubmitted annually, or as information changes, for the duration of the activities impacting lead to verify continued compliance.

3. Name and qualifications of Contractor's OSHA Competent Person under 29 CFR 1926.62.
4. Documentation from the Contractor, typed on company letterhead and signed by the Contractor, certifying that all employees listed therein have received the following:
 - a. medical monitoring within the previous twelve (12) months, as required in 29 CFR 1926.62;
 - b. biological monitoring within the previous six (6) months, as required in 29 CFR 1926.62;
 - c. respirator fit testing within the previous twelve (12) months, as required in 29 CFR 1910.134 (for those who don a tight-fitting face piece respirator)

This information shall be updated and resubmitted annually, or as information changes, for the duration of the activities impacting lead to verify continued compliance.

5. Names of the proposed non-hazardous construction and demolition (C&D) lead debris bulky waste disposal facility (CTDEEP-permitted Solid Waste landfill).
6. Names of the proposed scrap metal recycling facilities. The Contractor shall submit to the Engineer all documentation necessary to demonstrate the selected facility is able to accept lead-painted scrap metal.
7. Names of the proposed hazardous waste disposal facility (selected from the Department approved list provided herein), and copies of each facilities acceptance criteria and sampling frequency requirements.
8. Copies of the proposed hazardous waste transporters current USDOT Certificate of Registration for Hazardous Materials Transport, and the proposed transporters current Hazardous Waste Transporter Permits for the State of Connecticut and the waste destination State.
9. Negative exposure assessments conducted within the previous 12 months documenting that employee exposure to lead for each task is below the OSHA Action Level of $30 \mu\text{g}/\text{m}^3$. If a negative exposure assessment has not been conducted, the Contractor shall submit its air monitoring program for the work tasks as part of the Work Plan. Until a negative exposure assessment is developed for each task impacting lead paint, the Contractor shall ensure that all workers and authorized persons entering the Regulated Area wear protective clothing and respirators in accordance with OSHA 29 CFR 1926.62.

No activity shall commence until all required submittals have been received and found acceptable to the Engineer. Those employees added to the Contractor's original list will be allowed to perform work only upon submittal of acceptable documentation to, and review by, the Engineer.

Contractor shall provide the Engineer with a minimum of 48 hours notice in advance of scheduling, changing or canceling work activities.

(2) Lead Abatement Provisions

A. General Requirements:

All employees of the Contractor who perform work impacting lead paint shall be properly trained to perform such duties. In addition, the Contractor shall instruct all workers in all aspects of personnel protection, work procedures, emergency evacuation procedures and use of equipment including procedures unique to this project.

Contractor shall provide all labor, materials, tools, equipment, services, testing, and incidentals which are necessary or required to perform the work in accordance with applicable governmental regulations, industry standards and codes, and these Specifications.

Prior to beginning work, the Engineer and Contractor shall perform a visual survey of each work area and review conditions.

As necessary, the Contractor shall:

Shut down and lock out electrical power, including all receptacles and light fixtures, where feasible. The use or isolation of electrical power will be coordinated with all other ongoing uses of electrical power at the site.

If adequate electrical supply is not available at the site, the Contractor shall supply temporary power. Such temporary power shall be sufficient to provide adequate lighting and power the Contractor's equipment. The Contractor is responsible for proper connection and installation of electrical wiring and shall ensure safe installation of electrical equipment in compliance with applicable electrical codes and OSHA requirements.

If water is not available at the site for the Contractor's use, the Contractor shall supply sufficient water for each shift to operate the wash facility/decontamination shower units in addition to the water needed at the work area.

The Engineer may provide a Project Monitor to monitor compliance of the Contractor and protect the interests of the Department. In such cases, no activity impacting lead paint shall be performed until the Project Monitor is on-site. Where no Project Monitor will be provided, Contractor shall proceed at the direction of the Engineer. Environmental sampling, including ambient air sampling, TCLP waste stream sampling, and dust wipe sampling, will be conducted by the State as it deems necessary throughout the project. Air monitoring to comply with the Contractor's obligations under OSHA remains solely responsibility of the Contractor.

If at any time, procedures for engineering, work practice, administrative controls or other topics

are anticipated to deviate from those documented in the submitted and accepted Lead Work Plan, the Contractor shall submit a modification of its existing plan for review and acceptance by the Engineer prior to implementing the change.

If air samples collected outside of the Regulated Area during activities impacting lead paint indicate airborne lead concentrations greater than original background levels or $30 \mu\text{g}/\text{m}^3$, whichever is larger, or if at any time visible emissions of lead paint extend out from the Regulated Area, an examination of the Regulated Area shall be conducted and the cause of such emissions corrected. Cleanup of surfaces outside the Regulated Area using HEPA vacuum equipment or wet cleaning techniques shall be done prior to resuming work.

Work outside the initial designated area(s) will not be paid for by the Engineer. The Contractor will be responsible for all costs incurred from these activities including repair of any damage.

B. Regulated Area

The Contractor shall establish a Regulated Area through the use of appropriate barrier tape or other means to control unauthorized access into the area where activities impacting lead paint are occurring. Warning signs meeting the requirements of 29 CFR 1926.62 shall be posted at all approaches to Regulated Areas. These signs shall read:

DANGER
LEAD WORK AREA
MAY DAMAGE FERTILITY OR THE UNBORN CHILD
CAUSES DAMAGE TO THE CENTRAL NERVOUS SYSTEM
DO NOT EAT, DRINK, OR SMOKE IN THIS AREA

The Contractor shall implement appropriate engineering controls such as poly drop cloths, local exhaust ventilation, wet dust suppression methods, etc. as necessary, and as approved by the Engineer, to prevent the spread of lead contamination beyond the Regulated Area in accordance with the Contractor's approved work plan. Should the previously submitted work plan prove to be insufficient to contain the contamination, the Contractor shall modify its plan and submit it for review by the Engineer.

C. Wash Facilities:

The Contractor shall provide handwash facilities in compliance with 29 CFR 1926.51(f) and 29 CFR 1926.62 regardless of airborne lead exposure.

If employee exposure to airborne lead exceeds the OSHA Permissible Exposure Limit of 50 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), shower rooms must be provided. The Shower Room shall be of sufficient capacity to accommodate the number of workers. One shower stall shall be provided for each eight (8) workers. Showers shall be equipped with hot and cold or warm running water. Shower water shall be collected and filtered using best available technology and disposed of in accordance with all Federal, State and local laws, regulations and ordinances.

D. Personal Protection:

The Contractor shall initially determine if any employee performing construction tasks impacting lead paint may be exposed to lead at or above the OSHA Action Level of $30 \mu\text{g}/\text{m}^3$.

Assessments shall be based on initial air monitoring results as well as other relevant information. The Contractor may rely on historical air monitoring data obtained within the past 12 months under workplace conditions closely resembling the process, type of material, control methods, work practices and environmental conditions used and prevailing in the Contractor's current operations to satisfy the exposure assessment requirements. Monitoring shall continue as specified in the OSHA standard until a negative exposure assessment is developed.

Until a negative exposure assessment is developed for each task impacting lead paint, the Contractor shall ensure that all workers and authorized persons entering the Regulated Area wear protective clothing and respirators in accordance with OSHA 29 CFR 1926.62. Protective clothing shall include impervious coveralls with elastic wrists and ankles, head covering, gloves and foot coverings. Sufficient quantities shall be provided to last throughout the duration of the project.

Protective clothing provided by the Contractor and used during chemical removal operations shall be impervious to caustic materials. Gloves provided by the Contractor and used during chemical removal shall be of neoprene composition with glove extenders.

Respiratory protective equipment shall be provided and selection shall conform to 42 CFR Part 84, 29 CFR Part 1910.134, and 29 CFR Part 1926.62. A formal respiratory protection program must be implemented in accordance with 29 CFR Part 1926.62 and Part 1910.134.

E. Air Monitoring Requirements

The Contractor shall:

1. Provide air monitoring equipment including sample filter cassettes of the type and quantity required to properly monitor operations and personnel exposure surveillance throughout the duration of the project.
2. Conduct initial exposure monitoring to determine if any employee performing construction tasks impacting lead paint may be exposed to lead at or above the OSHA Action Level of 30 micrograms per cubic meter. Monitoring shall continue as specified in the OSHA standard until a negative exposure assessment is developed.
3. Conduct personnel exposure assessment air sampling, as necessary, to assure that workers are using appropriate respiratory protection in accordance with OSHA Standard 1926.62. Documentation of air sampling results must be recorded at the work site within twenty-four (24) hours and shall be available for review until the job is complete.

F. Lead Abatement Procedures

The Contractor's Competent Person shall be at the job site at all times during work impacting lead.

Work impacting lead paint shall not begin until authorized by the Engineer, following a pre-work visual inspection by the Project Monitor or Engineer to verify existing conditions.

Any activity impacting lead painted surfaces shall be performed in a manner which minimizes the spread of lead dust contamination and generation of airborne lead.

The Contractor shall conduct exposure assessments for all tasks which impact lead paint in accordance with 29 CFR 1926.62(d) and shall implement appropriate personal protective equipment until negative exposure assessments are developed.

All work impacting the materials identified below shall be conducted within an established Regulated Area with a remote wash facility/decontamination system in accordance with "C. Wash Facilities" and the OSHA Lead in Construction Standard. In accordance with 29 CFR 1926.62, engineering controls and work practices shall be utilized to prevent the spread of lead dust and debris beyond the Regulated Area and limit the generation of airborne lead. All wastes containing lead paint shall be properly contained and secured for storage, transportation and disposal.

The Contractor shall ensure proper entry and exit procedures for workers and authorized persons who enter and leave the Regulated Area. All workers and authorized persons shall leave the Regulated Area and proceed directly to the wash or shower facilities where they will HEPA vacuum gross debris from work suit, remove and dispose of work suit, wash and dry face and hands, and vacuum clothes. Lead chips and dust must not be removed by blowing or shaking of clothing. Wash water shall be collected, filtered, and disposed of in accordance with Federal, State and local water discharge standards. Any permit required for such discharge shall be the responsibility of the Contractor.

No one shall eat, drink, smoke, chew gum or tobacco, or apply cosmetics while in the Regulated Area.

Data from the limited lead testing performed by the Engineer is documented in the reports listed in the "Notice to Contractor – Hazardous Materials Investigations" or is presented herein. Under no circumstances shall this information be the sole means used by the Contractor for determining the extent of lead painted materials. The Contractor shall be responsible for verification of all field conditions affecting performance of the work as described in these Specifications in accordance with OSHA, USEPA, USDOT and CTDEEP standards. Compliance with the applicable requirements is solely the responsibility of the Contractor.

The following details the extent of each phase of operation designated for this project. Phase areas may be combined or divided at the direction of the Engineer. Proceed through the sequencing of the work phases under the direction of the Engineer.

Bridge No. 03191F, I-84 EB Exit 21 off-Ramp, Waterbury, CT

- No lead paint was identified on the structural steel/metal bridge components on the underside of Bridge No. 03191F.
- Lead paint was identified on the metal railing bridge components to be impacted at Bridge No. 03191F.

Bridge No. 03191F Components	Substrate	Color	Results
Girders, Bearings, Rockers, Diaphragms, Crossbeams, Connection Plates, etc.	Metal	White/light green	0.0 mg/cm ² ND<0.10%
Railing and Railing post/support	Metal	Grey	0.2-0.4 mg/cm ²

- As no lead paint was identified on the structural steel/metal bridge components to be impacted on the underside of Bridge No. 03191F, any paint waste generated from those bridge components would be non-hazardous, non-RCRA waste.
- The projected paint waste debris from the painted metal railing bridge components are presently presumed as CTDEEP/RCRA hazardous lead waste.

Paint Waste Stream	Result
Bridge 03191F - Railing and Railing post/support metal components	Presumed

While conducting work to the bridge, where it is necessary to impact the lead painted metal surfaces, the Contractor shall either:

- a. Remove the paint to be impacted prior to impacting the metal in accordance with OSHA Lead in Construction Standard 29CFR 1926.62, or
- b. Impact the metal using mechanical means with the paint in place in accordance with OSHA Lead in Construction Standard 29CFR 1926.62.

The Contractor shall submit a Work Plan to ConnDOT outlining the exact procedures that will be used to perform the work, contain the spread of lead debris and protect the employees performing the required renovation work impacting the lead paint. No work shall be started by the Contractor until the Work Plan is approved by the Engineer.

All work impacting the lead paint materials shall be conducted within an established Regulated Area with a remote wash facility/decontamination system in accordance with “C. Wash Facilities” and the OSHA Lead in Construction Standard. In accordance with 29 CFR 1926.62, engineering controls and work practices shall be utilized to prevent the spread of lead dust and debris beyond the Regulated Area and limit the generation of airborne lead. All wastes containing lead paint shall be properly contained and secured for storage, transportation and disposal.

On Bridge No. 03191F, the Engineer has characterized/presumed the paint waste streams associated with the railing and railing post/support metal bridge components as CTDEEP/RCRA Hazardous waste. If the paint is removed from the metal surfaces, the paint shall be handled and disposed of in accordance with USEPA/CTDEEP Hazardous Waste Regulations as described under this Item 0020903A.

No lead paint was identified on the white/light green structural steel/metal bridge components on the underside of Bridge No. 03191F, therefore any paint waste generated from those bridge components would be non-hazardous, non-RCRA waste as described under this Item 0020903A.

All steel and metal components generated from the miscellaneous exterior work tasks (painted or not) shall be segregated and recycled as scrap metal. The recycling of scrap metal (regardless of lead paint concentration) is exempt from USEPA RCRA and CTDEEP Hazardous Waste Regulation.

Should lead contamination be discovered outside of the Regulated Area, the Contractor shall immediately stop all work in the Regulated Area, eliminate causes of such contamination and take steps to decontaminate non-work areas.

Special Requirements:

1. Demolition/Renovation:
 - a. Demolish/renovate in a manner which minimizes the spread of lead contamination and generation of lead dust.
 - b. Implement dust suppression controls, such as misters, local exhaust ventilation, etc. to minimize the generation of airborne lead dust.
 - c. Segregate work areas from non-work areas through the use of barrier tape, drop cloths, etc.
 - d. Clean up immediately after renovation/demolition has been completed
2. Chemical Removal:

- a. Apply chemical stripper in quantities and for durations specified by manufacturer.
 - b. Where necessary, scrape lead paint from surface down to required level of removal (i.e. stabilized surface, bare substrate with no trace of residual pigment, etc.). Use sanding, hand scraping, and dental picks to supplement chemical methods as necessary.
 - c. Apply neutralizer compatible with substrate and chemical agent to substrate following removal in accordance with manufacturer's instructions.
 - d. Protect adjacent surfaces from damage from chemical removal.
 - e. Maintain a portable eyewash station in the work area.
 - f. Wear respirators that will protect workers from chemical vapors.
 - g. Do not apply caustic agents to aluminum surfaces.
3. Mechanical Paint Removal:
- a. Provide sanders, grinders, rotary wire brushes, or needle gun removers equipped with a HEPA filtered vacuum dust collection system. Cowling on the dust collection system for orbital-type tools must be capable of maintaining a continuous tight seal with the surface being abated. Cowling on the dust collection system for reciprocating-type tools shall promote an effective vacuum flow of loosened dust and debris. Inflexible cowlings may be used on flat surfaces only. Flexible contoured cowlings are required for curved or irregular surfaces.
 - b. Provide HEPA vacuums that are high performance designed to provide maximum static lift and maximum vacuum system flow at the actual operating vacuum condition with the shroud in use. The HEPA vacuum shall be equipped with a pivoting vacuum head.
 - c. Remove lead paint from surface down to required level of removal (i.e. stabilized surface, bare substrate with no trace of residual pigment, etc.). Use chemical methods, hand scraping, and dental picks to supplement abrasive removal methods as necessary.
 - d. Protect adjacent surfaces from damage from abrasive removal techniques.
 - e. "Sandblasting" type removal techniques shall not be allowed.
4. Component Removal/Replacement:

- a. Wet down components which are to be removed to reduce the amount of dust generated during the removal process.
- b. Remove components utilizing hand tools and follow appropriate safety procedures during removal. Remove the components by approved methods which will provide the least disturbance to the substrate material. Do not damage adjacent surfaces.
- c. Clean up immediately after component removals have been completed. Remove any dust located behind the component removed.

G. Prohibited Removal Methods:

The use of heat guns in excess of 700 degrees Fahrenheit to remove lead paint is prohibited.

The use of sand, steel grit, air, CO₂, baking soda, or any other blasting media to remove lead or lead paint without the use of a HEPA ventilated contained negative pressure enclosure is prohibited.

Power/pressure washing shall not be used to remove lead paint.

Compressed air shall not be utilized to remove lead paint.

Chemical strippers containing Methylene Chloride are prohibited. Any chemical stripping may be prohibited on a project-by-project basis.

Power tool assisted grinding, sanding, cutting, or wire brushing of lead paint without the use of cowled HEPA vacuum dust collection systems is prohibited.

Lead paint burning, busting of rivets painted with lead paint, welding of materials painted with lead paint, and torch cutting of materials painted with lead paint is prohibited. Where cutting, welding, busting, or torch cutting of materials is required, lead paint in the affected area must be removed first.

Chemical stripping of coatings from bridge components is generally prohibited unless specifically allowed on a project-by-project basis.

H. Clean-up and Visual Inspection:

The Contractor shall remove and containerize all lead waste material and visible accumulations of debris, paint chips and associated items.

During clean-up the Contractor shall utilize rags and sponges wetted with lead-specific detergent and water as well as HEPA filtered vacuum equipment.

The Engineer will conduct a visual inspection of the work areas in order to document that all surfaces have been maintained as free as practicable of accumulations of lead in accordance with 29 CFR 1926.62(h). If visible accumulations of waste, debris, lead paint chips or dust are found in the work area, the Contractor shall repeat the cleaning, at the Contractor's expense, until the area is in compliance. The visual inspection will detect incomplete work, damage caused by the abatement activity, and inadequate clean up of the work site.

I. Post-Work Regulated Area Deregulation:

Following an acceptable visual inspection, any engineering controls implemented may be removed.

A final visual inspection of the work area shall be conducted by the Competent Person and the Project Monitor or Engineer to ensure that all visible accumulations of suspect materials have been removed and that no equipment or materials associated with the lead paint removal remain. If this final visual inspection is acceptable, the Contractor will reopen the Regulated Area and remove all signage.

The Contractor shall restore all work areas and auxiliary areas utilized during work to conditions equal to or better than original. Any damage caused during the performance of the work activity shall be repaired by the Contractor at no additional expense to the State.

J. Waste Disposal/Recycling:

Non-metallic building debris waste materials tested and found to be non-hazardous Construction and Demolition (C&D) bulky waste shall be disposed of properly at a CTDEEP approved Solid Waste landfill as described under this Item 0020903A.

Metallic debris shall be segregated and recycled as scrap metal at an approved metal recycling facility.

Concrete, brick, etc. coated with any amount of lead paint cannot be crushed, recycled or buried on-site to minimize waste disposal unless tested and found to meet the RSR GA/Residential standards.

Hazardous lead debris shall be disposed of as described under this Item 0020903A.

The Contractor shall comply with the latest requirements of the USEPA RCRA Hazardous Waste Regulations 40 CFR 260-274 and the DEEP Hazardous/Solid Waste Management Standards 22a-449(c).

Hazardous lead debris shall be transported from the Project by a licensed hazardous waste transporter approved by the Department and disposed of at an EPA-permitted and Department-approved hazardous waste landfill within 90 days from the date of generation.

The Contractor must use one or more of the following Department-approved disposal facilities for the disposal of hazardous waste:

Clean Earth of North Jersey, Inc., (CENJ) 115 Jacobus Avenue, South Kearny, NJ 07105 Phone: (973) 344-4004; Fax: (973) 344-8652	Clean Harbors Environmental Services, Inc. 2247 South Highway 71, Kimball, NE 69145 Phone: (308) 235-8212; Fax: (308) 235-4307
Clean Harbors of Braintree, Inc. 1 Hill Avenue, Braintree, MA 02184 Phone: (781) 380-7134; Fax: (781) 380-7193	ACV Enviro (CycleChem) (General Chem Co) 217 South First Street, Elizabeth, NJ 07206 Phone: (908) 355-5800; Fax (908) 355-0562
Triumverate (EnviroSafe Corp Northeast) (Jones Environmental Services (NE), Inc.) 263 Howard Street, Lowell, MA 01852 Phone: (978) 453-7772; Fax: (978) 453-7775	US Ecology Environmental Quality Detroit, Inc. 1923 Frederick Street, Detroit, MI 48211 Phone: (800) 495-6059; Fax: (313) 923-3375
Stericycle (Republic Environmental Systems) 2869 Sandstone Drive, Hatfield, PA 19440 Phone: (215) 822-8995; Fax: (215) 997-1293	Clean Harbors – Spring Grove Facility 4879 Spring Grove Ave, Cincinnati OH 45322 Phone: (513) 681-6242; Fax: (513) 681-0869
Envirite of PA (US Ecology) 730 Vogelsong Road, York, PA 17404 Phone: (717) 846-1900; Fax: (717) 854-6757	Stablex, Canada, Inc. 760 Industrial Bl, Blainville Quebec J7C3V4 Phone: (451) 430-9230; Fax: (451) 430-4642
Environmental Quality Company: Wayne Disposal Facility 49350 North I-94 Service Drive Belleville, MI 48111 Phone: (800) 592-5489; Fax: (800) 592-5329	Stericycle (Northland Environmental, Inc.) (PSC Environmental Systems) 275 Allens Avenue, Providence, RI 02905 Phone: (401) 781-6340; Fax: (401) 781-9710

No facility may be substituted for the one(s) designated in the Contractor's submittal without the Engineer's prior approval. If the material cannot be accepted by any of the Contractor's designated facilities, the Department will supply the Contractor with the name(s) of other acceptable facilities.

Prior to the generation of any hazardous waste, the Contractor shall notify the Engineer of its selected hazardous waste transporter and disposal facility. The Contractor must submit to the Engineer (1) the transporter's current US DOT Certificate of Registration and (2) the transporter's current Hazardous Waste Transporter Permits for the State of Connecticut, the hazardous waste destination state and any other applicable states. The Engineer will then obtain on a contiguous per site basis a temporary EPA Generators ID number for the site that he will forward to the Contractor. Any changes in transporter or facility shall be immediately forwarded to the Engineer for review.

Handling, storage, transportation and disposal of hazardous waste materials generated as a result of execution of this project shall comply with all Federal, State and Local regulations including the USEPA RCRA Hazardous Waste Regulations (40 CFR Parts 260-271), the CTDEEP

Hazardous Waste Regulations (22a-209 and 22a-449(c)), and the USDOT Hazardous Materials Regulations (49 CFR Part 171-180).

All debris shall be contained and collected daily or more frequently as directed by the Engineer, due to debris buildup. Debris shall be removed by HEPA vacuum collection. Such debris and paint chips shall be stored in leak-proof storage containers in the secured storage site, or as directed by the Engineer. The storage containers and storage locations shall be reviewed by the Engineer and shall be located in areas not subject to ponding. Storage containers shall be placed on pallets and closed and covered with tarps at all times except during placement, sampling and disposal of the debris.

Hazardous waste materials are to be properly packed and labeled for transport by the Contractor in accordance with EPA, CTDEEP and USDOT regulations. The disposal of debris characterized as hazardous waste shall be completed within 90 calendar days of the date on which it began to be accumulated in the lined containers. Storage of containers shall be in accordance with current DEEP/EPA procedures.

The Contractor shall label hazardous waste storage containers with a 6-inch square, yellow, weatherproof, Hazardous Waste sticker in accordance with USDOT regulations.

Materials other than direct paint related debris which are incidental to the paint removal work activities (tarps, poly, plywood, PPE, gloves, decontamination materials, etc.) which may be contaminated with lead, shall be stored separately from the direct paint debris, and shall be sampled by the Engineer for waste disposal characterization testing. Such materials characterized as hazardous shall be handled/disposed of as described herein, while materials characterized as non-hazardous shall be disposed of as non-hazardous CTDEEP Solid Waste.

Direct paint related debris materials not previously sampled and characterized for disposal, which may be originally presumed to be hazardous waste, shall also be stored separately and sampled by the Engineer for ultimate waste disposal characterization testing and handled/disposed of based on that testing.

Project construction waste materials unrelated to the paint removal operations shall NOT be combined/stored with paint debris waste and/or incidental paint removal materials as they are not lead contaminated and shall NOT be disposed of as hazardous waste. The Engineer's on-site Inspectors shall conduct inspections to verify materials remain segregated.

The Contractor shall obtain and complete all paperwork necessary to arrange for material disposal, including disposal facility waste profile sheets. It is solely the Contractor's responsibility to co-ordinate the disposal of hazardous materials with its selected treatment/recycling/disposal facility(s). Upon receipt of the final approval from the facility, the Contractor shall arrange for the loading, transport and treatment/recycling/disposal of the materials in accordance with all Federal and State regulations. **No claim will be considered based on the failure of the Contractor's disposal facility(s) to meet the Contractor's**

production rate or for the Contractor's failure to select sufficient facilities to meet its production rate.

The Contractor shall process the hazardous waste such that the material conforms with the requirements of the selected treatment/disposal facility, including but not limited to specified size and dimension. Refusal on the part of the treatment/disposal facility to accept said material solely on the basis of non-conformance of the material to the facility's physical requirements is the responsibility of the Contractor and no claim for extra work shall be accepted for reprocessing of said materials to meet these requirements.

All DOT shipping documents, including the Uniform Hazardous Waste Manifests utilized to accompany the transportation of the hazardous waste material shall be prepared by the Contractor and reviewed/signed by an authorized agent representing ConnDOT, as Generator, for each load of hazardous material that is packed to leave the site. The Contractor shall not sign manifests on behalf of the State as Generator. The Contractor shall forward the appropriate original copies of all manifests to the Engineer the same day the material leaves the Project site.

Materials not related to lead paint removal and/or characterized as non-hazardous waste shall NOT be shipped for hazardous waste disposal in accordance with USEPA RCRA hazardous waste minimization requirements.

A load-specific certificate of disposal, signed by the authorized agent representing the waste disposal facility, shall be obtained by the Contractor and promptly delivered to the Engineer for each load.

In addition to all pertinent Federal, State and local laws or regulatory agency policies, the Contractor shall adhere to the following precautions during the transport of hazardous materials off-site:

- All vehicles departing the site are to be properly logged to show the vehicle identification, driver's name, time of departure, destination, and approximate volume, and contents of materials carried. Vehicles shall display the proper USDOT placards for the type and quantity of waste;
- No materials shall leave the site unless a disposal facility willing to accept all of the material being transported has agreed to accept the type and quantity of waste;
- Documentation must be maintained indicating that all applicable laws have been satisfied and that the materials have been successfully transported and received at the disposal facility; and,
- The Contractor shall segregate the waste streams (i.e. concrete, wood, etc.) as directed by the receiving disposal facility.

Any spillage of debris during disposal operations during loading, transport and unloading shall be cleaned up in accordance with EPA 40 CFR 265 Subparts C & D, at the Contractor's expense.

The Contractor is liable for any fines, costs or remediation costs incurred as a result of their failure to be in compliance with this Item and all Federal, State and Local laws.

K. Project Closeout Data:

Provide the Engineer, within thirty (30) days of completion of the project site work, a compliance package; which shall include, but not be limited to, the following:

1. Competent persons (supervisor) job log;
2. OSHA-compliant personnel air sampling data;
3. Completed waste shipment papers for non-hazardous lead construction and demolition (C&D) waste disposal or recycling and scrap metal recycling.
4. Copies of completed Hazardous Waste Manifests (signed by authorized disposal facility representative).

Method of Measurement:

The completed work shall be paid as a lump sum. This item will include all noted services, equipment, facilities, testing and other associated work for up to three (3) ConnDOT project representatives. Services provided to any ConnDOT project representatives in excess of three (3) representatives will be measured for payment in accordance with Article 1.09.04 – “Extra and Cost-Plus Work.”

Basis of Payment:

The lump sum price bid for this item shall include: services, materials, equipment, all permits, notifications, submittals, personal air sampling, personal protection equipment, temporary enclosures, incidentals, fees and labor incidental to activities impacting lead removal, treatment and handling of lead contaminated materials, and the transport and disposal of any hazardous and/or non-hazardous, non-RCRA lead waste.

Final payment will not be made until all project closeout data submittals have been completed and provided to the Engineer. Once the completed package has been received in its entirety and accepted by the Engineer, final payment will be made to the Contractor.

Pay Item

Pay Unit

Lead Compliance for
Miscellaneous Exterior Tasks

Lump Sum

END OF SECTION

ITEM #0101143A – HANDLING AND DISPOSAL OF REGULATED ITEMS

Description:

Work under this item shall include the management (handling and disposal) of regulated items and all associated work by persons who are employed by a CTDEEP permitted Spill Contractor and trained/certified in accordance with OSHA Hazard Communication regulations. Regulated items include hazardous and other materials and wastes, the disposal of which is restricted by Federal and/or State laws and regulations, and which may be a component of equipment or other items located on-site. Regulated items include those listed herein, or additional similar items identified on site by the Engineer. Work under this item does not include asbestos containing materials, lead paint, contaminated or hazardous soils.

Activities shall be performed in accordance with, but not limited to, the current revision of the USEPA & CTDEEP Hazardous Waste Regulations (40 CFR 260-282, 22a-209 and 22a-449(c)), USEPA PCB Regulations (40 CFR 761), USEPA Protection of Stratospheric Ozone (40 CFR 82), OSHA Hazard Communication (29 CFR 1910.1200), OSHA Hazardous Waste & Emergency Response Regulations (29 CFR 1910.120), USDOT Hazardous Materials Regulation (49 CFR 171-180), OSHA, RCRA, CERCLA, CAA, TSCA, and all other laws and regulations.

The work activities include the removal, handling, packing, labeling, transport, manifesting, and recycling or disposal of various regulated items at the Project site prior to beginning planned renovation/demolition activities.

The Contractor is solely responsible for verifying actual locations and quantities of the items with hazardous/regulated material/waste constituents and for their proper handling and disposal. The recycling or proper disposal, as appropriate, of all regulated items shall be completed prior to the initiation of any demolition or renovation activities.

Materials:

All materials shall be suitable for the management of regulated items and shall meet all applicable federal, state and local regulations. Such materials include, but are not limited to, proper containers, packing materials, labels, signs, shipping papers, personnel protective equipment (PPE) and spill kits.

Construction Methods:

(1) Allowable Disposal/Recycling Facilities

Disposal facilities for RCRA-hazardous, TSCA-hazardous, Connecticut Regulated, and Universal wastes shall be chosen from among those listed below. No other facility shall be used for these types of wastes without the written approval of the Engineer.

Advanced Disposal Services
Greentree Landfill
635 Toby Road
Kersey, PA 15846
Phone: (814) 265-1744 Fax: (814) 265-8745
MSW, C&D, asbestos, PCB remediation waste <50
ppm, petroleum contaminated soils, nonhazardous solid
wastes

Advanced Disposal
(managed by Interstate Waste Services)
7095 Glades Pike
Summerset, PA 15501
Phone: (814) 444-0112 Fax: (814) 444-0127
MSW, C&D debris, residual waste, sewer sludge,
incinerator ash, asbestos

Allied Waste Niagara Falls Landfill, LLC
5600 Niagara Falls Blvd.
Niagara, NY 14304
Phone: (716) 285-3344 Fax: (716) 285-3398
Non-hazardous waste, industrial solid waste, municipal
sewage treatment sludge, contaminated soil & debris,
asbestos waste, C&D debris, industrial process sludge

American Lamp Recycling, LLC
26 Industrial Way
Wappingers Falls, NY 12590
Phone: (845) 896-0058 Fax: (845) 896-1520
Mercury containing device, universal waste

Tradebe (Bridgeport United Recycling, Inc.)
50 Cross Street
Bridgeport, CT 06610
Phone: (203) 334-1666 Fax: (203) 334-1439
RCRA & CRW waste oil, fuel, wastewater

Clean Earth of Carteret
24 Middlesex Ave.,
Carteret, NJ 07008
Phone: (732) 541-8909 Fax: (732) 541-8505
Concrete, brick, block, street sweepings, stone, rock,
asphalt and petroleum contaminated soil

Clean Earth of Philadelphia, Inc.
3201 South 61 St.,
Philadelphia, PA 19153
Phone: (215) 724-5520 Fax: (215) 724-2939
Petroleum contaminated soil

Clean Earth of North Jersey, Inc. (aka CENJ)

115 Jacobus Ave,
South Kearny, NJ 07105
Phone: (973) 344-4004 Fax: (973) 344-8652
RCRA liquid and solid, asbestos

Clean Earth of Southeast Pennsylvania, Inc.
7 Steel Road,
Morrisville, PA 19067
Phone: (215) 428-1700 Fax: (215) 428-1704
Petroleum contaminated soil
Clean Harbors Environmental Services, Inc.
2247 South Hwy. 71,
Kimball, NE 69145
Phone: (308) 235-1012 Fax: (308) 235-4307
RCRA liquid, solid & sludge

Clean Harbors Environmental Services, Inc.
Cleveland Facility
2900 Rockefeller Ave.,
Cleveland, OH 44115
Phone: (216) 429-2401 Fax: (216) 883-1918
RCRA liquid: aqueous organic & inorganic wastewater

Clean Harbors Environmental Services, Inc.
Spring Grove Facility
4879 Spring Grove Ave.,
Cincinnati, OH 45232
Phone: (513) 681-6242 Fax: (513) 681-0869
RCRA liquid, solid & sludge: aqueous organic &
inorganic wastewater, PCB wastewater treatment

Clean Harbors of Baltimore, Inc.
1910 Russell St,
Baltimore, MD 21230
Phone: (410) 244-8200 Fax: (410) 752-2647
RCRA liquid: aqueous organic & inorganic wastewater

Clean Harbors of Braintree, Inc.
1 Hill Avenue,
Braintree, MA 02184
Phone: (781) 380-7134 Fax: (781) 380-7193
RCRA & TSCA liquid & solid

Clean Harbors of Connecticut, Inc.
51 Broderick Road,
Bristol, CT 06010
Phone: (860) 583-8917 Fax: (860) 583-1740
RCRA & CRW liquid

Clean Harbors of Woburn
(Murphy's Waste Oil Services, Inc.)
252 Salem Street,

Woburn, MA 01801

Phone: (781) 935-9066 Fax: (781) 935-8615
RCRA liquid: oil, oil/water mixtures; CRW oil filters,
oily soil & debris, F001/F002 contaminated oils,
antifreeze

Clinton Landfill

242 Church Street

Clinton, MA 01510

Phone: (978) 365-4110 Fax: (978) 365-4106
Comm-97 soils and other materials subject to a BUD
and additional review by MADEP (*2-week lead time
for review by MADEP)

Colonie Landfill (Waste Connections, Inc.)

1319 Loudon Rd,

Cohoes, New York 12047

Phone: (518) 783-2827 Fax: (518) 786-7331

Non-haz. wastes, special wastes, contaminated soil

Cumberland County Landfill

(aka Community Refuse Services

Managed by Interstate Waste Services)

135 Vaughn Road,

Shippensburg, PA 17257

Phone: (717) 729-2060 Fax: (717) 423-6822

Municipal solid waste, non-hazardous waste

ACV Enviro (aka Cycle Chem & General
Chemical Corp.)

217 South First Street,

Elizabeth, NJ 07206

Phone: (908) 355-5800 Fax: (908) 355-0562

RCRA, TSCA liquid and solid

Envirite of PA (US Ecology)

730 Vogelsong Road,

York, PA 17404

Phone: (717) 846-1900 Fax: (717) 854-6757

RCRA hazardous wastes

Environmental Quality Company:

Wayne Disposal Facility

(aka EQ Michigan Disposal Waste Treatment Plant
and Wayne Disposal Inc. Site #2)

49350 North I-94 Service Drive

Belleville, MI 48111

Phone: (734) 697-2200 Fax: (734) 699-3499

RCRA & TSCA liquid and solid

US Ecology (Environmental Quality Detroit Inc.)

1923 Frederick Street,

Detroit MI 48211

Phone: (734) 329-8017 Fax: (313) 923-3375

RCRA & CRW liquid wastewater

Environmental Soil Management of New York,
LLC (ESMI of New York)

304 Towpath Road,

Fort Edward, NY 12828

Phone: (518) 747-5500 Fax: (518) 747-1181

Petroleum contaminated soil

Environmental Soil Management of NH

67 International Dr.

Loudon, NH 03307

Phone: (603) 783-0228 Fax: (603) 783-0104

Petroleum contaminated soil

Triumvirate (Formerly EnviroSafe Corporation

Northeast & Jones Environmental Services)

263 Howard Street,

Lowell, MA 01852

Phone: (978) 453-7772 Fax: (978) 453-7775

RCRA & TSCA liquid and solid

Hazelton Creek Properties, LLC*

(Hazelton Mine Reclamation Project)

280 South Church St.,

Hazelton, PA 18201

Phone: (570) 574-1010 Fax: (570) 457-3395

Fresh, brackish or marine dredge material, coal ash,
cement kiln dust, lime kiln dust, co-gen ash, regulated
fill

*Please note that if this facility is to be used, each bin
letter will require an additional 10 day (or more) waiting
period on top of the 15-day lab period designated in the
specs to allow for PADEP review.

Heritage Hazardous Waste Landfill (Heritage

Environmental Services, LLC)

4370 W County Rd 1275 N

Roachdale, IN 46172

Phone: (765) 435-2704 Fax: (315) 687-3898

Hazardous Wastes, Asbestos

Manchester Landfill

311 Olcott St.,

Manchester, CT 06040

Phone: (860) 647-3248 Fax: (860) 647-3238

Municipal solid waste, non-hazardous waste,
contaminated soil

Northeast Lamp Recycling, Inc.

250 Main Street,

East Windsor, CT 06088

Phone: (860) 292-1992 Fax: (860) 292-1114

CRW solid waste, mercury containing devices & universal waste
 Stericycle (Northland Environmental, LLC)
 (aka PSC Environmental Systems)
 275 Allens Ave.,
 Providence RI 02905
 Phone: (401) 781-6340 Fax: (401) 781-9710
 RCRA liquid and solid

Ontario County Landfill
 (Managed by Casella Waste)
 3555 Post Farm Road,
 Stanley, NY 14561
 Phone: (585) 526-4420 Fax: (585) 526-5459
 Municipal solid waste, non-hazardous waste solid,
 special wastes including asbestos, ash from
 boilers/incinerators, contaminated soil, demo debris

Paradise Heating Oil, Inc.
 Quimby Street,
 Ossining, NY 10562
 Phone: (631) 926-2576 Fax: (718) 294-2226
 CRW waste oil liquid

Phoenix Soil, LLC
 58 North Washington Street
 Plainville, CT 06062
 Phone: (860) 747-8888 Fax: (203) 757-4933
 Contaminated Soil

Red Technologies Soil
 232 Airline Avenue
 Portland, CT 06980
 Phone: (860) 342-1022 Fax: (860) 342-1042
 Temporary Storage & Transfer of contaminated soil

Republic Services Conestoga Landfill
 420 Quarry Road
 Morgantown, PA 19543
 Phone: (610) 286-6844 Fax: (610) 286-7048
 MSW, C&D debris, residual waste, contaminated soil,
 asbestos *Please note that if this facility is to be used,
 each bin letter will require an additional 10 day (or
 more) waiting period on top of the 15-day lab period
 designated in the specs to allow for PADEP review.

Stericycle (Formerly Republic Environmental
 Systems (aka Philip Services Corporation (PSC)
 Republic)
 2869 Sandstone Dr.,
 Hatfield PA 19440
 Phone: (215) 822-8995 Fax: (215) 997-1293

RCRA & TSCA industrial solid & sludge, aqueous
 waste, contaminated soil, PCB waste, oil & petroleum
 waste, organic waste
 Soil Safe, Inc.
 378 Route 130, Logan Township,
 Bridgeport NJ 08085
 Phone: (410) 872-3990 x1120
 Fax: (410) 872-9082
 Soil contaminated with petroleum or metals, some
 industrial waste solids

The Southbridge Recycling & Disposal Park
 165 Barefoot Rd.
 Southbridge, MA 01550
 Phone: (508) 765-9723, (603) 235-3597
 Fax: (508) 765-6812
 MSW, non-hazardous C & D waste, contaminated soil
 for cover

Stablex Canada, Inc.
 760 Industrial Blvd.
 Blainville Quebec J7C 3V4
 Phone: (450) 430-9230 Fax: (450) 430-4642
 RCRA liquid and solid, industrial wastes

Ted Ondrick Company, LLC
 58 Industrial Road,
 Chicopee, MA 01020
 Phone: (413) 592-2566 Fax: (413) 592-7451
 Petroleum contaminated soil

Tradebe Treatment & Recycling
 136 Gracey Ave.
 Meriden, CT 06451
 Phone: (203) 238-8114 Fax: (203) 238-6772
 RCRA, CRW wastewater, oil, hazardous waste fuels,
 hazardous and non-hazardous wastewater

Tunnel Hill Reclamation
 2500 Township Road, 205 Route 2
 New Lexington, OH 43764
 Phone: (914) 713-0203 Fax: (914) 713-0672
 Municipal solid waste, non-hazardous waste,
 contaminated soils

Waste Management
 RCI Fitchburg Landfill
 Fitchburg Princeton Road,
 Westminister, MA 01473
 Phone: (978) 355-6821 Fax: (978) 355-6317
 Solid: MSW, non-hazardous waste, C&D, contaminated
 soil for use as cover material under MADEP COMM-97
 policy

Turnkey Landfill (Waste Management of NH)
TLR III Refuse Disposal Facility
90 Rochester Neck Road, PO Box 7065

Rochester, NH 03839
Phone: (603) 330-2197 Fax: (603) 330-2130
Solid: MSW, C&D, PCB remediation waste (<50ppm),
virgin petroleum contaminated soil, CRW solid waste

The category of material accepted by each facility listed above is for informational purposes only. The Contractor shall verify facility acceptance of each type of regulated item.

(2) Submittals

Thirty (30) days prior to commencement of work involving the management of regulated items, the Contractor shall submit to the Engineer for approval, the following documentation:

1. Hazard communication training for all employees performing this work.
2. Biohazardous Waste Compliance Plan as outlined in Section 3(c)
3. Names of the treatment facilities, recycling facilities and/or disposal facilities the Contractor intends to use to receive each type of regulated item.
4. Hazardous Material Transporter USDOT Certificate of Registration for each waste transporter.
5. Hazardous Material Transporter Permit for the State of Connecticut, the destination state(s), and all other applicable states for each waste transporter.

Contractor shall provide the Engineer with a minimum of 48 hours notice in advance of scheduling, changing or canceling work activities.

(3) Regulated Item Management Provisions

(a) General Requirements

The Contractor's OSHA Competent Person shall be in control on the job site at all times during hazardous material management work activities. This person must be capable of identifying existing hazards, possess the authority to implement corrective measures to reduce/eliminate the hazards, comply with applicable Federal, State and Local regulations that mandate work practices, and be capable of performing the work of this contract. All employees who perform regulated material management related work shall be properly trained and qualified to perform such duties.

All labor, materials, tools, equipment, services, testing, insurance, and incidentals which are necessary or required to perform the work in accordance with applicable governmental regulations, industry standards and codes, and these specifications, shall be provided by the Contractor.

Ladders and/or scaffolds shall be in compliance with OSHA requirements, and of adequate length, strength and sufficient quantity to support the scope of work. Use of ladders/scaffolds shall be in conformance with OSHA 29 CFR 1926 Subpart L and X requirements.

Work performed at heights exceeding six feet (6') shall be performed in accordance with the OSHA Fall Protection Standard 29 CFR 1926 Subpart M including the use of fall arrest systems as applicable.

Inventory data from investigative surveys throughout the buildings are included herein and are presented for informational purposes only. Under no circumstances shall this information be the sole means used by the Contractor for determining the quantities or extent of the regulated items to be managed. The Contractor shall be responsible for verification of all field conditions affecting performance of the work. The Contractor shall submit to the Engineer for concurrence any additional items not listed herein that it believes to be regulated items included under this item. However, compliance with applicable requirements is solely the responsibility of the Contractor.

The Engineer will provide a Project Monitor to monitor the activities of the Contractor and inspect the work required. Environmental sampling shall be conducted as deemed necessary by the Engineer. Spill areas shall be cleaned by the Contractor until accepted by the Engineer. The Engineer may sample the spill area to demonstrate Contractor compliance with an acceptable standard.

(b) Personnel Protection

Prior to commencing work, the Contractor shall provide hazard communication training to all employees as necessary in accordance with OSHA 29 CFR 1926.59 and 29 CFR 1910.1200 and instruct all workers in all aspects of personnel protection, work procedures, emergency procedures and use of equipment including procedures unique to this project. Worker health and safety protocols that address potential and/or actual risk of exposure to site specific hazards are solely the responsibility of the Contractor.

The Contractor shall provide respiratory protection that meets the requirements of OSHA as required in 29 CFR 1910.134 and 29 CFR 1926.1000. A formal respiratory protection program, including appropriate medical surveillance, must be implemented in accordance with OSHA standards. The Contractor shall, as necessary, conduct exposure assessment air sampling, analysis and reporting to ensure the workers are afforded appropriate respiratory protection.

The Contractor shall provide and require all workers to wear appropriate personnel protective equipment, including protective clothing and respiratory protection, as required, within regulated work areas which exceed OSHA Personnel Exposure Limits (PELs) or when handling hazardous materials.

(c) Regulated Item Management Work Procedures

The Contractor shall not begin work until the Project Monitor is on-site.

Prior to beginning work on-site, the Contractor shall prepare waste characterization profile forms for each type of waste stream to be generated and forward such forms to the Engineer for review,

approval and signature. Upon approval, the Contractor shall forward such forms to the appropriate disposal facilities for acceptance.

The Contractor shall utilize all appropriate engineering controls and safety and protective equipment while performing the work in accordance with OSHA, USEPA, USDOT, CTDEEP and Connecticut Department of Public Health DPH regulations.

The Contractor shall employ work practices so as to minimize the disturbance of the constituents in the regulated items and prevent breakage and spills. In the event of a spill, the Contractor shall cordon off the area and notify the Engineer. The Contractor is responsible to have spills and the effected areas decontaminated to the acceptance of the Engineer by personnel trained in hazardous waste operator emergency response.

The Contractor shall carefully and properly remove, handle, pack, label and manifest all of the regulated items in waste containers specified and suitable to contain the waste in accordance with all federal and state regulations.

Prior to transportation and recycling and/or disposal, all proper USEPA, OSHA, CTDEEP and USDOT labels and placards shall be affixed to the waste containers and hazardous materials shipping papers such as waste manifests/bills of lading shall be completed.

Removal of I-84 EB Exit 21 Off-Ramp, Waterbury, CT

Bridge No. 03191F, I-84 EB Exit 21 Off-Ramp, Waterbury, CT

Bridge No. 03196, I-84 over South Main Street, Waterbury, CT

Prior to construction activity which would disturb such materials, properly remove, handle, pack, label, transport, manifest and recycle or dispose of the regulated items from those listed below:

The following hazardous/regulated materials and items have been identified associated with Bridge Nos. 03191F & 03196:

- **Universal waste (UW) – Hg lights – Bridge mounted luminaires, off-ramp lights**
- **Connecticut regulated waste (CRW) – Hg lamp ballast – Bridge mounted luminaires, off-ramp lights**

Upon discovery of any previously unidentified regulated items during renovation activities, the Contractor shall immediately notify the Engineer, and work shall cease in that area until the Engineer can determine the extent of any impact and proper handling procedures are implemented.

Efforts shall be made to recycle the constituents of the regulated items rather than dispose of them in accordance with the waste minimization efforts required under RCRA.

RCRA hazardous waste shall not be stored on the job site in excess of 90 calendar days from the accumulation start date.

Connecticut Regulated Waste shall not be transported to a RCRA or TSCA permitted facility for disposal, unless otherwise allowed by the Engineer in writing.

All non-RCRA hazardous waste materials, regulated waste materials and recyclable waste items shall be manifested separately from RCRA and TSCA hazardous waste, and documented properly on non-hazardous waste manifests, waste shipment records, bills of lading or other appropriate shipping papers for transportation to the recycling and/or disposal facility.

The Contractor shall prepare each lab pack list and shipping document (manifests, waste shipment records, bills of lading, etc.) with all of the required information completed (including types of waste, proper shipping name, categories, packing numbers, amounts of waste, etc.) in accordance with applicable federal and state regulations. The document will be signed by an authorized agent representing ConnDOT as the Generator for each load that is packed to leave the site.

The Contractor shall forward the appropriate original copies of shipping papers to the Engineer the same day the regulated items leave the project site.

All vehicles departing the site transporting hazardous materials shall display proper USDOT placards, as appropriate for the type of waste being transported.

(d) Project Closeout Documents:

Within thirty (30) days after completion of the on-site project work, the Contractor shall submit to the Engineer copies of the following completed documents:

1. Hazardous Waste Manifests
2. Waste Shipment Records/Bills of Lading
3. Recycling Receipts

Documents 1. through 3. must include the signature of an authorized disposal facility representative acknowledging receipt of hazardous materials.

Method of Measurement:

The work of “Handling and Disposal of Regulated Items” shall be provided for in accordance with Article 1.04.05 – Extra Work.

Basis of Payment:

The work of “Handling and Disposal of Regulated Items” shall be paid for in accordance with Article 1.04.05 – Extra Work, which price shall include the management, removal, handling, packing, labeling, transport, manifesting, recycling or disposal of the regulated constituents in the specific equipment/items scheduled for impact at the project site, and all equipment, materials, tools and labor incidental to the work.

Final payment will not be made until completed copies of all Manifest(s), Waste Shipment Records, Bills of Lading and/or Recycling Receipts have been provided to the Engineer. Once

completed and facility-signed copies have been received in their entirety, the Engineer will make the final payment.

<u>Pay Item</u>	<u>Pay Unit</u>
Handling and Disposal of Regulated Items	Estimate

END OF SECTION

ITEM #0107090A - CTDOT BOUNDARY MARKER (SURVEY MONUMENT)

Description: Work done under this item consists of setting survey boundary markers (monuments, disks in ledge or concrete structures, or capped rebar) along new Right-of-Way acquisition lines in the locations indicated on the plans or as directed by the Engineer.

Materials: CTDOT concrete boundary monuments, CTDOT boundary disks, and CTDOT capped reinforcing bars (rebars) will be provided by the Department. All other materials (Granular Fill or quick setting grout) shall be the responsibility of the Contractor. The Contractor shall arrange to pick up CTDOT-supplied materials from the District Office or other designated location within the District.

Construction Methods: The Contractor shall be responsible for all computations, location, staking, and setting of highway boundary markers at all P.C.'s, P.T.'s and any other angle points in the State's Property Acquisition and Defined Highway Easement Lines as shown on the plans and the attached details, or as directed by the Engineer.

The standard boundary marker will be the CTDOT concrete boundary monument. Boundary disks set in ledge or structures and capped rebar shall be set at locations as shown in the plans or where the Engineer determines that it is impractical to set a concrete boundary monument.

The setting of boundary markers shall not begin until all excavation, filling operations, grading and drainage has been completed and approval has been granted by the Engineer.

The Contractor shall retain the services of a Land Surveyor licensed in the State of Connecticut to serve as Project Surveyor to directly oversee this work and to ensure that each marker has been set in accordance with CTDOT Standards. The Contractor shall provide to the Engineer the name, place of professional employment, business address, phone number, and license number of the Project Surveyor to the Department.

All boundary and staking computations shall be provided by the Project Surveyor to the Engineer and shall be approved by the District Survey Office prior to staking the locations of the boundary markers.

The Project Surveyor shall stake the location of the boundary markers at the location(s) shown on the plans or as directed by the Engineer. This work shall meet or exceed a positional accuracy of 1:5000 (0.02 feet per 100 feet) as defined in Section 20-300b-11 of the Regulations of Connecticut State Agencies.

Excavation for the placement of the CTDOT Boundary Monuments shall be by hand or with a power auger. The use of a backhoe or other heavy equipment for excavation purposes will not be allowed. The bottom of the hole shall be hand-tamped granular fill and the concrete monument shall be set plumb to the finished grade and backfilled with granular fill and suitable native soil, as shown in the detail (attached). The remaining backfill shall be compacted in six (6) inch layers or as directed by the Engineer.

In locations where the Engineer determines that concrete monuments cannot be set, the Project Surveyor shall set CTDOT Boundary disks or CTDOT Boundary capped rebars as directed. Rebar driving sleeves shall be used in the setting of capped rebars. All disks set in ledge or concrete shall be secured with ROCKITE®, KWIXSET®, QUIKRETE®, or approved equal fast setting hydraulic anchoring cement compound.

Concrete boundary monuments must be allowed to settle for fourteen (14) days. Once all concrete boundary monuments are completed and allowed to settle and all other boundary markers are in place, the Contractor shall notify the Engineer that the boundary marker disks are ready to be drilled. The CTDOT District Survey Office will verify the location of the boundary markers or monuments by drilling the exact location of the highway acquisition or highway easement lines on the boundary monuments or markers within 60 days of notification from the Engineer.

If any boundary marker disks are found to be outside of the boundary point locations and are unable to be drilled, the boundary monuments or boundary markers shall be removed and replaced at the Contractor's expense. Once the boundary monuments or markers have been drilled and found to meet Contract requirements, the Engineer will notify the Contractor of this acceptance.

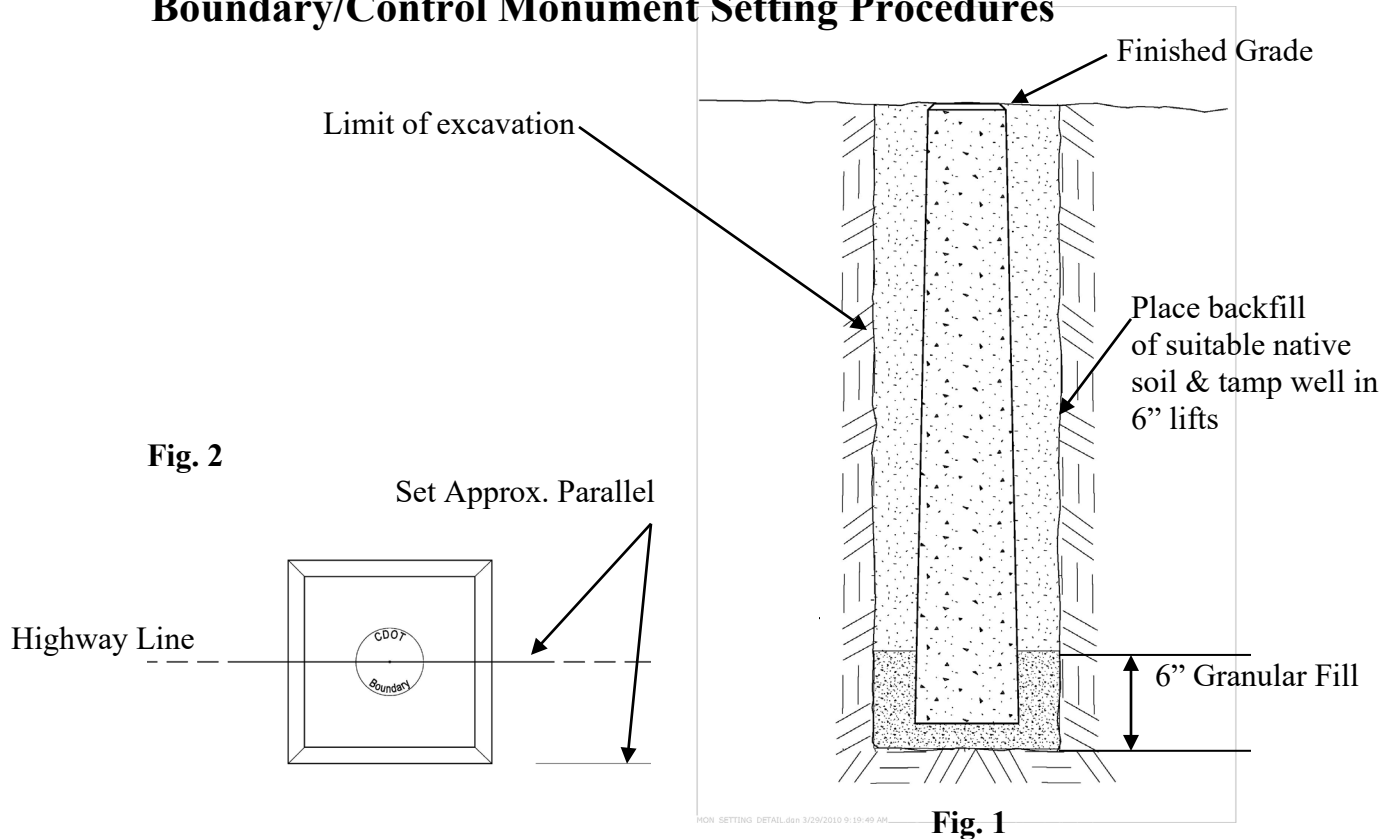
Method of Measurement: This work will be measured for payment by the number of CTDOT boundary markers, (either monuments, disks, or capped rebar) complete and accepted in place.

Basis of Payment: This work will be paid for at the Contract unit price each for "CTDOT Boundary Marker (Survey Monument)" complete and accepted in place, which price shall include all computations, equipment, tools, transportation of Department-supplied materials, non-Department supplied materials, and labor incidental to the location, staking and setting of boundary markers, and shall include any disposal of excess excavated materials. The removal and replacement of non-conforming markers will not be paid.

Pay Item	Pay Unit
CTDOT Boundary Marker (Survey Monument)	ea.

CONNECTICUT DEPARTMENT OF TRANSPORTATION

Boundary/Control Monument Setting Procedures



Procedure "A"

Setting CT DOT Survey Monuments to a specific point:

The Project Surveyor shall compute and stake the layout of each new CHD monument to be set. The stake shall be a 2" x 2" x 18" (or larger) hardwood stake and tack. The new monument shall be tied in to three points, the hole dug, and new monument placed as indicated above. The new monument is to be set plumb in the same horizontal position as the existing staked point to within three, one-hundredths (0.03') of a foot. It shall be positioned by the Contractor, to an exact point, within the specified tolerance. Any monuments not falling within the specified limits shall be reset at the Contractor's expense.

Procedure "B"

Setting CT DOT Survey Disc in ledge:

When a new CHD point falls on ledge which is exposed or within less than 2' of the ground surface, a CT DOT disc shall be set. A 3/4" diameter hole shall be drilled to a depth of 3" and the surface of the ledge leveled so that the disc sits flush when complete. Discs shall be affixed using ROCKITE®, KWIXSET®, QUIKRETE®, or approved equal fast setting hydraulic anchoring cement compound in accordance with the manufacturer's recommended procedures.

Procedure "C"

Setting CT DOT "RECHD" (Capped Rebar)

This procedure shall follow the standards of Procedure "A" except a 3/4" x 3' section of rebar is substituted for the traditional concrete monument. The rebar shall be driven with a protective sleeve and shall be set to within three one-hundredths (0.03') of a foot of the staked point, then topped with a two (2") inch diameter CT DOT aluminum cap, which receives the final precise drill hole. The capped "RECHD" shall be set flush to the ground.

ITEM # 0201013A – REMOVAL OF EXISTING FENCE

Description: This item shall include removing existing chain link fence and gates where shown on the plans and as directed by the engineer.

Construction Methods: The Contractor shall carefully dismantle and remove chain link fence in the location shown on the plans or as directed by the Engineer. All material removed will become property of the contractor upon completion of the work. It is the responsibility of the contractor to remove all material from the site and properly dispose of it.

Method of Measurement: This work will be measured for payment by the number of linear feet of fence and gate removed, including posts and bracing, measured from outside to outside of terminal posts.

Basis of Payment: Removal of existing fence work will be paid for at the Contract unit price per linear foot for “Removal of Existing Fence.” The price shall include removal and disposal of posts, footings, fence fabric, gates, excavation, backfill, equipment, tools, labor, and any work incidental thereto.

<u>Pay Item</u>	<u>Pay Unit</u>
Removal of Existing Fence	l.f.

ITEM #0202452A – TEST PIT

Description: This work shall consist of the excavation of test pits where necessary to locate or examine utilities, including but not limited to water, gas, sanitary sewer, storm and electric facilities.

This work shall consist of the satisfactory removal of all materials including, but not limited to, sawcutting pavements and sidewalks, pavement and sidewalk removal, excavation, shoring and bracing, water removal from within pit, stockpiling, satisfactory disposal of surplus or unsuitable material, backfilling, compacting, pavement repair, sidewalk repair, etc.

Test pits shall be dug as necessary for the Contractor to determine subsurface conditions as indicated on the Contract Drawings or as directed by the Engineer.

This work shall include the coordination with the affected utility companies. Any damage caused by the Contractor or Subcontractors, as determined by the Engineer, shall be corrected by the Contractor in accordance with these specifications.

Materials: All materials shall be provided by the Contractor and shall meet the current standards of the affected service.

Construction Methods: Coordinate excavation of test pits with respective utility company, and other owners having facilities in the vicinity. Check with "Call Before You Dig", 1/800/922-4455 before digging.

Give sufficient notice and allow ample delay time for others to perform necessary work. A minimum of 30 days shall be allowed by the Contractor to ensure the test pits are performed prior to the beginning of other construction work in the area of a proposed test pit.

Notify the Department, Engineer, and Utility Companies one-week in advance of digging each test pit.

Perform all work in conformance with applicable safety codes.

Sawcut pavement, sidewalk, curbs or other hard surface materials in neat and straight line. Excavate pits providing clean-cut vertical sides. Provide sheeting, bracing and dewatering wherever necessary.

Dig test pits ensuring that underground utilities or structures are not damaged. The Contractor shall excavate by hand methods where necessary to ensure that underground utilities or structures are not damaged. It shall be the Contractor's sole responsibility for any damages incurred during excavation operations. Any damages shall be repaired or replaced by the Contractor to the satisfaction of the Owner/Responsible Agency/Owner's Representative at the Contractor's own expense.

The Contractor shall measure and record the size, configuration, exact horizontal and vertical location (elevation) of all utilities, pipes or other obstacles uncovered in the pits. Submit information in written or sketch form to the Department, Engineer, and Utility Companies and respective utility companies for review. Notify the Department, Engineer, and Utility Companies of any revealed conflicts which may require design revisions, relocations and/or adjustments as early as possible to avoid unnecessary delays. No work shall be started within areas of conflict until so authorized.

Protect each pit with steel plates, other coverings, fences, barriers or other appropriate materials as deemed necessary.

Do not backfill pits until authorized. Compact backfill materials to at least 95% of maximum density to the subgrade elevation or as otherwise directed.

The surface of test pit areas shall be restored to a condition equal or better than original as approved by the Engineer.

Method of Measurement: The quantity to be paid for under this item will be the number of completed test pits as directed by the Engineer.

Corrective work required repairing damage caused by the Contractor or its Subcontractors shall not be measured for payment.

Basis of Payment: This work will be paid for at the contract unit price each for "Test Pit" as directed by the Engineer. No direct payment will be made for furnishing and placing bituminous concrete pavement for patch or other surface repair, but the cost shall be included in the cost of the test pit item. Payment will include all materials, equipment, labor and tools necessary for or incidental to the satisfactory completion of this work.

Pay Item

Pay Unit

Test Pit

ea.

ITEM #0210821A—WATER POLLUTION CONTROL

Description: This work shall consist of measures to control water pollution and soil erosion which become necessary for the completion of the work, but for which no item is provided in the Contract. Such measures include:

- temporary check dams, water bars, berms, dikes, dams
- temporary sediment traps
- pump settling basins
- silt fence
- inlet protection
- hay bales
- erosion control matting
- fiber rolls, coir rolls, wattles
- gravel, stone, riprap
- mulch
- permanent or temporary seeding
- slope drains, ditches, channels, temporary drainage measures
- dust control
- topsoil
- other erosion control materials, devices, or methods

If a situation arises that requires immediate deployment of water pollution control measures, the Engineer will direct the Contractor to use this item to prosecute the work.

If the Contractor proposes changes in construction methods or staging which would affect the as designed pollution controls, plans for revised pollution controls shall be submitted for the Engineer's approval prior to start of work.

Materials: The materials shall meet the pertinent articles of the Standard Specifications. The Contractor shall submit Product Data for the materials.

Construction Methods: The Engineer has the authority to control the surface area of earth material exposed by construction operations and to direct the Contractor to immediately provide permanent or temporary pollution control measures to protect watercourses, wetlands, or other natural resources. Every effort shall be made by the Contractor to prevent erosion on the Site and prevent runoff onto abutting property.

All disturbed areas shall be permanently or temporarily stabilized by mulching, seeding or other methods as the work progresses to comply with the intent of this specification.

All damaged slopes shall be repaired as soon as possible. The Engineer will limit the surface area of earth material exposed if the Contractor fails to sufficiently protect the slopes.

The Contractor shall always have on hand the necessary materials and equipment to provide for slope stabilization and corrective measures to damaged slopes.

Temporary channels, ditches, water bars and outfalls shall be protected prior to directing water into them.

The erosion control features installed by the Contractor shall be maintained by the Contractor, and such installations shall be removed if ordered by the Engineer. Maintenance of erosion control measures by the Contractor shall include the clean out of accumulated sediment.

Method of Measurement: The work and materials required for Water Pollution Control measures will be measured for payment as provided for under 1.09.04 - Extra and Cost-Plus Work.

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

Basis of Payment: Work will be paid for as provided under 1.09.04 - Extra and Cost-Plus Work.

Control measures that are made necessary by the Contractor's failure to install and maintain controls as a part of the work as scheduled or ordered by the Engineer shall be performed by the Contractor at its own expense.

Control work at off-Site areas selected by the Contractor shall be the responsibility of the Contractor.

Pay Item	Pay Unit
Water Pollution Control	est

ITEM #0219011A – SEDIMENT CONTROL SYSTEM AT CATCH BASIN

Description: Work under this item shall consist of furnishing, installing, maintaining, replacing, and removing sediment control system at catch basins, herein referred to as Silt Sack, at the locations as shown on plans or as directed by the Engineer. The work shall also include removal of accumulated sediment, and disposal of accumulated sediment,

Materials: The Silt Sack must be commercially produced and marketed for the specific application(s) on the Project. All Silt Sack must be manufactured from a specially designed woven polypropylene geotextile sewn material. The Silt Sack must be able to handle flows of at least 180 gallons per minute per square foot, fit any sized catch basin or drop inlet, and be UV resistant.

The Silt Sack product shall be one of the following or an approved equal:

1. Siltsack®
2. Dandy Sack®
3. FleXstorm Catch-It™
4. PIG®Sediment-Drain Filter
5. ACF Environmental Silt Sack

The Sediment Control System at Catch Basin must have the following features: two dump straps attached at the bottom to facilitate the emptying of the Silt Sack and lifting straps to be used to lift the Silt Sack from the catch basin or drop inlet. The Silt Sack shall have a restraint cord approximately halfway up to keep the sides away from the catch basin or drop inlet walls. When required, a curb deflector shall be installed as directed by the Engineer.

Product Data for the Silt Sack to be used by the Contractor must be submitted for review and acceptance by the Engineer or their authorized delegate prior to the installation on-Site.

Construction Methods: The Contractor shall install the Silt Sack per the manufacturer's instructions and recommendations at each catch basin or drop inlet as shown on the plans or as directed by the Engineer to provide inlet protection to prevent silt, sediment, or debris from entering the stormwater drainage system.

When the Silt Sack becomes 1/2 full of accumulated sediment, the Contractor shall empty, clean, and replace the Silt Sack back into the catch basin or drop inlet. Sediment emptied shall be considered unsuitable material and be disposed of at an off-Site approved upland facility per federal, State, and local environmental laws and regulations.

At the completion of the Project, the Contractor shall remove all Silt Sacks within the Project limits. Any spilled sediment material during removal operations shall be removed by the Contractor at no cost to the State.

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

Basis of Payment: The item “Sediment Control System at Catch Basin” will be paid at the Contract unit price for each completed system in place and accepted, which price shall include installing, maintaining, replacing, removal of material, off-Site disposal of accumulated material, materials, equipment, tools, and labor incidental thereto.

The cost of installing hay bales, geotextile, check dam, or fiber roll for inlet protection shall be paid for under their respective Contract item or special provision.

Pay Item	Pay Unit
Sediment Control System at Catch Basin	ea.

ITEM #0401008A – COLORED STAMPED CONCRETE

ITEM #0401101A – MAT REINFORCEMENT FOR CONCRETE PAVEMENT

ITEM #0401201A – TRANSVERSE CONTRACTION JOINT

ITEM #0401302A – LONGITUDINAL CONTRACTION JOINT

Description: Work under these items shall include integrally colored Portland Cement Concrete (PCC) imprinted with a stamped aesthetic pattern, reinforcement, transverse contraction joints, longitudinal contraction joints, and sealing in accordance with the lines, grades, thicknesses, and typical cross sections shown on the plans. It is not intended to address repair of existing concrete.

Materials: Materials for this work shall meet the following requirements:

1. **Portland Cement Concrete:** Concrete shall meet the requirements of Class PCC03540 in accordance with Section M.03. Cement from the same mill, and raw materials of the same type and brand, shall be used for all stamped concrete and test panels to ensure color uniformity. Accelerating admixtures will not be permitted. **Type III Portland cement and other accelerated cement products will not be permitted.**
2. **Integral Coloring Agent:** The primary concrete coloring agent shall be pigmented coloring admixtures processed specifically for incorporating into the concrete mix and must comply with ASTM C979 and ASTM C494 specifications. The coloring agent shall contain colored, water-reducing, coloring admixtures that are lime proof and UV resistant, and without calcium chloride. The pigment color to be added to the concrete shall be selected in accordance with AMS-STD-595 as shown on the plans or as directed by the Engineer from manufacturer's standards.
3. **Reinforcing Steel:** Reinforcing steel shall be galvanized and shall meet the requirements of Article M.06.01.
4. **Tie Bars:** Tie bars shall be deformed steel bars meeting ASTM A615, Grade 60 specifications and shall be galvanized in accordance with ASTM A767, Class 1.
5. **Adhesive Anchoring Material:** Adhesive anchoring material for tie bars shall be an approved two-part epoxy bonding compound meeting the requirements of ASTM C881 or ASTM D1763.
6. **Concrete Blocks:** Concrete blocks for support of reinforcement and tie bars shall meet the requirements of Class PCC03540 in accordance with Section M.03.
7. **Dowel Bars and Baskets:** Dowel bars and baskets shall be galvanized according to ASTM A767, Class 1. Dowels shall be smooth, steel bars meeting ASTM A615, Grade 60 specifications. Bond-breaking material applied to each dowel shall consist of paraffin wax, lithium grease, or other semi-solid, inert lubricant approved by the Engineer.

- 8. Release Agent:** Releasing agent shall be a liquid bond breaker designed to prevent adhesion of imprinting tools to concrete. The releasing agent shall be compatible with the integrated coloring agent and shall be used to facilitate release of stamping mats as recommended by the manufacturer. The color of the releasing agent, if applicable, shall be comparable to the color used for the integrated coloring agent unless otherwise specified on the plans or by the Engineer.
- 9. Curing Materials:** Liquid curing compound shall be as specified in Subarticle M.03.04-3.
- 10. Joint Sealant:** Joint seal shall be one of the following silicone sealants:
 - a) DOWSIL 890-SL or approved equal meeting the requirements of ASTM D5893, Type SL.
 - b) DOWSIL 888 or approved equal meeting the requirements of ASTM D5893, Type NS.
- 11. Sealing Compound:** Sealing compound shall conform to the requirements of ASTM C309 and shall follow recommendations from the integral coloring agent, release agent, and curing compound manufacturers.

The Contractor shall submit a Materials Certificate (MC) a minimum of 30 days prior to use for all materials listed. The submitted MCs shall indicate that all materials to be used on the Project meet the requirements listed herein in accordance with the corresponding test specification.

All concrete material delivered to the Project shall be documented, transported, and tested in accordance with Articles 6.01.03-II-3 and 6.01.03-II-4. The standard mix parameters shall be as specified in Table M.03.02-1. In addition, the air content of the plastic concrete shall be determined in accordance with AASHTO T 152, Pressure Method.

Construction Methods:

- 1. Equipment:** The equipment shall include the following:
 - a) Forms
 - b) Vibratory Device
 - c) Portable Screed
 - d) Float
 - e) Edging Tool
 - f) Mat Tools
 - g) Joint Tool
 - h) Saw
 - i) Pressure Sprayer
 - j) 10-Foot Straight Edge
 - k) Hand Tools
 - l) Work Bridges (optional)

2. **Qualifications:** The installer of the concrete shall provide documentation showing a minimum of three (3) projects placed within the past three (3) years that include coloring and stamping of concrete. The installer shall provide as references the contact information of the owner (name, title/position, company, phone, email), project locations (route/road(s), town, state), equipment used, and dates installed. This required documentation shall be provided 30 days prior to installation. Installers not meeting these qualifications will not be allowed to perform the concrete installation.
3. **Quality Control Plan:** The Contractor shall submit a Quality Control Plan (QCP) to the Engineer for approval a minimum of 30 days prior to placement of the concrete. The QCP shall include the following:
 - a) Contractor's quality control representative and contact information.
 - b) Name and location of the material suppliers or production plants.
 - c) Description of equipment.
 - d) Procedure for stamping, forming joints, curing, cleaning, and sealing concrete.
 - e) Manufacturer's recommendations for the coloring agent, release agent, curing compound, and sealing compound.
4. **Test Panel:** At least 30 days prior to construction of the concrete, the Contractor shall prepare a test panel showing the proposed coloring and stamping pattern as well as demonstrating procedures for placing, consolidating, imprinting, finishing, curing, cleaning, and sealing of the concrete as described in the approved QCP and as shown on the plans. A dummy joint shall also be formed in the middle of the test panel by tooling (no sawing or load transfer devices will be required) and filled flush with silicone sealant. The test panel shall be eight (8) feet by eight (8) feet in size and placed to a depth of twelve (12) inches using the same methods as outlined in this specification, using the same materials (including reinforcement if specified), and in weather conditions similar to conditions existing at the job site. The test panel shall include a repaired area of at least three (3) feet by three (3) feet to demonstrate the Contractor's ability to match the color and texture in the event the stamped concrete becomes damaged during construction and requires repair. The test panel must be a distinct concrete pour and will not be permitted to be constructed within the specified limits of the final work. The test panel will be reviewed by the Engineer for adherence to Contract requirements and must be approved in writing prior to beginning production work. If the Engineer deems the test panel not acceptable, additional test panels shall be constructed until a passing test panel is completed.

Supplementary test panels that are five (5) feet by five (5) feet in size may be required for purposes of color or stamping pattern comparison only. These supplementary test panels will not be used to evaluate the concrete construction procedures described above. If the resulting color or pattern is not acceptable to the Engineer, adjustments shall be made to address any comments provided and another supplementary test form shall be prepared for inspection.

The approved test panel(s) shall be left at the project site or an alternate location approved by the Engineer. The Contractor shall protect the approved test panel(s) throughout the duration

of construction so they can be used as a standard for judging the final work. All test panels shall be removed and disposed of when directed by the Engineer.

- 5. Weather Restrictions:** At the time of concrete placement, the ambient temperature shall be above 50°F and below 95°F. Concrete shall not be placed when the forecast indicates the ambient temperature will drop below 40°F at any time during the seven (7) day period following placement. Concrete shall not be placed when inclement weather conditions are forecasted within 24 hours after placement, as determined by the Engineer. Should unexpected precipitation occur during concrete placement, the Contractor shall immediately stop placement and utilize squeegees, compressed air, or other tools and methods approved by the Engineer to remove excess water from the concrete surface.

6. Preparation:

- a) Forms:** Forms shall be set by the Contractor to true line and grade. The specified grade shall be set, and the specified granular base, subbase, or fill material (paid for under other items) shall be compacted as required prior to the setting of forms.
- b) Dowel Bars and Baskets:** Dowels and basket assemblies shall be placed at transverse contraction and construction joints at the required length, size, and spacing as shown in the plans. Bond-breaking material shall be applied to each dowel.
- c) Tie Bars:** Tie bars shall be placed along the longitudinal interface between granite curbing and the edges of the concrete slab as shown on the plans. Adhesive anchoring material shall be used for all tie bars connecting to curbs and shall only be applied to the portion of the tie bar embedded within the curbing.

Additionally, when a longitudinal contraction or construction joint is called out on the plans, tie bars shall be placed perpendicular to the longitudinal joint and be rigidly secured on concrete blocks of the same strength as the concrete.

Tie bars shall be of specified length, size, and spacing as shown on the plans.

- d) Reinforcement:** When concrete is placed in a single layer, reinforcement shall be positioned in advance of concrete placement and supported using concrete blocks as specified herein. Reinforcing steel shall be free from dirt, oil, paint, grease, mill scale, loose or thick rust, and any other material which could impair bond of the steel with the concrete.

When concrete is placed in two layers, the entire width of the bottom layer shall be struck off and consolidated to such length and depth that reinforcement may be laid full length on the concrete in its final position without further manipulation. The reinforcement shall be placed directly upon the concrete, after which the top layer of the concrete shall be placed, struck off, and screeded. Any portion of the bottom layer of concrete which has been in place for more than 45 minutes without being covered with a top layer shall be removed and replaced with freshly mixed concrete at the Contractor's expense.

Reinforcing steel shall be of specified length, size, and spacing as shown on the plans.

- e) **Pre-Placement:** A pre-placement meeting shall be held at least one week prior to concrete placement to discuss the project and application methods. This meeting must take place no earlier than 30 days prior to concrete placement. This meeting shall include representatives from the General/Prime Contractor, subcontractor/concrete installer, coloring agent manufacturer, CTDOT Construction, and CTDOT Design.

7. Concrete Placement/Finishing:

- a) **Sequence:** The sequence of operations for placing and finishing the concrete shall be as follows: pouring, consolidating, leveling, floating, removal of laitance, edging, forming joints, final smoothing, and stamping.

Work bridges or other devices necessary to provide access to the concrete surface for the purpose of finishing, straight-edging, and making corrections shall be provided by the Contractor.

The addition of water to the concrete surface to assist in finishing operations will not be permitted without the Engineer's approval. If the application of water is permitted by the Engineer, it shall be applied as a fog spray by means of approved spray equipment.

- b) **Pouring:** Concrete must be delivered to the project location with the coloring admixture already mixed in, ready to be poured. The color of the concrete shall match, in reasonably close conformance, the AMS-STD-595 color called out on the design plans. The concrete mix shall be deposited onto granular base without disturbing joint assemblies.

Where concrete is to be placed adjoining a previously constructed concrete slab, a minimum compressive strength of 2,500 psi must be attained prior to operating equipment upon the existing concrete. If only finishing equipment is carried on the existing concrete, placement in adjacent areas may be permitted after the concrete is tested in accordance with the "Field Acceptance and Testing" requirements herein, and has attained a modulus of rupture of 400 psi when determined by the Contractor using AASHTO T 97.

- c) **Consolidating:** Mechanical vibration shall be used to thoroughly consolidate the concrete throughout the entire poured area. Approved spud-type vibrators with minimum head diameters of 2 inches shall be used to consolidate the concrete. Vibrators shall be capable of transmitting 7,000 to 10,000 vibrations per minute. The vibrators shall be held vertically, and vibration shall be done full-depth over the entire poured area in a uniform pattern.

Concrete adjacent to joints and at the slab edges shall be consolidated without voids or segregation against the joint material, under and around all dowels, dowel baskets, tie bars, reinforcement, and other features designed to extend into the concrete. Vibrators shall not come into direct contact with a joint assembly, the granular base, or forms. All concrete

must be consolidated to the satisfaction of the Engineer.

- d) **Leveling:** Concrete shall be struck off and screeded with an approved portable screed as soon as it is placed. When concrete is placed in two layers, a second screed shall be provided for striking off the bottom layer of concrete after reinforcement is positioned.
- e) **Floating:** After the concrete has been struck off and consolidated it shall be further smoothed, trued, and consolidated by means of a float. Allow bleed water to evaporate prior to continuing finishing operations.
- f) **Edging at Forms and Joints:** Prior to stamping, but before the concrete has taken its initial set, the edges of the concrete along each side of each slab, formed contraction joints, and construction joints shall be worked with an edging tool and rounded to a minimum radius of 1/4 inch. A well-defined and continuous radius shall be produced, and a smooth, dense mortar finish obtained. The surface of the slab shall not be unduly disturbed by tilting the tool during use.

At all joints, any tool marks appearing on the slab adjacent to the joints shall be eliminated by brooming the surface. All joints shall be tested with a straight edge before the concrete has set, and correction shall be made if either side of the joint is 1/4 inch higher than the other or if they are higher or lower than the adjacent slabs.

- g) **Stamping:** Prior to stamping, a releasing agent shall first be applied evenly to the surface of the concrete. This operation shall not begin while bleed water is present.

The stamped concrete shall be constructed by imprinting the surface with mat tools prior to full set of the concrete. The stamping pattern shall be as shown on the plans or as directed by the Engineer, and shall match that of the approved test panel. The mats used shall match the specified pattern or an equal approved by the Engineer. Mat tools shall be high quality resilient mats reproduced from castings of natural materials and providing uniform control of joint depth. The Contractor shall follow all manufacturer recommendations unless otherwise directed by the Engineer.

After stamping is completed, the applied release agent shall be allowed to fully evaporate. If necessary, the concrete surface shall be cleaned of excess releasing agent according to the manufacturer's recommendations. This shall be done without damaging or marring the stamped concrete and only after the initial set is achieved.

- 8. **Joints:** Joints shall be constructed of the type and dimensions and at the locations required by the plans. All joints shall be protected from the intrusion of deleterious material until sealed.
 - a) **Transverse Joints:** Transverse joints shall be either a contraction joint or construction joint as defined below. Smooth steel dowel bars shall be placed perpendicular to the transverse joints at the required length, size, and spacing, and be supported with dowel baskets as shown on the plans. **Joints in granite curbs must be spaced as shown on the**

plans to align with the transverse joints.

A transverse contraction joint shall be created when adjacent slabs of concrete are poured together. Transverse contraction joints shall consist of planes of weakness created by forming and cutting grooves in the surface of the concrete.

A transverse construction joint shall be created when adjacent slabs of concrete are poured separately. Formwork shall be used to create a natural plane along the transverse construction joint.

Transverse construction joints shall be created when there is an interruption of more than 30 minutes in the concreting operations. No transverse construction joint shall be created within 10 feet of a contraction joint, or plane of weakness. If sufficient concrete has not been mixed at the time of interruption to form a slab at least 10 feet long, the excess concrete back to the last preceding joint shall be removed and disposed of as directed.

- b) Longitudinal Joints:** Longitudinal joints, when required and shown on the plans, shall be either a contraction joint or construction joint as defined below. Deformed steel tie bars shall be placed perpendicular to the longitudinal joint and be rigidly secured on concrete blocks of the same strength as the concrete. Tie bars shall be of specified length, size, and spacing as shown on the plans.

A longitudinal contraction joint shall be created when adjacent inner and outer slabs of concrete are poured together. Longitudinal contraction joints shall consist of planes of weakness created by forming and cutting grooves in the surface of the concrete.

A longitudinal construction joint shall be created when adjacent inner and outer slabs of concrete are poured separately. Formwork shall be used to create a natural plane along the longitudinal construction joint.

- c) Forming and Sawing Joints:** Formed joints shall be made by depressing an approved tool or device into the plastic concrete to create the required grooves. The tool or device shall remain in place until the concrete has attained its initial set and shall then be removed without disturbing the adjacent concrete, unless the device is designed to remain in the joint. After the concrete has set, the formed joint shall be saw cut to the depth specified on the plans.

Sawed joints shall be created by cutting grooves in the surface of the concrete using an approved saw. The saw shall be capable of providing straight, clean cuts of uniform depth and width to the dimensions shown on the plans. The saw shall be capable of making both a single, deeper cut (for crack control) as well as a wider, shallower cut (to form the upper sealant reservoir), in one single pass, using multiple blades mounted side-by-side in gang blade arrangement.

For both formed and sawed contraction joints, sawing shall commence as soon as the

concrete has hardened sufficiently to permit sawing without excessive raveling, usually 4 to 24 hours. **All joints, except for construction joints, shall be sawed before uncontrolled shrinkage cracking takes place.** If necessary, the sawing operations shall be carried on both during the day and night, regardless of weather conditions. Sawing shall be discontinued when a crack develops ahead of the saw. In general, all joints shall be sawed in sequence. If extreme conditions exist, which make it impractical to prevent erratic cracking by early sawing, the contraction joint groove shall be formed prior to initial set of concrete as provided above. When uncontrolled cracking does occur, the Engineer will evaluate the area and may require that individual slabs be removed and replaced. No additional payment will be made for the cost to remove and replace concrete that has uncontrolled cracking.

Joints, however formed, shall be continuous. There shall be no gaps in either transverse or longitudinal joints at the intersection of the joints.

9. **Curing:** As soon as possible after the finishing operations have been completed, the release agent has completely evaporated, and marring of the concrete will not occur, the entire surface of the newly placed concrete shall be cured using liquid membrane forming compound. The concrete shall not be left exposed for more than 30 minutes between stages of curing or during the curing period. The Contractor shall protect concrete from premature drying and excessive cold or hot temperatures by promptly applying curing compound. Concrete surfaces shall be protected for the duration recommended by the manufacturer after curing compound is applied.

When resin-based curing compound is used, it shall be applied following the final finishing, immediately after the disappearance of the water sheen and before any surface checking or marked dehydration of the concrete occurs. When water-soluble, linseed oil-based compound is used, it shall be applied immediately following the final finishing.

The compound shall be applied by an approved self-propelled mechanical pressured sprayer delivering a fine, even spray with uniform coverage. This equipment shall be provided with a suitable device for adequate agitation of the compound to prevent settlement. For the sides of concrete exposed after removal of the forms and for areas where the use of self-propelled equipment is not practical, approved hand-held spray bars delivering a fine, even spray may be used; the compound shall be drawn from a tank equipped with an approved device or method to prevent settlement. If the compound is applied in two applications, the second application shall be applied within 30 minutes of the first application. The compound shall be applied in a continuous, uniform film at not less than 1 gal. per 150 s.f.

The concrete surface shall be properly protected from rain before the concrete is sufficiently cured. If rain falls on the newly coated concrete before the film has dried sufficiently, or if the film is damaged, the Contractor shall be required to apply a new coat of material to the affected areas. The treated surface shall be protected by the Contractor for a period of at least 7 days.

10. **Sealing Joints:** Joints shall be sealed as soon after completion of the curing period as feasible and before the concrete is opened to traffic or Contractor equipment. Just prior to sealing, each

joint shall be thoroughly cleaned of all foreign material, including membrane curing compound. The joint-faces shall be clean and surface dry when the seal is applied.

The sealing material shall be applied to each joint opening according to the details shown on the plans or as directed by the Engineer, which shall include construction joints. The joint seal material shall fill the joint flush with the concrete surface. When a non-sag silicone sealant is used, hand tooling will be required after application to ensure the material is placed completely against the sidewalls and properly adheres to all joint-faces.

- 11. Sealing Surface:** Prior to sealing, the concrete surface must be cleaned of dirt, oil, gas, grease, excess release agent, curing compound residue, and all other foreign material or contaminants. This shall be done using a pressure washer that is capable of spraying water up to 3,500 psi. Pressure washing shall occur following the stamping operation at a time recommended by the release agent and curing compound manufacturers, but not before the concrete has set sufficiently to prevent marring and cured for a minimum of 7 days. The Engineer may require additional time for curing if necessary. Care shall be taken to avoid damaging the concrete surface or the stamping pattern during cleaning. The Contractor shall test a small area of the concrete before pressure washing the entire surface to ensure that no damage or discoloration occurs. Joint sealant or other components of the structure that are to remain shall be protected.

The concrete surface shall be allowed to dry completely after cleaning and any remaining dust or loose particles shall be removed using clean, dry, oil-free compressed air before applying a compatible sealing compound per manufacturer's recommendations.

12. Field Acceptance and Testing:

- a) **Surface Test (Straightedge) and Corrections:** The final pattern of the concrete shall be uniform when compared to adjacent sections that do not require corrective work. As soon as the concrete has hardened sufficiently, the concrete surface shall be tested by the Contractor with an approved 10-foot straightedge placed both transversely and longitudinally to the centerline at sufficient intervals to check the surface profile. Areas showing high spots of more than 1/4 inch exclusive of stamping will be marked by the Engineer and shall be removed and corrected by the Contractor. Correction of surface irregularities and resulting surface finish shall meet the requirements specified herein.
- b) **Flexural Testing of Concrete:** The flexural strength of the concrete shall be determined by the Contractor in accordance with AASHTO T 97 at a frequency acceptable to the Engineer. The compressive strength specimens shall be cast and cured in the field in accordance with AASHTO T 23. After proper curing, these cylinders will be transported to the Material Evaluation and Specification Unit (MESU) for strength evaluation in accordance with AASHTO T 22.

- 13. Opening to Traffic:** The Contractor shall protect the concrete until opened to traffic. Any damage occurring prior to the opening to traffic shall be repaired or replaced.

Vehicular traffic shall be excluded until 14 days have passed from the concrete placement. The Contractor's Quality Control testing must also demonstrate a compressive strength of 3,200 psi after 14 days of curing.

Any damage to the concrete from traffic or any other causes, occurring prior to acceptance of the Contract, shall be repaired by the Contractor at its own expense.

Method of Measurement: This work will be measured for payment as follows:

1. **Colored Stamped Concrete:** This work will be measured by the number of cubic yards of accepted colored stamped concrete. The quantity will be determined from the theoretical computed volume based on the required concrete thickness and widths as shown on the plans.

The colored stamped concrete shall be constructed strictly in accordance with the thickness and widths shown on the plans. The State will not be liable for payment for any thickness and widths in excess of that required. The colored stamped concrete thickness shall be measured after all granular base preparations are completed. The Engineer will check the thickness of fixed form colored stamped concrete area by taking depth measurements from the granular base to the top of the forms prior to the placement of concrete. The Contractor shall make necessary adjustments to the granular base and forms to the satisfaction of the Engineer to ensure the thickness shown on the plans is placed. No concrete shall be placed until the Engineer has made depth measurements that confirm the specified thickness will be placed.

Should the Contractor fail to allow the Engineer to take measurements that confirm the specified depth before pouring, the Engineer will require that the Contractor take cores so that thickness measurements can be performed in accordance with AASHTO T 148. When the thickness of concrete is deficient by more than 0.5 inch, the Engineer will determine whether the area of such deficiency will be left in place or replaced in accordance with the provisions of Article 1.05.03. All additional work, including coring, patching of core holes, removal of all concrete, reinforcement steel, joint material required, and any delay to the Contractor's operation as a result of deficient thickness will not be cause for additional compensation.

2. **Mat Reinforcement for Concrete Pavement:** This work will be measured by the number of square yards of completed and accepted of colored stamped concrete that is reinforced.
3. **Transverse Contraction Joint:** This work will be measured by the number of linear feet of completed and accepted transverse contraction joint.
4. **Longitudinal Contraction Joint:** This work will be measured by the number of linear feet of completed and accepted longitudinal contraction joint.

Basis of Payment: Payment for the work will be made as follows:

1. **Colored Stamped Concrete:** Concrete will be paid for at the Contract unit price per cubic yard for "Colored Stamped Concrete," complete in place, which price shall include all

equipment, tools, labor, work incidental thereto and all materials, except reinforcement and joints. There will be no separate measurement or payment made for coloring agent, releasing agent, or curing and sealing compounds, but the cost will be considered as included in the contract unit price for the colored stamped concrete.

No separate payment will be made for the concrete testing equipment, the instruction in its use, in-place testing, or concrete test beams and cylinders as specified, but the cost of this work shall be considered included in the general cost of the work. The transporting and Quality Assurance testing of beams and cylinders will be done by the Department without expense to the Contractor.

The construction of any stamped concrete surfaces, prior to acceptance of the test panel, will not be measured for payment. Approved test panels will be measured and paid for by the number of cubic yards of colored stamped concrete completed and accepted. No measurement or payment will be made for rejected test panels that do not meet specification requirements.

- 2. Mat Reinforcement for Concrete Pavement:** Reinforcement will be paid for at the Contract unit price per square yard of "Mat Reinforcement for Concrete Pavement," complete in place, which price shall include all materials, equipment, tools, labor, and work incidental thereto. It shall also include the cost of concrete blocks used for support of reinforcing steel.
- 3. Transverse Contraction Joints:** Transverse contraction joints will be paid for at the Contract unit price per linear foot for "Transverse Contraction Joint," complete in place, which price shall include all transverse joint seal, load transfer devices (dowel bars and basket assemblies), bond breaker, and all other material, equipment, tools, labor, and work incidental thereto. This shall also apply to transverse construction joints, where adjacent slabs are poured separately and formwork establishes a natural plane.
- 4. Longitudinal Contraction Joint:** Longitudinal contraction joints will be paid for at the Contract unit price per linear foot for "Longitudinal Contraction Joint," complete in place, which price shall include all tie bars and supports, adhesive anchoring, longitudinal joint seal, and all other material, equipment, tools, labor, and work incidental thereto. This shall apply also to longitudinal construction joints, where adjacent slabs are poured separately and formwork establishes a natural plane, and the longitudinal interface between granite curbing and the concrete slab.

Pay Item	Pay Unit
Colored Stamped Concrete	c.y.
Mat Reinforcement for Concrete Pavement	s.y.
Transverse Contraction Joint	l.f.
Longitudinal Contraction Joint	l.f.

ITEM # 0406176A – FLEXIBLE PERVIOUS PAVEMENT

Description: Work under this item shall consist of flexible, porous, ADA compliant, and UV resistant pavement surface constructed on a permeable aggregate base with a thickness and color as shown on the plans or as directed by the Engineer, and in accordance with these specifications.

Materials:

1. Pavement system - The flexible pavement system shall be:

KBI Flexi-Pave, manufactured by K.B. Industries, Inc., 7300 Bryan Dairy Road Suite 400, Largo, FL 33777-1544, telephone (727) 723-3300

No substitutions will be allowed.

2. Permeable Aggregate – Permeable Aggregate shall conform to Standard Specifications, Sections 2.12 and Articles M.002.02 and M.02.06.

3. Binding Agent – The binding agent shall be as follows:

XFP75, manufactured by K.B. Industries, Inc., 7300 Bryan Dairy Road Suite 400, Largo, FL 33777-1544, telephone (727) 723-3300

4. Color – The color of the flexible pavement system shall be “Cypress”, manufactured by K.B. Industries, Inc. or as directed by the Engineer.

5. Geotextile – Geotextile shall be installed as per manufactures recommendations and conform to Standard Specifications, Section 7.55 and Section M.08.01-19. Geotextile shall have permeability greater than the soil below.

Construction Methods: Flexible pervious pavement systems shall be installed by manufacturer authorized factory trained technicians only. The flexible pervious pavement shall have a uniform and consistent color. All manufacturers’ recommendations shall be followed unless otherwise directed by the Engineer.

Storage of Materials: The Contractor shall provide a secure, clean, dry location for storage of materials at temperatures above 45°F. Under no circumstances should materials be stored outside unless fully protected from moisture with 10 mil polyethylene barrier and tarpaulin.

Flexible pervious pavement must not be applied until the trees have been planted in the splitter islands.

The flexible pervious pavement shall be placed on the prepared permeable aggregate base to the depth and width as shown on the plans. The permeable aggregate base shall be placed to such a

depth that after compaction it shall be at the specified depth (4" minimum) below the finished grade of the flexible pervious pavement. The base shall be wetted and rolled or tamped after the spreading of each layer.

Low Temperature Placements: No flexible pervious pavement is to be placed when air temperature is below 45°F. No flexible porous pavement will be placed on frozen sub-grade, or when base is wet. Flexible pervious pavement exposed to temperatures below 35°F after placement must be protected through the use of an approved method as recommended by the manufacture or as directed by the engineer. Any flexible pervious pavement placed during cold weather that is damaged because of freezing shall be replaced at the Contractor's own expense.

Flexible pervious pavement shall not be installed during rain events. The Contractor shall monitor the National Weather Service forecasts for rain at the project location and adjust the schedule as necessary for installations. Appropriate precautionary measures at each site shall be taken if it rains 24 hour after installation as recommended by the manufacturer.

Flexible pervious pavement shall be protected from all foot or vehicular traffic for until product has fully cured to prevent damage. The Contractor shall protect newly placed flexible pervious pavement so as to reasonably prevent damage. The Contractor shall repair or remove and replace any damaged or defaced surface at his own expense. Determination to repair or remove and replace will be at the sole discretion of the Engineer.

Prior to project completion flexible pervious pavement shall be cleaned as per manufacturer's recommendations.

Method of Measurement: This work will be measured for payment as follows:

1. Flexible Pervious Pavement: This work will be measured by the actual number of square feet of completed and accepted Flexible Pervious Pavement.
2. Excavation: Excavation below the finished grade of the splitter island including excavation for permeable aggregate base and disposal of surplus material will not be measured for payment, but the cost shall be included in the price bid for Flexible Pervious Pavement. Excavation above the finished grade of the splitter islands will be measured and paid for in accordance with Section 2.02
3. Permeable Aggregate Base: This work will not be measured for payment, but the cost shall be considered as included in the price bid for the Flexible Pervious Pavement.
4. Binding Agent: This work will not be measured for payment, but the cost shall be considered as included in the price bid for the Flexible Pervious Pavement.
4. Geotextile: This work will not be measured for payment, but the cost shall be considered as included in the price bid for the Flexible Pervious Pavement.

Basis of Payment: This work will be paid for at the contract unit price per square foot for "Flexible Pervious Pavement," complete in place, which price shall include all excavation as specified above, disposal of surplus material, permeable aggregate base, geotextile, cleaning, equipment, tools, materials and labor incidental thereto.

Warranty:

The installation shall be guaranteed against defects in workmanship and materials for a period of 5 years post construction. The Manufacturer shall provide a statement of warrantee with reference to project 0151-0340 to the Connecticut Department of Transportation prior to installation. The Manufacturer shall furnish and repair all damaged or defective sections resulting from poor workmanship or material during the guarantee period, as directed by the Engineer, and at no cost to the State.

Pay Item	Pay Unit
Flexible Pervious Pavement	SF.

ITEM #0406314A – 80 MIL PAVEMENT MARKING GROOVE 5” WIDE
ITEM #0406315A – 80 MIL PAVEMENT MARKING GROOVE 7” WIDE
ITEM #0406316A – 80 MIL PAVEMENT MARKING GROOVE 9” WIDE
ITEM #0406317A – 80 MIL PAVEMENT MARKING GROOVE 13” WIDE

Description:

Work under this item shall consist of grooving the pavement surface in continuous or intermittent intervals for the placement of recessed pavement markings. Unless otherwise noted, the groove shall be 1 inch wider than the anticipated pavement marking. The groove for double-yellow centerline markings shall consist of two grooves, each 5 inches wide.

Groove Width: 5 inches wide for 4-inch markings
7 inches wide for 6-inch markings
9 inches wide for 8-inch markings
13 inches wide for 12-inch markings

Groove Depth: 0.080 inches $\pm$ 0.010 inches

The groove shall not be installed continuously for intermittent (Dotted Lines and Broken Lane Lines) pavement markings, but only where markings are to be applied.

The groove shall not be installed on metal bridge decks, on bridge joints, at drainage structures, at loop detector sawcut locations, or in other areas identified by the Engineer.

Construction Methods:

Equipment:

The grooving equipment shall be equipped with a free-floating, depth-controlled head which provides a consistent groove depth over irregular pavement surfaces. The grooving head shall only be equipped with diamond saw blades. Any ridges in the bottom of the groove shall have a maximum height of 0.015 inches. The grooving equipment shall be capable of installing a groove 6 inches away from any vertical or horizontal obstruction.

Installation: The pavement marking groove shall be installed in accordance with the current CTDOT pavement marking standard drawings.

The Contractor shall establish control points for measuring offsets and pre-marks along the entire distance of pavement being grooved. Prior to installation of the groove, the Contractor shall verify that the equipment is capable of installing the correct width and spacing of the groove. The control points, pre-marks, and equipment will be reviewed by the Engineer prior to commencement of the work.

The groove will be considered defective if any edge of the groove varies more than 0.25 inch in a 10-foot length, or if the alignment of the groove visibly deviates from the normal alignment of the road.

Item #0406314A, #0406315A, #0406316A, #0406317A

Final Cleaning: The Contractor shall immediately collect all debris and dust resulting from the grooving operation by vacuuming the pavement groove and adjacent pavement surface. Collected debris and any waste material shall be properly disposed of by the Contractor.

The work area shall be returned to a debris-free state prior to re-opening to traffic.

Repair of Unacceptable Groove:

The Contractor shall repair any defective groove(s) to the satisfaction of the Engineer. All work in conjunction with this repair shall be performed at no additional cost to the State.

Pavement Marking Requirements:

The Contractor is required to install permanent pavement markings in the grooves before the lane or roadway is opened to live traffic. If the permanent pavement markings cannot be installed before the lane or roadway is opened to live traffic, the Contractor will need to obtain approval from the Engineer to open the lane or roadway. Liquidated Damages based on Limitation of Operations restrictions will be enforced. If approved by the Engineer, the Contractor will be allowed to open the lane or roadway to live traffic and the Contractor will be required to install temporary hot-applied waterborne pavement markings without glass beads, at their own expense, within 24 hours of opening the lane or roadway. Temporary hot-applied waterborne pavement markings shall be applied at a 5 mil thickness. Within 5 calendar days after the installation of the groove, permanent pavement markings shall be applied in the groove over the temporary hot-applied waterborne pavement markings.

Groove Depth Gauge:

The Contractor shall supply the Engineer with two accurate, easily readable gauges with which to verify groove depth for the duration of the Project. The gauges shall be delivered at least one week prior to the anticipated beginning of grooving operations. Gauges shall be accompanied by the manufacturer's instructions for their use. The gauges will be returned to the Contractor at the conclusion of the Project.

Method of Measurement:

This work will be measured for payment by the number of linear feet of grooves installed in the pavement as ordered and accepted by the Engineer.

Basis of Payment:

This work will be paid for at the Contract unit price per linear foot of "Pavement Marking Groove" installed in the pavement and accepted. This price shall include cleaning of the pavement, all materials, equipment, tools, depth gauges, and labor incidental thereto, and disposal of any waste material resulting from the grooving operation.

Pay Item	Pay Unit
80 Mil Pavement Marking Groove 5" Wide	l.f.
80 Mil Pavement Marking Groove 9" Wide	l.f.
80 Mil Pavement Marking Groove 13" Wide	l.f.

Item #0406314A, #0406315A, #0406316A, #0406317A

(Recommended to be included on Projects exceeding 1,000t of total bituminous concrete of all mixes. It is anticipated that this spec may sunset once most/all bituminous concrete suppliers have been incorporated into Haul Hub, and inspection staff receives phones from the districts.)
Delete this header prior to inclusion in Project documents.

ITEM #0406899A – E-TICKETING (BITUMINOUS CONCRETE)

Description:

This item consists of coordination between the HaulHub Technologies Automated Electronic Ticketing (e-Ticketing) System, the bituminous concrete material supplier, and the Department for bituminous concrete materials delivered to the Project. It also includes supplying all requirements of the Materials and Construction Methods sections of this specification.

Materials:

The Contractor shall supply three (3) new cellular-enabled Android or iOS phones with backup power for use by the Department during the Project, including car chargers and protective cases. The Contractor shall submit proposed phone Product Data to the Department prior to purchase. The Contractor shall supply an unlimited cellular plan for the e-Ticketing phones. Phones will be returned to the Contractor at the conclusion of the Project.

The phones supplied for Department personnel use shall:

1. Contain minimum 128gb local storage to store all e-Tickets for each load of material delivered during paving operations.
2. Have battery capacity able to stay active for an entire paving operation. Backup power batteries shall have a minimum of 10,000 mAh (milliamp hours) and have compatible connections with phones.

The Contractor shall supply all equipment needed to receive e-Tickets for their own use or for their subcontractors' use and the cost shall be included in the general cost of the Project.

Construction Methods:

At least 30 days prior to initial use of the e-Ticketing system, the Contractor shall set up a meeting with HaulHub Technologies, the bituminous concrete material supplier, Department Project personnel and Division of Construction Operations (DCO) personnel to coordinate collecting pertinent information. At least 15 days prior to paving, the bituminous concrete material supplier shall generate a calibration ticket to ensure proper integration of HaulHub with the bituminous concrete material supplier's existing ticketing system.

Any questions regarding this item shall be directed to <mailto:ETicketing.DOT@ct.gov>

HaulHub is contracted by the Department, therefore the Contractor shall not be responsible for training or support. Virtual training will be available to all parties by HaulHub Technologies upon request prior to bituminous concrete material being delivered to the Project. The Department

(Recommended to be included on Projects exceeding 1,000t of total bituminous concrete of all mixes. It is anticipated that this spec may sunset once most/all bituminous concrete suppliers have been incorporated into Haul Hub, and inspection staff receives phones from the districts.)
Delete this header prior to inclusion in Project documents.

Contract with Haul Hub includes a technical representative that will be available virtually, or on-Site as needed, for on-demand troubleshooting during the Project. DOT Inspection staff is responsible for logging all loads as Delivered or Rejected, and to document any waste tonnage.

HaulHub Technologies will coordinate initial setup of the e-Ticketing system with the bituminous concrete supplier(s). The e-Ticketing system shall be integrated with the bituminous concrete material suppliers' existing point of sale and ticketing system to deliver and store e-Tickets for immediate and later use by Project staff.

During the Project, each delivery vehicle shall have an e-Ticket and a paper ticket produced for each load of material. Printed tickets will be acceptable in lieu of e-Tickets in the event of e-Ticketing system malfunction or lack of cellular reception. Material source locations shall be equipped with reliable, stable Internet access. Providing reliable internet access shall be supplied at no additional cost to the State.

Information on e-Tickets shall meet the requirements of standard specifications Sub article 4.06.03-1 (Material Documentation) for bituminous concrete materials and as noted below.

Information on e-Tickets shall include:

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

(Recommended to be included on Projects exceeding 1,000t of total bituminous concrete of all mixes.
 It is anticipated that this spec may sunset once most/all bituminous concrete suppliers have been
 incorporated into Haul Hub, and inspection staff receives phones from the districts.)
 Delete this header prior to inclusion in Project documents.

Method of Measurement:

This item, being paid on a lump sum basis, will not be measured for payment. Prior to beginning work, the Contractor shall submit a proposed schedule of values for this item for review and concurrence by the Engineer.

Basis of Payment:

The work under the item “e-Ticketing (Bituminous Concrete)” will be paid at the Contract lump sum price and shall include furnishing all materials, labor, tools, equipment, and incidentals as specified in the Materials and Construction Methods articles of this specification. Poor Internet access will not be considered justification for any Contract schedule adjustment, delays or costs associated with the delays.

Pay Item	Pay Unit
e-Ticketing (Bituminous Concrete)	l.s.

ITEM #0406999A - ASPHALT ADJUSTMENT COST

Description: The Asphalt Adjustment Cost will be based on the variance in price for the performance-graded binder component of the following:

- I. Hot Mix Asphalt (HMA) and Polymer Modified Asphalt (PMA),
- II. Ultra-Thin Bonded HMA (UTB-HMA) and Ultra-Thin Bonded PMA (UTB-PMA),
- III. Thin Friction Wearing Course (TFWC),
- IV. Binder Rich Intermediate Courses (BRIC) and Stone Matrix Asphalt (SMA), and
- V. Asphalt Rubber Chip Seal (ARCS) treatments completed and accepted during the Contract.

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

Construction Methods:

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

- I. For HMA, PMA, TFWC, BRIC, and SMA mixtures:
 - a. The HMA, PMA, TFWC, BRIC, or SMA mixture for which the adjustment would be applied is listed as a Contract item with a pay unit of tons.
 - b. ***The total quantity for all HMA, PMA, TFWC, BRIC, and SMA mixtures in the Contract or individual purchase order (Department of Administrative Service contract awards) exceeds 1000 tons or the Project duration is greater than 6 months.***
 - c. The difference between the posted *Asphalt Base Price* and *Asphalt Period Price* varies by more than \$5.00 per ton.
- II. For UTB-HMA and UTB-PMA mixtures:
 - a. The UTB-HMA or UTB-PMA mixture for which the adjustment would be applied is listed as a Contract item.
 - b. ***The total quantity for the UTB-HMA or UTB-PMA mixture in the Contract exceeds:***
 - i. 800 tons if the UTB-HMA or UTB-PMA item has a pay unit of tons,***
 - ii. 30,000 square yards if the UTB-HMA or UTB-PMA item has a pay unit of square yards, or***
 - iii. the Project duration is greater than 6 months.***
 - Note: The quantity of UTB-HMA or UTB-PMA measured in tons shall be determined from the material documentation requirements set forth in the UTB-HMA or UTB-PMA item specification.
 - c. The difference between the posted *Asphalt Base Price* and *Asphalt Period Price* varies by more than \$5.00 per ton.
 - d. No Asphalt Adjustment Cost will be applied to the liquid emulsion that is specified as part of the UTB-HMA or UTB-PMA mixture system.
- III. For Asphalt Rubber Chip Seal (ARCS) treatments:
 - a. The ARCS treatment for which the adjustment would be applied is listed as a Contract item.

- b. ***The total quantity for the ARCS treatment in the Contract exceeds 30,000 square yards or the Project duration is greater than 6 months.***

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

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

Regardless of the binder used in all mixtures or treatments, the Asphalt Adjustment Cost will be based on PG 64-22.

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

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

Method of Measurement:

A.

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

Where:

- **HMA:**
 1. For HMA, PMA, UTB-HMA, UTB-PMA, TFWC, BRIC, and SMA mixtures with pay units of tons:
The quantity in tons of accepted HMA, PMA, UTB-HMA, UTB-PMA, TFWC, BRIC, or SMA mixture measured and accepted for payment.
 2. For UTB-HMA and UTB-PMA mixtures with pay units of square yards:
The quantity of UTB-HMA and UTB-PMA mixture delivered, placed, and accepted for payment, calculated in tons as reported according to the Material Documentation provision of the UTB-HMA and UTB-PMA specification.
- ***Asphalt Base Price:*** The asphalt price posted on the CTDOT website 28 days before the actual bid opening posted.
- ***Asphalt Period Price:*** The asphalt price posted on the CTDOT website during the period the HMA, PMA, UTB-HMA, UTB-PMA, TFWC, BRIC, or SMA mixture was placed.
- **PG% (Performance-Graded Binder percentage):**
 1. For HMA or PMA mixes:
 - PG% = 4.5 for HMA S1 and PMA S1

- PG% = 5.0 for HMA S0.5 and PMA S0.5
- PG% = 6.0 for HMA S0.375, PMA S0.375, HMA S0.25 and PMA S0.25
- 2. For UTB-HMA, UTB-PMA, TFWC, BRIC, and SMA mixes:
 - PG% = Design % PGB (Performance Graded Binder) in the approved job mix formula, expressed as a percentage to the tenth place (e.g. 5.1%)

B. For Asphalt Rubber Chip Seal:

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

Where:

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

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

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

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

Pay Item	Pay Unit
Asphalt Adjustment Cost	est.

ITEM #0503001A – REMOVAL OF SUPERSTRUCTURE

Description:

This work shall include the complete removal and disposal of the superstructure portion of Ramp 10, as well as the partial removal and disposal of existing bridge deck and parapets on the main line structure within the limits shown on the plans. The bridge deck is constructed of reinforced concrete.

Construction Methods:

Removal of the Ramp 10 superstructure shall conform to the requirements of Section 5.03 of Form 819. Removal of the existing bridge deck and parapets on the main line structure shall conform to the requirements of Section 9.74 of Form 819.

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 “Removal of Superstructure,” at the location designated, which price shall include all equipment, tools and labor incidental to the full or partial removal of the superstructure (including saw cutting and the furnishing, installing, and removal of protective debris shielding, working platforms, temporary falsework, or supports of any kind) and shall include the proper disposal thereof.

Payment for the full or partial removal of bridge substructure(s) will be made at the Contract unit price per cubic yard for "Removal of Existing Masonry," in accordance with 9.74.05.

<u>Pay Item</u>	<u>Pay Unit</u>
Removal of Superstructure	l.s.

ITEM #0511801A - BRIDGE SCUPPER-FIBERGLASS HOPPER

Description:

Work under this item shall consist of furnishing and installing scuppers and grates as shown on the Plans. All work to be done shall conform to the pertinent provisions of Sections 6.03, M.06, and M.07.

Materials:

Materials for the frames and grates of the scuppers shall be structural steel conforming to the provisions of AASHTO M270 Grade 50 and shall be manufactured in accordance with the plans. The bolts, nuts, and locking device shall be stainless steel conforming to the provisions of ASTM A276 Type 304.

Caulking shall be silicone sealant conforming to ASTM C-290 Type S, Grade NS, Class 40.

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

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

The Contractor shall furnish Certified Test Reports for each batch in conformance with the requirements set forth in the Specifications.

The reinforcing material shall be of commercial grade glass fiber having a coupling agent which will provide a suitable bond between the glass reinforcement and the resin. The glass and the resin shall be applied in proper quantities to achieve maximum strength. However, the glass fiber shall not be less than 25% by mass. The laminate shall have a minimum ultimate tensile strength of 12 ksi, a minimum flexural strength of 19 ksi, and a minimum tangent flexural modulus of elasticity of 800 ksi. The material used as reinforcing on the surface exposed to chemical attack shall be a commercial grade chemical resistant glass having a coupling agent.

The laminate shall consist of an inner surface, an interior layer, and no exterior layer of laminate body. The composition of the inner surface and interior layer are intended to achieve optimum chemical resistance. The inner surface shall be free of cracks and crazing with a smooth finish with an average of not over 12 pits per sq. in., providing the pits are less than 1/8" in diameter

and not over 1/32" deep and are covered with sufficient resin to avoid exposure of inner surface fabric. Some waviness is permissible so long as the surface is smooth and free of pits. Between 10 mils and 20 mils of reinforced resin rich surface shall be provided. This surface shall be reinforced with 1 ply glass reinforcing mat.

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

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

All manufacturing practices shall conform to SPI (Society of the Plastics Industry) Standards.

Each Hopper shall be shipped to the job site paper wrapped in a cardboard carton or box of other suitable material.

Steel frames and grates shall be galvanized by the hot-dip process in accordance with the requirements of ASTM A153.

Construction Methods:

Shop Drawings: Before fabricating any materials, the Contractor shall submit shop drawings to the Engineer for approval in accordance with Article 1.05.02.-3. These drawings shall include but not be limited to the following information:

- a. A plan and elevation with details showing all lengths, fittings, supports, and material designation needed to fabricate the scupper.
- b. Commercial items shall be identified by manufacturer, trade name, and catalog number and shall indicate sufficient details.

The installation of welded studs shall be in accordance with the requirements of Article 5.08.03.

The scuppers shall be located and set to grade as shown on the plans or as directed by the Engineer. All connections shall be secure and watertight, including the connections to adjacent concrete.

Method of Measurement:

The scuppers will be measured for payment by the number of units installed, completed, and accepted.

Scuppers and grates with necessary welded studs, metal grating, bolts, nuts and washers and pipe extension will constitute one unit.

Basis of Payment:

The work will be paid for at the contract unit price each for “Bridge Scupper – Fiberglass Hopper”, complete in place, which price shall include all materials including caulking, welded studs, metal grating, and all equipment, tools and labor incidental thereto.

<u>Pay Item</u>	<u>Pay Unit</u>
Bridge Scupper – Fiberglass Hopper	ea.

ITEM #0586007.10A – SPECIAL TYPE “C” CATCH BASIN – 0’-10’ DEEP

ITEM #0586046.10A – SPECIAL TYPE “C-L” CATCH BASIN – 0’-10’ DEEP

Description:

This work shall consist of furnishing and installing a precast concrete structure with a Special Type “C” Catch Basin Top or Special Type “C-L” Catch Basin Top, according to the details, and at the locations shown on the plans completed in place.

Materials:

All materials shall conform to those outlined by the contract plan details and in Section 5.86.02.

Construction Methods:

Construction methods shall conform to those outlined by the contract plan details and in Section 5.86.03.

Method of Measurement:

The catch basins will be measured for payment by the number of units installed, completed, and accepted per Section 5.86.04, ‘Manholes, Catch Basin and Drop Inlets.’

Basis of Payment:

The work will be paid for at the contract unit price for each Special (Type) Catch Basin – 0’-10’ Deep, complete in place, including all incidental expense.

<u>Pay Item</u>	<u>Pay Unit</u>
Special Type “C” Catch Basin – 0’-10’ Deep	ea.
Special Type “C-L” Catch Basin – 0’-10’ Deep	ea.

ITEM #0586754A – SPECIAL TYPE ‘C’ CATCH BASIN TOP

Description:

Work under this item shall consist of furnishing and installing City of Waterbury Catch Basin Tops as shown on the Plans. All work to be done shall conform to the pertinent provisions of Sections 5.86, M.06, and M.08.

Materials:

All materials shall conform to those outlined by the contract plan details and in Section 5.86.02.

Construction Methods:

Construction methods shall conform to those outlined by the contract plan details and in Section 5.86.03.

Method of Measurement:

The catch basin tops will be measured for payment by the number of units installed, completed, and accepted per Section 5.86.04, ‘Replacement of frames, covers, and tops.’

Basis of Payment:

The work will be paid for at the contract unit price each for “Special Type ‘C’ Catch Basin Top”, complete in place, including all incidental expense.

<u>Pay Item</u>	<u>Pay Unit</u>
Special Type “C” Catch Basin Top	ea.

ITEM #0586781A – SPECIAL MANHOLE FRAME AND COVER

Description:

Work under this item shall consist of furnishing and installing Special Manhole Frame and Covers as shown on the Plans. All work to be done shall conform to the pertinent provisions of Sections 5.86, M.06, and M.08.

Materials:

All materials shall conform to those outlined by the contract plan details and in Section 5.86.02.

Construction Methods:

Construction methods shall conform to those outlined by the contract plan details and in Section 5.86.03.

Method of Measurement:

The manhole frame and covers will be measured for payment by the number of units installed, completed, and accepted per Section 5.86.04, ‘Replacement of frames, covers, and tops.’

Basis of Payment:

The work will be paid for at the contract unit price each for “Special Manhole Frame and Cover”, complete in place, including all incidental expense.

<u>Pay Item</u>	<u>Pay Unit</u>
Special Manhole Frame and Cover	ea.

ITEM #0601445A - EMBANKMENT WALL (SITE NO. 1)

Description: This item will consist of designing, furnishing and constructing an embankment retaining wall in the location, grades, and to the dimensions and details shown on the contract drawings, and in accordance with these specifications.

Retaining Wall Selection: The embankment wall type shall be selected from the list of embankment walls shown on the plans. The Engineer will reject any proposed embankment wall type that is not listed on the plans.

The plans will list all proprietary embankment walls that are appropriate for each Site. This list does not warrant that the walls can be designed to meet either the dimensional, structural, or geotechnical constraints at each Site.

Refer to the Department's Qualified Product List (QPL) for the current approved proprietary embankment wall and for the suppliers' contact information; no other proprietary embankment walls will be allowed. The Department's QPL can be found at: [QUALIFIED PRODUCT LIST](#)

NOTE: SEE THE PLANS FOR THE SPECIFIC EMBANKMENT WALL TYPES THAT ARE ACCEPTABLE FOR EACH SITE.

No other proprietary embankment walls will be allowed for this project.

This listing does not warrant that the individual walls can be designed to meet either the dimensional, structural, or geotechnical constraints at each site.

Design:

1 - Design Computations: It is the Contractor's responsibility for the design, detailing and additional construction specifications required to construct the wall. The actual designer of the retaining wall shall be a qualified Professional Engineer licensed in the State of Connecticut.

2 - Designer's Liability Insurance: The Designer of the proprietary retaining wall shall secure and maintain, at no direct cost to the Department, a Professional Liability Insurance Policy for errors and omissions in accordance with Articles 1.03.07 and 1.05.02.

3 - Preliminary Submissions: Prior to the start of fabrication or construction, the Contractor shall submit to the Engineer a design package, which shall include, but not be limited to the following:

a. Detailed Plans:

- Stamped by a licensed Professional Engineer (Connecticut).

- Full plan view of the wall drawn to scale. The plan view must reflect the horizontal alignment and offset from the horizontal control line to the face of the wall. Beginning and ending stations, all utilities, signs, lights, etc. that affect the construction along with all property lines and easement lines adjacent to the wall shall be shown.
- Full elevation view of the wall drawn to scale. Elevation views should indicate the elevation at the top and bottom of walls, horizontal and vertical break points, and the location of finished grade.
- Typical cross sections drawn to scale including all appurtenances. Detailed cross section should be provided at significant reinforcement transitions such as wall ends.
- Details of all wall components and their connections such as the length, size and type of soil reinforcement and where any changes occur; facing details; connections; etc.
- Certified test reports indicating the connection strength versus normal load relationship for the block-soil reinforcement connection to be used.
- Drainage details for embankment backfill including attachment to outlets shown on contract drawings.
- Details of any roadway drainage pipe projecting through the wall, or any attachments to the wall. Details of the treatment of drainage swales or ditches shown on the contract drawings.
- Design parameters used along with AASHTO references.
- Material designations for all materials to be used.
- Detailed construction methods including a quality control plan. Construction quality control plans should include monitoring and testing frequencies (e.g. for setting batter and maintaining horizontal and vertical control). Construction restraints should also be listed in the details. Specific requirements for construction around obstructions should be included.
- Details of installation of protective fencing where required.
- Details of Architectural Treatment where required.

- Details of Temporary Earth Retaining System(s) where required.
 - Details of wall treatment where the wall abuts other structures.
 - Treatment at underground utilities where required.
- b. Design Computations:
- Stamped by a licensed Professional Engineer (Connecticut).
 - Computations shall clearly refer to the applicable AASHTO provisions as stated in the Notes on the Contract Drawings.
 - Documentation of computer programs including all design parameters.
- c. Construction Specifications:
- Construction methods specific to the proprietary retaining wall chosen. These specifications should include construction limitations including vertical clearance, right-of-way limits, etc. Submittal requirements for materials such as certification, quality, and acceptance/rejection criteria should be included. Details on connection of modular units and connection of reinforcements such that assurance of uniform stress transfer should be included.
 - Any requirements not stated herein.

The submissions for proprietary retaining walls shall be treated as working drawings according to Section 1.05 amended as follows:

- a. Six sets of each submission shall be supplied to the State
- b. The Contractor shall allow 21 days for the review of each submission. If subsequent submissions are required as a result of the review process, 21 days shall be allowed for review of these submissions. No extensions in contract time will be allowed for the review of these submissions.

4 - Final Submissions: Once a proprietary retaining wall design has been reviewed and accepted by the Department, the Contractor shall submit the final plans. The final submission shall include one set of full size (approximately 24" x 36") mylar sheets and five sets of full size blue line copies.

The final submission shall be made within 14 days of acceptance by the State. No work shall be performed on the retaining wall until the final submission has been received by the Department.

Acceptance of the final design shall not relieve the Contractor of his responsibility under the contract for the successful completion of the work.

The actual designer of the proprietary retaining wall is responsible for the review of any shop drawings prepared for the fabrication of the wall. One set of full size blue line copies of all approved shop drawings shall be submitted to the Department's permanent records.

5 - General Design Requirements:

a. All designs for proprietary walls and temporary earth retaining systems shall conform to the latest edition of the American Association of State Highway and Transportation Officials (AASHTO) LRFD Bridge Design Specifications, including the latest interims, as specified in the plans, except as noted otherwise herein:

b. The wall design shall follow the general dimensions of the wall envelope shown in the contract plans.

c. The top of the concrete leveling pad shall be located at or below the theoretical leveling pad elevation. The minimum wall embedment shall be two feet as measured to the top of the leveling pad or as shown on the plans.

d. If footing steps are required, they shall be kept below the minimum embedment depth. Footing steps in addition to those shown on the plans will be permitted at no additional cost to the State.

e. The wall shall be designed to be within all property lines and easement lines shown on the contract drawings. If additional work areas are necessary for the construction of the proprietary retaining wall, the Contractor shall be responsible for obtaining the rights from the affected property owners. Copies of these rights shall be forwarded to the Department.

f. The top of the wall shall be at or above the top of the wall elevations shown on the plans. The top of the wall may be level or sloped to meet the top of the wall line noted.

g. Cast-in-place concrete will not be an acceptable replacement for areas noted by the wall envelope, except for minor grouting of pipe penetrations.

h. The mechanical wall height for the purposes of design calculations shall be from the top of the leveling pad to the top of the potential failure surface where the failure surface intercepts the ground surface.

i. The minimum length of internal soil reinforcement shall be as specified in AASHTO 11.10.2.1, except for the minimum eight (8.0') foot length requirement.

j. If there are specific surcharges acting on the wall, they shall also be accounted for. The minimum equivalent fluid pressure used to design the wall shall be 33 lbs./ft² per linear foot of wall.

k. The maximum factored service limit bearing resistance of the soil shall be assumed to be 4 ksf unless otherwise shown on the plans. If additional soils information is required by the designer, it must be obtained by the Contractor and will not be reimbursed by the State.

Materials: Materials shall conform to the following requirements and those not listed below shall be as prescribed within the Standard Specifications for Roads, Bridges and Incidental Construction, including supplemental specifications and applicable special provisions.

1 – Facing Block: The facing block can be precast or drycast concrete and shall be the color specified on the plans. The block shall meet the following requirements:

a. Drycast Concrete:

- i. The minimum compressive strength of the block shall be 4000 psi measured at 28 days.
- ii. The maximum water absorption shall be less than five percent.

The Contractor shall submit to the Engineer a certified test report confirming the compressive strength and water absorption conform to the requirements of ASTM C-140.

b. Precast Concrete: Shall conform to the requirements of Section M.03 and as follows:

- i. The minimum compressive strength of the block shall be 4000 psi measured at 28 days.
- ii. All precast concrete components shall be air-entrained composed of Portland cement, fine and coarse aggregates, admixtures and water. The air-entraining feature may be obtained by the use of either air-entraining Portland cement or an approved air-entraining admixture. The entrained-air content shall be not less than four percent or more than seven percent.

2 - Geosynthetic Soil Reinforcement: The minimum strength of the geosynthetic soil reinforcement shall be based on experimental data. The Contractor shall submit to the Engineer a certified test report confirming the strength of the material when tested according to the methods specified in ASTM D5262 and extrapolated according to ASTM D2837 as outlined in AASHTO Article 5.8.7.2.

3 – Metallic Soil Reinforcement: All soil reinforcement and structural connectors shall be hot dipped galvanized according to the requirements of ASTM A123 (AASHTO M-111).

The minimum thickness of the galvanizing shall be based on the service life requirements as previously stated.

Steel strip reinforcement shall be hot rolled to the required shape and dimensions. The steel shall conform to AASHTO M223 (ASTM A572) Grade 65 unless otherwise specified.

Welded wire fabric reinforcement shall be shop fabricated from cold-drawn wire of the sizes and spacings shown on the plans. The wire shall conform to the requirements of ASTM A82, fabricated fabric shall conform to the requirements of ASTM A185.

4 - Metal Connectors: All metal hardware shall be hot dipped galvanized according to the requirements of ASTM A123 (AASHTO M-111). The minimum thickness of the galvanizing shall be based on the service life requirements in the AASHTO Specifications.

5 - Backfill Material: The material for backfill shall be Pervious Structure Backfill conforming to the requirements of Articles M.02.05 and M.02.06.

6 - Facing Sealer: The face of all exposed drycast block shall be coated with clear Penetrating Sealer Protective Compound conforming to the requirements of Article M.03.02

Construction Methods: All construction methods for items not listed below shall be in accordance with the detailed requirements prescribed for the construction of the several contract items entering into the completed structure as specified in the Standard Specifications for Roads, Bridges, and Incidental Construction.

1 - Installation: The foundation for the structure shall be graded level for a width equal to or exceeding the length of the soil reinforcements, or as shown on the plans. If rock is encountered in the excavation, it shall removed to provide a level area equal to or exceeding the length of the soil reinforcements, but not greater than the pay limits shown on the plans.

Prior to wall construction, the foundation, if not in rock, shall be compacted as directed by the Engineer. Any foundation soils found to be unsuitable shall be removed and replaced.

At each foundation level, an unreinforced concrete leveling pad shall be provided as shown on the plans. The leveling pad shall have nominal dimensions of 6 inch thickness and 24 inch width, and shall be cast using minimum 2,000 psi 28-day compressive strength concrete. The leveling pad shall be cast to the design elevations as shown on the plans. Allowable elevation tolerances are +0.01 foot (1/8 inch), and -0.02 foot (1/4 inch), from the design elevation.

The materials for the wall shall be handled carefully and installed in accordance with manufacturer's recommendations and specifications. Special care shall be taken in setting the bottom course of blocks to true line and grade.

All blocks above the first course shall interlock with the lower courses by means of connecting pins. Vertical joints shall be staggered with each successive course as shown on the working drawings. Vertical tolerances and horizontal alignment tolerances measured from the face line shown on the plans shall not exceed $\frac{1}{2}$ inch when measured along an 8-foot straightedge. The overall tolerance of the wall from top to bottom shall not exceed $\frac{1}{2}$ inch per eight feet of wall height or one inch total, whichever is the lesser, measured from the face line shown on the plans. A bond breaker shall be placed between the blocks and any adjacent cast-in-place concrete.

2 - Backfilling: Backfill placement shall closely follow erection of each course of panels. Backfill shall be placed in such a manner as to avoid any damage or disturbance to the wall materials or misalignment of the facing panels. Any wall materials which become damaged or disturbed during backfill placement shall be either removed and replaced at the Contractor's expense or corrected, as directed by the Engineer. Any backfill material placed within the reinforced soil mass which does not meet the requirements of this specification shall be corrected or removed and replaced at the Contractor's expense.

Backfill shall be compacted to 95 percent of the maximum density as determined by AASHTO T-99, Method C or D (with oversize correction, as outlined in Note 7).

The moisture content of the backfill material prior to and during compaction shall be uniform throughout each layer. Backfill material shall have a placement moisture content less than or equal to the optimum moisture content. Backfill material with a placement moisture content in excess of the optimum moisture content shall be removed and reworked until the moisture content is uniform and acceptable throughout the entire lift. The optimum moisture content shall be determined in accordance with AASHTO T-99, Method C or D (with oversize correction, as outlined in Note 7).

If 30 percent or more of the backfill material is greater than 19 mm in size, AASHTO T-99 is not applicable. For such a material, the acceptance criterion for control of compaction shall be either a minimum of 70 percent of the relative density of the material as determined by a method specification provided by the wall supplier, based on a test compaction section, which defines the type of equipment, lift thickness, number of passes of the specified equipment, and placement moisture content.

The maximum lift thickness after compaction shall not exceed 10 inches, regardless of the vertical spacing between layers of soil reinforcements. The Contractor shall decrease this lift thickness, if necessary, to obtain the specified density. Prior to placement of the soil reinforcements, the backfill elevation at the face shall be level with the connection after compaction. From a point approximately three feet behind the back face of the panels to the free end of the soil reinforcements the backfill shall be two inches above the attachment device elevation unless otherwise shown on the plans.

Compaction within three feet of the back face of the panels shall be achieved by at least three passes of a lightweight mechanical tamper, roller or vibratory system. The specified lift

thickness shall be adjusted as warranted by the type of compaction equipment actually used. Care shall be exercised in the compaction process to avoid misalignment of the panels or damage to the attachment devices. Heavy compaction equipment shall not be used to compact backfill within three feet of the wall face.

At the end of each day's operation, the Contractor shall slope the last level of backfill away from the wall facing to direct runoff of rainwater away from the wall face. The Contractor shall control and divert runoff at the ends of the wall such that erosion or washout of the wall section does not occur. In addition, the Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

3 - Face Sealer: After the wall has been erected, the entire exposed face of the wall shall be coated with Penetrating Sealer Protective Compound. The application of the sealer shall conform to the requirements Article 8.19.03.

Several samples of the dry cast block shall be sealed prior to sealing the actual wall to ensure that the sealer will not discolor the block. If the sealer does discolor the block, the Contractor shall change to another approved supplier of sealer.

Method of Measurement: This work will be paid for on a lump sum basis and will not be measured for payment.

Basis of Payment: This work will be paid for at the contract lump sum for "EMBANKMENT WALL (SITE NO.)", complete in place, which price shall include all work shown within the pay limits shown on the plans for the retaining wall including but not limited to the following:

1. Design, detailing, and specifications for the wall.
2. Excavation for the wall
3. Design and Construction of temporary earth retaining systems for the support of the slope during construction.
4. Construction of the Embankment Wall, including the unreinforced concrete leveling pad.
5. The furnishing, placing and compacting of pervious structure backfill within the maximum payment lines.
6. The furnishing and placing of backfill drainage systems for the wall.
7. Any other work and materials shown on the plans for the construction of the wall.

The price shall also include all materials, equipment, tools and labor incidental thereto.

If bedrock or large boulders (greater than one cubic yard) are encountered in the excavation, the payment for its removal will be made under the item "Structure Excavation - Rock".

ITEM #0602903A – DRILLING HOLES

DESCRIPTION: This work shall consist of core drilling through a concrete bridge parapet, wingwall or retaining wall at the locations as shown on the plans, and in accordance with this specification. The drilled hole shall be used to allow the passage of rigid electrical conduit nipple with weather-head into an existing junction box.

MATERIALS: Mortar shall conform to the requirements of Article M.11.04.

Silicone sealant shall be 100% clear silicone rated for outdoor use.

Rigid metal conduit shall be 2" and shall conform to the requirements of Article M.15.09-1. Weather-head shall accept 3 No. 2 conductors and ground wire.

CONSTRUCTION METHODS: The Contractor shall core drill through a concrete bridge parapet, wingwall, or retaining wall at the locations as shown on the plans. The drilled hole shall have a diameter no larger than the minimum diameter required to accept a 2" rigid metal conduit nipple. The Contractor shall avoid damaging existing reinforcing bars when drilling through the structure wall. The location of the existing re-bar shall be determined using a re-bar locator. Where a hole is drilled into the back of an existing junction box, the hole shall be cleaned, and all loose dust removed prior to installation of the conduit. Once the conduit has been inserted through the drilled hole, the Contractor shall seal around the conduit using a silicone type sealant rated for outdoor use. Conduit shall be secured to the junction box using lock-nuts and shall be terminated with an insulated bonding bushing. A weather-head shall be connected to the outside threaded end of the conduit nipple.

The drilling method used shall not cause spalling or other damage to the concrete. Concrete spalled or otherwise damaged by the Contractor's operations shall be repaired with mortar and finished flush to match the existing outside face of the structure wall.

Conduit will be paid for under a separate bid item.

METHOD OF MEASUREMENT: This work will be measured for payment by the actual number of holes drilled, complete and accepted.

BASIS OF PAYMENT: This work shall be paid for at the contract unit price each for "Drilling Holes" of the diameter and depth required, complete and accepted in place, which price shall include locating re-bar, drilling, RMC conduit nipple, weather-head, sealing around conduit, mortar, and all material, tools, equipment, labor, and work incidental thereto.

Pay Item
Drilling Holes

Pay Unit
EA.

ITEM #0603729A - LOCALIZED PAINT REMOVAL AND FIELD PAINTING OF EXISTING STEEL

Description: Work under this item shall consist of paint removal and field painting of the existing steel at designated areas. The work shall include containments, paint removal, collection of paint and associated debris, surface preparation and field painting. Designated areas include: areas specifically designated on the plans and those areas where construction activities require the removal of the existing coatings to accomplish other Contract work (such as, but not limited to, arc gouging or welding). The paint removal is required because of the possible presence of hazardous paint containing lead or other hazardous metals. The paint removal is required to comply with OSHA and DEEP regulations.

Privately-owned utilities, bridge rails, stay-in-place forms, fences, elastomeric bearing pads and bronze components shall be protected from damage by surface preparation and painting operations and are not to be painted.

Submittals: A minimum of 20 calendar days before starting any paint removal, surface preparation and coating application work, the painting Contractor shall submit the following to the Engineer for acceptance:

1. A copy of the firm's written Quality Control Program used to control the quality of surface preparation and coating application including, but not limited to, ambient conditions, surface cleanliness and profile, coating mixing, dry film thickness and final film continuity.
2. A copy of the firm's written surface preparation and application procedures. This written program must contain a description of the equipment that will be used for surface preparation, including the remediation of soluble salts, and for paint mixing and application. Coating repair procedures shall be included.
3. A detailed description of the Contractor's enforcement procedures and the authority of personnel.
4. Containment plans (paint removal/collection of debris, surface preparation, coating applications, coating applications with heat, etc.).
5. If the application of heat is proposed for coating application purposes, provide information on the heat containment and procedures that will be used, with data sheets for the equipment.
Note: If heat is used for coating operations, the heat and containment must be maintained to provide the required temperatures for the duration of the **cure** period.
6. Proof of SSPC-QP1 qualifications, CAS-certification(s) and QP2 qualifications, as applicable.
7. Coating product information, including coating manufacturer, product name, application instructions, technical data, MSDS and color chips.

The Contractor shall not begin any paint removal work until the Engineer has accepted the submittals. The Contractor shall not construe Engineer acceptance of the submittals to imply approval of any particular method or sequence for conducting the Work, or for addressing health and safety concerns. Acceptance of the programs does not relieve the Contractor from the responsibility to conduct the work in strict accordance with the requirements of Federal, State, or

local regulations, this specification, or to adequately protect the health and safety of all workers involved in the Project and any members of the public who may be affected by the Project. The Contractor remains solely responsible for the adequacy and completeness of the programs and work practices, and adherence to them.

Materials: The paint shall be one of the following **2-coat systems**:

Carbomastic 15	
Carbothane 133 LV, manufactured by:	Carboline 2150 Schuetz Road St. Louis, MO 63146 (800) 848-4645

Epoxy Mastic Aluminum II	
HS Poly 250, manufactured by:	Sherwin Williams 425 Benton Street Stratford, CT 06615 (203) 377-1711 (800) 474-3794

Carbomastic 90	
Carbothane 133 LV, manufactured by:	Carboline 2150 Schuetz Road St. Louis, MO 63146 (800) 848-4645

All materials for the complete coating system shall be furnished by the same coating material manufacturer with no subcontracted manufacturing allowed. Intermixing of materials within and between coating systems will not be permitted. Thinning of paint shall conform to the manufacturer's written recommendations. The coating thickness shall be in accordance with the Manufacturer's printed instructions. All components of the coating system and the mixed paint shall comply with the Volatile Organic Compounds (VOC) Content Limits and Emission Standards stated in the Connecticut Department of Energy and Environmental Protection's Administration Regulation for the Abatement of Air Pollution, Sections 22a-174-41 through 41a and 22a-174-20(s), respectively.

Control of Materials: A Materials Certificate will be required for the selected paint system in accordance with Article 1.06.07, confirming the conformance of the paint to the requirements set forth in these specifications. The selected Topcoat shall conform (as close as possible) in color to the existing topcoat.

Note: If any of the above and/or following stipulated Contract specifications differ from those of the manufacturer's recommended procedures or ranges, the more restrictive of the requirements shall be adhered to unless directed by the Engineer in writing.

Construction Methods:

Contractor - Subcontractor Qualifications: Contractors and subcontractors doing this work are required to be certified by the SSPC Painting Contractor Certification Program (PCCP) to QP 1 entitled “Standard Procedure for Evaluating Qualifications of Painting Contractors (“Field Application to Complex Structures”). When the work involves the disturbance of lead-containing paint, the Contractor and subcontractor are also required to be certified to SSPC-QP 2 “Standard Procedure for Evaluating the Qualifications of Painting Contractors to Remove Hazardous Paint.” The certification(s) must be kept current for the duration of the work. If a Contractor’s or subcontractor’s certification expires, the firm will not be allowed to do any work related to this item until the certification is reissued. Requests for extension of time for delay to the completion of the Project due to an inactive certification will not be considered and liquidated damages will apply. In addition, if any recoat times are exceeded, the affected areas shall be cleaned to SSPC-SP 15 and coatings reapplied in accordance with these specifications at no additional cost to the State.

Contractors and subcontractors are required to have at least one (1) **Coating Application Specialist (CAS) (SSPC ACS/NACE No. 13)**-certified (Level II-Interim Status-Minimal) craft-worker. CAS-certified (Level II-Interim Status-Minimal) craft-worker(s) are required for all crews/craft-workers up to four (4) crew members. For each crew larger than four (4), an additional CAS-certified (Level II-Interim Status-Minimal) craft-worker shall be present on each surface preparation/painting crew during surface preparation cleaning/removal and spray application (Atmospheric and Immersion Service) operations. A crew-member is a person who is on the job performing hand/power tool cleaning and/or spray application of protective coatings on a steel structure. The certification(s) must be kept current for the duration of the Project work. If a Contractor’s, subcontractor’s or any craft-worker’s certification expires, the firm will not be allowed to do any work on this item until the certification is reissued.

All Contractor activities associated with the work described and specified herein shall be conducted in accordance with all applicable Federal, State of Connecticut and local safety regulations and guidelines.

Quality Control Inspections: The Contractor shall perform first line, in process Quality Control (QC) inspections. The Contractor shall implement a Quality Control Program accepted by the Engineer, including written daily reports, that ensures that the work accomplished complies with these specifications. All Quality Control Reports must be reviewed and signed by either a NACE Coating Inspector Level 2 - Certified (must have completed sessions I, II and III) or SSPC – BCI Level I Inspector (Minimum qualifications). Copies of these reports shall be provided daily to the Engineer. Contractor QC inspections shall include, but not be limited to the following:

- Suitability of protective coverings and containments
- Ambient conditions
- Surface preparation (solvent cleaning or hand/power tool cleaning)
- Coating application (mixing, thinning, and wet/dry film thickness)

- Recoat times and cleanliness between coats
- Coating continuity (freedom from runs, sags, pinholes, shadow-through, skips, misses, etc.)
- Final film acceptance

Limits of Paint Removal and Field Painting: Prior to applying the heat of welding equipment to localized areas of existing steel superstructures, the existing paint shall be removed to a width of 6 inches from wherever the heat will be applied, or as directed by the Engineer. The locations of the paint removal and field painting shall be reviewed and accepted by the Engineer prior to commencement of the work. Such acceptance by the Engineer does not relieve the Contractor of his responsibility for complying with applicable OSHA and DEEP regulations.

Containment for Paint Removal and Collection of Debris: The containment(s) shall be designed and erected to contain, as well as facilitate the collection of debris from the paint removal operations. Drawings and details of the containment(s) shall be submitted to the Engineer for review and comments prior to any paint removal. Review of the containment by the Engineer shall in no way relieve the Contractor of his responsibility for the containment. The containment shall conform to the requirements found within the SSPC Guide 6. The class of the containment shall be a minimum of Class 3P, modified to include the following:

- A. The containment materials shall be air and water impenetrable and fire resistant.
- B. With the exception of the entryways, all seams in the containment enclosure shall be lapped a minimum of 24 inches and shall be tied off at intervals not to exceed 18 inches.
- C. All attachments to bridge parapets or the underside of the bridge deck shall be sealed to prevent the escape of dust and debris.

The above specified containment must be used for **all** paint removal and collection of debris operations. The containment must remain in place until all associated debris has been collected.

Storage and Disposal of Collected Debris: All of the debris resulting from the paint removal operations shall be contained and collected. Debris within containment enclosures shall be removed by HEPA vacuum collection prior to disassembly of the enclosures. All the debris, rust and paint chips shall be stored in leak-proof storage containers at the Project site. Debris storage shall be in accordance with Connecticut Hazardous Waste Management Regulations. The storage containers and storage locations shall be reviewed by the Engineer and shall be located in areas not subject to ponding. Storage containers shall be placed on pallets and closed and covered with tarps at all times except during placement, sampling, and disposal of the debris.

Prior to generation of any hazardous waste, the Contractor shall notify the Engineer of its selected hazardous waste transporter and disposal facility. The Contractor must submit to the Engineer: (1) the transporter's current U.S DOT Certificate of Registration and (2) the transporter's current Hazardous Waste Transporter Permits for the State of Connecticut, the hazardous waste destination state and any other applicable states. The Engineer will then obtain an EPA ID number that will be forwarded to the Contractor. Any changes in transporter or facility shall be immediately forwarded to the Engineer for review.

The Contractor shall conform to the latest requirements of the Hazardous Waste Management Regulations prepared by the DEEP's Hazardous Waste Management Section, subject to regulations of Section 22a-449(c) of the Connecticut General Statutes.

Disposal of the debris shall be in strict conformance with all Federal E.P.A. and DEEP regulations for hazardous materials.

All necessary forms, including the "Uniform Hazardous Waste Manifest" obtained from the Hazardous Waste Management Section of DEEP, must be filled out, approved and signed by the Department's Project Engineer (Construction), and appropriate copies returned to the Department's Division of Environmental Compliance.

A licensed hazardous waste transporter and a licensed hazardous waste treatment/disposal facility must be secured from lists available from the DEEP and approved by the Department's Division of Environmental Compliance.

The Contractor is liable for any fines, costs, or remediation costs incurred as a result of their failure to be in compliance with this special provision and all Federal, State and Local laws.

Paint Removal/Surface Preparation: The existing structural steel shall be power tool cleaned according to SSPC-SP 15 "Commercial Grade Power Tool Cleaning." The power tools (needle guns, grinders, etc.) shall be equipped with HEPA vacuum attachments. Before the power tool cleaning, all dissolvable foreign matter, such as oil, grease, and dust shall be removed by wiping or scrubbing the surface with rags or brushes wetted with solvent in accordance with the provisions of SSPC-SP 1 "Solvent Cleaning." Clean solvent and clean rags or brushes shall be used for the final wiping. The cleaned surface shall be accepted by the Engineer. If the surface is determined to meet the requirements of SSPC-SP 15, painting operations can commence.

Note: Chemical stripping and abrasive blast cleaning will not be permitted.

Existing Steel Surfaces to be Painted: After the designated areas have been inspected and accepted according to the surface preparation specification, SSPC SP 15, the steel surfaces which are to receive the field touch-up paint shall be cleaned immediately prior to coating operations by wiping or scrubbing the surface with rags or brushes wetted with solvent. Use clean solvent and clean rags for the final wiping.

- Solvent must be compatible with the specified coatings. Solvent cleaned surfaces shall be primed before any detrimental recontamination or corrosion occurs. Follow manufacturer's safety recommendations when using any solvent.
- All foreign materials such as dirt, dust, loose rust scale, sand, bird droppings, and all materials loosened or deposited on the steel surface by cleaning operations shall also be completely removed by vacuuming before any painting operations commence.
- Failure by the Contractor to properly prepare and clean surfaces to be painted in accordance with the specifications shall be cause for rejection by the Engineer. All surfaces that are rejected

shall be cleaned and painted to the satisfaction of the Engineer in accordance with the specifications, at no additional cost to the State.

Application of Field Paint: The method for coating application shall be by brush and roller equipment. The containment for paint application shall consist of drop cloths and a solid platform bottom.

Storage, opening, mixing, thinning and application of the paint shall be accomplished in strict accordance with the specified Contract requirements and procedures published by the paint manufacturer and supplier. The Contractor shall have at the Project site, at all times, the current copies of all technical data, recommendations and procedures published by the paint manufacturer. All coatings shall be supplied in sealed containers bearing the manufacturers name, product designation, batch number and mixing/thinning instructions. Leaking containers shall not be used. Paint shall be furnished in the manufacturer's original sealed and undamaged containers. For multiple component paints, only complete kits shall be mixed and used. Partial mixing is not allowed. The paint shall be applied to produce a uniform smooth coat without runs, streaks sags, wrinkles, or other defects.

The Contractor shall provide a suitable facility for the storage of paint, which is in accordance with the latest Federal and State regulations. This facility must provide protection from the elements and insure that the paint is not subjected to temperatures outside the manufacturer's recommended extremes. Storage for paint must be located in reasonable proximity to the painting locations. The Engineer shall be provided access to the stored paint at any time, for inspection and to witness removal of the materials. The Contractor's facility for the storage of paint is subject to the approval of the Engineer.

Ambient Conditions: Solvent cleaning just prior to coating application or coating application work shall be performed when the conditions are as follows:

- The relative humidity is at or below 80% and when there is no falling rain or dew present, or anticipated, before a prepared surface can be coated.
- The substrate is not damp or covered by frost or ice.
- The surface temperature and air temperature are between 50°F and 100°F.
- The surface temperatures of the steel and air are more than 5°F above the dew point temperature, as determined by a surface temperature thermometer and electric or sling psychrometer.

If the requirements of the coating manufacturer differ from the ranges provided above, comply with the most restrictive requirements unless directed otherwise by the Engineer in writing.

The Contractor is liable for any fines, costs, or remediation costs incurred as a result of his failure to be in compliance with this special provision and all federal, state, and local laws.

Method of Measurement: This work will be measured by the actual square foot of existing steel at designated areas where paint was removed, surfaces cleaned, re-painted and accepted. **Note:** In some instances when **new steel** is being added to the designated areas where the paint was removed,

the removal area may not equal the area to be re-painted. Measurement in these cases will be by the actual square foot of existing steel where the paint was removed and accepted.

Basis of Payment: This work will be paid for at the Contract unit price per square foot for "Localized Paint Removal and Field Painting of Existing Steel," complete in place, which price shall include all materials, containments, collection and disposal of non-hazardous debris, containers, equipment, tools, labor, heating devices, services of the technical advisor and for any incidental work. No direct payment will be made for the cost of storage or hauling the paint and other materials, including paint chips and associated debris, to and/or from the bridge site, but the cost thereof shall be included in the Contract unit price.

Pay Item	Pay Unit
Localized Paint Removal and Field Painting of Existing Steel	s.f.

ITEM # 0653002A – CLEAN DRAINAGE SYSTEM

Section 6.53 of the Standard Specifications is supplemented and amended as follows:

6.53.01 – Description:

Add the following:

Also included under this item is the cleaning of existing bridge scuppers as called for on the plans and as directed by the Engineer.

6.53.04 – Method of Measurement:

Delete the entire Article and replace with the following:

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

6.53.05 – Basis of Payment:

Delete the entire Article and replace with the following:

This work will be paid for at the contract lump sum price for “Clean Drainage System” which price shall include cleaning existing culverts, manholes, catch basins, drop inlets and bridge scuppers as indicated on the plans, and all equipment, tools, and labor incidental to the completion of this task. All costs incidental to the disposal of sludge, dirt, sand, gravel, roots, grease, and other debris will be included in the price above.

<u>Pay Item</u>	<u>Pay Unit</u>
Clean Drainage System	LS

ITEM #0707001A – MEMBRANE WATERPROOFING (WOVEN GLASS FABRIC)

Description: Work under this item shall consist of furnishing and applying a waterproof membrane system to the surface of concrete decks, curbs, and buried structures, as shown on the plans and in accordance with the Manufacturer's recommendations.

Materials: Materials for this work shall be as follows:

Primer shall meet the requirements of ASTM D41.

Liquid asphalt shall meet the requirements of ASTM D449, Type III for above ground, and Type I for below ground.

Woven glass fabric shall be saturated with asphalt and shall meet the requirements of ASTM D1668, Type I.

Construction Methods: Prior to application of the primer, the concrete surfaces shall be prepared so that any projections or holes are rounded and are less than 1/4 inch in height or 1/2 inch in depth. Any nonconforming hole or projection shall be repaired prior to installation, to the satisfaction of the Engineer.

No materials shall be installed on a wet surface, in wet weather, or when the air or surface temperature is below 35°F without written authorization from the Engineer.

After the concrete surface is deemed acceptable by the Engineer, the surface shall be thoroughly cleaned of loose or foreign substances by blowing the area with clean, oil-free compressed air.

Primer shall be applied for a minimum distance of 2 inches up the face of the curb and onto a deck surface. The primer shall be applied with a sprayer, roller or squeegee without allowing the primer to pond. The primer shall be applied per the Manufacturer's recommendations. The primer shall be cured prior to being overlaid or disturbed.

Liquid asphalt shall be contained in double jacketed melters or tanker. Liquid asphalt shall be heated to produce a liquid asphalt that is lump free and free flowing at a temperature recommended by the Manufacturer, but not to exceed 400°F in a melter and 450°F in a tanker. If the Manufacturer recommends a higher delivery temperature, a request may be submitted with a Certified Test Report including the flash point of the material. Melters and tankers shall be equipped with thermometers. Melters shall be equipped with an agitator.

Liquid asphalt shall be applied over the areas on the concrete surfaces previously coated with the primer. The woven glass fabric shall extend a minimum of 2 inches up the face of the curb with the remaining width extending onto the deck, or as shown on the plans. Press the fabric into place to eliminate all air bubbles and to bond the fabric to the base coat of liquid asphalt while the asphalt

is still in liquid form. The strip of fabric must be firmly and uniformly pressed against the curb. Liquid asphalt must be applied over the strip of fabric to ensure a watertight joint along the curb line.

Each subsequent strip of full width fabric shall be “shingled” into a base coat of liquid asphalt so that there will be 2 layers of fabric at all points with longitudinal laps not less than 2 inches wide. All end laps shall be at least 12 inches. If so ordered by the Engineer, additional strips of woven glass fabric shall be placed over any other areas of the concrete surface that require special protection.

Liquid asphalt must be applied to the top of any fabric and allowed to saturate the entire fabric area. The top coat of liquid asphalt shall be of sufficient thickness to completely conceal the fabric weave to the satisfaction of the Engineer. All laps must be thoroughly sealed down.

Liquid asphalt must not flow into deck joints, weepholes or drainage structures.

The entire waterproofing membrane shall be free of wrinkles, air bubbles, or other defects. In the event bubbles or blisters form under the membrane, they shall be addressed to the satisfaction of the Engineer.

All damage or areas of poor installation shall be repaired with a patch. Patches, made of layers of hot liquid asphalt and fabric, shall extend at least 12 inches beyond the area to be repaired. A second patch shall extend over the first by at least 3 inches beyond the first on all sides.

Vehicular or pedestrian traffic shall not be allowed on the finished membrane waterproofing. The Contractor shall take every precaution necessary to prevent damage to the finished membrane. The Contractor shall repair, at its expense, any damage, to the satisfaction of the Engineer.

At least one course of hot mix asphalt overlay shall be placed as soon as practical in order to prevent damage to the installed membrane. In no case shall the membrane be left unprotected for a time period exceeding the recommendations of the membrane Manufacturer.

Method of Measurement: This work will be measured for payment by the actual number of square yards of waterproofed surface completed and accepted by the Engineer.

Basis of Payment: This work will be paid at the Contract unit price per square yard for “Membrane Waterproofing (Woven Glass Fabric)” which price shall include furnishing all materials, equipment, tools, labor and incidentals necessary to complete the work.

Pay Item	Pay Unit
Membrane Waterproofing (Woven Glass Fabric)	s.y.

ITEM #0751713A – 12” UNDERDRAIN

Section 7.51 is deleted entirely and replaced with the following:

7.51.01 – Description: Underdrains shall consist of pervious pipe laid in a trench filled with pervious material. Underdrain are to connect to existing and or proposed closed drainage systems.

7.51.02 – Materials:

1. **Pipe:** The pipe of underdrains shall be Perforated High Density Polyethylene (HDPE) Pipe with a smooth interior. Perforated HDPE Pipe shall conform with AASHTO Designation M 294 Type SP with Class 1 perforations.
2. **Aggregate:** Aggregate used for backfilling the trench shall meet the gradation requirements of M.01.02 for No. 3 Stone.
3. **Geotextile:** Geotextile filter fabric shall meet the requirements of M.08.01-19.
4. **Bedding Material:** Bedding Material shall meet the requirements of M.08.03-1.

7.51.03 – Construction Methods: The trench for the underdrain shall be excavated in accordance with the requirements of 2.86.03. The dimensions of the trench shall be as indicated on the plans or as ordered. Where the bottom of the trench is unstable or in rock, the trench shall be excavated 6 inches deeper and an additional 6 inches of bedding material shall be placed in the trench.

Underdrain pipe installation shall be in accordance with 6.86.03, as recommended by the pipe manufacturer, and as specified herein.

The pipe shall be wrapped in geotextile fabric with the seams lapped and welded or bonded. Where the seams of the geotextile are not welded or bonded, they shall be lapped to a minimum width equal to the diameter of the pipe.

The trench shall be lined with geotextile fabric prior to pipe installation and backfilling and installed in accordance with 7.55.03.

The pipe shall be installed with the perforations facing upward. After the pipe has been installed, the aggregate shall be placed carefully around and over the pipe to a height of 12 inches above the top of pipe. The remainder of the trench shall be filled with aggregate and tamped in layers as shown on the plans.

Where shown on the plans or directed by the engineer, the Contractor shall connect underdrains or outlets to existing or proposed drainage systems or structures. Where the upgrade end of the underdrain does not enter a structure, it shall be capped or plugged as directed.

7.51.04 – Method of Measurement: This work will be measured for payment by the actual number of linear feet of underdrains completed, accepted, and measured in place. Trench

excavation will not be measured for payment. Rock in drainage trench will be measured for payment in accordance with 2.86.04.

7.51.05 – Basis of Payment: This work will be paid for at the Contract unit price per linear foot for “Underdrain” complete in place, which price shall include pipe of the size and type specified, elbows, tees, wyes, couplings, fittings, trench excavation, geotextile, aggregate, bedding material, material and labor incidental thereto.

There will be no direct payment made for capping, plugging, or connecting underdrains to existing or proposed drainage systems or structures, but the cost thereof shall be included in the cost of the underdrain items involved.

Rock in drainage trench will be paid for in accordance with 2.86.05 at the Contract unit price per cubic yard for “Rock in Drainage Trench Excavation” of the applying depth.

Pay Item

Pay Unit

12” Underdrain

L.F.

ITEM #0755040A - GEOCELL FOR ACCESS ROADS

Description: Work under this item shall consist of furnishing, installing, and maintaining (during construction) geocell for temporary access roads in the locations and to the dimensions as shown on the Plans or as directed by the Engineer.

Materials:

1. Geocell: Geocells shall be made of perforated High Density Polyethylene (HDPE) and shall have a nominal opening of 11-inches x 11-inches when expanded and a minimum height of 6-inches.

PROPERTY	TEST METHOD	CRITERIA
Geometric Properties		
Nominal Thickness Prior to Texture	ASTM D5199	50 Mil (-5% +10%)
Design Properties		
Density of Plastics	ASTM D1505/D792	58.4 to 60.2 lbs./ft ³
Seam Strength and Its Efficiency	GRI GS13	100%
Quality Control and Quality Assurance		
Environmental Stress Cracking	ASTM D1693 (for ethylene plastic)	>5000 hrs.
Environmental Stress Crack Resistance	ASTM D5397 (for HDPE and PP)	>300 hrs.
Seam Peel Strength	USACE GL-86-19 (Appendix A)	Min. 480 lbs.
Seam Hang Strength	USACE GL-86-19 (Appendix A)	Seam Hang Strength – A 4.0 in. weld joint supporting a load of 160 lbs. for 30 days minimum or a 4.0 in. weld joint supporting a load of 160 lbs. for 7 days minimum while undergoing temperature change from 74° F to 130° F on a 1-hour cycle.
Environmental Durability		
Carbon Black Content	ASTM D1603	1.5% - 2% by weight

2. Geotextile – (Separation-Class 1) shall meet the requirements of Article 7.55.03 and M.08.01-19 as shown on the Plans.
3. Infill for the Geocell and Overfill material: Crushed Stone shall meet the requirements of Article M.01.02 gradation Nos. 3, 4, 6 and 67 or a blend thereof. If a blended gradation is chosen, the Contractor shall submit the gradation for the Engineer's acceptance. When tested

for gradation, only the largest sieve, nominal maximum aggregate sieve, and the smallest sieve will be tested. Specifically, the maximum stone size is limited to 2-inches and the minimum stone size is limited to 0.18-inches (Sieve No. 4) regardless of selected infill.

4. Anchors/Rebar: Anchors shall be used to hold the expanded geocell sections in a fully and uniformly extended position at the required opening dimension, paying careful attention to the slope angles indicated on the Plans, until infilling of the geocell sections is complete. Spacing of anchors shall meet the manufacturer's recommendations. Length of anchors shall be three times the height of the geocell but not less than 18-inches and shall have a minimum 0.375 inch diameter. Stakes are not an acceptable alternative.
5. Mechanical Fasteners: Fasteners shall be utilized to fasten adjacent sections of the geocell to each other. Provide mechanical fasteners in accordance with the manufacturer's recommendations with the capability of holding adjacent geocell panels in direct contact with the finished surface.

Construction Methods: Install the geocells as shown on the plans, according to the manufacturer's instructions and as follows:

Submittals: The Contractor shall submit Working Drawings in accordance with Article 1.05.02 to the Engineer for review. The submittal shall include:

1. Layout on designed slope
2. Material Designations (Size, Spacing, material information/Catalog Cuts for all components)
3. Installation Procedure
4. Methods for placement
5. Gradation of infill
6. Connection of Geocell sections
7. The number of total anchors required, paying careful attention to the slope angles shown on Plans.
8. The size and locations of the anchors
9. Anchor installation, infilling and compaction
10. Geocell Manufacturer information including Technical Representative contact information.
11. Certified Test Reports and Materials Certificates

Technical Representative: The Contractor shall arrange for a technical representative from the manufacturer of the geocell to be on Site at the beginning of the operations in order to ensure results that meet the requirements of the Contract, to the satisfaction of the Engineer.

Geotextile Installation: Place geotextile on prepared base course and ensure a minimum 12-inch overlap between adjacent layers. Extend the geotextile a minimum of 6-inches beyond the proposed limits of the geocell.

Geocell Installation: Store and transport the geocell sections per the manufacturer's recommendations and in an unexpanded configuration until the sections are ready to be installed. The geocell sections shall be set to final grade to produce a smooth and uniform surface for construction vehicles to traverse. The top surface of adjacent geocell sections shall be flush at all locations.

Position the collapsed geocell section in place and expand the geocell so that the desired cell opening is achieved. Install the anchors as required by the manufacturer. Install additional anchors as needed to secure the expanded geocell, in order to achieve the required opening dimensions, and to keep the geocell in place until the sections are infilled.

In situations where it is not practical to use anchors (i.e. over soft soil, soils containing obstructions, existing shallow utilities, etc.) an installation frame shall be required to allow for the expansion of the geocells without anchoring in place. The installation frame must be capable of fully expanding the geocells to achieve the required opening dimensions, and must also hold them in place until the infill material is placed.

Align adjoining geocell sections and overlap abutting perimeter cell welded ends. Keep top of the geocell sections flush before fastening. Connect adjacent geocell sections with mechanical fasteners, in accordance with the manufacturer's recommendations. Mechanical fasteners must be capable of holding adjacent geocell panels in direct contact until infill material is placed and compacted. Fasten all adjoining cells of adjacent geocell sections and all overlapped abutting perimeter cell welded ends.

Once the geocell is secured, place the infill material within the expanded geocell sections. Overfill the geocells a minimum of 2 inches, to allow for compaction and to ensure the top of the compacted infill material is a minimum of 1 inch above the top of the geocell, and to protect the geocell from damage due to construction activities. Limit the drop height of the Infill material to a maximum height of 3 feet, to prevent damaging or displacing the cell wall. Compact infill material to uniform grade. Do not operate equipment on unfilled or partially-filled geocell sections, until sections have been overfilled with loose infill material. Compaction shall be done in a manner that prevents damage to the geocell but thoroughly densifies the infill material with sufficient energy to ensure that further densification during the life of the access road is minimized and the hoop stresses in the geocell walls are engaged. Sheepsfoot roller shall not be used to compact the infill material. The edges must be protected, e.g. with toe trenches, to prevent loss of fill due to erosion and undermining.

Quality Control/Quality Assurance: The Contractor is to verify material properties per Section 1.06, including Materials Certificates and Certified Test Reports. The Contractor is to verify proper placement of Geotextile prior to geocell placement. The Contractor is to confirm proper installation of geocell sections including proper expansion and connection of the geocell sections

using anchors and mechanical fasteners prior to infill placement. The Contractor is to verify proper placement and compaction of the infill material and all other aspects of the Geocell for Access Roads.

Method of Measurement: This work will be measured for payment by the actual number of square yards of geocell installed and accepted by the Engineer. The area will be measured directly along the top of the surface of the geocell, prior to placement of the infill material.

Basis of Payment: This work will be paid for at the Contract unit price per square yard for "Geocell for Access Road," complete in place. The price shall include all necessary materials including the geocell, infill material, anchors and mechanical fasteners, compaction, and shall include all labor, materials and equipment incidental thereto. All costs associated with providing the technical representative shall also be included under this item. Formation of Subgrade, Geotextile (Separation-Class 1), and Processed Aggregate Base will be paid separately.

Pay Item	Pay Unit
Geocell for Access Roads	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 # 0913027A – REMOVE AND RELOCATE CHAIN LINK FENCE

Description:

This item shall include removing and relocating existing chain link fence, concrete base and gates where shown on the plans and as directed by the engineer.

Materials:

The existing fence shall be removed, and the materials shall be the components salvaged from the existing chain link fence. Any fence deemed to require replacement shall meet the requirements of M.10.05 and shall be paid for under Item No. 0913021 – 6' Chain Link Fence.

CONCRETE – Shall conform to Section M.03

SUBBASE – Shall conform to Section M.02.02

Construction Methods:

The Contractor shall carefully dismantle and remove, and re-install the existing fence, incorporating new material as required, in the location shown on the plans or as directed by the Engineer.

In the event that the chain link fence is destroyed during construction, the chain link fence shall be replaced by the Contractor at his expense.

Method of Measurement:

This work will be measured for payment by the number of linear feet of completed and accepted salvaged fencing, including gates, measured from outside to outside of terminal posts.

Basis of Payment:

This work will be paid for at the Contract unit price per linear foot for “Remove and Relocate Chain Link Fence” complete in place, which price shall include all materials, equipment, tools, excavation, backfill, concrete, grout, disposal of surplus material, and labor incidental thereto.

Pay Item

Pay Unit

Remove and Relocate Chain Link Fence

l.f.

ITEM #0913952A - PROTECTIVE FENCE (5' HIGH)

Description: Work under this item consists of furnishing and installing chain link fencing in accordance with the details shown on the plans and with these specifications.

Materials: Materials for this work shall be as follows:

1. **Chain Link Fabric:** The fabric shall be a black Poly(Vinyl Chloride) (PVC) - coated steel chain link type, conforming to the specifications of ASTM F668, Class 2b, thermally fused and bonded. The #9 gage core wire shall be galvanized, PVC-coated, then woven to create a continuous fabric having a two inch mesh, knuckled at both top and bottom. The PVC coating shall be the color black as described in ASTM F934.
2. **Posts and Rails:** The material used to manufacture framework for color chain link fencing systems shall be galvanized sheet steel, in coils, meeting the general requirements of ASTM A924 and the specific product requirements of ASTM A653, quality level HSLA (high strength, low alloy), Type I, Grade 50 (50,000 psi minimum yield strength), coating designation Z600 (2.0 oz./ft²) applied by the hot-dip process. The framework shall be manufactured in accordance with commercial standards to meet the requirements of ASTM F1043, Group IC, electrical resistance welded round steel pipe. All burrs and sharp edges shall be removed and smoothed before galvanizing.
3. The manufactured framework shall be subjected to a complete thermal stratification coating process (multi-stage, high temperature, multi-layer) including a pretreatment wash with zinc phosphate, an electrostatic spray application of an epoxy base, and a separate electrostatic spray application of a polyester finish. The color of the finish coat shall be black.
4. The material used for the base coat shall be a zinc-rich thermosetting epoxy. The minimum thickness of the base coat shall be 2 mils. The material used for the finish coat shall be a thermosetting “no mar” TriGlycidyl IsoCyanurate (TGIC) polyester powder. The minimum thickness of the finish coat shall be 2-3 mils.
5. The coated framework shall demonstrate the ability to endure a salt spray resistance test conducted in accordance with ASTM B117 without loss of adhesion for a minimum exposure time of 3,500 hours. Additionally, the coated framework shall demonstrate the ability to withstand exposure in a weatherometer apparatus for 1,000 hours without failure in accordance with Practice D1499 and to show satisfactory adhesion when subjected to the cross-hatch test in accordance with ASTM D3359. The polyester finish coat shall not fade, crack, blister or split under normal use.
6. **Fence Fittings:** All materials and coating requirements shall conform to the specifications of ASTM F626. All fittings shall receive the same coating system as the posts and rails. The ties used to fasten the fabric to the post and rails shall not be less than #6 and #9 gage respectively.

7. **Galvanizing Compound:** Galvanizing compound shall conform to the requirements of Federal Specification TT-P-641b or Military Specification MIL-P-21035.
8. **Non-shrink Grout:** Grout used to anchor fence posts in preformed holes shall be non-shrink and non-staining and shall conform to the requirements of Subarticle M.03.01-12.
9. **Silicone Joint Seal:** Joint seal placed around the base of the posts to seal the interface between the post and the non-shrink grout shall conform to the requirements of the special provision "Section 6.01 - Concrete for Structures."

All components of the chain link fence shall be the color black as described in ASTM F934. Coating which exhibits peeling or chipping will be cause for rejection of the shipment.

Materials Certification and Testing: The Contractor shall furnish a Materials Certificate in accordance with Article 1.06.07 for the fabric, posts, rails, all fittings and for the chemical anchoring material. A sample of PVC-coated fabric shall be submitted to the Department for testing the bond of the coating in accordance with the requirements of ASTM F668, Class 2b.

Shop Drawings: Before fabricating any materials, the Contractor shall submit shop drawings to the Engineer for approval in accordance with Article 1.05.02. These drawings shall include but not be limited to the following information: a layout plan showing all post and rail spacing, all fence and anchorage details, material lists and material designations and the name and telephone number of a person to contact who can answer questions about the shop drawings.

Construction Methods: The protective fence shall be accurately fabricated and installed in accordance with the plans and as directed by the Engineer.

Posts shall be centered in the preformed holes in the concrete and held plumb. Non-shrink grout shall then be placed in the annular space around the post, overfilling the hole to build the grout up above the surrounding concrete so water drains away from the post.

After the grout has completely set, place silicone joint sealant around the base of the post against the non-shrink grout to seal against moisture intrusion around the post.

All rails shall be erected to produce a smooth, continuous appearance with posts placed vertically and with all rails parallel to the grade of the parapets. The fabric shall be stretched tightly between end posts and securely fastened with stretcher bar bands. The fabric shall be attached to the rails and line posts as shown on the plans. Dome caps shall be installed on top of all posts.

Coated fabric, fence posts, rails and fittings shall be handled with care so the coating is not damaged. Damage to the galvanized coating below the finish coating shall be repaired in accordance with ASTM A780 with two coats of galvanizing compound before repairing the

finish coat. The final dry film thickness of the galvanizing compound shall be a minimum of 2 to 3 mils. Damage to coating shall be repaired as directed by the manufacturer.

Method of Measurement: This work will be measured for payment by the number of linear feet of completed and accepted fence, measured horizontally from centerline to centerline of posts.

Basis of Payment: This work will be paid for at the contract unit price per linear foot for “Protective Fence (5’ High)”, complete and accepted in place, which price includes all materials, equipment, tools and work incidental thereto.

ITEM #0947303A – BUS PASSENGER SHELTER

Section 9.47 is deleted entirely and replaced by the following:

Description: This work shall consist of furnishing and installing bus passenger shelters and associated benches at the locations as shown on plans and as directed by the engineer.

Materials: The bus shelter and associated bench shall be manufactured by the following or an approved equal:

Miami Lakes
Columbia Equipment Co., Inc.
72 Albany Ave
Freeport, New York 11520
Phone: (516) 442-3340
Website: www.columbiaequipment.com

Construction Methods: Installation shall be completed in accordance with the manufacturer instructions and recommendations.

Method of Measurement: This work shall be measured for payment by the number of bus passenger shelters completely installed and accepted in place.

Basis of Payment: This work will be paid for at the Contract unit bid price each for “Bus Passenger Shelter”, which price shall include all materials, equipment, labor, tools, and work incidental thereto. Concrete slab required under the bus passenger shelter and accessible boarding area shall be paid for under “Concrete Sidewalk”.

<u>Pay Item</u>	<u>Pay Unit</u>
Bus Passenger Shelter	ea.

ITEM #0950021A – LOW GROW TURF MIX

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 Specifications. The following mix shall be used for this item:

Low Grow Turf 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 and/or varieties must be approved by the ConnDOT Landscape Design office.

<u>Proportion (Percent)</u>	<u>Species Common name</u>	<u>Scientific name</u>
30%	Slender Creeping Red Fescue See approved varieties*	Festuca rubra L. spp. trichophylla
30%	Strong Creeping Red Fescue See approved varieties*	Festuca rubra L. spp. rubra
35%	Hard Fescue See approved varieties*	Festuca brevipila
5%	White Clover	Trifolium repens

Approved Varieties:

Slender Creeping Red Fescue: SeaMist, Seabreeze GT, Dawson, Sprinkler, SeaLink

Strong Creeping Red Fescue: Xeric, Shademaster III, Jasper II, Garnet, Chantilly

Hard Fescue: Blueray, Predator, Firefly, Spartan II, Eureka II, Henry

Trifolium repens: Pipolina, Pirouette

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.

Maintenance Requirements: As part of this item, the Contractor shall mow all slopes 4:1 or less (flatter) and level turf established (seeded) areas to a height of 4 in (100 mm) when the grass

growth attains a height of 6 inches, once per year for the duration of the Contract or as directed by the Engineer. Additional mows to those included in the specification and as directed by the Engineer shall be paid for as extra work.

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 “Low Grow Turf Mix ” 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.

Pav Item

Pav Unit

Low Grow Turf Mix

s.y.

ITEM #0950040A - CONSERVATION SEEDING FOR SLOPES

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

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

Three qualified conservation seed mixtures are detailed below:

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

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

Mulch shall meet the requirements of Article M.13.05.

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

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

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

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

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

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

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

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

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

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

Mowing will not be allowed within areas that are seeded with conservation seed mix, unless authorized by the Engineer.

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

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

Pay Item	Pay Unit
Conservation Seeding for Slopes	s.y.

ITEM #0952001A – SELECTIVE CLEARING AND THINNING

Section 9.52 is amended as follows:

Article 9.52.03 – Construction Methods is supplemented as follows:

Traffic Signal Equipment:

Prior to scheduling support structure installation and at least 14 days in advance of clearing operations, stake out the limits of vegetation and tree clearing to facilitate installation of traffic signal equipment as described below.

Visibly mark or flag trees scheduled to be removed.

The Engineer will review the identified trees and verify the limits of clearing and thinning prior to the Contractor proceeding with the cutting operation.

For the following intersections, cut, trim, and/or remove trees/tree limbs/vegetation as indicated below and to account for future vegetation growth when applicable. This work shall be completed prior to turning on the new signal equipment.

<u>Int. No.</u>	<u>Location</u>	<u>Additional Information</u>
XXX-XXX	Waterbury – I-84 WB Exit 21 Off Ramp	Trim tree branches to provide line of sight to detection zones “Sign Activation Zone” and “Alert Notification Zone” as shown on WWS-02 from the applicable equipment. All trimming/clearing to occur within existing ROW.
151-236	Waterbury - S.R. 847 (Grand Street/Meadow Street) at Meadow Street, Freight Street, and Private Drive	Trim tree branches/vegetation to install span pole assembly 151-236-A on the southwest corner of (Grand Street/Meadow Street) at Meadow Street. All trimming/clearing to occur within existing ROW.

Extruded and Sheet Aluminum Signs:

Prior to scheduling sign installation and at least 14 days in advance of clearing operations, stake out the limits of vegetation and tree clearing to provide visibility to signs as described below.

Visibly mark or flag trees proposed to be removed. Contact the Engineer if an adjustment to sign location can prevent tree removal.

The Engineer will review the identified trees and verify the limits of clearing and thinning prior to the Contractor proceeding with the cutting operation.

At all extruded aluminum sign and sign support locations, cut, trim and/or remove vegetation/tree limbs needed for installation and to provide visibility to the sign(s) and to account for future vegetation growth. The entire sign plus a 10' buffer shall be visible for 800-ft measured from the center of the right-travel lane approaching the sign, as viewed from a 3.5-ft height above the roadway.

At all sheet aluminum sign locations, cut, trim and/or remove vegetation/tree limbs needed for installation and to provide visibility to the sign(s) and to account for future vegetation growth. The entire sign plus a 10' buffer shall be visible for 200-ft measured from the center of the right-travel lane approaching the sign, as viewed from a 3.5-ft height above the roadway.

This work shall be completed prior to installing the sign panel onto the vertical supports.

ITEM #0969030A - PROJECT COORDINATOR (MINIMUM BID)

Description: Under this item the Contractor shall furnish software, the services of an administrative employee as the Project Coordinator for this Project, and other deliverables, to coordinate and expedite all phases of the work required for the Project and to ensure that the construction schedule required by Article 1.05.08 (as modified herein) is submitted and maintained.

The minimum lump sum bid for this item shall be equal to 0.5% of the Contractor's total bid. Failure of the Contractor to bid at least the minimum amount will result in the Department adjusting the Contractor's bid to include the minimum bid amount for this item.

The Project Coordinator's resume shall be submitted for acceptance, in writing, within seven (7) calendar days of the award of the Contract, and shall not be changed without prior written notice to the Department.

The resume must demonstrate that the Project Coordinator is experienced and versatile in the preparation, interpretation and modification of Critical Path Method (CPM) construction schedules. This must include successful completion of at least three (3) construction projects of similar complexity, where they served in a lead scheduling capacity. If the Contractor does not have an employee that has these skills, they shall engage the services of a Consultant, subject to the approval of the Engineer, for the scheduling work required. If a Consultant is engaged, they shall be present at the first meeting, along with the Project Contractor, prepared to discuss, in detail, the methods and techniques they propose to use. Thereafter, the Project Coordinator or the Consultant responsible for updating the CPM Schedule shall attend all meetings between the Contractor, its Subcontractors, and any other meetings, which will affect the CPM schedule.

When the Contract is administered under Section 1.20 (Facilities Construction), the following requirement shall also apply:

The Project Coordinator's resume shall demonstrate, in addition to the above noted requirements, a minimum of eight (8) years' experience related to commercial/industrial building construction as a Project Coordinator, and shall have knowledge of all trades involved in the construction, including civil/site work, environmental work, concrete work, masonry work, steel work, carpentry, electrical work, and mechanical work. Other combinations of experience and education totaling ten (10) years in commercial building construction will be considered subject to the approval of the Engineer.

Computer Software: The Contractor shall provide the following software with all the required maintenance throughout the Contract. The Engineer reserves the right to expand or relax this specification to adapt to the software limitations and availability.

Software: The Contractor shall use latest version of the Oracle Primavera P6 scheduling software to produce the required schedules. The Contractor shall provide the Engineer

with a licensed copy registered in the Department's name of the same version of the Oracle Primavera P6 scheduling software, and maintain Oracle Primavera customer support services offered by the software producer for the duration of the Contract.

The Contractor shall deliver to the Engineer all supporting documentation for the software including any instruction manuals. The Contractor shall coordinate delivery of the software through the Department Project Engineer.

Construction Methods: The Project Coordinator shall attend all meetings between the Contractor and the Department, the Contractor and its Subcontractors, and any other meetings that affect the progress of the work. The Project Coordinator shall be knowledgeable of the status of all parts of the work throughout the duration of the Contract.

Submittals: In Article 1.05.08 (Schedules and Reports) references to Bar Chart schedules shall be replaced with the following:

Critical Path Method (CPM) Scheduling:

Proper relationship between all major activities shall be indicated. Node numbers shall be coded such that the major activities shown on the Critical Path Schedule shall be easily referenced to the Detailed Project Schedule when it is developed. Break down the work covered under each Special Provision, or Division and Section of Article 1.20 of the Standard Specifications, into individual activities required and logically group related activities together within the CPM.

All documents which require review by the Department shall be clearly identified within the schedule. The Department and any outside agency shall be allocated a minimum number of calendar days for review in accordance with Article 1.20-1.05.02. If Article 1.20 does not apply, the Department shall be allocated a minimum of thirty (30) calendar days (exclusive of weekends and holidays) for review and comment on each submittal. Any submittals requiring review by an outside Agency (DEEP, Coast Guard, Army Corps of Engineers, etc.) shall be allocated a minimum of sixty (60) calendar days. The Department shall not be held responsible for any delay associated with any substitution or other revisions proposed by the Contractor that are subject to review.

The schedule shall indicate the logic of the work for the major elements and components of work under the Contract, such as the planned mobilization of plant and equipment, sequences of operations, procurement of materials and equipment, duration of activities, type of relationship, lag time (if any), and such other information necessary to present a clear statement of the intended activities.

The schedule shall consist of a network technique of planning, scheduling and control, shall be a clear statement of the logical sequence of work to be done, and shall be prepared in such a manner that the Contractor's work sequence shall be optimized between early start and late start restraints. The Contractor shall use the same criteria in a consistent manner throughout the term of the Contract. If, at any time, the Contractor alters logic, original durations, and descriptions, adds activities or activity codes or in any way modifies the Baseline Schedule, they must notify the

Engineer of the change, in writing, presenting in detail the reasons for the change. The Engineer reserves the right to accept or reject any such change.

The critical path of the Project must be identified on the CPM schedule. The critical path is the longest-duration path through the network. The significance of the critical path is that the activities on it cannot be delayed without delaying the Project. Because of its potential impact on the entire schedule, critical path analysis is an important aspect of Project planning.

The critical path can be identified by determining the following four parameters for each activity:

1. ES - Earliest Start Time: the earliest time at which the activity can start given that its precedent activities must be completed first.
2. EF - Earliest Finish Time: equal to the earliest start time for the activity plus the time required to complete the activity.
3. LF - Latest Finish Time: the latest time at which the activity can be completed without delaying the Project.
4. LS - Latest Start Time: equal to the latest finish time minus the time required to complete the activity.

The *float time* for an activity is the time between its earliest and latest start time, or between its earliest and latest finish time. Float is the amount of time that an activity can be delayed past its earliest start or earliest finish without delaying the Project. Delays to activities on the critical path through the project network in which no float exists, that is where $ES=LS$ and $EF=LF$, will delay the Project.

Float available in the schedule, at any time shall not be considered for the exclusive use of either the Department or the Contractor. During the Contract, any float generated due to the efficiencies of either party is not for the sole use of the party generating the float; rather it is a shared commodity to be reasonably used by either party. Project float will be a resource available to both the Department and the Contractor.

Each CPM Schedule submittal shall be in the form of an activity on node diagram (precedence diagramming method) and shall include at a minimum,

- Early Start computer sort
- Total Float computer sort
- Activity Number computer sort
- Schedule Diagram in Time Scaled Logic format
- Claim digger report or approved equal
- Other reports as required by the Engineer
- Digital backup data which includes all Project schedule files in the program format

If the diagrams are requested to be printed out by the Department, they shall be on 22 inch x 34 inch sheets. Additional, more detailed diagrams for important aspects or phases of the work may be required as requested by the Department.

Activity I.D. numbers shall be keyed to the item numbers assigned in the Contract. The first three or four digits of the activity I.D. number shall be identical to the first three or four digits of the pay item number in the Contract. The remaining digits may be used to provide unique, orderly and sequential I.D. numbers for each activity.

Activity codes shall be listed in a schedule dictionary provided by the Project Coordinator and maintained as directed by the Engineer. At a minimum, activity codes for responsibility (prime, subcontractor by name), location of work (bridge #, span #, sta. #, site, building, type of work, etc.) and stage or phase number should be included.

1. Recovery Schedules: If, in the opinion of the Engineer, the updated schedule indicates that the Project has fallen behind, or that a revision in sequence of operations may be necessary for any other reason, absent a justifiable time extension, the Contractor shall immediately institute all necessary steps to improve the Project's progress and shall submit such revised network diagrams, tabulations and operational plans, as may be deemed necessary by the Engineer, to demonstrate the manner in which an acceptable rate of progress will be regained.
2. Should the Contractor not demonstrate an ability to regain an acceptable rate of progress, the Engineer will require the schedule to be resource loaded in the next monthly update. No additional compensation will be allowed for resource loading the schedule.
3. As-Built Schedule: Within thirty (30) days of completion of the Project, including all corrective work, the Contractor shall submit an "As-Built Schedule" showing the actual progress of work. The Contractor shall submit three prints of this final CPM Schedule and digital project backup data which includes all Project schedule files for the Engineer's exclusive use.
4. Daily Construction Reports: For Contracts administered under Section 1.20 (Facilities Construction), the Project Coordinator shall assist the Engineer in the preparation of a daily construction report, by ensuring that each of the Contractor's employees and subcontractors working on the Project Site on a given day signs the Engineer's sign-in sheet for that day. They shall keep and provide to the Engineer their daily list of employees and subcontractors who worked on the Project Site each day.

Method of Measurement: Within ten (10) calendar days of the award of the Contract, the Contractor shall submit to the Engineer for review and comment a breakdown of its lump sum bid price for this item detailing:

1. The development cost to prepare the Baseline Schedule in accordance with Article 1.05.08 or 1.20-1.05.08 as modified by these specifications. Development costs shall not exceed

25% of the total cost of the Project Coordinator item and shall include costs to furnish and install all specified hardware.

2. The cost to provide the services of the Project Coordinator, including costs to prepare and submit the Monthly Updates and Narrative, to furnish and submit any Recovery Schedules, to furnish and submit Two Week Look Ahead Schedules and to maintain and provide supplies for the specified hardware. A per month cost will be derived by taking this cost divided by the number of Contract months remaining from the date of acceptance of the Baseline Schedule.
3. The cost of submission and certification of the As-Built Schedule in accordance with these specifications. The submission and certification costs shall be no less than 2% of the total cost of the item.
4. Substantiation showing that the costs submitted are reasonable based on the Contractor's lump sum bid.

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

1. Upon acceptance of the "Baseline" Schedule by the Engineer, the lump sum development cost will be certified for payment.
2. Upon receipt of each monthly narrative and update Schedule (the first being an update of the approved Baseline Schedule noted above), the per month cost for the services of the Project Coordinator will be certified for payment.
3. Upon acceptance of the As-Built Schedule by the Engineer, the lump sum submission and certification cost will be certified for payment.

Basis of Payment: This item will be paid for at the Contract lump sum price for "Project Coordinator" complete, which price shall include the preparation and submission of all schedules, narratives, updates, reports and submittals, including an electronic copy of the schedule unprotected.

The lump sum price will be certified for payment as described in "Method of Measurement" subject to the following conditions:

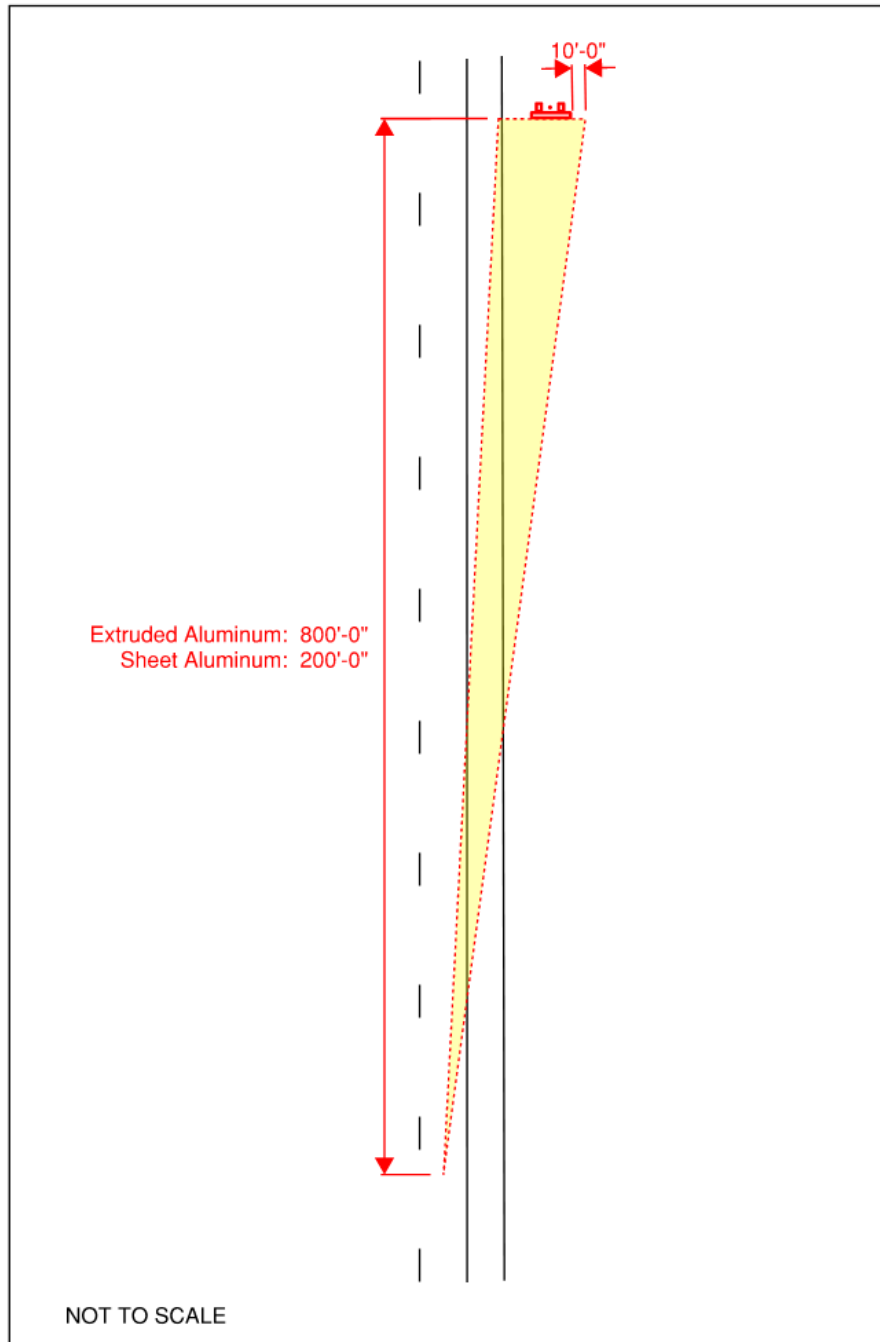
1. Any month where the monthly update of the CPM schedule is submitted late, as specified in Article 1.05.08, without authorization from the Engineer, will result in the following actions:
 - a. The monthly payment for the Project Coordinator item will be deferred to the next monthly payment estimate. If any monthly submittal is more than thirty (30)

calendar days late, there will be no monthly payment for the services of the Project Coordinator.

- b. The greater of 5% of the monthly payment estimate or \$25,000 will be retained from the monthly payment estimate until such time as the Contractor submits all required reports.
 - c. If, in the Engineer's judgment, the Contractor is not in compliance with this specification, the Engineer may withhold all Contract payments.
- 2. In the event the Contract time extends beyond the original completion date by more than thirty (30) calendar days, and a time extension is granted, the Department may require additional CPM schedule updates which will be paid for at the per month cost for the services of the Project Coordinator.
 - 3. If the Contractor is not in compliance with this specification or has failed to submit a monthly update, or a Recovery Schedule for any portion of the work, the Engineer will withhold all Contract payments until the schedule is submitted to and accepted by the Engineer.

Pay Item	Pay Unit
Project Coordinator	l.s.

Clearing and Thinning for Extruded Aluminum Signs & Sheet Aluminum Signs



ITEM #0969055A - CONTRACTOR QUALITY CONTROL MANAGER AND QUALITY CONTROL PROGRAM LEVEL 1

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

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

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

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

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

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

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

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

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

The minimum lump sum bid for this item shall be **\$360,000.00**. Failure of the Contractor to bid at least the minimum amount will result in the Department adjusting the Contractor's bid to the minimum bid amount for this item.

Construction Methods:

Submittals

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

The submittal shall outline the credentials of the proposed QCM, who shall be an individual with demonstrated construction experience. This shall include at least 7 years of experience in any combination of the following areas:

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

The submittal shall also list any certifications or training in quality control principles (NETTCP Quality Assurance Technologist or approved equal) of the proposed QCM and two (2) letters of verification from previous clients.

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

Sample forms and reports intended to be used to assure compliance with this specification shall be included in the initial submittal of the QC Program. Sample forms and reports shall include:

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

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

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

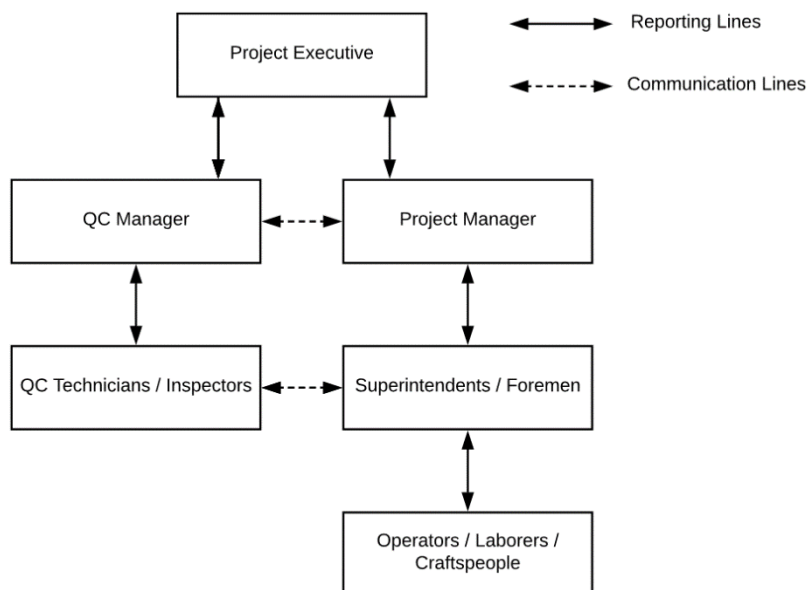
- (3) Additional QC Personnel: When additional QC personnel are required due to simultaneous work operations, the Contractor shall provide resume(s) of qualifications of the proposed personnel at least thirty (30) days in advance of the work. All additional QC personnel utilized for inspecting, sampling,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

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

- (4) **Laboratories:** All laboratories performing QC testing of Project Produced Materials shall be qualified through either the AASHTO Accreditation Program (AAP) or the NETTCP Laboratory Qualification Program. The Contractor shall provide laboratory proof of qualification at least thirty (30) days in advance of the work.
- (5) **Reports:** The Contractor shall be required to produce and submit to the Engineer daily and monthly inspection reports as described in the Reporting Element of this specification.

Elements of the Contractor Quality Control Program:

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



2. Design Control: This Element shall describe how the Contractor and the QCM control any design process (i.e. Working and Shop Drawings) for which it is responsible. This shall include the selection of design input data, checking for correctness, completeness, compatibility and format, and reviewing and approving design output documents prior to submission to the Department. This Element shall provide guidance as to how the QCM or other personnel shall indicate that documents have been reviewed by the Contractor prior to submission, and that Department comments have been adequately addressed prior to any required resubmissions.

3. Procurement Control: This Element shall describe the methods used by the Contractor and the QCM to assure that all materials and specialized equipment provided for the work are as specified. Included shall be guidelines for documenting that purchase documents have been

reviewed to assure that correct details have been ordered, including specification, grade, type, color, Buy America or other aspects as required by the Contract.

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

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

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

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

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

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

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

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

5. Inspection: This Element shall describe how the Contractor and the QCM will assure that the specified quality of materials and workmanship will be achieved. The Contractor’s QC Program is not related to any inspection carried out by the Engineer. Inspection will include the identification and tracking of the quality characteristics (metrics) used to verify that the level of quality of materials and workmanship conforms to the requirements of the Contract.

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

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

- Construction Surveying
- Maintenance & Protection of Traffic
- Earthwork
- Subbase and Base Material
- Hot Mix Asphalt
- Drainage
- Bridge Demolition
- Earth Retaining Systems
- Geotechnical (Foundations, Piles, Drilled Shafts)
- Reinforcing Steel
- Precast concrete elements
- Electrical
- Landscaping
- Environmental Compliance
- Permit Compliance

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

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

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

This Element shall describe the system(s) used to assure that all materials and workmanship for critical work categories are in conformance with the Contract, including:

- visual inspection of the work, including frequency and hold points
- materials to be tested
- tests to be conducted
- frequency of testing
- locations of sampling
- checks
- intermittent or continuous inspections
- inspections of completed work
- or a combination of above methods

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

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

6. Special Process Control: This Element shall describe the measures to be used to assure that any special processes (such as, welding, high-strength bolting, nondestructive examination, critical coatings, surveys, and control of critical tolerances) shall be controlled by procedures that are described in and comply with the Contractor's approved QC Program. The recording of results shall properly document that processes are in conformance with the Contract. In addition, this Element shall describe the methods used to verify, document and track any pre-qualification of the processes, personnel and equipment where required by the Contract.

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

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

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

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

9. Reporting: QC Inspection Reports: The Contractor shall be required to produce and submit to the Engineer daily and monthly inspection reports in accordance with all requirements of this specification. The QC Program shall clearly define the information that shall be provided as part of the daily and monthly reports.

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

For any week that a non-conformance report is issued, either by the Contractor or the Engineer, actions taken to resolve the non-conformance report shall be summarized and included with the submission of the daily reports. Updates on the status of the non-conformance shall continue in each submission of daily reports until the non-conformance

issue is resolved. Once resolved, the next submission of daily reports shall document that supervisory field personnel involved in the work have been informed of any changes to be implemented to avoid recurrence of deviations. Any revisions or amendments made to the QC Program, once submitted and accepted by the Engineer, shall be documented in the next submission of daily reports.

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

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

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

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

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

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

Basis of Payment: This item will be paid for at the Contract lump sum price for “Contractor Quality Control Program Level 1” complete, which price shall include all submittals, QC Program revisions and amendments, inspections, monitoring, daily logs, reports, meetings, records, and all materials, equipment, labor and work incidental thereto.

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

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

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

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

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

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

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

Pay Item

Contractor Quality Control Manager and
Quality Control Program Level 1

Pay Unit

LS

ITEM #0969064A - CONSTRUCTION FIELD OFFICE, LARGE

Description: Under the item included in the bid documents, 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 CTDOT forces and others who may be engaged to augment CTDOT 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	Large
Minimum Sq. Ft. of floor space with a minimum ceiling height of 7 ft.	1400
Minimum number of exterior entrances.	2
Minimum number of parking spaces.	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.

Unless otherwise approved by the Engineer, office space shall be partitioned into segregated work areas for each user as follows:

- A. Each work area (or cubicle) shall be a minimum of 8 feet × 8 feet, with full height walls or tall cubicle partitions (minimum 6 feet high), placed to provide a minimum of 6 feet walking space around and between each user work area (for social distancing).
- B. Only one user (workstation/desk) per work area.
- C. Desks, tables, and other work surfaces shall be arranged so that adjacent users do not face each other.

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 CTDOT personnel and such assistants as they may engage; and for field offices sizes Large and Extra 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 CTDOT and will be kept in their possession while State 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. An ADA/ABA compliant ramp with non-skid surface shall be provided with the Extra-Large field office.

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, electronics, 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 State's CTDOT electrical inspector, must be contacted at 860-594-2240. (Do Not Call Local Town Officials)

- I. Prior to field office removal, the CTDOT Office of Information Systems (CTDOT OIS) must be notified to deactivate the communications equipment.

Heating, Ventilation and Air Conditioning (HVAC): The field office shall be equipped with sufficient and properly operating, heating, air conditioning, and ventilation equipment to maintain a temperature range of 68°-80° Fahrenheit within the field office. The Contractor shall increase ventilation rates and increase the percentage of outdoor air that circulates into the system where possible.

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 one (1) telephone line for phone/voice service. For an Extra-Large field office this shall consist of three (3) telephone lines for phone/voice service. The Contractor shall pay all charges.

The Contractor shall provide the field office telephone number(s) to the CTDOT Project Engineer within 10 calendar days after the signing of the Contract as required by Article 1.08.02.

Data Communications Facility Wiring: As soon as the field office is in place, the Contractor shall propose a central wiring location, to designated CTDOT District personnel for the review and approval of CTDOT OIS. The central wiring location shall be large enough to house the Contractor supplied modem, Contractor supplied patch panel (if applicable), and CTDOT OIS supplied LAN switch and router. The Contractor shall supply the number of Category 6A 568B patch panels necessary to support the anticipated number of networked devices. The central wiring location shall also house the data circuit with appropriate power requirements and Category 6A cable run to the location of the installed data circuit. Power shall be provided at the central wiring location to power the hardware installed.

The Contractor shall install CAT 6A cables from the central wiring location to each workstation, Smart Board/TV location, Multifunction Laser Printer/Copier/Scanner and any other networked devices. The CAT 6A cables shall terminate in a (Category 6A 568B) wall or surface mount data jack at each networked device. Each run / jack shall be clearly labeled with an identifying Jack Number. The CAT 6A cables shall be terminated at the central wiring location with a service loop and RJ45 connectors. The Contractor shall also supply CAT6A cables of adequate length to reach from the wall or surface mount jack to the device being networked.

The number of networked devices anticipated shall be at least equal to the number of personal computer tables, Multi-Function Laser Printer/Copier/Scanner, Contractor supplied devices, and smartboards listed below.

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	Extra 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	8
Standard secretarial type desk and matching desk chair that has pneumatic seat height adjustment and dual wheel casters on the base.	-	-	-	1
Personal computer tables (4 ft. x 2.5 ft.).	2	3	5	8
Drafting type tables (3 ft. x 6 ft.) and supported by wall brackets and legs; and matching drafter's stool that have pneumatic seat height adjustment, seat back and dual wheel casters on the base.	1	1	1	2
Conference table, 3 ft. x 12 ft.	-	-	-	1
Table – 3 ft. x 6 ft.	-	-	-	1
Office Chairs.	2	4	8	20
Mail slot bin – legal size.	-	-	1	1
Non-fire-resistant cabinet.	-	-	2	4
Fire resistant cabinet (legal size/4 drawer), locking.	1	1	2	3
Storage racks to hold 3 ft. x 5 ft. display charts.	-	-	1	2
Vertical plan racks for 2 sets of 2 ft. x 3 ft. plans for each rack.	1	1	2	2
Double door supply cabinet with 4 shelves and a lock – 6 ft. x 4 ft.	-	-	1	2
Case of cardboard banker boxes (Min 10 boxes/case)	1	1	2	3
Open bookcase – 3 shelves – 3 ft. long.	-	-	2	2
White Dry-Erase Board, 36" x 48" min. with markers and eraser.	1	1	1	1
Interior partitions – 6 ft. x 6 ft., soundproof type, portable and freestanding.	-	-	6	6
Coat rack with 20 coat capacity.	-	-	-	1
Wastebaskets - 30 gal., including plastic waste bags.	1	1	1	2
Wastebaskets - 5 gal., including plastic waste bags.	1	3	6	10
Electric wall clock.	-	-	-	2
Electronic Level	1	1	1	2

Furnishing Description (continued)	Office Size			
	Small	Med.	Large	Extra Large
	Quantity			
Telephone.	1	2	3	-
Full size stapler 20 (sheet capacity, with staples)	1	2	5	8
Desktop tape dispensers (with Tape)	1	2	5	8
8 Outlet Power Strip with Surge Protection	3	4	6	9
Rain Gauge	1	1	1	1
Business telephone system for three lines with ten handsets, intercom capability, and one speaker phone for conference table.	-	-	-	1
Mini refrigerator - 3.2 c.f. min.	1	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	1
Microwave, 1.2 c.f., 1000W min.	1	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	2
Multi-Function Laser Printer/Copier/Scanner combination unit, network capable, as specified below under <u>Field Office Technology</u>	1	1	1	1
Field Office Internet Service and Hardware as specified below under <u>Field Office Technology</u>	1	1	1	1
Digital Camera as specified below under <u>Field Office Technology</u>	1	1	3	3
Teleconferencing Equipment as specified below under <u>Field Office Technology</u>	-	-	1	-
Infrared Thermometer, including annual third-party certified calibration, case, and cleaning wipes.	1	1	1	2
Concrete Curing Box as specified below under Concrete Testing Equipment.	1	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	1
Concrete Slump Cone and accessories as specified below under Concrete Testing Equipment.	1	1	1	1
First Aid Kit	1	1	1	1
T-handle concrete cylinder mold splitter as specified below under Concrete Testing Equipment	1	1	1	1
Smart Phones as specified under <u>Computer Related Hardware and Software</u> .	-	-	-	-

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.

Field Office Technology:

The Contractor shall supply the internet service connection, Contractor supplied modem, associated hardware, Digital Camera(s), Smart Phones, Multifunction Laser Printer/Copier/Scanner, Conference Room Teleconferencing Equipment, associated hardware and software meeting the requirements of this specification, as well as the latest minimum specifications posted, as of the Project advertising date, at CTDOTs [Construction Field Office Technology](#) web site.

Within 10 calendar days after the signing of the Contract, but before ordering/purchasing the required Digital Camera(s), Smart Phones, Multifunction Laser Printer/Copier/Scanner, Teleconferencing Equipment, as well as associated hardware, the Contractor must submit a copy of their proposed order(s) with catalog cuts and specifications to the Administering CTDOT District for review and approval. The modem, digital cameras, smart phones, and Teleconferencing Equipment will be reviewed by CTDOT District personnel for approval. The Multifunction Laser Printer/Copier/Scanner will be reviewed by the CTDOT OIS. The Contractor shall not purchase the hardware, software, or services until the Administering CTDOT District 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, setup of the internet service connection and the configuration of the modem with a static IP address. Installation shall be coordinated with CTDOT District and Project personnel. Specifically, the Contractor shall supply the District with a Static IP Address, Subnet Mask Address and Gateway Address immediately upon establishment of internet service connection to assist with OIS equipment installation.

After the approval of the hardware and software, the Contractor shall contact the designated representatives of the CTDOT administering District, a minimum of 2 working days in advance of the proposed delivery or installation of the modem / Internet Service Connection, Digital Camera(s), Smart Phones, Multifunction Laser Printer/Copier/Scanner, Teleconferencing Equipment, as well as associated hardware, software, supplies, and support documentation. The hardware and cabling shall be installed in the field office to and at locations acceptable to the Engineer. Adequate electric service shall be supplied at all hardware and workstation locations to support the Department staff and hardware specified.

The Contractor shall provide all supplies, paper, maintenance, service, and repairs (including labor and parts) for the printer(s), copiers, field office Wi-Fi / internet service, and other equipment and facilities required by this specification for the duration of the Contract. All repairs of contractor supplied equipment and internet service must be performed within 48 hours. If the repairs require more than 48 hours, then an equal or better replacement must be provided.

Once the Contract has been completed, the Contractor supplied 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 rainwater 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.

Electronic Level: The Contractor shall supply and maintain in working order, for the duration of the Contract, the number of electronic levels, identified in the Additional Equipment, Facilities and Services table of this specification. The electronic level(s) shall meet the following requirements:

- A. 48-inch length, box beam type
- B. IP65 water and dust proof
- C. 0.1-degree accuracy
- D. Backlit display
- E. Carrying case included
- F. New or like new condition

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 T 119, Standard Test Method for Slump of Hydraulic-Cement Concrete.
- D. T-handle concrete cylinder mold splitter.

All testing equipment will remain the property of the Contractor at the completion of the Project.

Insurance Policy: The Contractor shall provide a separate insurance policy, with no deductible, in the minimum amount of five thousand dollars (\$5,000) to insure all State-owned data equipment and supplies used in the office against all losses. The Contractor shall be named insured on that policy, and the CTDOT shall be an additional named insured on the policy. Insured losses shall include, but not be limited to, theft, fire, and physical damage. The CTDOT will be responsible for all

maintenance costs of CTDOT owned computer hardware. In the event of loss, the Contractor shall provide replacement equipment in accordance with current CTDOT equipment specifications, within seven days of notice of the loss. If the Contractor is unable to provide the required replacement equipment within seven days, CTDOT may provide replacement equipment and deduct the cost of the equipment from monies due or which may become due the Contractor under the Contract or under any other contract. The Contractor's financial liability under this paragraph shall be limited to the amount of the insurance coverage required by this paragraph. If the cost of equipment replacement required by this paragraph should exceed the required amount of the insurance coverage, CTDOT will reimburse the Contractor for replacement costs exceeding the amount of the required coverage.

Maintenance: During field office occupancy by CTDOT, 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 professional cleaning including vacuuming carpet, washing and waxing floors, cleaning restrooms, removal of trash, general cleaning, 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 way 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 State 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, (Large)," 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 specified herein.

Pay Item	Pay Unit
Construction Field Office, (Large)	Month

ITEM #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:

Interstate 84 Eastbound

The Contractor shall maintain and protect the minimum number of through lanes and shoulders on a paved travel path not less than 12 feet in width per lane during the hours dictated in the special provision for Article 1.08.04 – Limitation of Operations.

The Contractor will be permitted to halt traffic during the allowable periods. If more than one 10 minute period is required, then the Contractor shall allow all stored vehicles to proceed through the work area prior to the next stoppage.

I-84 Eastbound Exit 21 On-Ramp (from Meadow Street)

The Contractor shall maintain and protect the existing number of lanes of traffic, including turning lanes at intersections on the ramp. During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

The Contractor shall maintain and protect existing traffic operations, with the following exceptions:

1. During the allowable periods and when the Contractor is actively working, the Contractor will be permitted to maintain and protect a minimum of one lane of traffic on a paved travel path not less than 11 feet in width.
2. During the allowable periods and when the Contractor is actively performing the bridge deck removal of the Exit 21 Off-Ramp over the Exit 21 On-Ramp, the Contractor will be permitted to close the ramp and shall detour traffic during Stages 4 and/or 5, as shown on the Detour Plans.

I-84 Westbound Exit 19 On-Ramp (from Bank Street)

The Contractor shall maintain and protect the existing number of lanes of traffic, including turning lanes at intersections on the ramp. During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

The Contractor shall maintain and protect existing traffic operations, with the following exceptions:

1. During the allowable periods and when the Contractor is actively working, the Contractor will be permitted to maintain and protect a minimum of 1 lane of traffic on a paved travel path not less than 11 feet in width.
2. During the allowable periods and when the Contractor is actively performing the bridge deck removal of the Exit 21 Off-Ramp over the Exit 19 On-Ramp, the Contractor will be permitted to close the ramp and shall detour traffic as shown on the Detour Plans.

Meadow Street

The Contractor shall maintain and protect the existing number of lanes of traffic, including turning lanes at intersections on Meadow Street. During stage construction, the existing number of lanes will be considered to be the number of lanes as shown on the Maintenance and Protection of Traffic (MPT) Plans contained in the contract plans.

The Contractor will be permitted to halt traffic during the allowable periods. If more than one 10 minute period is required, then the Contractor shall allow all stored vehicles to proceed through the work area prior to the next stoppage.

The Contractor shall maintain and protect existing number of lanes of traffic, with the following exceptions:

1. During the allowable periods and when the Contractor is actively working on Meadow Street, 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.
2. During the allowable periods and when the Contractor is actively performing the bridge deck and pier removal of the Exit 21 Off-Ramp over Meadow Street, the Contractor will be permitted to close Meadow Street 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.
3. The Contractor will be permitted to close pedestrian sidewalks and detour pedestrian traffic as shown on the Detour Plans. The Contractor shall notify the Engineer at least 14 days in advance of implementing the pedestrian detour.

Bank Street, South Main Street, Field Street

The Contractor shall maintain and protect a minimum of 1 lane of traffic in each direction with each lane on a paved travel path not less than 11 feet in width, with the following exceptions:

1. During the allowable periods and when the Contractor is actively working, the Contractor will be permitted to maintain and protect at least an alternating one-way traffic operation on a paved travel path not less than 11 feet in width and no more than 300 feet in length, unless specified elsewhere in the Contract. There shall be no more than one alternating one-way traffic operation within the Project limits without prior approval of the Engineer.
2. During the allowable periods and when the Contractor is actively performing the median reconstruction work on Field Street, the Contractor will be permitted to close eastbound Field Street and shall detour traffic during Stages 6, as shown on the Detour Plans.

All Other Roadways

The Contractor shall maintain and protect a minimum of one lane of traffic in each direction with each lane on a paved travel path not less than 11 feet in width, with the following exceptions:

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

Commercial and Residential Driveways

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

Intermediate Term Sidewalk Closures

The Contractor shall maintain and protect existing pedestrian accommodations, or a minimum of 4 feet in width, on all existing sidewalks, sidewalk ramps, and access to pedestrian pushbuttons, with the following exception:

- During the allowable periods and when the Contractor is actively constructing pedestrian amenities or installing signal equipment, the Contractor will be allowed to close pedestrian sidewalks and sidewalk ramps and restrict access to pedestrian pushbuttons for no more than a continuous 48 hour period of time.

No more than two corners of an intersection may be closed for an intermediate term sidewalk closure at any time. Where all four corners of an intersection have sidewalks and sidewalk ramps, diagonal corners shall not be closed at the same time.

During the intermediate term sidewalk closure, all approaches to the sidewalk shall be blocked by Construction Barricade Detectable with Sidewalk Closed signs.

The Contractor shall ensure that traffic control signals with pedestrian phases where access to the pushbuttons cannot be provided are revised at the start of the closure to automatically activate the pedestrian phase every signal cycle.

Intermediate term sidewalk closures may be extended to 72 hours with prior approval of the Engineer.

Pedestrians:

The Contractor shall provide and maintain clear pedestrian travel paths on new or existing sidewalk or temporary bituminous walks, an ADA-accessible pedestrian path with a minimum of 4 feet in width, on at least one side of the street at all times during and after construction hours.

If the Contractor proposes changes to the plans or the contract does not include plans, 30 days in advance of implementation, the Contractor shall submit plans and procedures in accordance with typical details of the Manual on Uniform Traffic Control Devices (MUTCD) for maintaining pedestrian sidewalk access during the reconstruction of the sidewalk to the Engineer for review. When a sidewalk or pedestrian route is closed, pedestrians must be detoured or temporary sidewalk must be provided. Pedestrian detours and temporary sidewalks must meet ADA requirements. The

appropriate signs for pedestrian detour shall be installed in accordance with the MUTCD. All approaches to the closed sidewalks shall be blocked by Construction Barricade Detectable with Sidewalk Closed signs. Temporary bituminous sidewalk and ramps, if required, will be paid under Contract Item "Temporary Pavement" and all pedestrian detour signage will be paid under Contract Item "Construction Signs."

When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.

Pedestrians should be detoured to existing crosswalks. If this is not possible, temporary crosswalks should be located at intersections. If this is not possible, temporary midblock crosswalks may be installed. Curb parking shall be prohibited for at least 50 ft in advance of any temporary crosswalk.

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 on Meadow Street, Field Street, and the I-84 Eastbound Exit 21 On-Ramp (from Meadow Street). Unpaved travel paths will only be permitted on the I-84 Eastbound Exit 21 On-Ramp (from Meadow Street) for up to a single work shift at a time. 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, between Monday at 9:00 a.m. through Friday at 4:00 p.m., for a duration not to exceed 10 calendar days and opposing traffic lane dividers shall be used as a centerline, which applies to West Liberty Street, South Main Street, Meadow Street, and Field Street.

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.

At no time shall an overhead sign be left partially removed or installed.

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.

On limited-access highways, construction vehicles entering travel lanes shall not be allowed without a lane closure. The lane closure shall be of sufficient length to allow vehicles to enter or exit the work area at the posted speed limit, in order to merge with existing traffic.

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.

Traffic Signals

The Contractor shall keep each traffic signal in the project limits operational at all times during construction in accordance with Special Provision "Temporary Signalization."

The Contractor shall install final pavement markings and signing prior to the proposed traffic signal being made fully operational.

Loop detectors disturbed by the Contractor's operations shall be made operational or temporary detection must be provided within 24 hours of the termination of the existing loop detectors.

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 - Limited Access Highways, Turning Roadways and Ramps

During construction, the Contractor shall maintain all pavement markings 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.

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

Figure 1: Typical PCMS Messages

Table 2: Acceptable Abbreviations

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

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

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

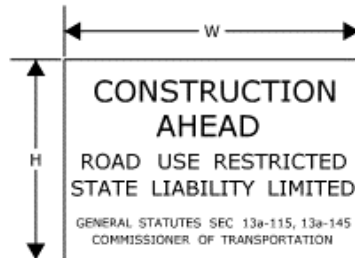
Table 3: Unacceptable Abbreviations

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

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

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED

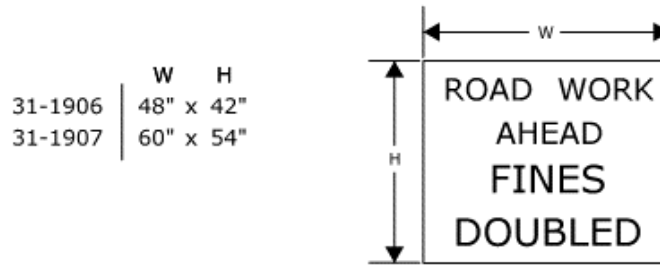
Tracy L. Fogarty
PRINCIPAL ENGINEER

Tracy L. Fogarty, P.E.
2019.10.09 16:30:32-0400

REGULATORY SIGN "ROAD WORK AHEAD, FINES DOUBLED"

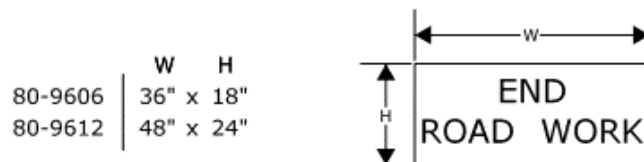
THE REGULATORY SIGN "ROAD WORK AHEAD FINES DOUBLED" SHALL BE INSTALLED FOR ALL WORK ZONES THAT OCCUR ON ANY STATE HIGHWAY AND MUNICIPAL ROAD IN CONNECTICUT WHERE THERE ARE WORKERS PRESENT ON THE HIGHWAY.

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.



"END ROAD WORK" SIGN

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



CONSTRUCTION TRAFFIC CONTROL PLAN
ROAD WORK AHEAD
SIGNS

SCALE: NONE

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED

Tracy L. Fogarty
PRINCIPAL ENGINEER

Tracy L. Fogarty, P.E.
2010.08.12 15:58:44 04/007

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

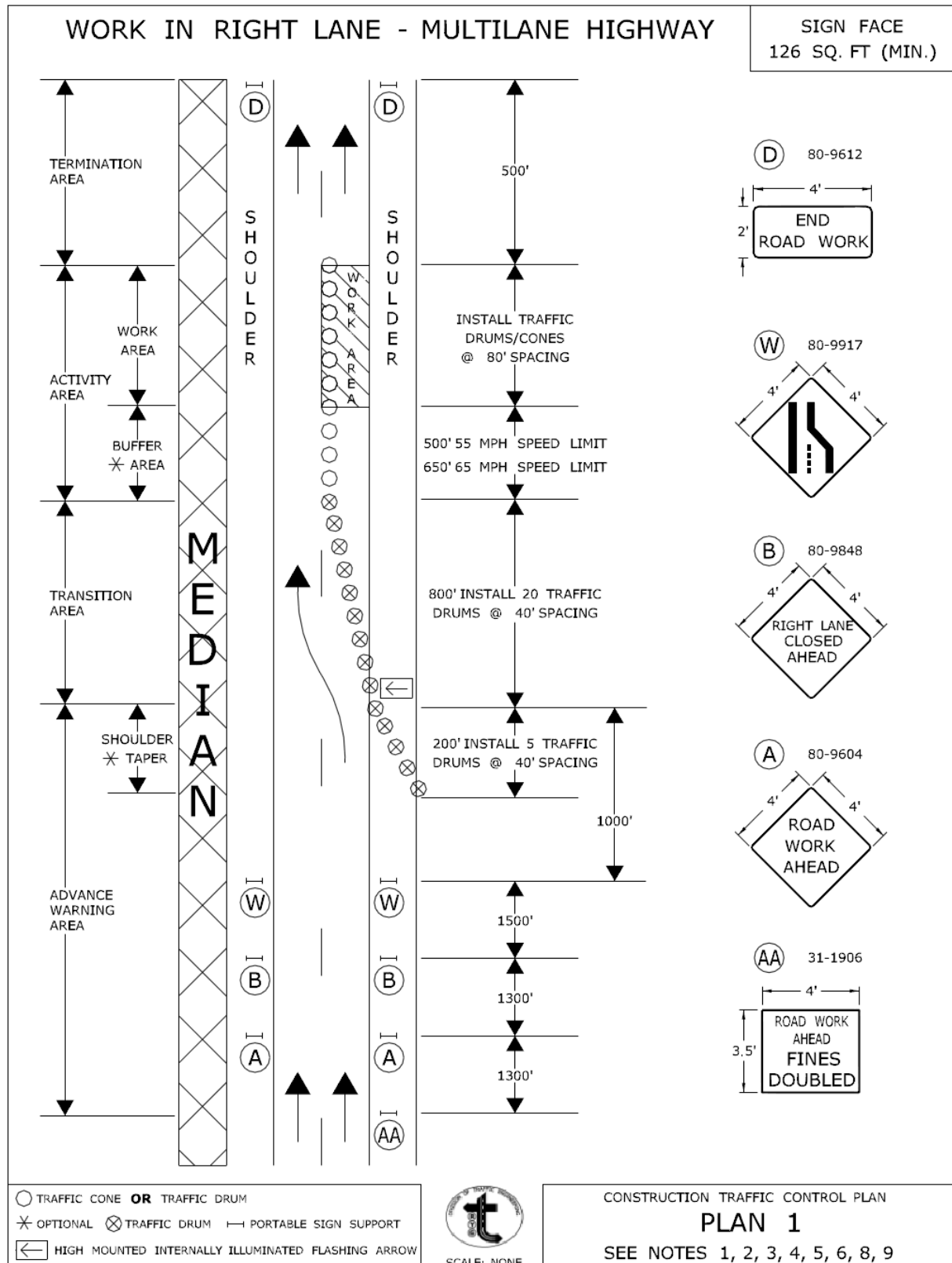
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BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED

Tracy L. Fogarty
PRINCIPAL ENGINEER

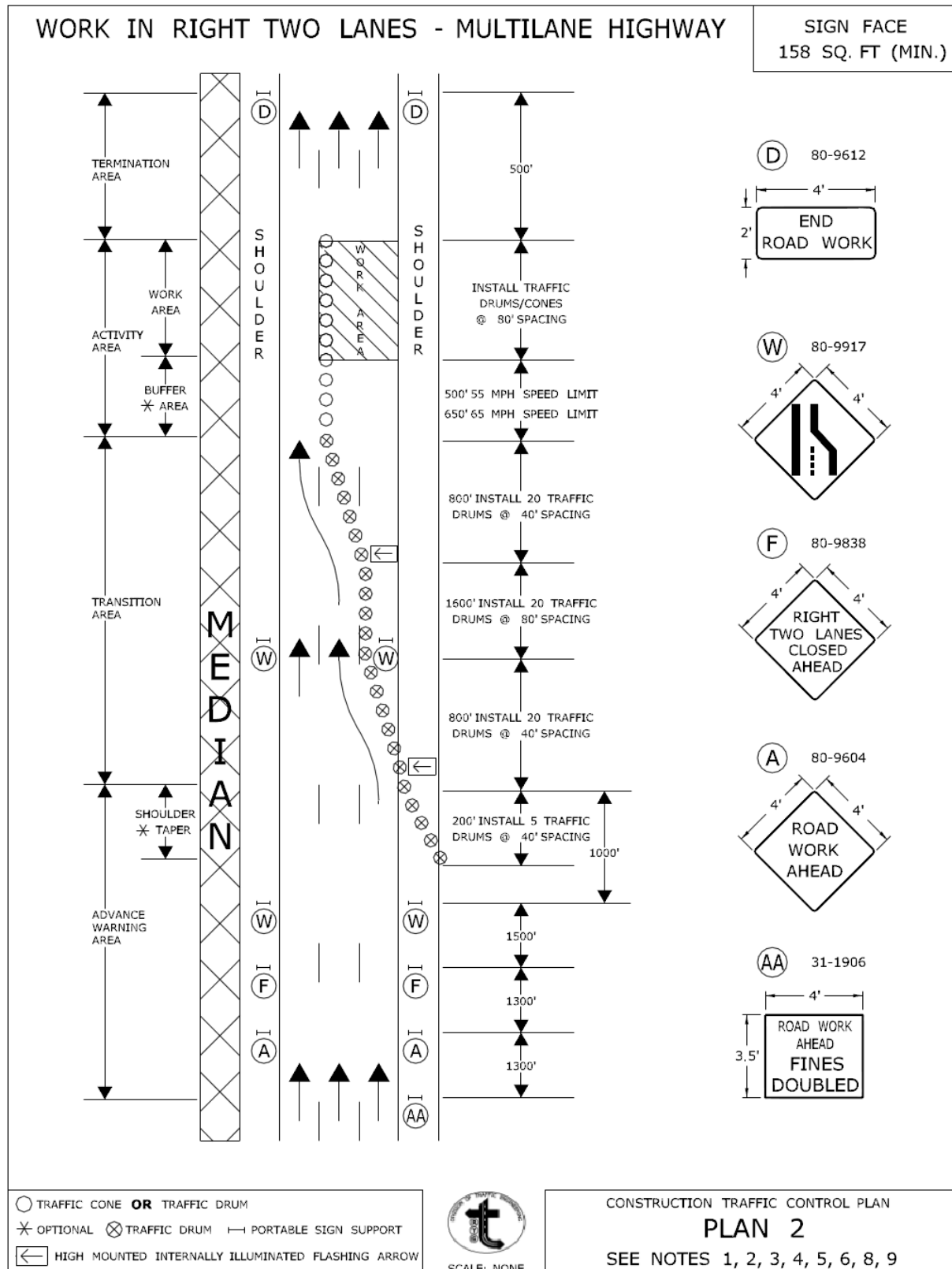
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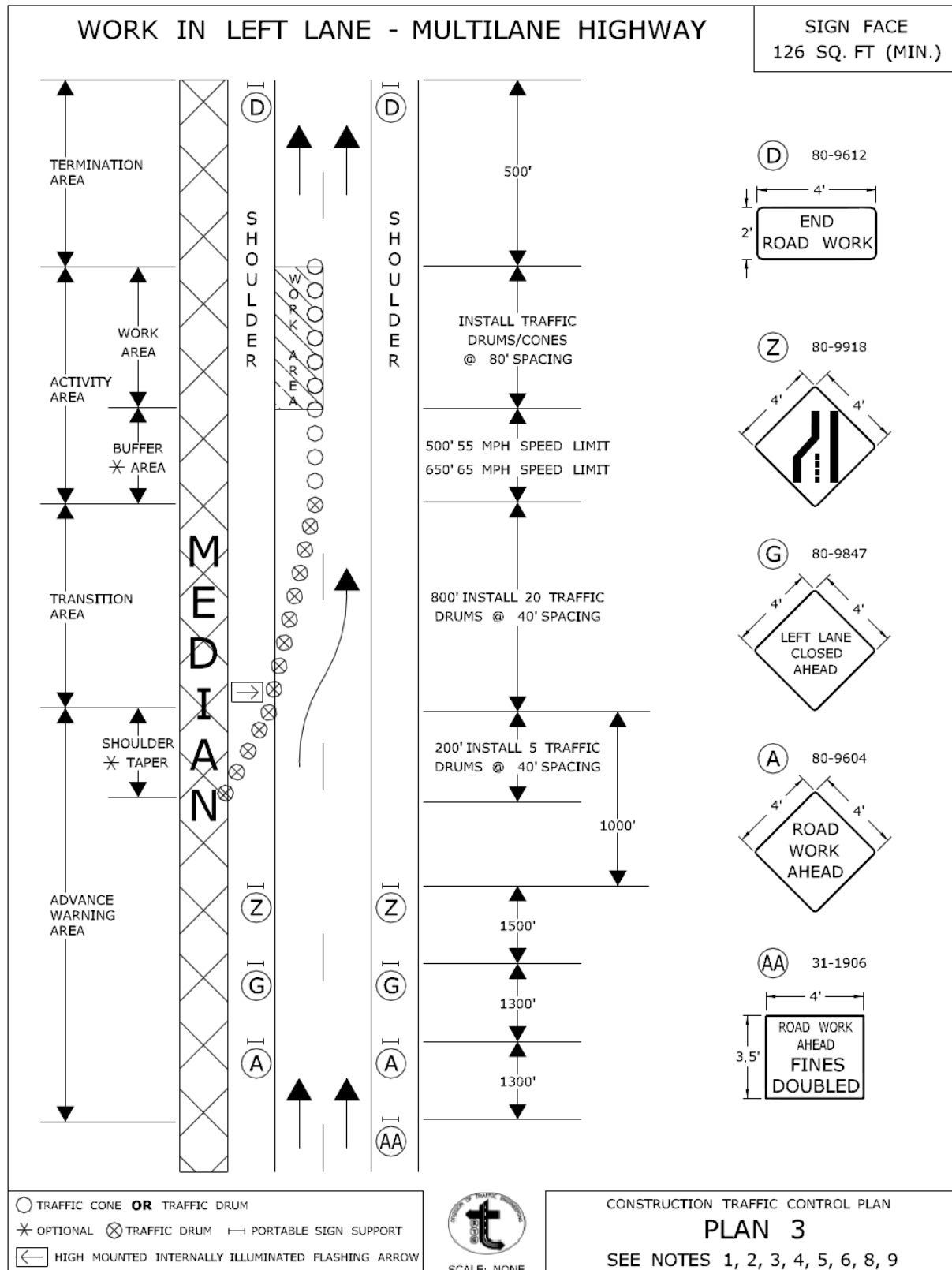


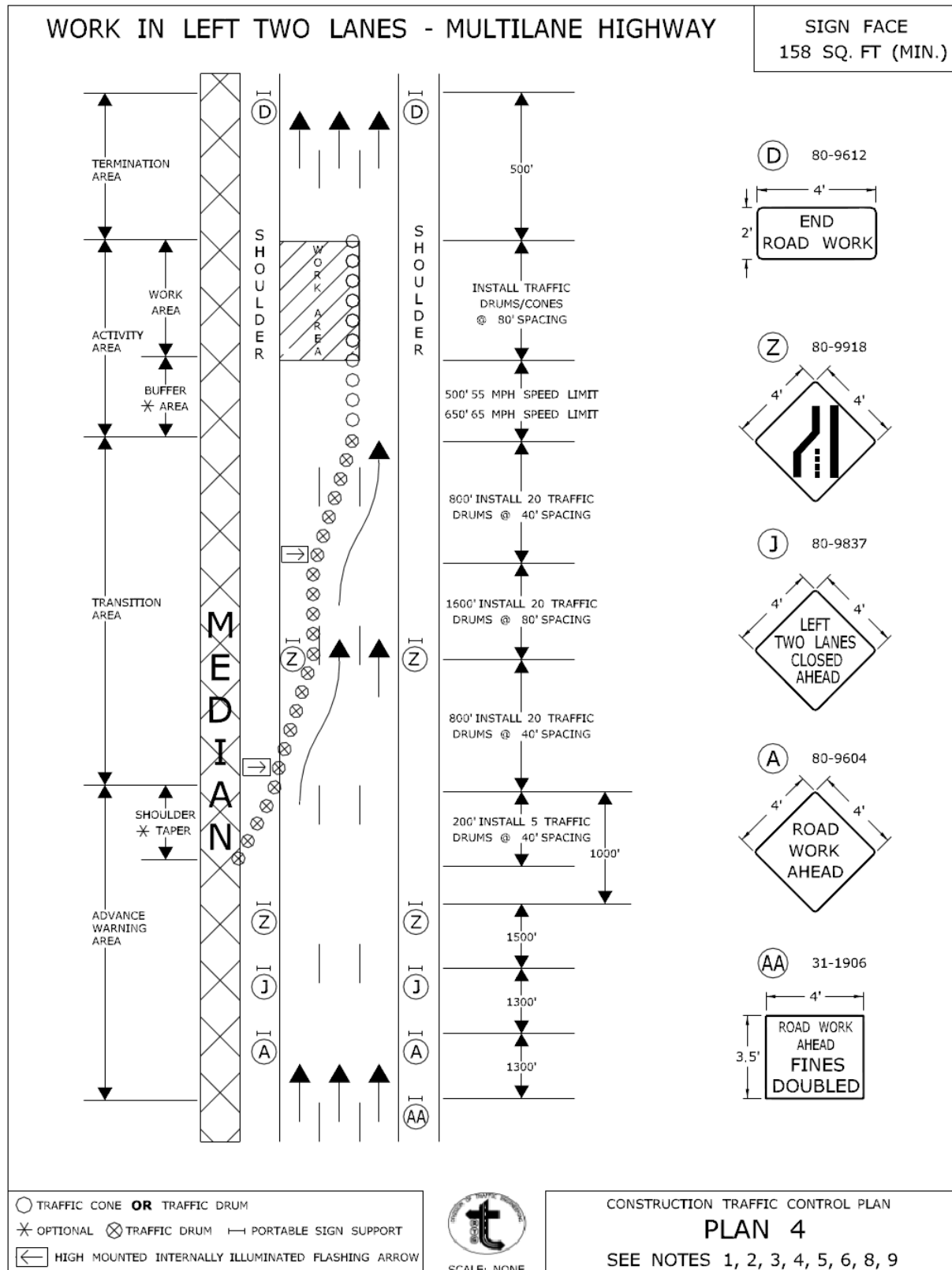
CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED

Charles S. Harlow
Charles S. Harlow
2012.06.05 15:51:00-0400
PRINCIPAL ENGINEER

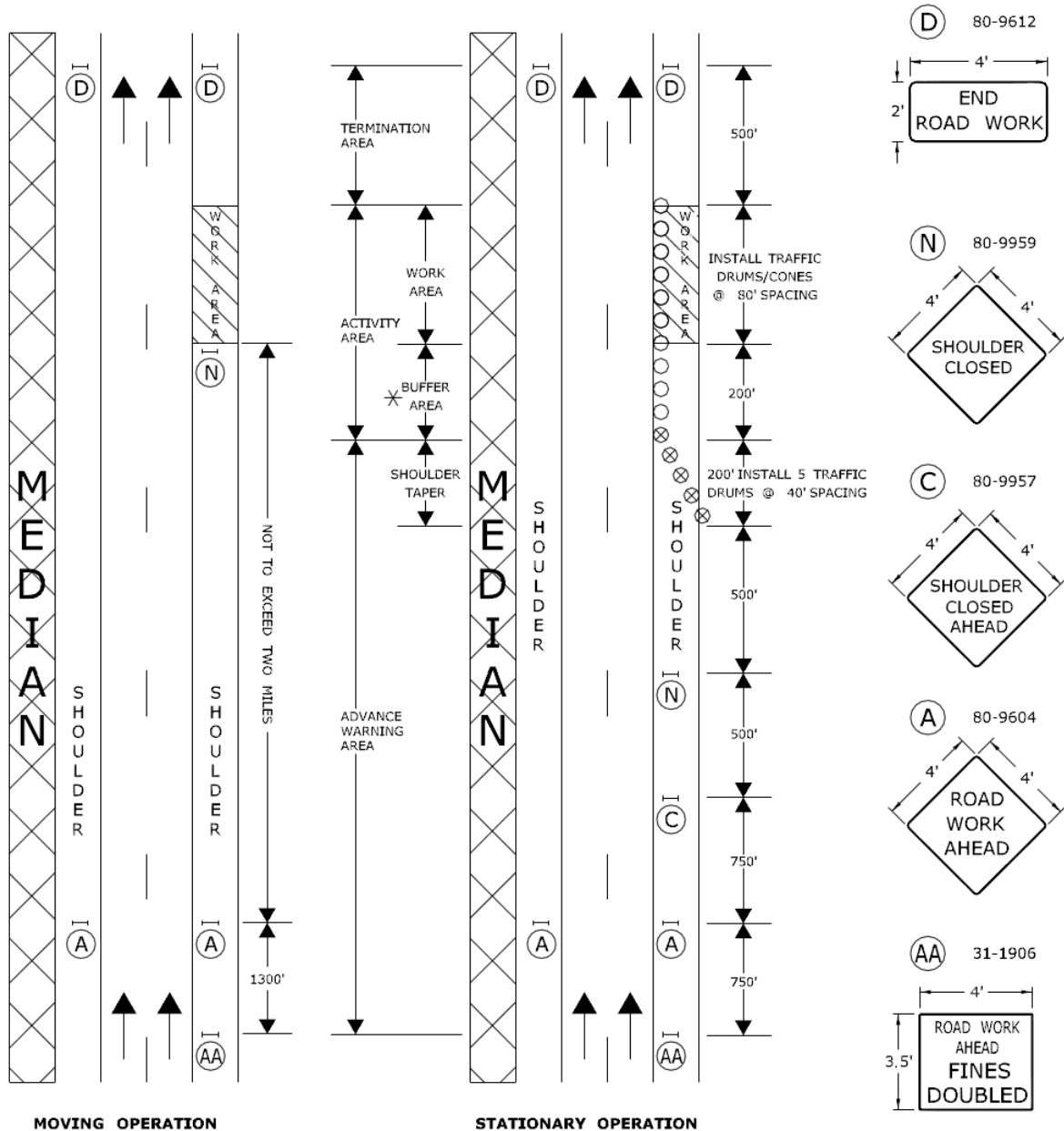






WORK IN SHOULDER AREA - MULTILANE HIGHWAY

SIGN FACE
94 SQ. FT (MIN.)



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



SCALE: NONE

CONSTRUCTION TRAFFIC CONTROL PLAN

PLAN 6

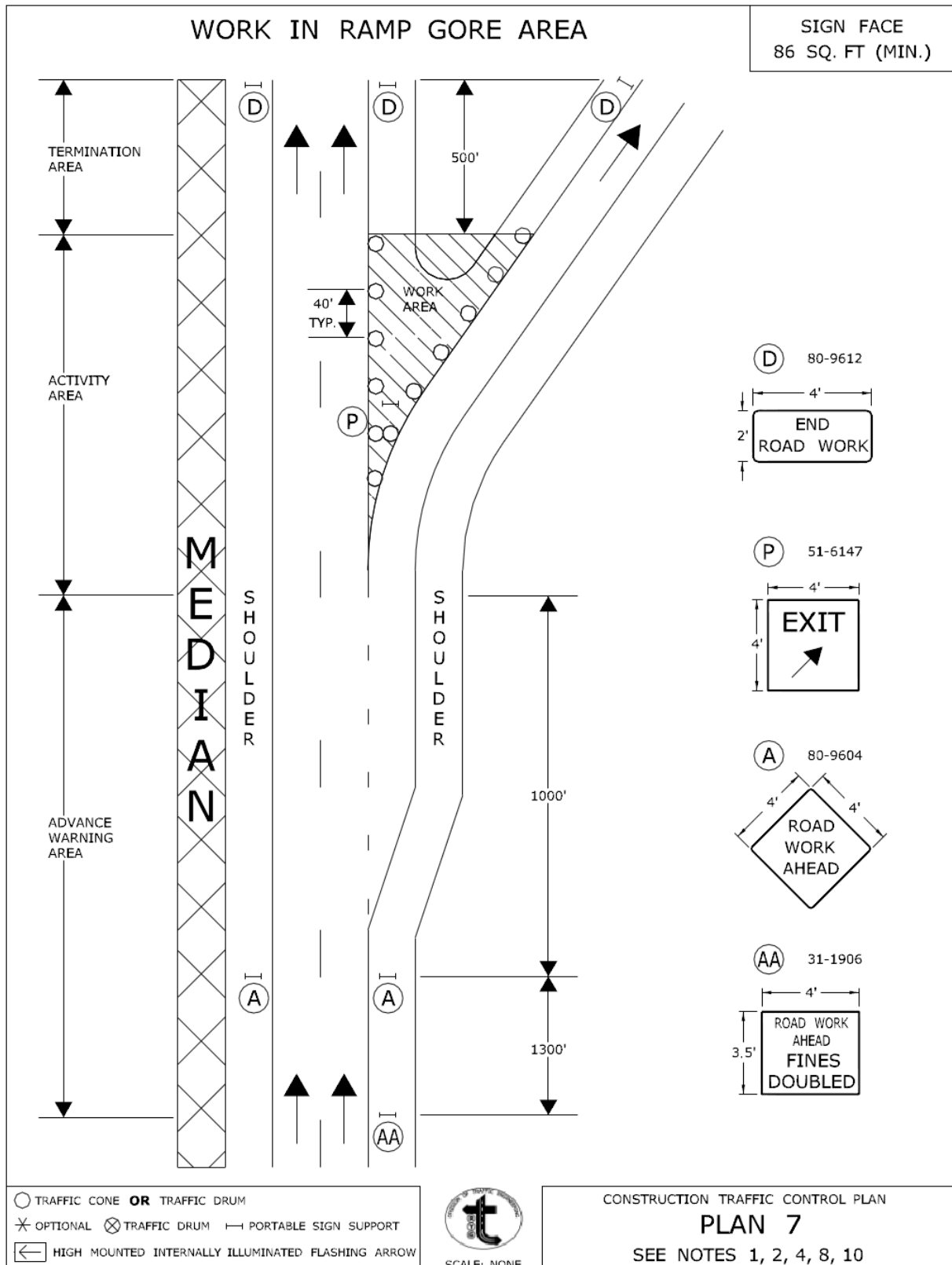
SEE NOTES 1, 2, 4, 8

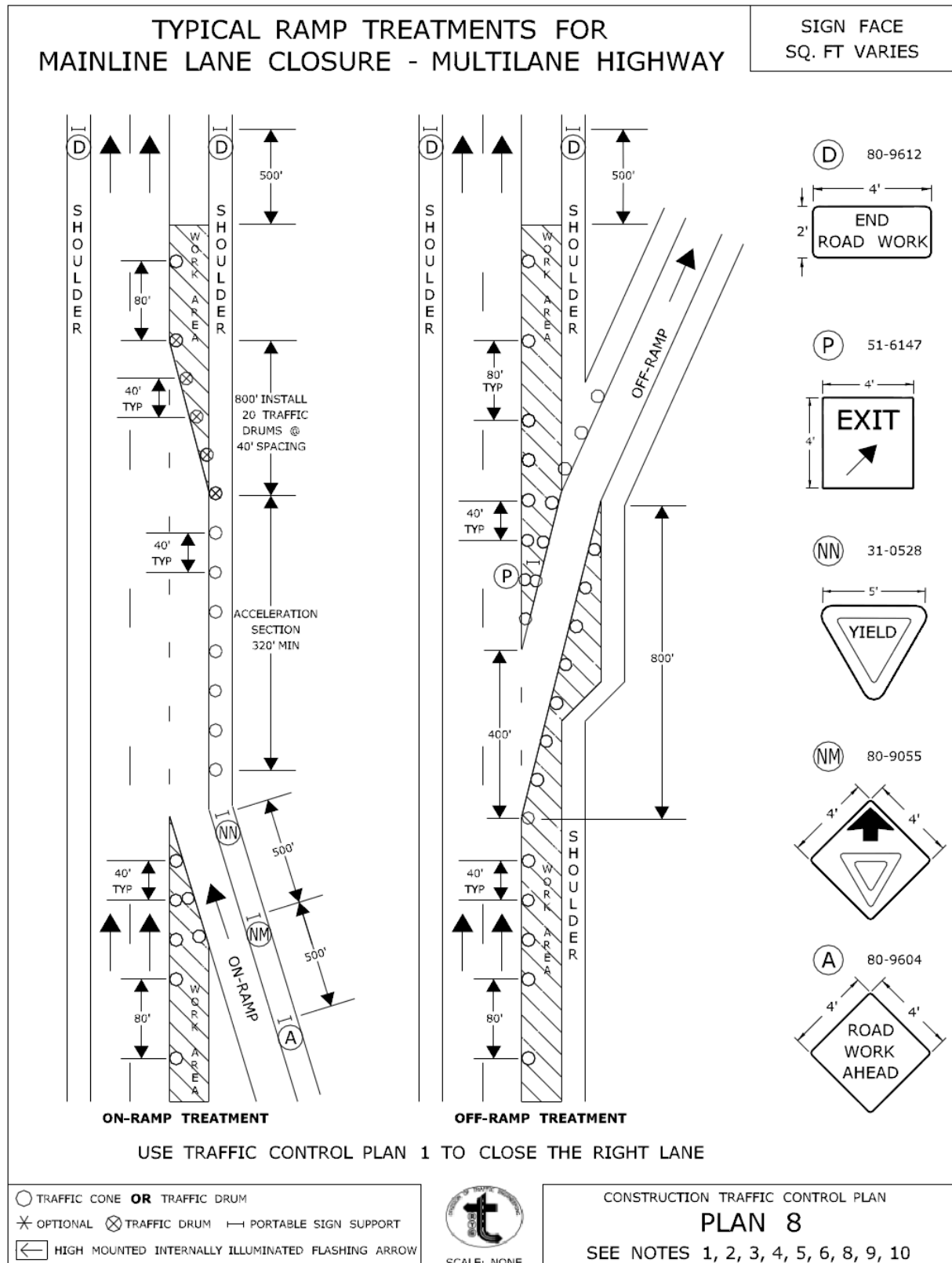
CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED

Charles S. Harlow
PRINCIPAL ENGINEER

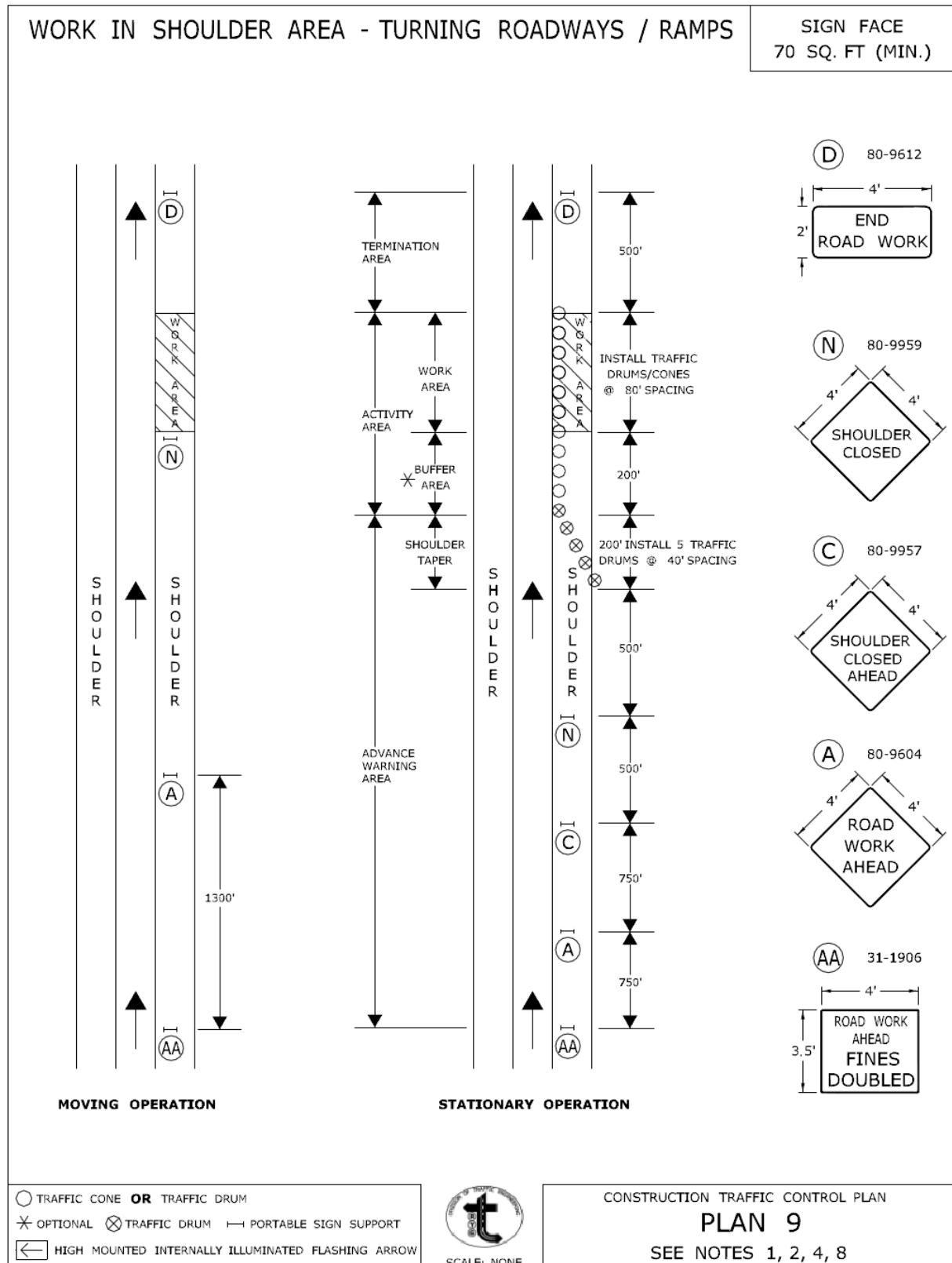
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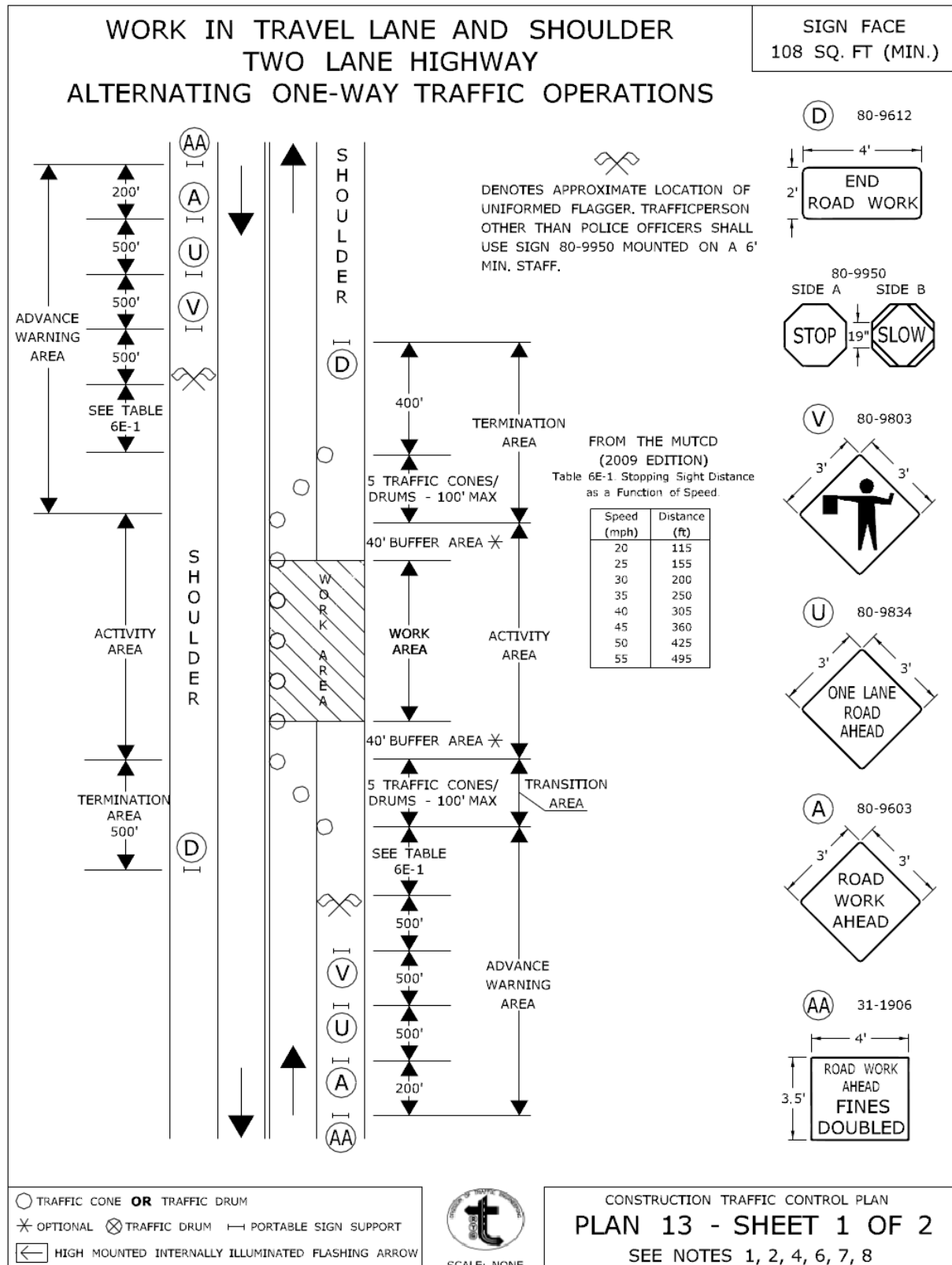




CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED *Charles S. Harlow*
PRINCIPAL ENGINEER
Charles S. Harlow
2012.06.05 15:53:31-0400'





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

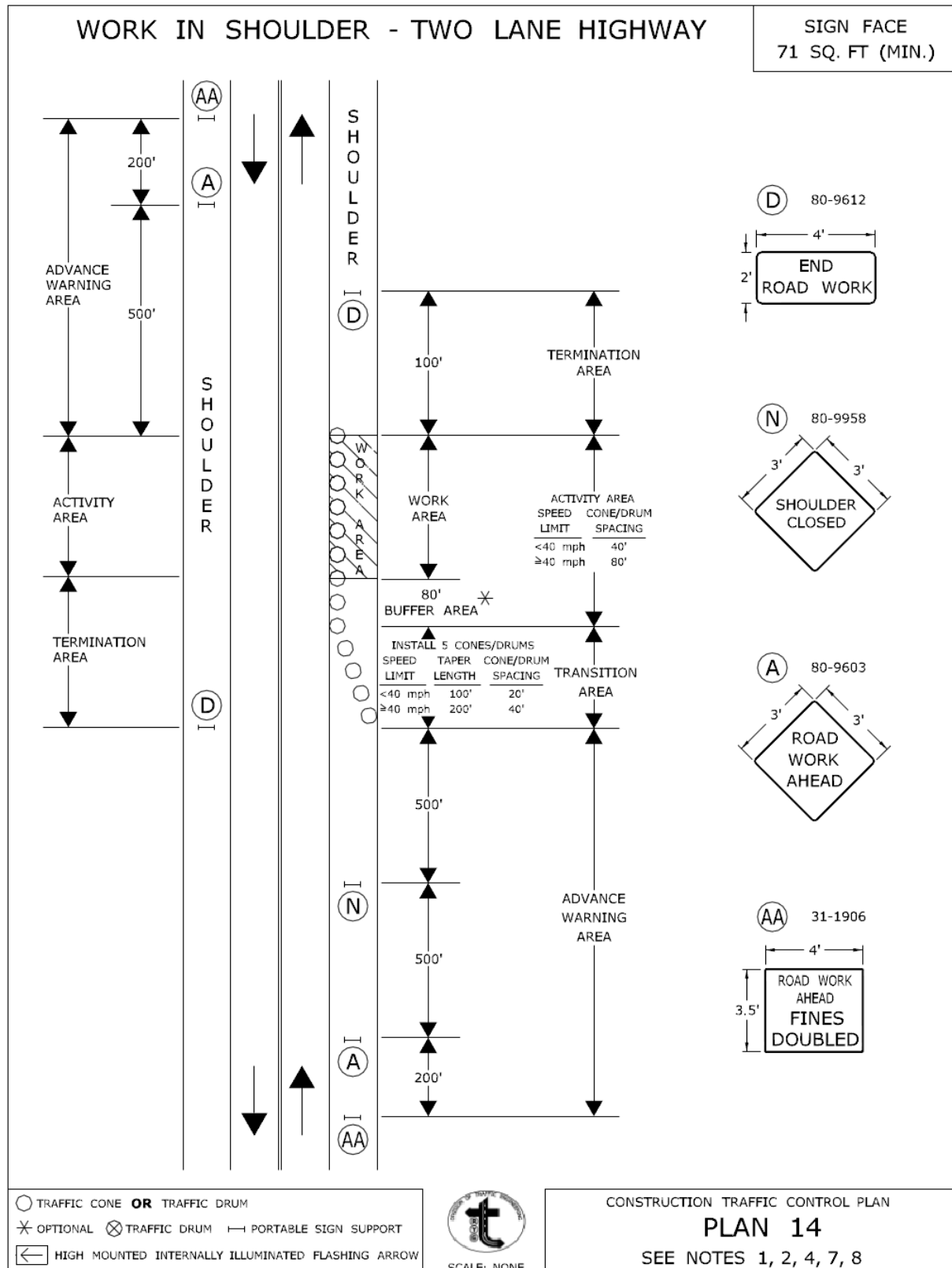
CONSTRUCTION TRAFFIC CONTROL PLAN
PLAN 13 - SHEET 2 OF 2
SEE NOTES 1, 2, 4, 6, 7, 8

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED

Charles S. Harlow
PRINCIPAL ENGINEER

Charles S. Harlow
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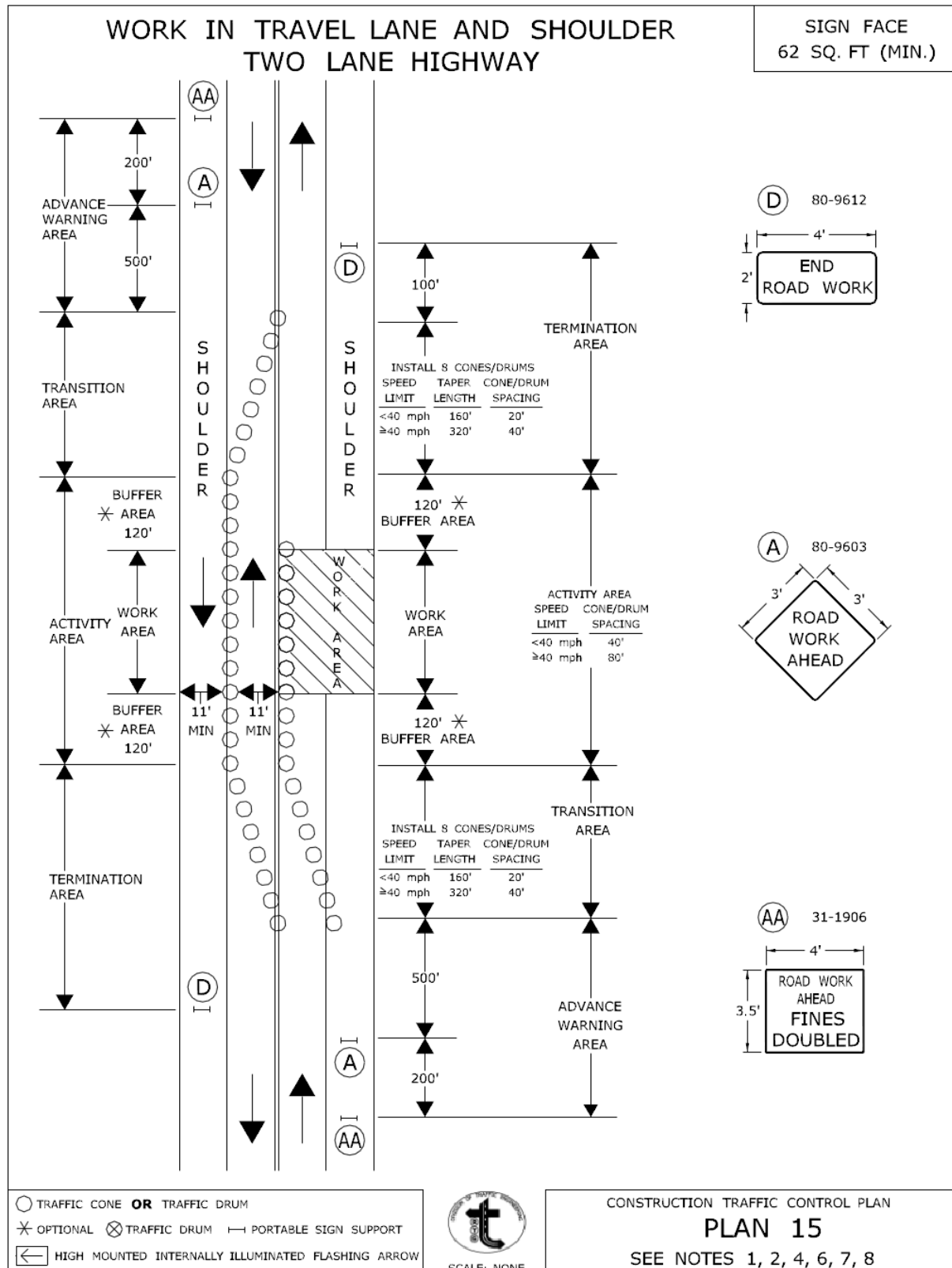


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APPROVED

Charles S. Harlow
PRINCIPAL ENGINEER

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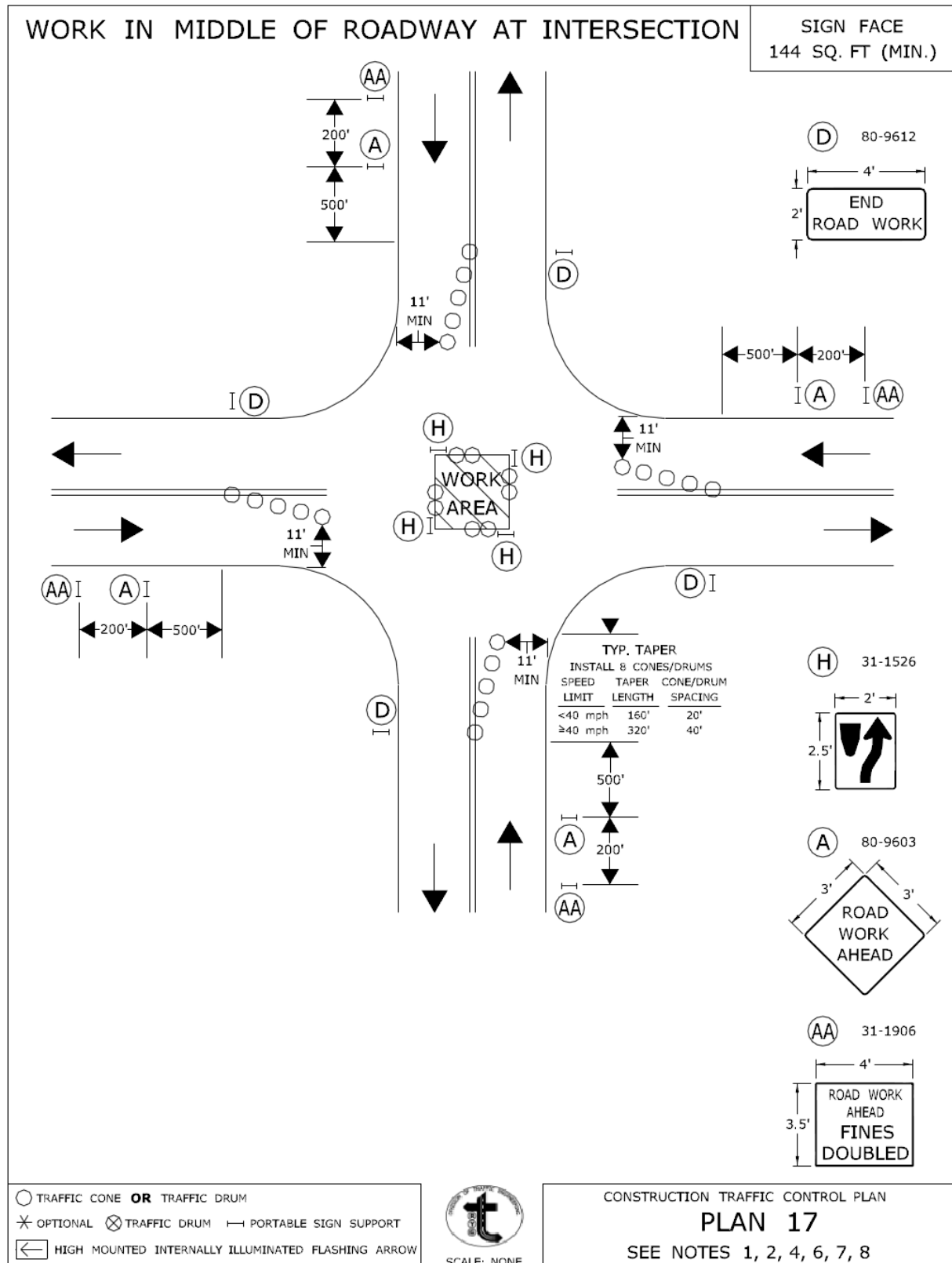


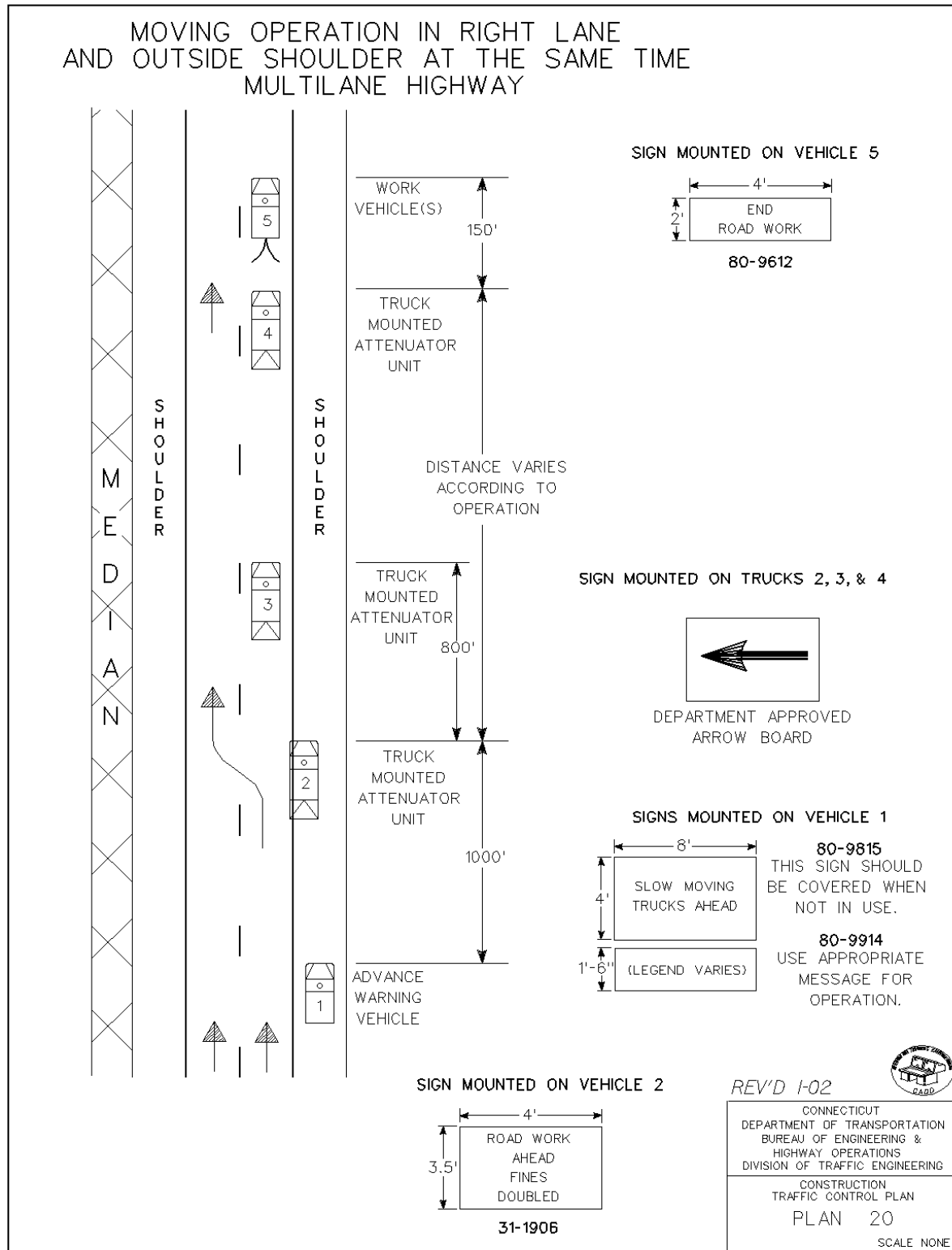


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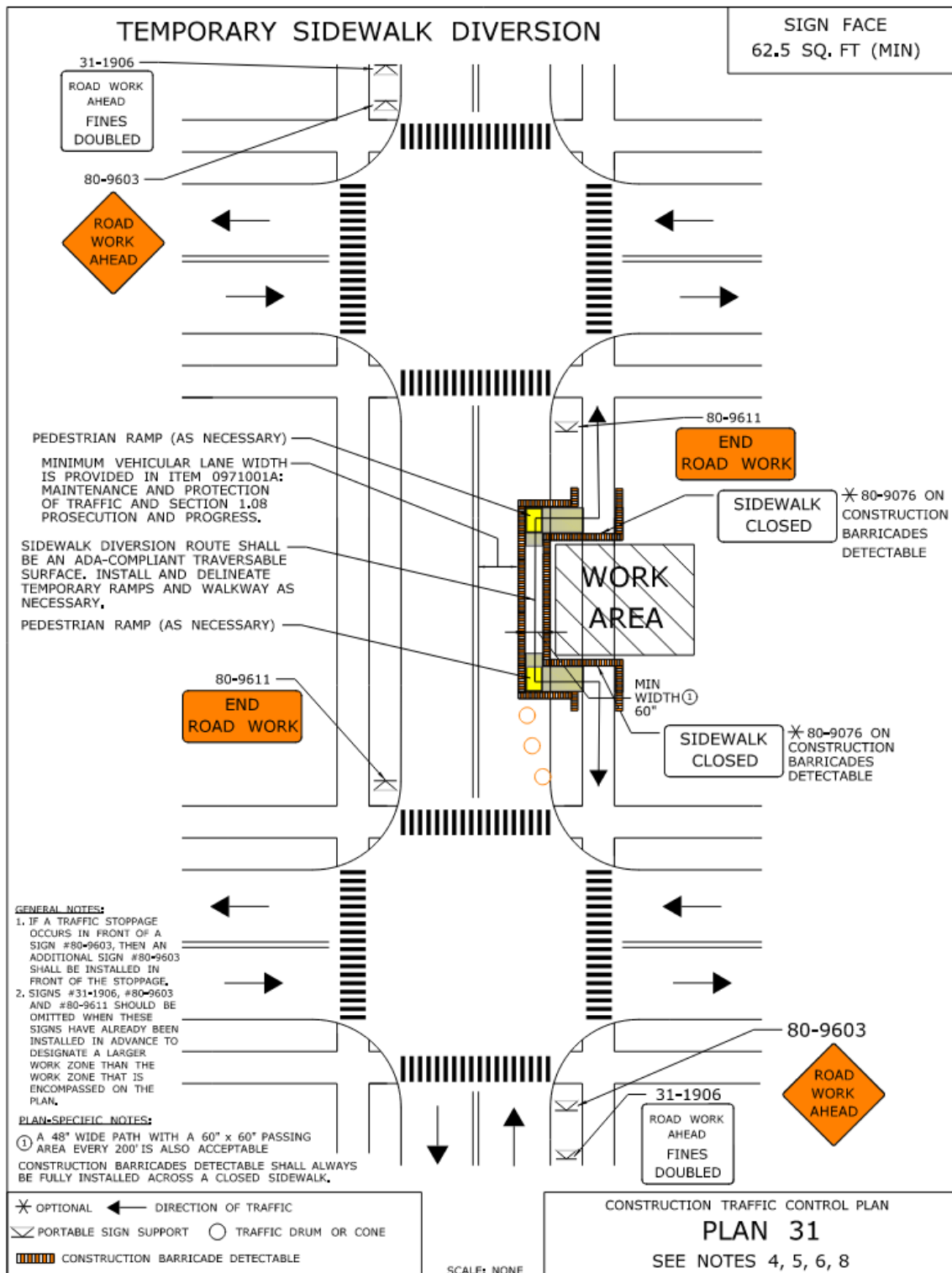
Charles S. Hahn
PRINCIPAL ENGINEER

Charles S. Harlow
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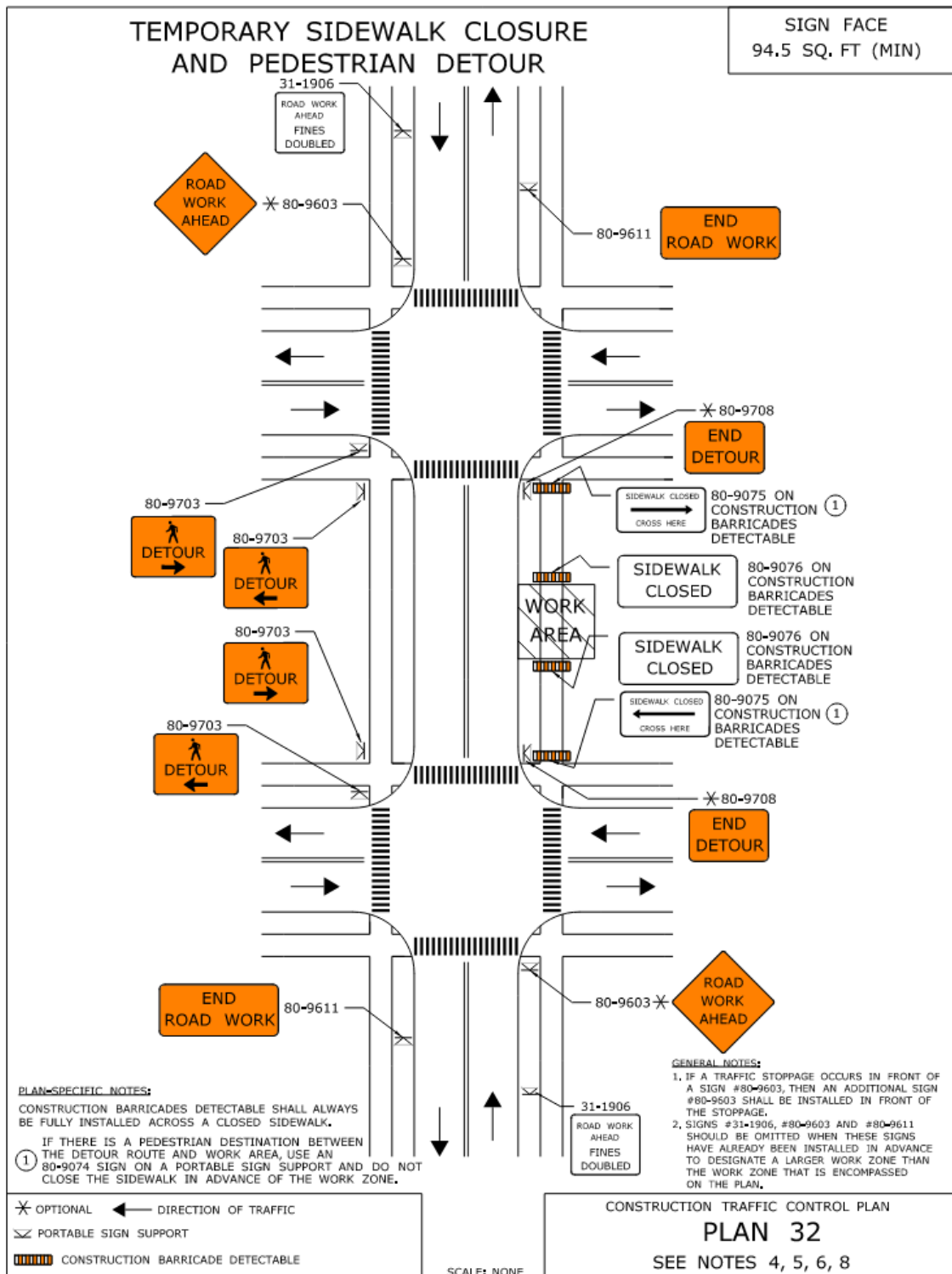




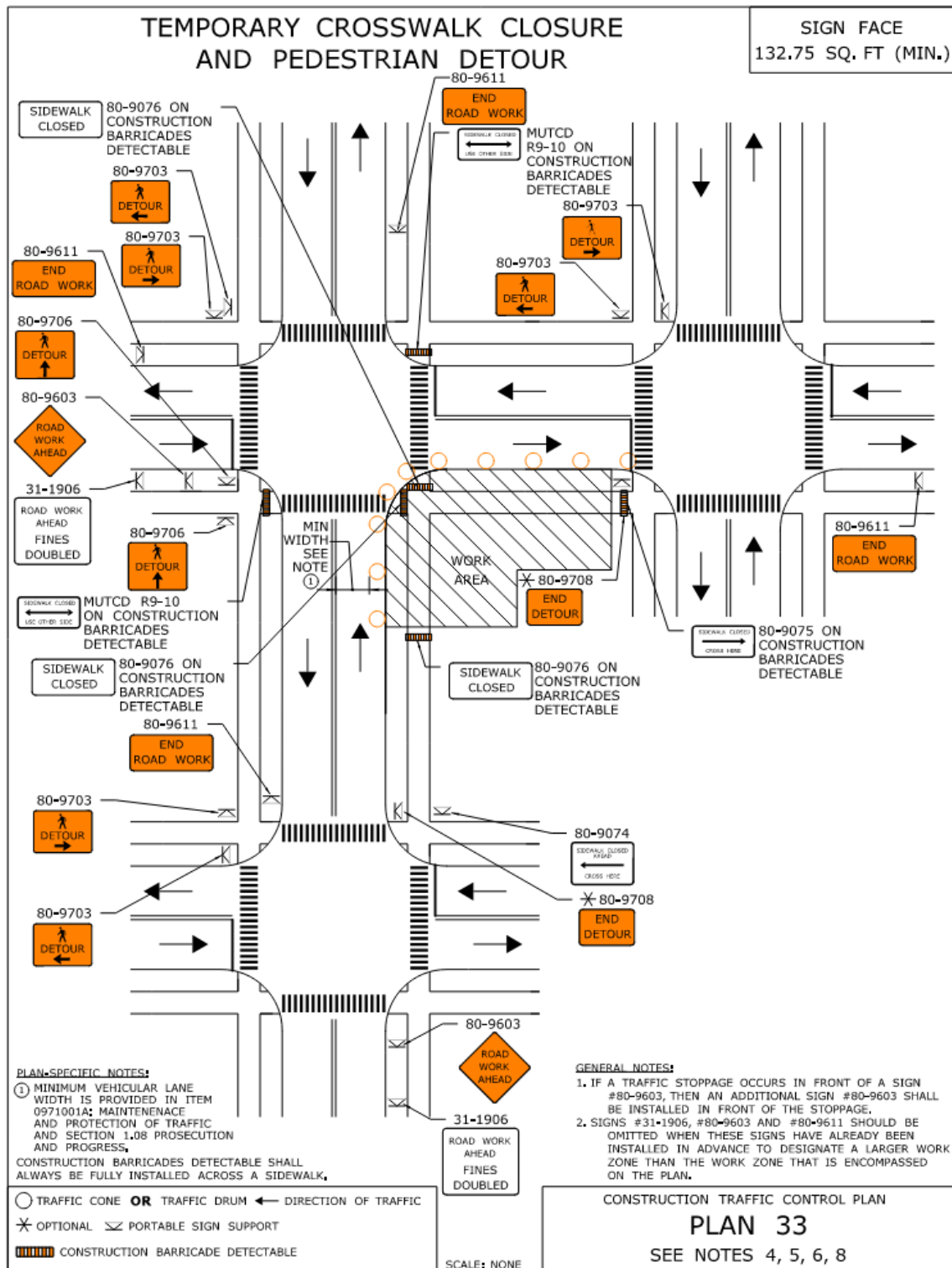
APPROVED John D. McCall DATE I-30-02
PRINCIPAL ENGINEER



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

The temporary relocation of signs and supports, and the furnishing, installation and removal of any temporary supports shall be paid for under the item “Maintenance and Protection of Traffic”. Temporary overhead sign supports and foundations shall be paid for under the appropriate item(s).

The cost of furnishing, installing, and removing the material for the 4H:1V traversable slope shall be paid for under the item “Maintenance and Protection of Traffic”.

ITEM #0979005A – PEDESTRIAN BARRICADE

Section 9.79 is supplemented and amended as follows:

9.79.01—Description:

Replace the entire Article with the following:

Under this item the Contractor shall furnish all Pedestrian Barricades required on the Project as stated in the item “Maintenance and Protection of Traffic,” as shown on the Plans, and as directed by the Engineer.

Pedestrian barricades visible to vehicular traffic shall have retroreflective sheeting compliant with the Retroreflective Sheeting: Construction Barricade Sheeting section of the [Department’s Qualified Product List](#) on the side(s) facing vehicular traffic.

9.79.02—Materials:

Replace the entire Article with the following:

Pedestrian Barricades used on the Project shall be listed on the [Department’s Qualified Product List](#) under the Pedestrian Barricade category as follows:

- The barricades listed under the Test Level 3 category may be used on roadways with a posted speed limit of 60 miles per hour or less;
- The barricades listed under the Test Level 2 category may be used on roadways with a posted speed limit of 40 miles per hour or less;

Water filled Pedestrian Barricades shall only be used when the air temperature is above 33°F. Such barricades shall only be filled with water and may not contain additional chemicals.

9.79.03 - Construction Methods:

Add the following:

Pedestrian Barricades shall be installed per manufacturer guidelines.

Barricade supports shall not protrude more than 4 inches into the pedestrian facility.

Pedestrian Barricades used to close a pedestrian facility shall cover the entire width of the pedestrian facility.

Pedestrian Barricades used for channelizing pedestrian traffic shall meet the following requirements:

1. Barricades along the pedestrian path shall be interlocked and the gap between adjacent devices shall not exceed 1 inch;

2. Barricades shall be installed to produce a smooth continuous length of barrier, except for locations where access to, or crossing, a pedestrian facility is allowed;

9.79.04—Method of Measurement:

Replace the entire Article with the following:

Pedestrian Barricades will be measured as the number of feet along the top rail of pedestrian barricades installed and accepted on the Project.

9.79.05—Basis of Payment:

Replace the entire Article with the following:

Pedestrian Barricades will be paid at the Contract unit price per linear foot for "Pedestrian Barricade." The length of Pedestrian Barricades will be paid for once, regardless of the number of times used on the Project.

Pay Item	Pay Unit
Pedestrian Barricade	l.f.

ITEM #0981101A - OPPOSING TRAFFIC LANE DIVIDER

Article 9.81.01 - Description:

This item shall include furnishing, installing, resetting, and removing Opposing Traffic Lane Dividers. Opposing Traffic Lane Dividers will be used to separate opposing traffic on a two-lane two-way roadway. The legend on the divider shall be two opposing arrows.

The Opposing Traffic Lane Divider shall meet the requirements of Federal Highway Administration's Strategic Highway Research Program (SHRP). The Opposing Traffic Lane Divider shall be 12 inch wide by 18 inch high sign panels mounted back to back on a flexible support post. The post shall be mounted to a base.

A series of these devices shall be placed on the center line of a temporary two-way operation. The support shall be designed to recover automatically to a vertical position if struck by a vehicle.

The opposing Traffic Lane Divider is covered in Section 6F.76 of the Manual on Uniform Traffic Control Devices (2009 Edition).

Article 9.81.02 - Materials:

- 1) Panel - The vertical panel shall be constructed of a flexible material resistant to ultraviolet light, ozone and hydrocarbons. The surface shall be smooth and suitable for adherence of appropriate retroreflective sheeting. The retroreflective sheeting shall be Type IV retroreflective sheeting in accordance with Section M.18.09.
- 2) Support Post - The support post shall be made of a material resistant to ultraviolet light, ozone, and hydrocarbons. The post shall have sufficient stiffness to remain rigid in windy conditions. The support shall be designed to recover automatically to a vertical position or manually restored (when fastened to the roadbed), if struck by a vehicle.
- 3) Base - The base shall consist of a metal ballast plate fastened to a rubber base. For long-term use, the metal ballast plate can be fastened directly to the roadbed. When fastened to the roadbed, the post will need to be manually reset when hit. The base shall meet the requirements of the Federal Highway Administration's Strategic Highway Research Program (SHRP).

Article 9.81.03 - Construction Methods:

The Opposing Traffic Lane Dividers shall be spaced every 30 feet apart or as directed by the Engineer. The Contractor shall insure that the devices are kept clean and bright. Any devices that are missing, damaged, or defaced so that they are not effective, as determined by the Engineer and in accordance with the American Traffic Safety Services Association (ATSSA) guidelines contained in "Quality Standards for Work Zone Traffic Control Devices", shall be replaced by the Contractor at no cost to the State. When no longer required, they shall remain the property of the Contractor.

Article 9.81.04 - Method of Measurement:

This work will be measured for payment by the number of opposing traffic lane dividers furnished, installed and accepted on the project. Replacement devices shall not be measured for payment. Devices relocated to a different location in accordance with the Engineer shall not be measured.

Article 9.81.05 - Basis of Payment:

This work will be paid for at the contract unit price each for "Opposing Traffic Lane Divider" which price shall include all materials, equipment, tools, labor and work incidental to furnishing, installing, maintaining and removing the units.

ITEM # 0992090A - BENCH

Description:

Under this item the contractor shall provide and install benches as shown on the plans and specified herein.

Materials: The materials for the work shall conform to the following:

1. MANUFACTURER: Dumor, Inc., P.O. Box 142 Mifflintown, PA 17059-0142
MODEL: 58 (6' Length) Color: Black
2. MANUFACTURER: Dawn Enterprises; 275 Progress Drive, Suite B, Manchester, CT 06042
MODEL: Metal Oglethorpe Bench (6' Length) Color: Black

Or approved equal

Concrete shall meet the requirements of Section M.03 for PCC04460. Materials for processed aggregate base shall meet the requirements of M.05.01. Anchors and reinforcement shall meet requirements of M.06.01.

Submittals:

Shop or product drawings and product data shall be submitted including color verification, anchoring method.

Construction Methods:

The benches shall be installed in accordance with the manufacturer's recommendations and anchored to a concrete pad at the location and in the method as shown on the plans or as directed by the Engineer.

Drilling and bonding anchor bolts shall be in accordance with Section 6.10.

Excavation for the concrete pad shall be made to the required depths below the finished grade, as shown on the plans or as directed. All soft and yielding material shall be removed and replaced with suitable material.

Processed aggregate base shall be installed in accordance with Article 3.04.03.

Concrete pad shall be constructed in accordance with Article 6.01.03.

Method of Measurement

The work will be measured for payment by the actual number (ea.) of benches complete and accepted in place.

There will be no measurement or payment for the cost of processed aggregate base preparation, concrete pad, reinforcement, anchorage, and coordination, all of which shall be included in the bid price.

ITEM # 0992090A

Basis of Payment:

This work will be paid for at the contract unit price per actual number (ea.) of “Bench” complete and accepted in place, which price shall include all coordination, materials, reinforcement, processed aggregate base, concrete pad, anchorage, equipment, tools and labor incidental thereto.

Pay Item
Bench

Pay Unit
EA.

ITEM #1002201A – TRAFFIC CONTROL FOUNDATION – SPAN POLE

Description: Work under this item shall consist of designing and constructing drilled shaft foundations for steel span poles, in accordance with the details shown on the Plans and as ordered by the Engineer.

Materials: The reinforcing steel shall be uncoated, ASTM A615, Grade 60 reinforcement conforming to the requirements of Article M.06.01.

The concrete for the drilled shaft shall conform to Article M.03, Class PCC04460. The 28 day minimum compressive strength of the concrete in the constructed foundation shall be 4,400 psi. The concrete mix design, including admixtures, shall be submitted to the Engineer for review.

The slurry, if used, shall be Contractor designed mineral or polymer slurry that meets the range of values listed herein. The slurry mix design, including admixtures, shall be submitted to the Engineer for approval.

Permanent steel casing, if used, shall meet the requirements of ASTM A36 or ASTM A252, Grade 2.

Rigid metal conduit, ground rod sleeves and related hardware, and end caps shall be galvanized steel conduit, and shall conform to Article M.15.09.

Ground rods shall be 0.625 inches in diameter by 10.0 feet long copper clad steel. The copper cladding shall be a minimum thickness of 0.128 inches. The ground clamp shall be a square-head bolt type, approved for direct burial.

Bare copper wire shall conform to Article M.15.13.

Topsoil shall conform to Article M.13.01.

Fertilizer shall conform to Article M.13.03.

Seed mixture shall conform to Article M.13.04., or the seed mix specified on the Plans.

Mulch shall conform to Article M.13.05.

Erosion control matting shall conform to Article M.13.09.

Construction Methods:

General: Excavations required for shafts shall be performed through whatever materials are encountered, to the dimensions and elevations in the working drawings or as ordered by the Engineer. The methods and equipment used shall be suitable for the intended purpose and

materials encountered. Shaft excavation may be performed by combinations of augering, rotary drilling, down-the-hole hammer, reverse circulation drilling, clamming, scraping, or other means approved by the Engineer. Generally, either the dry method, wet method, temporary casing method, or permanent casing method may be used, as necessary, to produce sound, durable concrete foundation shafts free of defects. The Contractor shall select and use the method that is needed to properly accomplish the work, as determined by site conditions and subject to the approval of the Engineer. The Contractor is responsible for maintaining the stability of the shaft excavation during all phases of construction.

An optional construction joint may be introduced within the drilled shaft foundation. The location of this optional construction joint shall be as shown on the Plans. No alternate construction joint location shall be permitted unless approved by the Engineer.

Open excavation shall not be permitted to construct the portion of the foundation below the elevation of the optional construction joint.

Subsurface Conditions for Bidding: For the purpose of bidding this item, the Contractor shall assume that the subsurface conditions for each drilled shaft foundation location consists of cohesionless, medium dense, granular soil (AASHTO A-1 or A-2) with cobbles present and a high groundwater table which requires the use of wet construction/concreting methods. During excavation and construction of each foundation, should the Contractor encounter subsurface conditions that differ materially from those assumed at the time of bid, the Contractor shall notify the Engineer. All matters regarding increased cost relating to an agreed upon change in subsurface conditions will be handled per Section 1.04.04 – Differing Site Conditions.

Foundation Design Requirements: The design of drilled shaft foundations shall conform to the requirements of the latest edition of the AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals, including the latest interim specifications, available prior to the advertising date of the Contract, amended as follows:

- The foundation shall be designed for the soils and rock properties and parameters based on the subsurface conditions (character of the soil and rock, presence of ground water, etc.) in the location of, adjacent to and below the drilled shaft foundation excavation. The need and extent of all subsurface explorations and investigations shall be determined by the Contractor.
- The specified compressive strength, f'_c , of the concrete used in the design shall be 4,000 psi.
- The concrete cover for reinforcing in the drilled shaft shall be 3.00 inches, unless otherwise noted on the Plans.
- The reinforcement shall be uncoated and conform to ASTM A615, Grade 60.

- The foundation shall be designed for the span pole reactions of all limit state load combinations. The reactions shall include axial, shear, flexural and torsional load effects.
- The diameter of the drilled shaft foundation shall be 3.00 feet, unless otherwise noted on the Plans.
- The design of the drilled shaft foundation shall include embedment of the foundation in soil, the embedment of the foundation in rock or the embedment of the foundation partially in soil and partially in rock, as applicable.
- The design of the drilled shaft embedment depth shall account for the slope of the finished grade.
- The minimum embedment for a drilled shaft foundation, constructed entirely in soil, shall be no less than 12.00 feet below the finished grade at the low side of a sloping grade. The minimum embedment for a drilled shaft foundation, constructed entirely in rock shall be no less than 8.00 feet below the finished grade at the low side of a sloping grade.
- For drilled shaft foundations, the top of the drilled shaft pedestal shall project 3.00 inches above the level ground or 3.00 inches to 12.00 inches above the finished grade at the high side of a sloping grade, unless otherwise shown on the Plans.
- The drilled shaft foundation shall be reinforced with longitudinal and transverse reinforcement. The area of longitudinal reinforcement shall be no less than the sum of the reinforcement required for flexure and the longitudinal reinforcement required for torsion. The area of transverse reinforcement shall be no less than the sum of the reinforcement required for shear and the transverse reinforcement required for torsion.
- The minimum number of longitudinal reinforcing bars shall be 16. The minimum size of longitudinal reinforcing bars shall be #8. The minimum area of longitudinal reinforcing bars shall be no less than 1% of the gross cross-sectional area of the shaft. The minimum clear distance between longitudinal reinforcing bars shall be no less than 5 times the maximum aggregate size or 5.00 inches, whichever is greater. The reinforcement shall extend full length of the drilled shaft foundation, including the pedestal, less cover requirements. Splicing of the longitudinal reinforcement is not permitted.
- The drilled shaft foundation shall be transversely reinforced with spirals or circular, one piece, enclosed ties. The minimum size of the transverse reinforcement shall be #4. The maximum spacing/pitch of the transverse reinforcement shall be no more than 6.00 inches. The minimum spacing/pitch of the transverse reinforcement shall be no less than 4.00 inches. The maximum

spacing/pitch of the transverse reinforcement in the top 2.00 feet of the foundation shall be no more than 4.00 inches. The spiral reinforcement shall be terminated at the top and the bottom with 1 ½ turns of the reinforcing and a 135° standard hook. Spirals may be spliced with lap splices or mechanical connectors. For spirals, the minimum lap splice length shall be no less than that required for a Class B splice or 48 bar diameters, whichever is greater. For spirals, the mechanical connectors shall develop both in tension and compression 125% of the specified yield strength of the bar. For ties, the minimum lap splice length shall be no less than that required for a Class B splice. Tie lap splices shall be alternated. The ends of the bars in lap splices shall be anchored with a 135° standard hook around longitudinal reinforcement.

- The design of the foundation shall be coordinated with the traffic control structure to avoid conflicts between the embedded support anchorage and the foundation reinforcement.
- The design of the foundation shall account for the type of construction method selected. If the permanent casing construction method is elected for use, the design shall account for the permanent casing.

Submittal Requirements for Foundations: Prior to excavating for the foundation, the Contractor shall submit working drawings and design computations, with all details and documents necessary for fabrication and construction, for each span pole foundation in a **span wire structure configuration** for review in accordance with Article 1.05.02.

The working drawings and design computations for the span pole foundations shall conform to working drawing requirements for permanent construction. **A single set of working drawings with tabulated data for multiple span pole foundations in span wire structure configuration is allowed.** Each span pole foundation shall be referenced with an alpha-numeric identifier noted on the Contract documents. The working drawings and calculations shall be prepared in Customary U.S. units.

The span pole foundation working drawing and calculation submittal shall include the following:

- title sheet
- table of contents
- contact information for designer – contact information shall include name and address of design firm, name of contact person with phone number and email address
- foundation working drawings

- foundation design computations

The working drawings shall include complete details of all foundation components. The drawings shall include, but not be limited to the following:

- the Project number, town and traffic control structure identification number
- reference to the design specifications, including interim specifications
- material specifications for all components
- embedment depths for foundation in soil, rock and a combination of soil and rock
- anchor bolt details, including dimensions, embedment and projection
- location of foundation construction joint

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

- the Project number, town and traffic control structure identification number
- references to design specifications, including interim specifications, and the applicable code section and articles
- description/documentation for all computer programs used in the design
- drawings/models of the foundation with dimensions, loads and references to the local and global coordinate systems used (as applicable), to facilitate review of the results
- coefficients and factors used in the design
- traffic structure reactions of all applicable limit states
- soil and rock design parameters
- computations demonstrating the geotechnical and structural capacity of the drilled shaft is adequate for all applicable limit states
- development length computations confirming proper design of the reinforcement crossing the optional construction joint

Prior to excavating for the foundation, the Contractor shall submit the following:

Reinforcing Steel Shop Drawings: Based on the reviewed foundation design, the Contractor shall prepare reinforcing steel shop drawings for each foundation. The drawings shall be reviewed and stamped by the foundation designer. A copy of the reviewed and stamped reinforcing steel shop drawings shall be submitted in accordance with Article 1.05.02.

Concrete Mix Design: The Contractor shall submit the concrete mix design, including admixtures, for review in accordance with Article 1.05.02.

Slurry Mix Design: If the Foundation Construction Procedure involves the use of slurry, the Contractor shall submit the slurry mix design for review in accordance with Article 1.05.02.

Foundation Construction Procedure: The Contractor shall submit a written foundation construction procedure outlining the equipment; drilling procedure for soil and rock, including how spoils will be handled; temporary casing placement and removal; slurry placement; reinforcement, anchor bolt and conduit placement; and concrete placement required for the drilled shaft foundation construction for review in accordance with Article 1.05.02. The procedure shall include contingencies for the various soil, rock and subsurface water conditions that may be encountered during the foundation construction.

The Engineer will evaluate the foundation construction procedure for conformance with the Plans, specifications and special provisions and will then notify the Contractor of any additional information required and/or changes necessary to meet the Contract requirements. All procedural approvals given by the Engineer shall be subject to trial in the field and shall not relieve the Contractor of the responsibility to satisfactorily complete the work as detailed in the Plans and specifications. The Contractor shall not commence construction of the drilled shafts until the Engineer has accepted the foundation construction procedure.

Construction Procedures: The dry method consists of drilling the shaft excavation, removing accumulated water and loose material from the excavation, and placing the shaft concrete in a relatively dry excavation. The dry construction method shall be used only at sites where the groundwater table and site conditions are suitable to permit construction of the shaft in a relatively dry excavation, and where the sides and bottom of the shaft are stable and may be visually inspected prior to placing the concrete. The use of the dry construction method is permitted if less than one foot of water accumulates in the bottom of a hole without pumping over a one hour period, the excavation remains stable and any loose material and water can be removed prior to placement of concrete.

The wet construction method shall be used at sites where a dry excavation cannot be maintained for placement of the shaft concrete. Wet construction methods consist of using a polymer or mineral slurry to maintain stability of the hole perimeter while advancing the excavation to final

depth, placing the reinforcing cage and shaft concrete. This procedure may require desanding and cleaning the slurry; final cleaning of the excavation by means of a bailing bucket, air lift, submersible pump or other devices; and placing the shaft concrete with a tremie. Unless it is demonstrated to the satisfaction of the Engineer that the surface casing is not required, temporary surface casings shall be provided to aid shaft alignment and position, and to prevent sloughing of the top of the shaft excavation. Surface casing is defined as the amount of casing required from the ground surface to a point in the shaft excavation where sloughing of the surrounding soil does not occur.

The temporary casing construction method shall be used in lieu of the dry or wet construction methods or where the dry or wet construction methods are inappropriate. Temporary casing construction method consists of advancing the excavation through caving material with or without slurry. Temporary casing may be installed by driving or vibratory procedures in advance of excavation to the lower limits of the caving material. When a nearly impervious formation is reached, a casing is placed in the hole and sealed in the nearly impervious formation. After the drilling fluid is removed from the casing, drilling may proceed as with the dry method except that the casing is withdrawn when the shaft concrete is placed. If seepage conditions prevent use of the dry method, excavation is completed using the wet method. Slurry may be omitted if the casing is advanced ahead of drilling and only if minor caving of the hole is observed. Slurry shall be used in installation if drilling is to advance ahead of the casing or if the Engineer determines that the application of the slurry is required in order to maintain soil stability around the hole.

The permanent casing construction method shall be used in lieu of the dry or wet construction methods or where the dry or wet construction methods are inappropriate. The permanent casing construction method is similar to the temporary casing construction method, only with the casing permanently left in place. The permanent casing construction method consists of advancing the excavation through the caving material with or without slurry. Permanent casing may be installed by driving or vibratory procedures in advance of excavation to the lower limits of the caving material. When a nearly impervious formation is reached, a casing is placed in the hole and sealed in the nearly impervious formation. After the drilling fluid is removed from the casing, drilling may proceed as with the dry method. The casing is permanently left in place to stabilize the excavation while the shaft concrete is placed. If seepage conditions prevent the use of the dry method, excavation is completed using the wet method.

If the Engineer determines that the foundation material encountered during excavation is unsuitable or differs from that anticipated in the design of the shaft, or if rock is encountered at an unanticipated elevation, the Contractor's foundation designer shall determine if the foundation embedment should be revised from that shown on the working drawings. If rock is encountered, the Engineer shall be notified to inspect and determine the elevation of the top of competent rock. Any revisions to the foundation embedment during construction shall be reviewed by the Engineer.

Excavated materials which are removed from the shaft excavation and any drilled fluids used shall be disposed of by the Contractor as directed by the Engineer and in accordance with Section 1.10.

Casings shall be metal, smooth, clean, watertight, and of ample strength to withstand both handling and driving stresses and the pressure of both concrete and the surrounding earth materials. The outside diameter of casing shall not be less than the specified size of the shaft. Temporary casings shall be removed while the concrete remains workable (i.e., a slump of 4.0 inches or greater). Before the casing is withdrawn and while the casing is being withdrawn, a 5.0 foot minimum head of fresh concrete in the casing shall be maintained so that all the fluid trapped behind the casing is displaced upward without contaminating the shaft concrete. The required minimum concrete head may have to be increased to counteract groundwater head outside the casing. Separation of the concrete by hammering or otherwise vibrating the casing, during withdrawal operations, shall be avoided. Casing extraction shall be at a slow, uniform rate with the pull in line with the shaft axis. Permanent casings for the drilled shaft foundation shall be designed according to the AASHTO LRFD specifications. When the Contractor elects to construct the foundation with an optional construction joint, the Contractor is permitted to use a corrugated metal casing only for the portion above the elevation of the optional construction joint. Corrugated metal casing shall not be permitted below the location of the optional construction joint in the foundation under any circumstance. The permanent casing below the optional construction joint location shall be smooth metal as described above. No portion of the permanent casing shall be left exposed above the proposed finished grade.

Slurry used in the drilling process shall be a mineral or polymer slurry. The slurry shall have both a mineral grain size that will remain in suspension and sufficient viscosity and gel characteristics to transport excavated material to a suitable screening system. The percentage and specific gravity of the material used to make the suspension shall be sufficient to maintain the stability of the excavation and to allow proper concrete placement. The level of the slurry shall be maintained at a height sufficient to prevent caving of the hole.

The slurry shall be premixed thoroughly with clean fresh water at a temperature above 41° F and adequate time allotted for hydration prior to introduction into the shaft excavation. The elevation of the slurry within the shaft foundation shall be maintained within 24.0 inches of the top casing and at least 48.0 inches above the existing water level during drilling and until the concrete placement is essentially complete. The slurry properties shall be maintained at all times, including non-working periods and stoppages. The slurry shall be circulated and agitated, continuously if necessary, to maintain the slurry properties and to prevent it from setting up in the shaft.

The Contractor, in the presence of the Engineer, shall perform control tests on the slurry to ensure that the density, viscosity, and pH fall within the acceptable limits tabulated below. The Contractor shall provide all equipment required to perform the tests. If desanding is required, sand content shall not exceed 4% (by volume) at any point in the shaft excavation as determined by the American Petroleum Institute sand content test.

Range of Values (at 68°F)

Property (Units)	Time of Slurry Introduction	Time of Concreting (in Hole)	Test Method
Density (pcf)	64.3 to 69.1	64.3 to 75.0	Density Balance
Viscosity (seconds per quart)	28 to 45	28 to 45	Marsh Cone
pH	8 to 11	8 to 11	pH paper or meter

The control tests to determine unit weight (density), viscosity, and pH values of the slurry shall be done during the shaft excavation to establish a consistent working pattern.

Prior to placing shaft concrete, slurry samples shall be taken from the bottom and at intervals not exceeding 10.0 feet for the full height of slurry. Any heavily contaminated slurry that has accumulated at the bottom of the shaft shall be eliminated. The slurry shall be within specification requirements immediately before shaft concrete placement.

The hole shall be covered when left unattended.

After completing the shaft excavation, all loose material existing at the bottom of the hole shall be removed.

Prior to placing the reinforcement into the shaft, the Contractor, in the presence of the Engineer, shall determine the shaft dimensions, depth and alignment of the shaft. The concrete shaft shall not be out of plumb by more than 0.25 inches per foot of depth. The Contractor shall provide all equipment necessary for checking the shaft excavation. The Engineer shall inspect the shaft and verify that it has been properly cleaned.

The reinforcing steel shall be fabricated and assembled in accordance with Article 6.02.03. All reinforcement shall be assembled with wire ties. Welding to assemble the reinforcement is not permitted.

Immediately after the shaft excavation has been inspected and approved by the Engineer and prior to placement of the concrete, the assembled reinforcing steel cage, including cage stiffener bars, spacers, centralizers, and other necessary appurtenances, shall be carefully placed into the shaft excavation as a unit. Dropping or forcing cages into the shaft will not be allowed. The

reinforcing steel in the shaft shall be tied and supported so that the reinforcing steel will remain within allowable tolerances of its intended position until the concrete will support the reinforcing steel. When concrete is placed by tremie methods, temporary hold-down devices shall be used to prevent uplifting of the reinforcing steel cage during concrete placement. Concrete spacers or other approved noncorrosive spacing devices shall be used at sufficient intervals not exceeding 5.0 feet along the shaft to ensure concentric location of the cage within the shaft excavation. When the size of the longitudinal reinforcing steel is larger than a #8 bar, such spacing shall not exceed 10.0 feet. After placement of the reinforcing cage, the Engineer shall inspect the shaft to ensure that it has remained clean. If the inspection indicates that loose material has accumulated at the bottom of shaft excavation, the Contractor shall remove the reinforcing cage and reclean the shaft.

Concrete construction shall conform to Subarticle 6.01.03-I and II as amended herein.

Concrete shall be placed in the shaft excavation as soon as possible, but no more than 4 hours after completion of excavation and cleaning of the bottom of the excavation, and no more than 2 hours after placement of the reinforcing steel cage. Concrete shall be placed in a continuous operation to the top of the shaft, unless the Contractor elects the use of the optional construction joint at the location shown on the Plans. The concrete level shall be horizontal during the pouring operations. Concrete placement shall continue after the shaft is full and good quality concrete is evident at the top of the shaft. The elapsed time from the beginning of concrete placement in the shaft to the completion of placement shall not exceed 2 hours for a single pour.

In dry construction, concrete shall be placed in a single continuous operation with the flow of concrete down the center of the shaft excavation so as to consolidate the concrete on impact. During placement operations, the concrete is not permitted to hit the reinforcing steel. A dropchute, consisting of a hopper and flexible hose, may be used to direct the concrete down the center of the foundation and prevent the concrete from hitting the reinforcing steel. Accumulated water shall be removed before placing the concrete. At the time of concrete placement, no more than 2.0 inches of water may exist at the bottom of the excavation and loose sediment no more than 0.5 inches over one-half the base is acceptable.

In wet (slurry) construction, concrete is to be placed by the tremie method, where the concrete displaces the slurry from bottom of the excavation to the top. The concrete shall be placed through a top metal hopper and into a rigid leak-proof elephant trunk tremie tube, sufficiently large enough to permit free flow of concrete. The tremie tube shall be positioned so that it can be removed without disturbing the reinforcing. Initially, the discharge end of the tremie tube shall be sealed closed (plugged) to prevent slurry from entering the tube after it is placed in the excavation and before the tube is filled with concrete. After concrete placement has started, the tremie tube shall be kept full of concrete to the bottom of the hopper to maintain a positive concrete head. The flow of concrete shall be induced by slightly raising the discharge end of the tube, always keeping the tube end in the deposited concrete. No horizontal movement of the tremie tube will be permitted.

The shaft concrete shall be vibrated or rodded to a depth of 5.0 feet below the ground surface except where soft uncased soil or slurry remaining in the excavation will possibly mix with the concrete.

Exposed concrete shall be cured and finished in accordance with Subarticle 6.01.03-II.

Anchor bolt assemblies shall be embedded in the concrete as shown on the working drawings. A template plate shall be used to hold the anchor bolt assemblies, conduits and ground rod sleeve in the correct position. The anchor bolts shall be installed plumb.

All conduit ends terminating below grade shall be capped with a malleable iron caps. All above-grade conduit ends shall be terminated with an insulated bonding bushing with tinned insert. The rigid metal conduit sweeps shall extend a minimum of 2.00 feet from the side of the foundation and shall be placed a minimum of 2.00 feet below finished grade.

Ground rod and ground wire shall be installed as shown on the Plans.

No construction operations that would cause soil movement adjacent to the shaft, other than mild vibration, shall be conducted for at least 48 hours after shaft concrete has been placed.

The top of the foundations shall be backfilled and the adjacent disturbed ground surfaces restored to match the surrounding area after the concrete has cured and the forms are removed.

Placement of topsoil shall conform to Articles 9.44.01 and 9.44.03. Turf establishment shall conform to Article 9.50.03., or the seed mix specified on the Plans.

The span poles shall not be erected on the foundation until the concrete in the shaft has attained a compressive strength, f'_c , greater than or equal to 4,000 psi.

Method of Measurement: This work will be measured for payment by the number of foundation units, each completely installed and accepted.

The work to remove rock from the foundation excavation will be measured from the top of competent rock, as determined by the Engineer, to the bottom of rock excavation.

Basis of Payment: The work will be paid for at the Contract unit price each for "Traffic Control Foundation – Span Pole," completed and accepted in place, which price shall include all equipment, materials, tools and labor incidental to the subsurface exploration, design, fabrication, construction and disposal of drilling spoils, of the foundations at the locations specified on the Plans.

No additional payment will be made for the Contractor to test the slurry when it is used to construct a drilled shaft foundation. No additional payment will be made for subsurface investigations performed by the Contractor.

The permanent steel casing, if used, will not be measured for payment. The use of a permanent steel casing is considered incidental to the cost of the foundation and may be elected for use by the Contractor at no additional cost to the State.

The removal of existing roadside barrier systems, installation and removal of temporary roadside barrier systems and resetting existing roadside barrier systems will not be paid for separately, but will be included as part of the work.

The temporary support, protection and restoration of utilities (if necessary), including existing underground wiring, conduits, drainage structures, pipes and underdrain systems within the excavation limits will not be paid for separately, but will be included as part of the work.

Backfilling and restoration of adjacent ground surfaces (pavement, slope protection, topsoil and seed, etc.) in all areas disturbed by the work will not be paid for separately, but will be included as part of the work. The Engineer will determine the type, thickness and horizontal limits of the surfaces to be restored.

When rock is encountered within the limits of excavation, its removal will be paid for at the Contract unit price per vertical foot for "Rock in Foundation Excavation," which price shall include any additional excavation to remove the rock and any additional concrete required to fill the excavation beyond the designed foundation hole dimensions. Rock, in so far as it applies to "Rock in Foundation Excavation," shall be defined as rock in definite ledge formation, boulders, or portions of boulders, cement masonry structures, concrete structures or Portland cement concrete pavement which has a cross-sectional area that exceeds 50% of the cross-sectional area of the designed foundation hole.

<u>Pay Item</u>	<u>Pay Unit</u>
Traffic Control Foundation – Span Pole	ea.
Rock in Foundation Excavation	v.f.

ITEM #1002202A – TRAFFIC CONTROL FOUNDATION – MAST ARM

Description: Work under this item shall consist of designing and constructing drilled shaft foundations for mast arm assemblies, in accordance with the details shown on the Plans and as ordered by the Engineer.

Materials: The reinforcing steel shall be uncoated, ASTM A615, Grade 60 reinforcement conforming to the requirements of Article M.06.01.

The concrete for the drilled shaft shall conform to Article M.03, Class PCC04460. The 28 day minimum compressive strength of the concrete in the constructed foundation shall be 4,400 psi. The concrete mix design, including admixtures, shall be submitted to the Engineer for approval.

The slurry, if used, shall be Contractor designed mineral or polymer slurry that meets the range of values listed herein. The slurry mix design, including admixtures, shall be submitted to the Engineer for approval.

Permanent steel casing, if used, shall meet the requirements of ASTM A36 or ASTM A252, Grade 2.

Rigid metal conduit, ground rod sleeves and related hardware, and end caps shall be galvanized steel conduit, and shall conform to Article M.15.09.

Ground rods shall be 0.625 inches in diameter by 10.0 feet long copper clad steel. The copper cladding shall be a minimum thickness of 0.128 inches. The ground clamp shall be a square-head bolt type, approved for direct burial.

Bare copper wire shall conform to Article M.15.13.

Topsoil shall conform to Article M.13.01.

Fertilizer shall conform to Article M.13.03.

Seed mixture shall conform to Article M.13.04., or the seed mix specified on the Plans.

Mulch shall conform to Article M.13.05.

Erosion control matting shall conform to Article M.13.09.

Construction Methods:

General: Excavations required for shafts shall be performed through whatever materials are encountered, to the dimensions and elevations in the working drawings or as ordered by the Engineer. The methods and equipment used shall be suitable for the intended purpose and

materials encountered. Shaft excavation may be performed by combinations of augering, rotary drilling, down-the-hole hammer, reverse circulation drilling, clamming, scraping, or other means approved by the Engineer. Generally, either the dry method, wet method, temporary casing method, or permanent casing method may be used, as necessary, to produce sound, durable concrete foundation shafts free of defects. The Contractor shall select and use the method that is needed to properly accomplish the work, as determined by site conditions and subject to the approval of the Engineer. The Contractor is responsible for maintaining the stability of the shaft excavation during all phases of construction.

An optional construction joint may be introduced within the drilled shaft foundation.. The location of this optional construction joint shall be as shown on the Plans. No alternate construction joint location shall be permitted unless approved by the Engineer.

Open excavation shall not be permitted to construct the portion of the foundation below the elevation of the optional construction joint.

Subsurface Conditions for Bidding: For the purpose of bidding this item, the Contractor shall assume that the subsurface conditions for each drilled shaft foundation location consists of cohesionless, medium dense, granular soil (AASHTO A-1 or A-2) with cobbles present and a high groundwater table which requires the use of wet construction/concreting methods. During excavation and construction of each foundation, should the Contractor encounter subsurface conditions that differ materially from those assumed at the time of bid, the Contractor shall notify the Engineer. All matters regarding increased cost relating to an agreed upon change in subsurface conditions will be handled per Section 1.04.04 – Differing Site Conditions.

Foundation Design Requirements: The design of drilled shaft foundations shall conform to the requirements of the latest edition of the AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals, including the latest interim specifications, available prior to the advertising date of the Contract, amended as follows:

- The foundation shall be designed for the soils and rock properties and parameters based on the subsurface conditions (character of the soil and rock, presence of ground water, etc.) in the location of, adjacent to and below the drilled shaft foundation excavation. The need and extent of all subsurface explorations and investigations shall be determined by the Contractor.
- The specified compressive strength, f'_c , of the concrete used in the design shall be 4,000 psi.
- The concrete cover for reinforcing in the drilled shaft shall be 3.00 inches, unless otherwise noted on the Plans.
- The reinforcement shall be uncoated and conform to ASTM A615, Grade 60.

- The foundation shall be designed for the mast arm assembly reactions of all limit state load combinations. The reactions shall include axial, shear, flexural and torsional load effects.
- The diameter of the drilled shaft foundation shall be 3.0 feet for mast arms with pole diameters at the base less than or equal to 18 inches and 4.0 feet otherwise, unless otherwise noted on the Plans.
- The design of the drilled shaft foundation shall include embedment of the foundation in soil, the embedment of the foundation in rock or the embedment of the foundation partially in soil and partially in rock, as applicable.
- The design of the drilled shaft embedment depth shall account for the slope of the finished grade.
- The minimum embedment for a drilled shaft foundation, constructed entirely in soil, shall be no less than 12.00 feet below the finished grade at the low side of a sloping grade. The minimum embedment for a drilled shaft foundation, constructed entirely in rock shall be no less than 8.00 feet below the finished grade at the low side of a sloping grade.
- For drilled shaft foundations, the top of the drilled shaft pedestal shall project 3.00 inches above the level ground or 3.00 inches to 12.00 inches above the finished grade at the high side of a sloping grade, unless otherwise shown on the Plans.
- The drilled shaft foundation shall be reinforced with longitudinal and transverse reinforcement. The area of longitudinal reinforcement shall be no less than the sum of the reinforcement required for flexure and the longitudinal reinforcement required for torsion. The area of transverse reinforcement shall be no less than the sum of the reinforcement required for shear and the transverse reinforcement required for torsion.
- The minimum number of longitudinal reinforcing bars shall be 16. The minimum size of longitudinal reinforcing bars shall be #8. The minimum area of longitudinal reinforcing bars shall be no less than 1% of the gross cross-sectional area of the shaft. The minimum clear distance between longitudinal reinforcing bars shall be no less than 5 times the maximum aggregate size or 5.00 inches, whichever is greater. The reinforcement shall extend full length of the drilled shaft foundation, including the pedestal, less cover requirements. Splicing of the longitudinal reinforcement is not permitted.
- The drilled shaft foundation shall be transversely reinforced with spirals or circular, one piece, enclosed ties. The minimum size of the transverse reinforcement shall be #4. The maximum spacing/pitch of the transverse reinforcement shall be no more than 6.00 inches. The minimum spacing/pitch of

the transverse reinforcement shall be no less than 4.00 inches. The maximum spacing/pitch of the transverse reinforcement in the top 2.00 feet of the foundation shall be no more than 4.00 inches. The spiral reinforcement shall be terminated at the top and the bottom with 1 ½ turns of the reinforcing and a 135° standard hook. Spirals may be spliced with lap splices or mechanical connectors. For spirals, the minimum lap splice length shall be no less than that required for a Class B splice or 48 bar diameters, whichever is greater. For spirals, the mechanical connectors shall develop both in tension and compression 125% of the specified yield strength of the bar. For ties, the minimum lap splice length shall be no less than that required for a Class B splice. Tie lap splices shall be alternated. The ends of the bars in lap splices shall be anchored with a 135° standard hook around longitudinal reinforcement.

- The design of the foundation shall be coordinated with the traffic structure to avoid conflicts between the embedded support anchorage and the foundation reinforcement.
- The design of the foundation shall account for the type of construction method selected. If the permanent casing construction method is elected for use, the design shall account for the permanent casing.

Submittal Requirements for Foundations: Prior to excavating for the foundation, the Contractor shall submit working drawings and design computations, with all details and documents necessary for fabrication and construction, for each mast arm assembly foundation for review in accordance with Article 1.05.02.

The working drawings and design computations for the mast arm assembly foundation shall conform to working drawing requirements for permanent construction. **A single set of drawings with tabulated data for multiple mast arm foundations is not permitted.** Each mast arm foundation shall be referenced with an alpha-numeric identifier noted on the Contract documents. The working drawings and computations shall be prepared in Customary U.S. units.

- title sheet
- table of contents
- contact information for designer – contact information shall include name and address of design firm, name of contact person with phone number and email address
- foundation working drawings
- foundation design computations

The working drawings shall include complete details of all foundation components. The drawings shall include, but not be limited to the following:

- the Project number, town and traffic control structure identification number
- reference to the design specifications, including interim specifications
- material specifications for all components
- embedment depths for foundation in soil, rock and a combination of soil and rock
- anchor bolt details, including dimensions, embedment and projection
- location of foundation construction joint

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

- the Project number, town and traffic control structure identification number
- references to design specifications, including interim specifications, and the applicable code section and articles
- description/documentation for all computer programs used in the design
- drawings/models of the foundation with dimensions, loads and references to the local and global coordinate systems used (as applicable), to facilitate review of the results
- traffic structure reactions of all applicable limit states
- soil and rock design parameters
- computations demonstrating the geotechnical and structural capacity of the drilled shaft is adequate for all group load combinations
- development length computations confirming proper design of the reinforcement crossing the optional construction joint

Prior to excavating for the foundation, the Contractor shall submit the following:

Reinforcing Steel Shop Drawings: Based on the reviewed foundation design, the Contractor shall prepare reinforcing steel shop drawings for each foundation. The drawings shall be reviewed and stamped by the foundation designer. A copy

of the reviewed and stamped reinforcing steel shop drawings shall be submitted in accordance with Article 1.05.02.

Concrete Mix Design: The Contractor shall submit the concrete mix design, including admixtures, for review in accordance with Article 1.05.02.

Slurry Mix Design: If the Foundation Construction Procedure involves the use of slurry, the Contractor shall submit the slurry mix design for review in accordance with Article 1.05.02.

Foundation Construction Procedure:

The Contractor shall submit a written foundation construction procedure outlining the equipment; drilling procedure for soil and rock, including how spoils will be handled; temporary casing placement and removal; slurry placement; reinforcement, anchor bolt and conduit placement; and concrete placement required for the drilled shaft foundation construction for review in accordance with Article 1.05.02. The procedure shall include contingencies for the various soil, rock and subsurface water conditions that may be encountered during the foundation construction.

The Engineer will evaluate the foundation construction procedure for conformance with the Plans, specifications and special provisions and will then notify the Contractor of any additional information required and/or changes necessary to meet the Contract requirements. All procedural approvals given by the Engineer shall be subject to trial in the field and shall not relieve the Contractor of the responsibility to satisfactorily complete the work as detailed in the Plans and specifications. The Contractor shall not commence construction of the drilled shafts until the Engineer has accepted the foundation construction procedure.

Construction Procedures: The dry method consists of drilling the shaft excavation, removing accumulated water and loose material from the excavation, and placing the shaft concrete in a relatively dry excavation. The dry construction method shall be used only at sites where the groundwater table and site conditions are suitable to permit construction of the shaft in a relatively dry excavation, and where the sides and bottom of the shaft are stable and may be visually inspected prior to placing the concrete. The use of the dry construction method is permitted if less than one foot of water accumulates in the bottom of a hole without pumping over a one hour period, the excavation remains stable and any loose material and water can be removed prior to placement of concrete.

The wet construction method shall be used at sites where a dry excavation cannot be maintained for placement of the shaft concrete. Wet construction methods consist of using a mineral or polymer slurry to maintain stability of the hole perimeter while advancing the excavation to final depth, placing the reinforcing cage and shaft concrete. This procedure may require desanding and cleaning the slurry; final cleaning of the excavation by means of a bailing bucket, air lift,

submersible pump or other devices; and placing the shaft concrete with a tremie. Unless it is demonstrated to the satisfaction of the Engineer that the surface casing is not required, temporary surface casings shall be provided to aid shaft alignment and position, and to prevent sloughing of the top of the shaft excavation. Surface casing is defined as the amount of casing required from the ground surface to a point in the shaft excavation where sloughing of the surrounding soil does not occur.

The temporary casing construction method shall be used in lieu of the dry or wet construction methods or where the dry or wet construction methods are inappropriate. Temporary casing construction method consists of advancing the excavation through caving material with or without slurry. Temporary casing may be installed by driving or vibratory procedures in advance of excavation to the lower limits of the caving material. When a nearly impervious formation is reached, a casing is placed in the hole and sealed in the nearly impervious formation. After the drilling fluid is removed from the casing, drilling may proceed as with the dry method except that the casing is withdrawn when the shaft concrete is placed. If seepage conditions prevent use of the dry method, excavation is completed using the wet method. Slurry may be omitted if the casing is advanced ahead of drilling and only if minor caving of the hole is observed. Slurry shall be used in installation if drilling is to advance ahead of the casing or if the Engineer determines that the application of the slurry is required in order to maintain soil stability around the hole.

The permanent casing construction method shall be used in lieu of the dry or wet construction methods or where the dry or wet construction methods are inappropriate. The permanent casing construction method is similar to the temporary casing construction method, only with the casing permanently left in place. The permanent casing construction method consists of advancing the excavation through the caving material with or without slurry. Permanent casing may be installed by driving or vibratory procedures in advance of excavation to the lower limits of the caving material. When a nearly impervious formation is reached, a casing is placed in the hole and sealed in the nearly impervious formation. After the drilling fluid is removed from the casing, drilling may proceed as with the dry method. The casing is permanently left in place to stabilize the excavation while the shaft concrete is placed. If seepage conditions prevent the use of the dry method, excavation is completed using the wet method.

If the Engineer determines that the foundation material encountered during excavation is unsuitable or differs from that anticipated in the design of the shaft, or if rock is encountered at an unanticipated elevation, the Contractor's foundation designer shall determine if the foundation embedment should be revised from that shown on the working drawings. If rock is encountered, the Engineer shall be notified to inspect and determine the elevation of the top of competent rock. Any revisions to the foundation embedment during construction shall be reviewed by the Engineer.

Excavated materials which are removed from the shaft excavation and any drilled fluids used shall be disposed of by the Contractor as directed by the Engineer and in accordance with Section 1.10.

Casings shall be metal, smooth, clean, watertight, and of ample strength to withstand both handling and driving stresses and the pressure of both concrete and the surrounding earth materials. The outside diameter of casing shall not be less than the specified size of the shaft. Temporary casings shall be removed while the concrete remains workable (i.e., a slump of 4 inches or greater). Before the casing is withdrawn and while the casing is being withdrawn, a 5.0 foot minimum head of fresh concrete in the casing shall be maintained so that all the fluid trapped behind the casing is displaced upward without contaminating the shaft concrete. The required minimum concrete head may have to be increased to counteract groundwater head outside the casing. Separation of the concrete by hammering or otherwise vibrating the casing, during withdrawal operations, shall be avoided. Casing extraction shall be at a slow, uniform rate with the pull in line with the shaft axis. Permanent casings for the drilled shaft foundation shall be designed according to the AASHTO LRFD specifications. When the Contractor elects to construct the foundation with an optional construction joint, the Contractor is permitted to use a corrugated metal casing only for the portion above the elevation of the optional construction joint. Corrugated metal casing shall not be permitted below the location of the optional construction joint in the foundation under any circumstance. The permanent casing below the optional construction joint location shall be smooth metal as described above. No portion of the permanent casing shall be left exposed above the proposed finished grade.

Slurry used in the drilling process shall be a mineral or polymer slurry. The slurry shall have both a grain size that will remain in suspension and sufficient viscosity and gel characteristics to transport excavated material to a suitable screening system. The percentage and specific gravity of the material used to make the suspension shall be sufficient to maintain the stability of the excavation and to allow proper concrete placement. The level of the slurry shall be maintained at a height sufficient to prevent caving of the hole.

The slurry shall be premixed thoroughly with clean fresh water at a temperature above 41° F and adequate time allotted for hydration prior to introduction into the shaft excavation. The elevation of the slurry within the shaft foundation shall be maintained within 24 inches of the top casing and at least 48 inches above the existing water level during drilling and until the concrete placement is essentially complete. The slurry properties shall be maintained at all times, including non-working periods and stoppages. The slurry shall be circulated and agitated, continuously if necessary, to maintain the slurry properties and to prevent it from setting up in the shaft.

The Contractor, in the presence of the Engineer, shall perform control tests on the slurry to ensure that the density, viscosity, and pH fall within the acceptable limits tabulated below. The Contractor shall provide all equipment required to perform the tests. If desanding is required, sand content shall not exceed 4% (by volume) at any point in the shaft excavation as determined by the American Petroleum Institute sand content test.

Range of Values (at 68°F)

Property (Units)	Time of Slurry Introduction	Time of Concreting	Test Method

(in Hole)			
Density (pcf)	64.3 to 69.1	64.3 to 75.0	Density Balance
Viscosity (seconds per quart)	28 to 45	28 to 45	Marsh Cone
pH	8 to 11	8 to 11	pH paper or meter

The control tests to determine unit weight (density), viscosity, and pH values of the slurry shall be done during the shaft excavation to establish a consistent working pattern.

Prior to placing shaft concrete, slurry samples shall be taken from the bottom and at intervals not exceeding 10.0 feet for the full height of slurry. Any heavily contaminated slurry that has accumulated at the bottom of the shaft shall be eliminated. The slurry shall be within specification requirements immediately before shaft concrete placement.

The hole shall be covered when left unattended.

After completing the shaft excavation, all loose material existing at the bottom of the hole shall be removed.

Prior to placing the reinforcement into the shaft, the Contractor, in the presence of the Engineer, shall determine the shaft dimensions, depth and alignment of the shaft. The concrete shaft shall not be out of plumb by more than 0.25 inches per foot of depth. The Contractor shall provide all equipment necessary for checking the shaft excavation. The Engineer shall inspect the shaft and verify that it has been properly cleaned.

The reinforcing steel shall be fabricated and assembled in accordance with Article 6.02.03. All reinforcement shall be assembled with wire ties. Welding to assemble the reinforcement is not permitted.

Immediately after the shaft excavation has been inspected and approved by the Engineer and prior to placement of the concrete, the assembled reinforcing steel cage, including cage stiffener bars, spacers, centralizers, and other necessary appurtenances, shall be carefully placed into the shaft excavation as a unit. Dropping or forcing cages into the shaft will not be allowed. The reinforcing steel in the shaft shall be tied and supported so that the reinforcing steel will remain within allowable tolerances of its intended position until the concrete will support the reinforcing steel. When concrete is placed by tremie methods, temporary hold-down devices shall be used to prevent uplifting of the reinforcing steel cage during concrete placement. Concrete spacers or other approved noncorrosive spacing devices shall be used at sufficient intervals not exceeding 5.0 feet along the shaft to insure concentric location of the cage within the shaft excavation. When the size of the longitudinal reinforcing steel is larger than a #8 bar, such spacing shall not exceed 10.0 feet. After placement of the reinforcing cage, the Engineer shall inspect the shaft to ensure that it has remained clean. If the inspection indicates that loose material has accumulated at the bottom of shaft excavation, the Contractor shall remove the reinforcing cage and reclean the shaft.

Concrete construction shall conform to Subarticle 6.01.03-I and II as amended herein.

Concrete shall be placed in the shaft excavation as soon as possible, but no more than 4 hours after completion of excavation and cleaning of the bottom of the excavation, and no more than 2 hours after placement of the reinforcing steel cage. Concrete shall be placed in a continuous operation to the top of the shaft, unless the Contractor elects the use of the optional construction joint at the location shown on the Plans. The concrete level shall be horizontal during the pouring operations. Concrete placement shall continue after the shaft is full until good quality concrete is evident at the top of the shaft. The elapsed time from the beginning of concrete placement in the shaft to the completion of placement shall not exceed 2 hours for a single pour.

In dry construction, concrete shall be placed in a single continuous operation with the flow of concrete down the center of the shaft excavation so as to consolidate the concrete on impact. During placement operations, the concrete is not permitted to hit the reinforcing steel. A dropchute, consisting of a hopper and flexible hose, may be used to direct the concrete down the center of the foundation and prevent the concrete from hitting the reinforcing steel. Accumulated water shall be removed before placing the concrete. At the time of concrete placement, no more than 2.0 inches of water may exist at the bottom of the excavation and loose sediment no more than 0.5 inches over one-half the base is acceptable.

In wet (slurry) construction, concrete to be placed by the tremie method, where the concrete displaces the slurry from bottom of the excavation to the top. The concrete shall be placed through a top metal hopper and into a rigid leak-proof elephant trunk tremie tube, sufficiently large enough to permit free flow of concrete. The tremie tube shall be positioned so that it can be removed without disturbing the reinforcing. Initially, the discharge end of the tremie tube shall be sealed closed (plugged) to prevent slurry from entering the tube after it is placed in the excavation and before the tube is filled with concrete. After concrete placement has started, the tremie tube shall be kept full of concrete to the bottom of the hopper to maintain a positive concrete head. The flow of concrete shall be induced by slightly raising the discharge end of the tube, always keeping the tube end in the deposited concrete. No horizontal movement of the tremie tube will be permitted.

The shaft concrete shall be vibrated or rodded to a depth of 5 feet below the ground surface except where soft uncased soil or slurry remaining in the excavation will possibly mix with the concrete.

Exposed concrete shall be cured and finished in accordance with Subarticle 6.01.03-II.

Anchor bolt assemblies shall be embedded in the concrete as shown on the working drawings. A template plate shall be used to hold the anchor bolt assemblies, conduits and ground rod sleeve in the correct position. The anchor bolts shall be installed plumb.

All conduit ends terminating below grade shall be capped with a malleable iron caps. All above-grade conduit ends shall be terminated with an insulated bonding bushing with tinned insert. The

rigid metal conduit sweeps shall extend a minimum of 2.00 feet from the side of the foundation and shall be placed a minimum of 2.00 feet below finished grade.

Ground rod and ground wire shall be installed as shown on the Plans.

No construction operations that would cause soil movement adjacent to the shaft, other than mild vibration, shall be conducted for at least 48 hours after shaft concrete has been placed.

The top of the foundations shall be backfilled and the adjacent disturbed ground surfaces restored to match the surrounding area after the concrete has cured and the forms are removed. Placement of topsoil shall conform to Articles 9.44.01 and 9.44.03. Turf establishment shall conform to Article 9.50.03., or the seed mix specified on the Plans.

The mast arm assemblies shall not be erected on the foundation until the concrete in the shaft has attained a compressive strength, f'_c , greater than or equal to 4,000 psi.

Method of Measurement: This work will be measured for payment by the number of foundation units, each completely installed and accepted.

The work to remove rock from the foundation excavation will be measured from the top of competent rock, as determined by the Engineer, to the bottom of rock excavation.

Basis of Payment: The work will be paid for at the Contract unit price each for “Traffic Control Foundation – Mast Arm,” completed and accepted in place, which price shall include all equipment, materials, tools and labor incidental to the subsurface exploration, design, fabrication, construction and disposal of drilling spoils, of the foundations at the locations specified on the Plans.

No additional payment will be made for the Contractor to test the slurry when it is used to construct a drilled shaft foundation. No additional payment will be made for subsurface investigations performed by the Contractor.

The permanent steel casing, if used, will not be measured for payment. The use of a permanent steel casing is considered incidental to the cost of the foundation and may be elected for use by the Contractor at no additional cost to the State.

The removal of existing roadside barrier systems, installation and removal of temporary roadside barrier systems and resetting existing roadside barrier systems will not be paid for separately, but will be included as part of the work.

The temporary support, protection and restoration of utilities (if necessary), including existing underground wiring, conduits, drainage structures, pipes and underdrain systems within the excavation limits will not be paid for separately, but will be included as part of the work.

Backfilling and restoration of adjacent ground surfaces (pavement, slope protection, topsoil & seed, etc.) in all areas disturbed by the work will not be paid for separately, but will be included as part of the work. The Engineer will determine the type, thickness and horizontal limits of the surfaces to be restored.

When rock is encountered within the limits of excavation, its removal will be paid for at the Contract unit price per vertical foot for "Rock in Foundation Excavation," which price shall include any additional excavation to remove the rock and any additional concrete required to fill the excavation beyond the designed foundation hole dimensions. Rock, in so far as it applies to "Rock in Foundation Excavation," shall be defined as rock in definite ledge formation, boulders, or portions of boulders, cement masonry structures, concrete structures or portland cement concrete pavement which has a cross-sectional area that exceeds 50% of the cross-sectional area of the designed foundation hole.

<u>Pay Item</u>	<u>Pay Unit</u>
Traffic Control Foundation – Mast Arm	ea.

ITEM #1003906A - REMOVE LIGHT STANDARD

DESCRIPTION: Under this item the Contractor shall remove an existing light standard with transformer base (where present), bracket, and luminaire as indicated on the plans or as directed by the Engineer. The removed materials shall remain the property of the Contractor.

CONSTRUCTION METHODS: The Contractor shall remove a light standard, transformer base (where present), bracket, and luminaire, where required. The removed materials shall remain the property of the Contractor.

All removed materials shall be properly disposed of by the Contractor. The removed luminaire contains regulated materials. All regulated materials shall be as described and disposed of under Item No. 0101143A – Handling and Disposal of Regulated Items.

METHOD OF MEASUREMENT: This work will be measured for payment by the number of light standards with associated equipment removed and disposed of complete and accepted.

BASIS OF PAYMENT: This work will be paid for at the contract unit price each for "Remove Light Standard" complete, which price shall include the removal of a light standard with associated transformer base (where present), bracket, luminaire, lamp, cable and hardware, delivering, disposing, hauling, and including all materials, tools, equipment, labor and work incidental thereto.

Pay Item
Remove Light Standard

Pay Unit
EA.

ITEM #1003912A - REMOVE CONCRETE LIGHT STANDARD BASE

DESCRIPTION: Under this item the Contractor shall remove an existing concrete light standard base where shown on the plans or as directed. The removed concrete base shall remain the property of the Contractor.

CONSTRUCTION METHODS: The Contractor shall remove a concrete light standard base where required. The removed base shall be properly disposed of by the Contractor. The resulting excavation shall be backfilled with a gravel type fill, top soiled, graded, and seeded to match surrounding area, unless otherwise noted on the plans.

METHOD OF MEASUREMENT: This work will be measured for payment by the number of concrete light standard bases removed and disposed of, complete and accepted.

BASIS OF PAYMENT: This work will be paid for at the contract unit price each for "Remove Concrete Light Standard Base", which price shall include excavation, removal, backfill, topsoil, grass seed, hauling and disposing of the concrete base, all materials, equipment and work incidental thereto.

Pay Item

Remove Concrete Light Standard Base

Pay Unit

EA.

ITEM #1003925A - REMOVE EXISTING LUMINAIRE

DESCRIPTION: Under this item the Contractor shall remove an existing luminaire, and associated equipment as indicated on the plans or as directed and in accordance with these specifications. The removed luminaire and lamp shall be properly disposed of by the Contractor.

CONSTRUCTION METHODS: The Contractor shall remove an existing luminaire, and associated equipment where required. The removed luminaire and lamp shall be properly disposed of by the Contractor.

All removed materials shall be properly disposed of by the Contractor. The removed luminaire contains regulated materials. All regulated materials shall be as described and disposed of under Item No. 0101143A – Handling and Disposal of Regulated Items.

METHOD OF MEASUREMENT: This work will be measured for payment by the number of luminaires with associated equipment, removed and disposed of complete and accepted.

BASIS OF PAYMENT: This work will be paid for at the contract unit price each for "Remove Existing Luminaire", which price shall include removal of luminaire and associated equipment, hauling and unloading, disposal, and all materials, tools, equipment and labor incidental thereto.

<u>Pay Item</u>	<u>Pay Unit</u>
Remove Existing Luminaire	EA.

ITEM #1005602A - LED LUMINAIRE – TYPE 2

DESCRIPTION: This item shall consist of furnishing and installing a light emitting diode (LED) luminaire of the wattage, distribution, and voltage as specified, completely wired and attached to the arm or bracket of the pole in accordance with the plans and specifications.

MATERIALS: The LED luminaire shall be one of the following:

For luminaires with a Type II light distribution:

Philips Lumec, Road Focus, catalog number: **RFL-135W80LED-4K-G2-R2M-HVU-API-SP2-GY3**, with the following characteristics: 136 watts, 18,819 lumens, 4000k CCT, 480 volt, Type II medium light distribution, and 20kV/10kA surge suppression.

American Electric, Autobahn, catalog number: **ATB0-P304-480-R2-NR-NL**, with the following characteristics: 124 watts, 18,010 lumens, 4000k CCT, 480 volt, Type II light distribution, and 20kV/10kA surge suppression.

Eaton, Cooper Lighting, Archeon Medium, catalog number: **ARCH-M-PA2-120-740-8-T2U-AP-20K-K** with the following characteristics: 122 watts, 18,056 lumens, 4000k CCT, 480 volt, Type II urban light distribution, and 20kV/10kA surge suppression.

General Electric, Evolve, catalog number: **ERL2-H-18-B3-40-1-GRAY-G-I-T**, with the following characteristics: 140 watts, 18,000 lumens, 4000k CCT, 480 volt, Type II wide light distribution, and 20kV/10kA surge suppression.

For luminaires with a Type III light distribution:

Philips Lumec, Road Focus, catalog number: **RFL-135W80LED-4K-G2-R3M-HVU-API-SP2-GY3**, with the following characteristics: 136 watts, 18,761 lumens, 4000k CCT, 480 volt, Type III medium light distribution, and 20kV/10kA surge suppression.

American Electric, Autobahn, catalog number: **ATB0-P304-480-R3-NR-NL**, with the following characteristics: 124 watts, 18,230 lumens, 4000k CCT, 480 volt, Type III light distribution, and 20kV/10kA surge suppression.

Eaton, Cooper Lighting, Archeon Medium, catalog number: **ARCH-M-PA2-120-740-8-T3-AP-20K-K** with the following characteristics: 122 watts, 18,164 lumens, 4000k CCT, 480 volt, Type III urban light distribution, and 20kV/10kA surge suppression.

General Electric, Evolve, catalog number: **ERL2-H-18-C3-40-1-GRAY-G-I-T**, with the following characteristics: 140 watts, 18,000 lumens, 4000k CCT, 480 volt, Type III light distribution, and 20kV/10kA surge suppression.

No alternate luminaires will be accepted. A catalog cut will be required. It is the Contractors responsibility to install a luminaire of the required light distribution Type (II or III) at the location as called for on the plans. Shop drawings for this item shall include both Type II and Type III light distributions. Prior to ordering the luminaire from the manufacturer, the Contractor shall determine the correct quantity of each distribution type.

The luminaire housing shall be powder coated grey in color.

The luminaire shall be equipped with an internal bubble level.

The luminaire housing shall not have a photocontrol receptacle.

The luminaire's onboard circuitry shall include a surge protection device (SPD) to withstand high repetition noise transients as a result of utility line switching, nearby lightning strikes, and other interference. The LED luminaire shall be provided with integral 20Kv/10kA surge protection which shall conform and be labeled as UL 1449 compliant. The SPD protects the luminaire from damage and failure for common and differential mode transient peak currents up to 10 kA (minimum). SPD performance shall have been tested per procedures in ANSI C136.2/IEEE C62.41-2:2002 category C high exposure. The SPD shall fail in such a way as the Luminaire will no longer operate and the driver will be isolated from additional spikes. The SPD shall be field replaceable.

The LED luminaire shall carry a limited five year warranty on the LEDs and the Driver.

Conductors shall be #10 AWG in accordance with Article M.15.11 of the Standard Specifications. Insulation shall be THHN/THWN and rated for 600 volts. The equipment grounding conductor shall be No. 10 AWG, THHN/THWN, rated for 600 volts. The ground wire shall be green in color.

Fuses and fuse holders shall conform to the requirements of Article M.15.05. Fuses shall be fast acting type, rated at 10 amps.

CONSTRUCTION METHODS: The LED luminaire shall be installed at the end of the bracket and shall be securely fastened, properly oriented, connected to the power supply conductors, cleaned, and ready for operation. The luminaire shall be leveled using the internal bubble level within the fixture (if so equipped) or by placing an electronic (digital) level along the flat bottom face of the luminaire. All luminaires suspected of not being leveled shall be re-leveled by the Contractor at the discretion of the Engineer. The Contractor shall ensure that once installed the LED luminaire functions properly.

For installation on a new light standard: Fuse holders and fuses shall be installed in the pole base or in the adjacent cast iron junction box for bridge parapet mounted poles. Three No. 10 AWG conductors shall be installed from the fuse holders to the luminaire. The luminaire shall be

properly grounded with a No. 10 AWG equipment ground connected between the ground rod/system in the light pole base and the grounding lug in the luminaire.

For installation on an existing light standard: The Contractor shall remove and replace the existing no. 10 AWG conductors and existing fuses/fuse kits. Three No. 10 AWG conductors shall be installed from the fuse holders to the luminaire. For three phase lighting systems, the circuit phase connection of the existing luminaire (to be removed) shall be retained when connecting the LED luminaire. The luminaire shall be properly grounded with a No. 10 AWG equipment ground connected between the ground rod/system in the light pole base and the grounding lug in the luminaire. Existing tap conductors and fuse kits which are removed shall be properly disposed of by the Contractor. The existing HPS luminaire shall be removed under a separate item.

Luminaires classified as "spare" on the plans shall not be installed but shall be transferred to ConnDOT District Electrical Maintenance. The Contractor shall contact the Electrical Maintenance Supervisor at least 48 hours in advance to coordinate the transfer of materials. The Contractor shall load the luminaire (factory sealed in original packaging) onto the ConnDOT transport vehicle(s). The Contractor shall contact the project appropriate Electrical Maintenance Supervisor at the following telephone numbers:

District 1: 860-566-3156

District 2: 860-537-8942

District 3: 203-878-1869

District 4: 203-264-9590

METHOD OF MEASUREMENT: This work will be measured for payment by the number of LED luminaires installed, complete and accepted.

BASIS OF PAYMENT: This work will be paid for at the contract unit price each for "LED Luminaire – Type 2" of the type and size specified, complete and accepted in place, which price shall include all materials including luminaire, LEDs, driver, surge suppressor, conductors, fuses, fuse holders, connections, leveling, grounding, transfer of spare luminaire(s), and all labor, tools, equipment and work incidental thereto.

Pay Item

LED Luminaire – Type 2

Pay Unit

EA.

ITEM #1006150A - REMOVE AND REINSTALL UNDERBRIDGE LUMINAIRE

DESCRIPTION: This item shall consist of the removal of an existing underbridge luminaire with mounting pendant, and the re-installation of the luminaire and pendant bracket on a new anchorage at the location as shown on the plans or as directed by the Engineer. All existing surface conduit in the area of bridge deck construction shall be removed. All conductors shall be removed back to the nearest splice enclosure located on the abutment or pier.

MATERIALS: The materials for this work shall conform to the requirements of Article M.15.07.

The Contractor shall be responsible for damage to all equipment and material incurred during removal, storage and reinstallation of the luminaire. All repairs or replacements due to damage or loss by the contractor shall be made at the contractor's expense.

CONSTRUCTION METHODS: The Contractor shall remove an existing underbridge luminaire with pendent, mounting plate, surface conduit and conductors where indicated on the plan. The removed underbridge luminaire and pendant bracket shall be properly stored as required and reinstalled upon completion of the bridge construction. The Contractor shall remove existing surface mounted fiberglass conduit and conductors in conflict with the bridge work. The Contractor shall remove existing conductors back to the nearest splice enclosure located on the bridge abutment or pier. The removed conduit and conductors shall be disposed of by the Contractor. The underbridge luminaire shall be removed prior to the removal of the bridge deck.

Upon completion of the bridge construction, the Contractor shall reinstall the underbridge luminaire and pendant bracket at the location as indicated on the plans and in conformance with the details. New fiberglass conduit, liquid tight flexible metal conduit (LTFMC), and conductors shall be installed and shall reconnect the luminaire to the existing lighting circuit. Fiberglass conduit, LTFMC, and conductors shall be paid for under separate bid items. The new No. 10 conductors shall be connected to the existing underbridge lighting circuit. All connections to existing conductors shall be made in an approved splice box or conduit body.

The underbridge luminaire, pendant bracket, surface conduit, conductors and associated hardware shall be installed on the bridge structure in conformance with Section 10.06.03.

Temporary underbridge lighting will not be required during the removal and reinstallation process; however, the Contractor shall reinstall the underbridge luminaire as soon as the new bridge superstructure is in place. The disruption in underbridge lighting shall be kept to an absolute minimum.

METHOD OF MEASUREMENT: This work will be measured for payment by the number of underbridge luminaires removed and reinstalled, complete and accepted in place.

BASIS OF PAYMENT: This work will be paid for at the contract unit price each for "Remove and Reinstall Underbridge Luminaire", complete in place, which price shall include removal and reinstallation of the underbridge luminaire and pendant bracket, removal and disposal of surface conduit and conductors, and all materials, including anchors, hardware, drilling, storage, disposal, equipment, tools, labor and work incidental thereto.

Pay Item

Remove and Reinstall Underbridge Luminaire

Pay Unit

EA.

ITEM #1008640A – 1" FIBERGLASS CONDUIT - SURFACE

DESCRIPTION: This item shall consist of furnishing and installing conduit of the size and type specified with necessary fittings, where called for, at locations shown on the plans or as directed by the Engineer and in accordance with these specifications.

Work under the above items shall conform to Section 10.08.03-1 of the standard specifications, supplemented and amended as follows:

MATERIALS: The 1" fiberglass conduit shall be standard wall type with a minimum wall thickness of 0.070 inches. The conduit shall be reinforced thermosetting resin conduit using the single circuit filament winding process and shall be free from defects including non-circularity and foreign inclusions. The conduit shall be nominally uniform (as commercially practical) in color, density, and physical properties and shall be straight with the ends cut square to the inside diameter. The conduit color shall match the existing fiberglass conduit.

The complete conduit system shall be UL listed and shall meet or exceed the requirements of UL 2515 Above Ground Standard. All conduit, elbows and fittings shall be durably and legibly marked in accordance with NEMA TC 14.

All conduit joints shall be straight socket type which shall be permanently bonded using a joint adhesive supplied by the conduit manufacturer. The joint adhesive shall be applied to the conduit as specified by the Manufacturer. The resin system shall be epoxy anhydride-cured with no fillers.

A complete line of fittings, adapters, expansion fittings and elbows shall be available and shall be manufactured from the same materials and manufacturing process as the conduit. Expansion fittings shall be supplied by the conduit Manufacturer and shall provide a minimum of 4" of lateral movement and feature an internal O-ring to prohibit water intrusion.

The conduit shall have an operating range of -40F to +250F and shall contain a ultra-violet (UV) inhibitor to meet the appropriate UL, CSA or NEMA specification.

Clamps for attaching the conduit to the steel bridge structure shall be single hole type or beam-clamp type. Clamps for attaching the conduit to concrete bridge structure shall be two-hole type. All clamp materials shall be rated for outdoor wet environments. Threaded rods, anchor bolts, nuts and washers shall be 316 stainless steel. When clamping the fiberglass conduit to the steel bridge structure, a slip collar shall be installed at the clamp location to allow the conduit to laterally expand within the clamp. When clamping the fiberglass conduit to the concrete bridge structure, the two-hole strap shall be sized to allow the conduit to laterally expand within the strap.

Fiberglass conduit and fittings shall meet the requirements of the **Build America, Buy America Act (BABA)** which expands the requirements of the **Buy America Act (BAA)** to include

manufactured products and construction materials. Such products and materials (with exceptions) incorporated into projects “must be produced in the United States.”

CONSTRUCTION METHODS: Construction methods shall conform to Section 10.08.03-1 of the Standard Specifications and to the manufacturer’s instructions. Surface mounted conduit shall be installed where indicated on the plans; using mounting brackets and/or clamps as approved by the Department.

Fiberglass conduit shall be securely clamped to the structure wall with clamp spacing as recommended by the NEC for reinforced thermosetting resin conduit (RTRC). Support spacing shall not exceed 3’-0” as specified in NEC 355.30 or as listed by the conduit Manufacturer.

When clamping the fiberglass conduit to the steel bridge structure, a slip collar shall be installed at the clamp location to allow the conduit to laterally expand within the clamp. When clamping the fiberglass conduit to the concrete bridge structure, the two-hole strap shall be sized to allow the conduit to laterally expand within the strap.

Expansion Joints and conduit shall be supplied by the same Manufacturer. All expansion joints shall be installed using the Manufacturer’s recommended guidelines. For conduit lengths under 50 feet no expansion joints will be required. For conduit lengths between 50 feet to 200 feet one expansion joint shall be installed at the mid-point of the conduit. For conduit lengths over 200 feet an expansion joint shall be installed every 200 feet. A conduit expansion joint shall be installed at all bridge/structure expansion joints. Where the anticipated bridge joint expansion is in excess of 4”, a “double” type conduit expansion joint shall be installed. In areas where structural movement or expansion is anticipated and a standard conduit expansion coupling cannot be properly installed, the Contractor shall install a sufficient length of liquid light flexible metal conduit to account for the anticipated movement (paid for under a separate bid item).

All joints shall be glued together using the Manufacturer’s recommended adhesive as well as the Manufacturer’s recommended procedure. The surface of the conduit shall be dry and clean, free of dust, moisture, oil, grease, or any other contaminant. Prior to adhesive application to any field cut conduit, the cut end of the conduit shall be sanded with a rotary “flap wheel” sander (with 60 grit sandpaper) to remove the resin glaze. The resin glaze shall be removed to the depth equal to the depth of the joint. All sanding dust shall be removed prior to the application of the adhesive. The adhesive shall be applied only within the temperature range as specified by the Manufacturer. The adhesive shall be applied in conformance with the Manufacturer’s recommendations and in such a manner as to avoid “ponding” and voids which will result in weak joints. The Contractor shall ensure that no adhesive has formed on the interior wall of the conduit. Once the adhesive has set, the Contractor shall hand test the joint for proper connection. Any joints which are loose, cracked, or exhibit poor adhesion shall be cut out and re-made.

Prior to beginning work and fabrication of any materials, the Contractor shall take all field measurements necessary to assure the proper fit of the finished structure mounted conduit. This shall include all supports, brackets and hangers, fixed sweep bends, expansion/contraction

fittings, junction boxes, and other structure mounted appurtenances. The Contractor shall submit shop drawings to the Engineer for approval in accordance with Section 1.06.01 and 1.05.02.

METHOD OF MEASUREMENT: The conduit shall be measured for payment by the number of linear feet of the type and size installed and accepted. Expansion fittings, fixed sweep-bends, conduit, brackets, clamps, and assorted fittings, will not be measured for payment but shall be included in the pay item for the conduit of the type and size specified. The measured length shall be from end to end along the centerline through all fittings.

The pull tape and conduit testing will not be measured for payment but shall be included in the pay item for the conduit of the type and size specified.

BASIS OF PAYMENT: This work shall be paid for at the contract unit price per foot for “1” Fiberglass Conduit – Surface”, which price shall include all materials required including conduit, couplings, threaded connectors, elbows, clamps/brackets, attachment hardware, expansion fittings, fixed sweep-bends, conduit fittings, slip collars, caps, pull-rope, inserts, structural supports, adhesive, equipment, tools, labor, drilling and all work incidental thereto.

Pay Item

1” Fiberglass Conduit – Surface

Pay Unit

L.F.

ITEM #1008901A REMOVE CONDUIT

DESCRIPTION: This item shall consist of the removal of existing surface mounted conduit attached to bridge parapet, abutment, or pier. The existing conduit is used to carry power conductors to the highway lighting system. The limits of conduit removal shall be as indicated on the plans or as ordered and in accordance with these specifications. The removed conduit shall remain the property of the Contractor.

CONSTRUCTION METHOD: The Contractor shall remove surface mounted conduit with conductors from the bridge structure as indicated on the plans or as directed. This item shall also include the removal of any surface mounted junction boxes and conduit bodies associated with the conduit to be removed. The Contractor shall only remove the conduit once the new conduit and conductors have been installed and are supplying power to the new highway lights (new conduit and conductors to be paid for under separate bid items).

Removed conduit with conductors shall be properly disposed of by the Contractor.

METHOD OF MEASUREMENT: This work shall be measured for payment by the actual number in linear feet of conduit removed.

BASIS OF PAYMENT: This work will be paid for at the contract unit price per linear foot for "Remove Conduit" which price shall include the removal of the conduit with conductors, surface mounted junction boxes, cutting, removal of clamps, disposal, and all equipment, labor and work incidental thereto.

ITEM #1010902A - REMOVE CONCRETE HANDHOLE

DESCRIPTION: Under this item the Contractor shall remove an existing concrete handhole where shown on the plans or as directed. The removed concrete handhole shall be disposed of by the Contractor.

CONSTRUCTION METHODS: The Contractor shall remove and dispose of a concrete handhole where shown on the plans or as directed. The resulting excavation shall be backfilled with a gravel type fill, top soiled, graded to match surroundings, and grass seeded, unless otherwise noted on the plans.

METHOD OF MEASUREMENT: This work will be measured for payment by the number of concrete handholes removed and disposed of, complete and accepted.

BASIS OF PAYMENT: This work will be paid for at the contract unit price each for "Remove Concrete Handhole", which price shall include excavation, removal, backfill, topsoil, grass seed, hauling and disposing, and all materials, equipment and work incidental thereto.

Pay Item

Remove Concrete Handhole

Pay Unit

EA.

ITEM #1010905A – RESET CONCRETE HANDHOLE

Description:

Work under this item shall consist of resetting a concrete handhole at the location shown on the plans or as directed by the Engineer and in conformity with these specifications.

Materials:

The Contractor shall be responsible for damage to all equipment and materials incurred during resetting of the concrete handhole. All repairs or replacements due to damage or loss by the Contractor shall be made at the Contractor's expense.

Construction methods:

The concrete handhole shall be reset where shown on the plans or directed by the Engineer.

The Contractor shall raise or lower the existing concrete handhole so per CTDOT Traffic Standard Sheet TR-1010_01 - Concrete Handhole. When raising of the handhole is required, the following exception shall apply: The handhole shall not be raised past the limits of the existing conduit entering the handhole. The final placement of the handhole shall be such that the conduit ends are left within the limits of the wiring compartment of the handhole.

Method of measurement:

This work will be measured for payment by the number of concrete handholes reset, complete and accepted.

Basis of payment:

This work will be paid for at the contract unit price each for "Reset Concrete Handhole" which price shall include all equipment, labor, delivery and incidentals thereto.

<u>Pay Item</u>	<u>Pay Unit</u>
Reset Concrete Handhole	ea.

ITEM #1014403A – CABLE SPLICE

DESCRIPTION: This item shall consist of furnishing and installing insulated multiple tap submersible cable connectors in an existing concrete handhole. This item shall also include the removal and disposal of the existing cable connectors.

MATERIALS: The cable splice shall consist of an insulated multiple tap submersible block type cable connector. The connector shall be insulated for 600 volts, and shall be rated for wet and submersible applications. The cable splice shall consist of an aluminum splice block coated in EPDM rubber, which shall be dual rated for copper or aluminum conductors. Cable connection shall be made with aluminum set-screws. The cable splice shall meet ANSI C119.1 and C119.4, shall be rated for 90°C, and shall be UL listed. The cable splice shall have three or four ports as required by the application.

CONSTRUCTION METHOD: The Contractor shall replace all existing cable splices within an existing concrete handhole at the locations as indicated on the plans or as directed by the Engineer. Where an existing cable splice is a set screw type, the Contractor shall unscrew the existing set screws and remove the splice. Where the existing cable splice consists of a taped split-bolt type connector the Contractor shall cut the conductors as close to the splice as possible provided there will be a minimum of 15” of cable length remaining for each cable after the splice has been removed. Where the existing cable length is insufficient to maintain a 15” cable length, the Contractor shall carefully remove the insulating tape and unscrew the split bolt connector. The Contractor shall install the cable splice per the Manufacturer’s directions. All set screws shall be properly tightened and all caps shall be properly installed. Where access to the handhole or conductors is impeded by the presence of dirt, sand, silt or other road debris the handhole shall be properly cleaned as described under item 1010060A – Clean Existing Handhole. All removed materials shall be properly disposed of by the Contractor.

METHOD OF MEASUREMENT: This work shall be measured for payment by the number of existing concrete handholes in which cable splices are installed, complete and accepted.

BASIS OF PAYMENT: This work will be paid for at the contract unit price each for "Cable Splice " complete and accepted in place, which price shall include submersible cable splice blocks, removal of existing splices, connection, disposal and all removed equipment, tools, labor, and work incidental thereto.

Pay Item
Cable Splice

Pay Unit
EA.

ITEM #1014901A - REMOVE CABLE

DESCRIPTION: This item shall consist of removing highway lighting circuit conductors from existing conduit, complete and where indicated on the plans or as ordered and in accordance with these specifications. The removed cable shall remain the property of the Contractor.

CONSTRUCTION METHOD: The Contractor shall remove all single conductors from conduit at the locations where new lighting conductors are to be installed in existing conduit. Prior to the installation of new conductors (under a separate bid item), the conduit shall be completely cleaned of all obstructions and debris. The Contractor shall remove all sand, silt and other debris from the conduit using one of the following methods:

- 1) Rodding.
- 2) High pressure jet water spray.
- 3) Compressed air.
- 4) Pulling a mandrel through the conduit.

If the conduit is found to be damaged to the extent that the cleaning process will not clear the obstruction the Contractor shall notify the Engineer and await further instruction. Under no circumstances shall the Contractor pull new conductors into a partially obstructed conduit.

The removed cable shall be neatly coiled, tied and disposed of by the Contractor.

Where the existing cables are removed from rigid metal conduit, the Contractor shall also remove the existing bonding bushings from the conduit ends, and install new bonding bushings which are threaded, hot dip galvanized, and feature a bonding lug and phenolic insulation. If the exposed conduit threads are in such poor condition that a new threaded bushing cannot be securely installed, then the Contractor can use a set screw type bushing.

METHOD OF MEASUREMENT: This work shall be measured for payment by the actual number in linear feet (meter) of conduit from which the cable is removed.

BASIS OF PAYMENT: This work will be paid for at the contract unit price per linear foot for "Remove Cable" which price shall include the removal of single conductors, the cleaning of the conduit, the installation of new bonding bushings on the ends of the existing rigid metal conduit, the proper disposal of the removed conductors and bushings, and all equipment, labor and work incidental thereto.

Pay Item
Remove Cable

Pay Unit
L.F.

ITEM #1015034A – GROUNDING AND BONDING

Description:

The contractor shall perform a 3-point fall-of-potential ground resistance test at each Traffic Signal Controller cabinet foundation and provide corrective action when required.

MATERIAL:

- No. 6 Bare Copper Grounding Conductor
- 5/8" X 10' Ground Rod
- Bronze Grounding Clamp
- Crimp Type Electrical Connector
- Miscellaneous Electrical Tools

Construction Methods:

1. Ground Resistance Test Procedure:

Perform 3-point fall-of-potential ground resistance test at each Traffic Signal Controller cabinet foundation in accordance with Standard Sheet TR-1000_01 and submit the results to the Engineer. When the results of the test are unsatisfactory, provide corrective action as indicated on the Standard Sheet. The Contractor shall prepare a corrective plan and a list of items necessary for the plan. If authorized by the Engineer, this work will be considered "Extra Work" under Article 1.09.04.

Method of Measurement:

The item, being paid on a lump sum basis, will not be measured for payment.

Basis of Payment:

This work shall be paid for at the contract lump sum price for "Grounding and Bonding". This price shall include the installation of No. 6 Bare Copper Ground Wire, 5/8" X 10' Ground Rod, miscellaneous electrical tools, all equipment and work incidental thereto.

Prior to the commencement of work, the Contractor shall submit a proposed Schedule of Values for review and approval by the Engineer.

Pay Item	Pay Unit
Grounding and Bonding	l.s.

ITEM #1017019A – WIRELESS RADIO ASSEMBLY

Description:

Under this item, the contractor shall furnish, install, configure, and test the Wireless Radio Assembly, all cable and wiring, and all other equipment, materials and incidental costs necessary to provide a complete, fully operational communication between the controller cabinets and adjacent intersections/central system, as shown in the Plans, and shall conduct acceptance tests for this system under this specification.

1. The Wireless Radio Assembly shall be manufactured by Communication Networks (ComNet), Comnet Netwave Model NWK (1,2) IC Industrially Hardened High Performance Wireless Kit for High Density Environments meeting the following requirements:

Features

- a. Narrow Channel Spectrum Widths for large and noisy deployments
- b. 5, 10, 20 and 40 Mhz Channel Bandwidth Support
- c. Up to 200 Mbps Throughput
- d. 802.11a/n Compliant
- e. Distances up to 2 mi (FCC, IC) or 2km (ETSI)
- f. IEEE802.3at PoE Compliant PD on port 1
- g. IEEE802.3af power source (PSE) available on port 2
- h. Environmentally Hardened -40° to +167°F
- i. Meets class IP67 dust and water immersion protection standards
- j. Secure transmission: WPA2 - AES or TKIP encryption
- k. ComNet Antenna alignment feature eases installation and setup
- l. Antenna Alignment Tools
- m. LED array displays unit operational status along with received signal strength
- n. Scalable - Narrow Channel 5 and 10 MHz Bandwidths will allow for expansion of WLAN without losing reliability by increasing the total number of non-overlapping channels
- o. Firmware Upgrades Included Free for the life of the product
- p. Installation and Configuration Trainings Available
- q. Radio Internal Components covered by Lifetime Warranty.
- r. *Enclosure covered by Three Year Warranty.

Software Features

a. Addressing:	Static IP / DHCP Client / DHCP Server
b. SNMP:	V3
c. Dynamic DNS:	802.1q VLAN support
d. Embedded Firewall:	QoS support
e. Ability to Assign Static Routes	
f. Spanning Tree Protocol support	
g. 802.1x Port-Based Network Access Control	
h. User-Configurable Watchdog and Auto-Reboot Mechanism	

- i. Multi-Level Configuration and Monitoring Login Accounts
- j. User Configurable Long Range Parameters

Wireless Radio

- a. EIRP: NWK1 (FCC, IC): Up to +36 dBm for point to multipoint deployments, +49 dBm for point to point deployments using MAC-lock feature enabled
NWK2 (ETSI): +30 dBm
- b. RF Output: +30 dBm Rated Transmitter
- c. Operational Frequency: 5180 MHz - 5825 MHz, Region-dependent. Not all frequencies are supported in all regions. Contact ComNet for regional frequencies
- d. Bandwidths: 5, 10, 20 and 40 MHz

Standard Internal Antenna

- a. Antenna: Internal 20 dBi Dual Polarized Directional
- b. Gain: 20 dBi
- c. Azimuth: 17° Horizontal/Vertical
- d. Elevation: 17° Horizontal/Vertical

Connectors

- a. Gigabit Ethernet Port 1 RJ-45, Sealed Cable Gland
- b. 10/100 Ethernet Port 2 RJ-45, Sealed Cable Gland

Power

- a. Operating Voltage 24 to 56 VDC
- b. Power Consumption 5 W Max
- c. PD Power IEEE802.3af/at pass-through PD compliant
- d. PSE Power IEEE802.3af PSE compliant uplink

Mechanical

- a. Indicating LEDs Power On Ethernet Link Signal Strength
- b. Size (L x W x H) 10.6 x 10.6 x 2.9 in
- c. Shipping Weight: < 4.4 lb / 2 kg

Environmental

- a. MTBF >100,000 hours
- b. Operating Temp -40° to +167°F
- c. Storage Temp -40° to +185°F
- d. Relative Humidity 5% to 95%, non-condensing

*Warranty

- a. Internal Components Lifetime
- b. Enclosure 3 Year

Wireless Radio Integration:

The contractor shall procure and install the wireless Ethernet radio system equipment using the materials, installation and attachment methods recommended by the manufacturer. The radios shall be installed as per manufacturer's best practices for operation and avoid conflicts with utilities. The wireless radio equipment operates via Line of Sight (LOS) care should be taken during installation of the integrated antenna to avoid any obstructions, trees, foliage or anything that can alter the signal strength of the radio. All cables shall be permanently labeled in the cabinet and meet the manufacturer's bend radius recommendations and total length requirements.

At the head end and end point locations, a single radio is required and shall be connected to an Ethernet switch in the cabinet with the appropriate means to power the radio via Power over Ethernet (PoE). The radio shall be pointed at the repeater location and the integrator shall ensure the appropriate signal strength is obtained to ensure communications.

The repeater location shall have two wireless radios each pointing in opposite directions and installed and attached per the manufacturer's instructions. The radios shall be connected to an Ethernet switch in the cabinet with the appropriate power source to power the radios.

The system integrator shall ensure that the radios meet the intended communication path and ensure the recommended Signal Strength, signal to noise ratio and polling meet the specifications from the Engineer.

Warranty:

The Ethernet Switch shall be guaranteed free of design and manufacturing defects by the Manufacturer for a period of five (5) years after system acceptance. All warranties provided by the original equipment manufacturer shall be passed to the City of Waterbury and shall be in force for a period of five (5) years.

In addition, this item shall require the Manufacturer to furnish and install all supplied firmware and software fixes and updates to the City for the life of the product.

Method of Measurement:

The quantity of Wireless Radio Assemblies to be paid will be measured as the number actually furnished and installed.

Basis of Payment:

The unit price paid for each Wireless Radio Assembly shall include the cost of furnishing, installing, connecting and testing of the Wireless Radio Assembly. The price shall also include furnishing all labor, tools, materials, mounting hardware, power supplies, cables, software, configuration, testing, maintenance agreement, warranty, documentation, equipment, storage, transportation, and other incidentals necessary to complete the work.

Pay Item

Wireless Radio Assembly

Pay Unit

EA

ITEM #1017032A – SERVICE (METERED)

Description:

Furnish and install a metered electric service at the location shown on the plans or as directed by the Engineer.

Materials:

- Meter Socket
 - UL listed
 - Manual lever bypass
 - P.V.C Slip fitting that complies with Utility Company requirements
 - Locking metal cover for the glass enclosure
 - Contact the serving utility company for a list of approved meter sockets without main circuit breakers.
- National Electric Code (NEC) compliant load side service conductors
- Conduit Bond Clamp
 - UL listed
 - Rated for direct burial

Locations served by Eversource (formerly Connecticut Light and Power Co. [CL&P])

Overhead service source locations:

Meter socket rated at 100 amps

Underground service source locations (manholes):

Meter socket rated at 200 amps

Construction Methods:

Comply with the NEC, Public Utility Regulatory Authority (PURA), and the serving power company requirements. The serving power company's latest installation details for metered service supersede those shown on Standard Sheet TR-1108_01 Controllers. Install a meter socket with associated equipment on the outside of the controller cabinet, as shown on the plans. Mount the enclosure approximately 54 inches above the ground and wire the meter socket to the service panel within the cabinet. Install an expansion fitting in the conduit between the ground and the enclosure. For non-Eversource locations using rigid metal conduit (RMC) for service, attach a direct-buried bond clamp below ground level, adjacent to the foundation and bond the RMC to the controller cabinet ground rod. Install a continuous nylon pull rope of at least 200 lbs. breaking strength in the conduit between the meter socket and the service source. Ensure all circuit breakers are off when service is connected by the utility company. The work must be inspected and approved by the Engineer or their designated representative prior to scheduling a service connection. Record the meter number and the date service is connected for billing purposes.

Locations served by Eversource and all other electric power providers

Contact the power company engineering representative for exact requirements of the service. r. When the work is complete notify the Engineer to inspect and confirm that the work is according to the National Electric Code. Request that the Engineer contact the power company to schedule the connection.

Method of Measurement:

The installation of the Service (Metered) will be measured for payment by the number of metered electric services of the type specified, completed, with service connected, and accepted in place.

Basis of Payment:

This work will be paid for at the contract unit price each for "Service (Metered)" complete and accepted in place. The price shall include all material above ground such as the meter socket enclosure, surface conduit, expansion fitting, coupling, and load side service conductors. The price shall also include the direct-buried ground clamp, bonding wire, pull rope, all material, equipment, tools, labor and incidentals necessary.

Any fees for service materials and equipment that are to be furnished and installed by the power company (e.g. meter, service riser, line-side conductors, etc.) shall be confirmed by the contractor and included in the price for this item.

ITEM #1017052A REMOVE SERVICE

DESCRIPTION: Work under this item shall consist of removal of an existing electric service cabinet used for highway lighting at the location shown on the plans.

MATERIALS: The Contractor shall be responsible for damage to all equipment and material incurred during removal and hauling to specified area. All repairs or replacements due to damage or loss by the Contractor shall be made at the Contractor's expense with materials meeting the approval of the Engineer.

CONSTRUCTION METHODS: Work under this item shall consist of removal of an existing electric service cabinet used for highway lighting at the location shown on the plans. The existing lighting cabinet shall not be removed until the new lighting control cabinet has been installed and is fully operational. This item shall also include maintaining and protecting the operation of the existing cabinet as needed during construction, including any required connection of temporary lighting circuits to the cabinet (drilling, connecting, splicing, etc.).

The Contractor shall notify the Utility Company to disconnect service 30 days prior to removing the service equipment. Prior to service removal the Contractor shall contact ConnDOT Facilities Electrical to have a "Customer Request for Service" filed with Eversource to initiate the Eversource work request process. The service cabinet with all components shall be removed and shall be transported to the Contractor's storage yard for the project.

The Contractor shall contact ConnDOT District Electrical Maintenance and arrange for ConnDOT Electrical personnel to have the opportunity to inspect the cabinet and to salvage the cabinet as a unit or salvage specific components. The Contractor shall assist ConnDOT Electrical personnel in loading the material onto ConnDOT vehicles for transport. Any material not selected for salvage shall remain the property of the Contractor.

The Contractor shall contact the Electrical Maintenance Supervisor at least 48 hours in advance to coordinate the transfer of materials. The Contractor shall contact the project appropriate Electrical Maintenance Supervisor at the following telephone numbers:

District 4: 203-264-9590

The electric meter shall be returned to the appropriate utility company representative and the Contractor shall note the date on which the meter was returned and relay this information to the Engineer.

The existing concrete foundation and chain link enclosure (where present) shall be removed and disposed of by the Contractor. The resulting excavation shall be properly backfilled, graded and seeded to match the surrounding area or as indicated on the plans.

The Contractor shall not remove the existing cabinet until the new lighting control cabinet has been installed and is operational. Under no circumstances shall the proper nighttime operation of the roadway lighting system be disrupted.

METHOD OF MEASUREMENT: This work will be measured for payment by the number of services removed and delivered, complete and accepted.

BASIS OF PAYMENT: This work will be paid for at the contract unit price each for "Remove Service" which price shall include removal, delivery and unloading of the cabinet, removal and disposal of the foundation and chain link enclosure, drilling, excavation, backfilling, grading, seeding, utility coordination, utility construction costs, and all equipment, labor, work and incidentals thereto.

Pay Item
Remove Service

Pay Unit
EA.

ITEM #1019053A - AERIAL CABLE (3 NO. 2)

DESCRIPTION: This work shall consist of furnishing and installing aerial cable, with insulators and brackets, on proposed poles at the location indicated on the plans.

MATERIALS: Aerial cable shall be 7 strand aluminum containing a No. 2 AWG bare messenger with three No. 2 AWG cross-linked polyethylene insulated conductors rated at 600 volts.

CONSTRUCTION METHODS: The aerial cable shall be attached to poles with insulators, including all connections as indicated on the plans or as directed by the Engineer. When necessary, the aerial cable shall be relocated to maintain different illumination circuits as dictated by the construction stages. Aerial cable used for temporary lighting shall be removed once the permanent lighting is installed and operational. Removed aerial cable shall remain the property of the Contractor.

Where aerial cable is connected to an existing aluminum light standard, the Contractor shall properly guy the light standard in the direction required to offset the force applied to the pole by the aerial cable. The Contractor shall take all precautions while applying tension to the aerial cable to not damage the aluminum pole and pole transformer base. Removed pole caps shall be stored and properly re-installed upon final removal of the aerial cable. Upon removal of the aerial cable, all circuit connections shall be returned to original condition within the aluminum light standard. Where installed over a roadway, the aerial cable shall be installed at the maximum achievable height on the poles to which it is attached. The amount of "sag" in the installed aerial cable shall be minimized while ensuring the cable tension falls within the structural limits of the pole. Under no circumstances shall the height of the aerial cable over the roadway be less than 18'.

METHOD OF MEASUREMENT: This work will be measured for payment by the actual number of linear feet of aerial cable installed and accepted, including attachments.

BASIS OF PAYMENT: This work will be paid for at the contract unit price per linear foot for "Aerial Cable (3 No. 2)" of the size and voltage specified, complete in place, which price shall include, insulators, entrance cap and attachment, bracket, guys, anchors, all materials, tools, connections, equipment, labor, and work incidental thereto. The unit cost for this item is a one time only cost. The cost of removing and relocating the aerial cable to maintain different illumination circuits shall be included in the unit cost.

Pay Item
Aerial Cable (3 No. 2)

Pay Unit
L.F.

ITEM #1020030A - TEMPORARY ILLUMINATION UNIT

DESCRIPTION: Under this item the Contractor shall furnish and install a breakaway fiberglass light pole, bracket, luminaire, and associated hardware, to be used for temporary lighting during construction, as indicated on the plans or as directed by the Engineer. At the end of the project the temporary illumination unit shall become the property of the Contractor.

MATERIALS: The pole shaft shall be fiberglass reinforced composite (FRC). The pole shaft shall be constructed by the filament winding process from thermosetting polyester resin and contain a minimum of 65 percent of "E" type fiberglass by weight. The filament windings shall be continuously applied with uniform tension and shall be placed on the pole helically at low angles to provide axial strength. Additional windings shall be placed on the pole in a circular manner to provide compressive strength. The pole is to be round, tapered, hollow, and reinforced in the support arm and hardware attachment areas. The pole is to be non-conductive and chemically inert. The pole shall meet the current AASHTO LTS-2 *Street Lighting Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, and shall be approved by FHWA for use on Federal Aid projects. A 2½" x 5" handhole shall be provided at the base of the pole shaft at approximately 18" above the finished grade line.

The pole exterior surface is to be grey with a natural (textured) finish. The surface of the pole will be uniform for the entire length of the pole. The laminate shall contain colored pigment, the color of the final coating, and be of uniform color throughout the entire wall thickness of the pole. A coating shall be applied to the pole to maintain surface integrity against the damaging effects of sunlight and extremes in weather. The coating is to be highly weather resistant pigmented polyurethane. The coating thickness shall have minimum dry film thickness of 1½ mils.

The surface shall be tested for a minimum of 5000 hours of accelerated testing in accordance with ASTM G154 (UV-A lamp 340 NM wave length, 130° F, cycle lamp 4 hours on 4 hours off) with the following results: Fiber exposure: none, Crazing: none, Checking: none, Chalking: none, Color: may dull slightly.

The pole shall be suitable for direct burial and shall conform to the breakaway requirements of the current AASHTO *Standard Specification for Structural Supports for Highway Signs, Luminaires and Traffic Signals*. For direct buried break-away poles the butt end shall be enlarged to provide resistance to rotation and pull out.

Where indicated on the plans, the pole shaft shall be equipped with an anchor base of heavy duty A356-T6 aluminum which shall be permanently bonded to the outside of the fiberglass shaft. The anchor base pole shall be installed on a concrete foundation, parapet anchorage, or other fixed anchorage as called for on the plans. The anchor base pole shall be non-breakaway, but

shall be attached to the anchorage using breakaway couplings as indicated on the plans or as directed by the Engineer

Each pole is to be permanently marked in characters 3/16" minimum high on a brass or stainless steel plate with the Manufacturer's identification symbol, month and year of manufacture. Each pole shall be individually packaged for protection during shipping and storage. The pole shall be warranted to be free of defects in materials and workmanship for a period of three years from the date of purchase.

The top of the pole is to be pre-drilled for two 5/8" thru bolts on 9 1/2" centers starting 4" below the top of the pole. A 1 1/2" wire exit hole shall be centered one half the distance between the two holes.

A cast aluminum removable cap shall be securely mounted to the top of the pole. The cap shall be corrosion resistant and must remain in place when subjected to the maximum wind loading for which the pole is designed.

The luminaire bracket arm shall be 12' in length (single member) of an upsweep design fabricated from tubular aluminum. The luminaire end shall have a 2 3/8" outside diameter.

Anchors shall conform to the pertinent requirements of Article M.16.04-2b, c, d, and e.

The temporary LED luminaire shall be 120-140 watt, $\pm$ 18,000 lumen, 4000k CCT, featuring LED light bar technology, with Type II full-cutoff light distribution, 20kV/10kA surge suppression, and 480 volt electronic driver. The luminaire housing shall be powder coated grey in color. The LED luminaire shall carry a limited five year warranty on the LEDs and the Driver. The LED luminaire shall be one of the following: Philips Lumec (Road Focus series), American Electric (Autobahn series), Eaton-Cooper Lighting (Archeon Medium series), or General Electric (Evolve series). No alternate luminaires will be accepted. A catalog cut will be required.

The Contractor may re-use a temporary illumination unit which was salvaged from another Connecticut DOT project provided the unit meets the requirements of the current project, is in excellent structural condition, and retains full breakaway and operational performance. The contractor shall submit a shop drawing, Materials Certificate, and Certified Test Report for the salvaged temporary illumination unit. The Materials Certificate and Certified Test Report shall be in full compliance with the requirements of Section 1.06.07.

CONSTRUCTION METHODS: The fiberglass pole shall be set in the earth to the required depth and proper compaction of backfill provided around the pole and then attached to the anchors with guys as necessary. For anchor base poles the pole base shall be securely bolted to the anchor bolts of the fixed anchorage (breakaway couplings shall be used where directed). The bracket shall be attached to the pole and shall provide a luminaire mounting height over the roadway of 35'. The bracket and luminaire assembly shall be installed perpendicular to the

center line of the roadway. When necessary, the temporary light pole and luminaire shall be relocated to maintain different illumination circuits as dictated by the construction stages.

Upon completion of the project the temporary illumination unit shall be removed and shall remain the property of the Contractor.

Upon removal of the pole, the resulting excavation shall be properly backfilled to match the surrounding area.

METHOD OF MEASUREMENT: This work will be measured for payment by the number of temporary illumination units installed and accepted.

BASIS OF PAYMENT: This work will be paid for at the contract unit price each for "Temporary Illumination Unit" complete in place, which price shall include all materials, fiberglass poles, breakaway base, anchor base (when required), anchors, guys, brackets, luminaire, driver, hardware, connections, hauling, and all equipment, tools, labor and all work incidental thereto including excavating, auguring, removal of bituminous overlay, backfilling, removal, hauling, relocation, and disposal. The unit cost for this item is a one-time only cost. The cost of removing and relocating the temporary illumination unit to maintain different illumination circuits shall be included in the unit cost.

<u>Pay Item</u>	<u>Pay Unit</u>
Temporary Illumination Unit	EA.

ITEM #1103022A – 30' STEEL SPAN POLE

ITEM #1114102A –SPAN WIRE

Description: Work under this item shall consist of designing, fabricating and installing a steel span pole to carry traffic appurtenances (such as traffic signals or signs), of the type specified, on a prepared foundation, in accordance with the details shown on the Plans and as ordered by the Engineer. Work under this item shall also include designing and installing a steel span wire, at the locations indicated, in accordance with the details shown on the Plans and as ordered by the Engineer.

Materials: The tubular components, such as the pole and luminaire arm shall be made of steel with a minimum yield stress no less than 35,000 psi.

The structural plate components, such as the baseplates and hand hole frames shall be made of steel that conforms to the requirements of ASTM A709, Grade 50.

Anchorage plates shall conform to the requirements of ASTM A709, Grade 50.

The steel for pole members and structural plate components, such as the baseplates and hand hole frames, shall meet Charpy V-notch impact testing requirements for non-fracture critical members in Zone 2 and the following:

Yield Strength	Thickness in.	Minimum Average Energy, ft.-lbf
$F_y \leq 36 \text{ ksi}$	≤ 4	15 at 40°F
$36 \text{ ksi} < F_y \leq 50 \text{ ksi}$	≤ 2	15 at 40°F
$36 \text{ ksi} < F_y \leq 50 \text{ ksi}$	$2 < t \leq 4$	20 at 40°F
$50 \text{ ksi} < F_y \leq 70 \text{ ksi}$	≤ 4	15 at -20°F
Charpy V-notch sampling and testing shall be in accordance with AASHTO T243, "H" piece frequency.		

The non-structural components, such as hand hole covers, caps and anchor bolt covers, shall be made of steel with minimum yield stress of 35,000 psi.

The filler metal shall have a matching strength relationship with the base metal.

All high strength bolts shall conform to ASTM F3125 Grade A325, Type 1. Nuts shall conform to ASTM A563, Grade DH. Circular, flat, hardened steel washers shall conform to ASTM F436. The bolts, nuts and washers shall be galvanized in accordance with ASTM F2329 or ASTM B695, Class 55. The nuts shall be overtapped to the minimum amount required for the bolt assembly and all surfaces of the nuts shall be lubricated with a lubricant containing a visible dye of any color that contrasts with the color of the galvanizing. The high strength bolts shall conform to the requirements of Subarticle M.06.02-3.

The anchor bolts shall conform to ASTM F1554, Grade 105. The nuts shall conform to ASTM A563, Grade DH. The washers shall conform to ASTM F436. The bolts, nuts and washers shall be galvanized in accordance with ASTM F2329 or ASTM B695, Class 55. The nuts shall be overlapped to the minimum amount required for the bolt assembly and all surfaces of the nuts shall be lubricated with a lubricant containing a visible dye of any color that contrasts with the color of the galvanizing. Prior to shipping the anchor bolts, the nuts and washers shall be installed by hand on the anchor bolts to ensure that the nuts can be run on the threads. Only anchor bolts on which the nuts are free running shall be shipped. The anchor bolts shall be shipped with the nuts and washers on the threads.

All steel components, including anchor bolts, shall be completely galvanized, after fabrication, in accordance with ASTM A123, ASTM F2329 or ASTM B695, Class 55, as applicable. Repairs to damaged areas of the galvanized coatings shall be brush applied and conform to the requirements of ASTM A780. No spray applied repairs to damaged galvanized coating shall be permitted.

Stainless steel hardware and fixtures shall conform to AISI, Type 304.

The silicone sealant shall be a 1-component, 100% silicone sealant recommended for use with galvanized steel.

Neoprene gasket material for the access openings shall conform to ASTM D1056, Grade 2A2 or 2A3. Other grades of neoprene approved by the Engineer may be used.

Closed cell elastomer for sealing the space between the foundation and base plate shall conform to ASTM D1056, Grade 2A2 or 2A3 and shall have a pressure-sensitive adhesive backing on one side for adhesion to steel. Closed cell elastomer contained within the anchor bolt pattern shall not interfere with the anchor bolt leveling nuts and shall not block the opening in the base plate.

Non-shrink grout shall meet the requirements of M.03.05 and be suitable for exterior applications.

Bare copper grounding conductor shall be #8 AWG stranded bare copper wire conforming to M.15.13. The grounding bolt shall be stainless steel with a hex head.

Steel span wire shall conform to Article M.16.15.

All materials used in the finished structure shall be new. The use of materials that have been previously used in a structure or salvaged from a structure is not permitted.

The Contractor shall submit Certified Test Reports and Materials Certificates in conformance with Article 1.06.07 for the steel used for span pole members and structural plate components, high-strength bolts (including nuts and washers) and anchor bolts (including nuts and washers). The Certified Test Reports shall include the following:

- a. Mill test reports that indicate the place where the material was melted and manufactured.
- b. High-strength bolt test results for proof load tests, wedge tests, and rotational-capacity tests that indicate where the tests were performed, date of tests, location where the components were manufactured and lot numbers.
- c. Galvanized material test results that indicate the thickness of the galvanizing.

Prior to incorporation into the work, the Contractor shall submit samples in conformance with Article 1.06.02 for the steel used for span pole members and components, high-strength bolts (including nuts and washers), anchor bolts (including nuts and washers), U-bolts (including nuts and washers) and threaded rods (including nuts and washers).

Construction Methods: The design and fabrication of the span pole, including its anchorage (into the foundation), and the design of the span wire shall conform to the requirements of the latest edition of the AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, including the latest interim specifications, available prior to the advertising date of the Contract, amended as follows:

- The design of the span pole system shall consider all load effects due to the Strength I, Extreme I, and Service II limit states.
- The design wind speed shall be 150 mph for the Extreme I limit state.
- The design shall investigate the load effects resulting from applying the maximum and minimum load factors for each applicable limit state.
- The span pole and span wire shall be designed to support free swinging traffic signals and signs. The wind drag coefficient, C_d , for traffic signals and luminaires shall be no less than 1.2. The wind drag coefficient, C_d , for hanging traffic signs shall be 1.3.
- The span pole shall be designed to support a span wire with a sag no greater than 5% of the span. For definitions of sag and span, refer to Appendix A in the AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.
- The span wire properties shall conform to Article M.16.15. All span wires in a span pole configuration shall be the same grade and have the same diameter.
- The maximum luminaire arm length shall be 20.0 ft.
- The maximum diameter of the pole at the base shall be 18 in.

- The height and exposure factor, K_z , shall be determined based on the highest elevation of the structure or the supported appurtenances. The factor shall be considered constant in all pressure calculations required for the design of the structure. The height and exposure factor shall be no less than 1.05.
- The minimum effective length factor, K , shall be as follows:

For the poles, $k = 2.1$

- For any structure components subject to combined forces, the combined force interaction (CFI) ratio due to each limit state shall not exceed 0.70. For any structure components not subject to combined forces, the ratio of the computed force (or stress) to the force (or stress) limit due to each limit state shall not exceed 0.70.
- All poles in a span wire configuration shall have the same material designation.
- The span pole shall be a tubular member with either a round or multisided cross-section. Multisided tubular members with other than 8, 12 or 16 sides are not permitted. Multisided tubular members with fluted sides are not permitted. The pole shall be fabricated with a taper (change in diameter).
- Multisided tubular members with diameters less than or equal to 13 in. shall have a minimum of 8 sides. Multisided tubular members with diameters greater than 13 in. and less than or equal to 18 in. shall have no less than 12 sides.
- Multisided tubular members shall have a minimum internal bend radius of 5 times the tubular member thickness or 1 in., whichever is greater.
- The minimum wall thickness of the pole shall be 0.3125 in. The wall thickness of the pole shall be uniform throughout its length. Joining 2 tubular members together with a circumferential weld to fabricate a pole is not permitted. The use of shop-fabricated stepped members is not permitted. The use of multiple plies (laminations) to obtain the required pole thickness is not permitted.
- Slip-type field splices are not permitted in any member.
- The tubular members may be fabricated with no more than 2 longitudinal seam welds. The seam welds shall be ground smooth and flush with the adjacent base metal. The use of external longitudinal reinforcement bars at longitudinal seam welds is not permitted. The use of spiral seam welds is not permitted.
- The longitudinal seam welds within 6.00 inches of the member ends shall be complete joint penetration groove welds.

- 100% of partial joint penetration longitudinal seam welds shall be non-destructively tested in accordance with the magnetic particle method. 100 % of complete joint penetration seam welds shall be non-destructively tested in accordance with the ultrasonic method.
- All tubular member to transverse plate connections shall be made with a complete joint penetration groove weld with a backing ring attached to the plate with a continuous fillet weld. 100% of the complete joint penetration groove welds shall be non-destructively tested by the ultrasonic method after fabrication and prior to galvanizing. 100% of the complete joint penetration groove welds shall also be non-destructively tested by the ultrasonic method for toe cracks after galvanizing. 100% of backing ring fillet welds shall be non-destructively tested by the magnetic particle method after fabrication prior to galvanizing. After galvanizing, the joint between the backing ring and tubular member shall be sealed with silicone sealant to prevent the ingress of moisture.
- The use of stiffeners at tubular member to transverse plate connections is not permitted.
- The strength of a connection made with a complete joint penetration groove weld shall be no greater than the strength of the base metal. In connections joining base metal with different yield strengths, the base metal with the lower yield strength shall govern the design.
- The use of seal and tack welds is not permitted. No welding shall be performed after galvanizing.
- The minimum base plate thickness shall be no less than 2.50 inches, or at least as thick as the anchor bolt diameter, whichever is greater. The determination of the plate thickness in the tubular member to transverse plate connections shall consider the potential for the plate to warp due to the heat from welding. Consideration shall be given to the use of thicker plates to allow for subsequent machining of warped plates to a flat surface so that removal of material will not compromise the required strength of the plate.
- The opening in the base plate shall be sized to allow for proper galvanizing and allow conduits projecting from the foundation to pass through it. The size of the opening shall be kept to a minimum to reduce the flexibility of the baseplate.
- The pole base plate anchor bolt circle diameter shall be 24 in.
- The anchor bolt to base plate connection shall be designed as a double-nut connection with shear holes. The minimum distance from the center of the anchor bolt hole to the edge of the base plate shall be no less than 2 times the diameter of the anchor bolt. The anchor bolts shall use an embedded anchorage plate, 0.50 inch minimum thickness, to transmit loads from the pole base to the concrete

foundation. The use of hooked anchor bolts is not permitted. The minimum number of anchor bolts shall be 8. The minimum anchor bolt diameter shall be 2.00 inches. The minimum anchor bolt embedment, the distance from the top of the foundation to the top of the embedded anchorage plate, shall be 3.50 feet or the tension development length of the vertical foundation reinforcement plus the end concrete cover, whichever is greater. Each anchor bolt shall be supplied with 4 nuts and 4 washers. Washers shall be placed on the top and bottom surfaces of the pole base plate and anchorage plate. Welding to the anchor bolts is not permitted. The use of lock washers with the anchor bolt assembly is not permitted.

- The nominal breaking strength values of the span wire meet Article M.16.15. The resistance factor Φ_t shall be 0.60. The span wire pole clamp shall be designed to provide a resistance no less than the factored tensile resistance of the span wire.

The span pole shall be designed for the load effects due to the span wire(s) attached to the poles and all the actual traffic appurtenances (signals, signs, luminaires, cameras, etc.) and any future traffic appurtenances attached to the span wire and the pole arranged, positioned and located as shown on the Plans. The load effect due to the span wire, resulting from the attached traffic appurtenances, will not be provided and shall be determined by the Contractor. The span pole and span wire shall also be designed for load effects during all stages of construction that may exist during the Project under which the span pole is installed.

The span pole and span wire shall be designed to support traffic appurtenances with properties no less than those tabulated on the Plans. If multiple appurtenances are attached at the same location on the structure, the load effects on the structure shall be based on the sum of the applicable traffic appurtenance properties. For load effects based on the projected front face area of traffic appurtenances, the area shall be assumed oriented in a plane parallel to the plane formed by the span wire and poles.

The locations and dimensions of the span poles are shown on the traffic Plans. The luminaire arm and pole lengths and the attachment heights shall be verified by the Contractor based on the finished grade at the site, top of foundation elevation, the locations of overhead utility cables and the traffic appurtenance mounting heights. If either the wire or pole length is inadequate, the Contractor shall notify the Engineer.

The minimum vertical clearance from the top of the finished road to the bottom of the traffic signals shall be 16.0 ft. The maximum vertical clearance from the top of the finished road to the bottom of the traffic signals shall be 18.0 ft. The traffic signals shall be installed so that the bottom of all the signals for each approach is at the same elevation.

The design and erection of the span pole shall comply in all respects with the National Electrical Safety Code, specifically rules 233, 234, 235, and 238 regarding the clearances between overhead utilities and adjacent support structures and cables. Contractor shall verify all clearances based on the grade at the site, top of the foundation elevation and the

location of overhead utility cables. If minimum clearances cannot be achieved, Contractor shall notify the Engineer prior to designing the span poles.

Vent and drain holes shall be provided for galvanizing. The number, size and location of vent and drain holes shall be coordinated with the galvanizer prior to the submission of the working drawings and design computations. The area of vent and drain holes at each end of a member shall be at least 30% of the inside area of the member for members with diameters 3.00 inches and greater and 45% of the inside area of the member for members with diameters less than 3.00 inches. The vent and drain holes shall be strategically located for reducing stress and for proper galvanizing. The holes shall be made by drilling. Flame cut holes are not permitted. The edges of all holes shall be rounded by grinding.

A J-hook shall be welded to the inside of the pole at the top for wire handling and support.

The span pole shall have a hand hole, reinforced with a frame, located at the base of the pole. The hand hole shall be located with a normal direction that is 90° to the plane formed by the pole and span wire. The clear distance from the top of the baseplate to the outside face of the bottom of the hand hole frame shall be no less than the diameter of the span pole member plus 2.00 inches and no greater than the diameter of the span pole member plus 4.00 inches. The hand hole frame shall have a minimum 4.00 inch wide by minimum 6.00 inch high clear opening. The maximum width of the hand hole opening, the clear opening plus twice the frame thickness, shall not be greater than 40% of the tubular member diameter at that section. The inside corners of the hand hole frame shall be rounded to a radius of 30% to 50% of the width of the clear opening. The minimum thickness of the hand hole frame shall be no less than the thickness of the pole or 0.3125 inches, whichever is greater. The hand hole frame shall be connected to the pole with a partial joint penetration groove weld reinforced with a fillet weld. The hand hole weld shall start and end at the point that is coincident with the longitudinal axis of symmetry of the tubular member and the longitudinal axis of symmetry of the hand hole frame. 100% of the weld shall be non-destructively tested in accordance with the magnetic particle method. The hand hole shall be provided with a cover connected to the frame with no less than 4 stainless steel screws. The cover shall be installed with a neoprene gasket matching the dimensions of the cover. The cover and the gasket and the hand hole frame shall be in firm and continuous contact after tightening the fasteners. The cover shall also be attached to the frame with a 1.50 ft. long stainless steel chain. The inside bottom of the frame shall have a hole tapped for the stainless steel grounding bolt.

The span pole shall include wire entrance fittings. The number and size of the wire entrance fittings shall be as shown on the Plans. The fittings shall be welded, all-around, to the pole at a 45-degree angle to the pole.

The span pole shall be supplied with a pole cap plate and anchor bolt covers. The cap plates shall be attached with no less than 3 threaded fasteners. The joint between the tubular member and plate shall be sealed with a neoprene gasket matching the dimensions of the plate.

The design of the span pole and the anchorage shall be coordinated with the design of the foundation to ensure that the foundation is adequate for the support reactions and to avoid conflicts between the embedded anchorage and the foundation reinforcement.

The luminaire arms shall be fabricated of pipe with a minimum thickness equal to schedule 40. Single arm luminaires shall be used for luminaires with arm lengths less than or equal to 8.0 ft. Truss type luminaires shall be used for luminaires with arm lengths greater than 8.0 ft. The truss type luminaires shall consist of upper and lower members joined with vertical members at the tip and midspan. To accommodate the luminaire fixture, the size of the pipe in the luminaire arm at the tip shall be 2 in. diameter, schedule 40. If necessary, a reducing tenon shall be installed at the tip of the arm to accommodate the luminaire fixture.

The luminaire arm(s) shall be connected to the pole with clamp connections. Each clamp connection shall use 4 high-strength bolts. The installed nuts shall be prevented from loosening while in service. The use of lock washers to meet this requirement is not permitted. The arms shall be fillet welded, all-around, to the clamp(s). The size of the weld shall be no less than 0.25 in. A hole shall be provided in the clamp, (upper arm clamp for truss type arms) and pole to allow for cables to pass from the pole to the luminaire arm. The sides of all holes in the connection shall be ground smooth and edges rounded by grinding to prevent the cables from chafing.

Prior to designing each span wire configuration, the Contractor shall prepare and submit a layout drawing(s) based on a field survey for each span wire configuration to the Engineer for review in accordance with 1.05.02. The layout drawing shall be drawn to scale and include a plan and elevation (cross-section) of each span. At an intersection, 1 plan may be used for multiple spans in a span wire configuration. The elevation of the span wire shall be parallel to the plane formed by the pole and the wire. The layout drawing is a working drawing for permanent construction. The layout drawing shall include, but not be limited to the following:

- Project number, town, location (route number/road name, direction), station (if applicable), and structure number
- Location and dimensions of travel lanes and shoulders
- Location and elevation of the high point of the road
- Top and bottom of slope elevations. Slope of finished grade at foundations
- Locations of overhead utilities
- Locations of drainage facilities
- Type of protection (metal beam rail/barrier), dimension from the front face of metal beam rail /barrier to the edge of the foundation, and dimension from the back side of the metal beam rail post to the edge of the foundation

- Elevation of the top of the foundation(s)
- Dimension from top of foundation to span wire connection
- Dimension from top of foundation to top of pole
- Length and dimensions of each span in the configuration, dimension from centerline of pole where applicable
- Actual and, if applicable, future traffic appurtenances
- Location of traffic appurtenances along the span wire relative to the centerline of the foundations/pole.
- Minimum dimensions from high point of the road to bottom of the lowest traffic appurtenance

If there are any changes to the proposed location of the span wire configuration and foundations prior to the construction of the foundations, the layout drawing shall be re-submitted for review.

Prior to fabrication, the Contractor shall submit working drawings and design computations, **based on the reviewed layout drawing**, with all details and documents necessary for fabrication and erection of the structure and its components, for each **span wire structure configuration** for review in accordance with Article 1.05.02.

The working drawings and design computations for span poles and the computations for the span wire shall conform to working drawing requirements for permanent construction. **A single set of working drawings with tabulated data for multiple span poles in span wire structure configuration is allowed.** Each span pole shall be referenced with an alpha-numeric identifier noted on the Contract documents. Combining working drawing submittals for span pole structures with submittals for foundations is not permitted. The working drawings and computations shall be prepared in Customary U.S. units. Working drawings for the erection of the structure shall conform to Subarticle 6.03.03-3(d).

The span pole working drawing and calculation submittal shall include the following:

- title sheet
- table of contents
- contact information for designer, fabricator and galvanizer – contact information shall include name and address of each firm and the name of contact person with phone number and email address
- copy of fabricator's AISC certification

- copy of the traffic signal control plan detailing the span wire structure configuration
- copy of reviewed layout drawing
- span pole working drawings
- span pole design computations
- span wire computations
- span pole installation procedure, including the method to plumb the pole

The working drawings shall include complete details of all span pole components. The drawings shall include, but not be limited to the following:

- the Project number, town and span pole alpha-numeric identification number
- reference to the design specifications, including interim specifications
- reference to the design specifications design criteria, such as design wind speed, minimum design life, vehicle speed, etc.
- material specifications/designations for all components
- material designations for the pole, with an explanation of the alpha numeric characters (equivalent thickness, in inches, shall be provided for gage numbers)
- non-destructive weld testing requirements
- details of the location of the longitudinal seam weld(s) in the pole
- vent and drain holes for galvanizing
- a plan view of the anchor bolt layout relative to the orientation of the wire
- anchor bolt dimensions, including embedment and projection
- span pole installation procedure, including the method to plumb the pole, if procedure differs from that described in this specification

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

- the Project number, town and alpha-numeric span pole identifier

- references to design specifications, including interim specifications, and the applicable code section and articles
- description/documentation for all computer programs used in the design
- input data for all computer programs, including but not limited to the following:
 - geometric and physical properties of each pole
 - for each span of a span pole configuration
 - number of signs and signals
 - span length
 - span wire data (maximum sag limit and physical properties)
 - alpha numeric designation to each pole
 - span signal and sign input data for each span
 - fixture ID
 - fixture location from a reference point
 - all surface and wind areas of each fixture
 - weight of each fixture
 - luminaire input data for each pole when applicable
 - arm physical and geometric data
 - fixture data including mounting height, wind area, weight, drag coefficient and ice area
 - clear definition of each load combination with corresponding limit state and load factor
 - all externally applied loading and magnitude
- wind pressure calculations
- drawings/models of the structure, components and connections, with dimensions, loads and references to the local and global coordinate systems used (as applicable), to facilitate review of the results
- coefficients and factors used in the design
- analysis results of each span of a span pole configuration
- summary sheet of the analysis results of each span, including but not limited to the following:

- the maximum CFI ratios of the following structure components for each limit state:
 - span wire
 - for each pole in the span wire configuration, the CFI at the pole base, in the base plate, and in the anchor bolts
- the maximum reactions applied to the foundation due to each limit state
- horizontal deflections due to all applicable limit states

Prior to fabrication, the Contractor shall submit welding procedures in accordance with Subarticle 1.05.17.

The steel fabricator shall be AISC certified for the fabrication to the Standard for Bridge and Highway Metal Component Manufacturers (CPT).

Fabrication of the span pole may begin only after the working drawings and design computations have been reviewed and the Engineer has authorized fabrication to begin.

Notification of shop fabrication shall conform to Subarticle 6.03.03-4(a).

No changes may be made during fabrication without prior written approval by the Department.

Inspection of shop fabrication shall conform to Subarticle 6.03.03-4(e).

All welding details, procedures and nondestructive testing shall conform to the requirements of AWS D1.1 Structural Welding Code - Steel. Welders shall meet the requirements of Sub-article 6.03.03-1(b).

Nondestructive testing shall conform to Subarticle 6.03.03-4(f).

All members and components shall be hot-dip galvanized in a single dip. Double-dipping of members and components is not permitted. All exterior and interior surfaces of the span pole members and components shall be completely galvanized.

Galvanized members and components shall be free from uncoated areas, blisters, flux deposits, and gross inclusions. Lumps, projections, globules, or heavy deposits of zinc which will interfere with the intended use of the material will not be permitted.

After galvanizing, the joint between the backing ring and the tubular member shall be sealed with silicone sealant to prevent the ingress of moisture.

All damaged areas of the hot-dip galvanized surfaces 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 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.

Prior to shipping, all exterior and interior galvanized surfaces of the members and components shall be inspected, in the presence of the Engineer, to determine the acceptability of the galvanized coating. Galvanized coatings may be found acceptable by the Engineer if all surfaces of the members and components meet the galvanizing requirements herein. Only span pole members and components with acceptable galvanized coatings shall be shipped. If the galvanized coating on any member or component is found to be unacceptable, the Contractor shall submit a repair procedure to the Engineer for review.

After fabrication and prior to shipping, aluminum identification tags shall be attached to the span poles with self-tapping tamper resistant screws.

The finished members and components shall be protected with sufficient dunnage and padding to protect them from damage and distortion during transportation. Damage to any material during transportation, improper storage, faulty erection, or undocumented fabrication errors may be cause for rejection of said material at the Project Site. All costs associated with any corrective action will be borne by the Contractor.

Following delivery to the Project Site, the Engineer will perform a visual inspection of all material to verify shipping documents, fabricator markings, and that there was no damage to the material or coatings during transportation and handling.

The Engineer is not responsible for approving or accepting any fabricated materials prior to final erection and assembly at the Project Site.

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

The span pole shall be erected, assembled and installed in accordance with these specifications and the procedures and methods submitted with the working drawings. The Contractor and the span pole designer are responsible to ensure that the erection and assembly procedures and methods in this specification are acceptable for use with the span pole. Changes to these methods and procedures shall be submitted with the working drawings and computations.

Prior to installation of the span pole, the exposed threads of all the embedded anchor bolts shall be cleaned of accumulated dirt and concrete and shall be lubricated. The threads and bearing surfaces of all the anchor bolt nuts shall be cleaned and lubricated. The anchor bolts and nuts are properly lubricated if the nuts can be turned by hand on the anchor bolt threads. The lubricant shall contain a visible dye of any color that contrasts with the color of the galvanizing. Re-lubricate the threads of the anchor bolts and nuts if more than 24 hours has elapsed since earlier lubrication, or if the anchor bolts and nuts have become wet since they were first lubricated.

Install (turn) the leveling nuts onto the anchor bolts and align the nuts to the same elevation or plane. The distance from the bottom of the leveling nuts to the top of the foundation shall not exceed 1.00 inch. Place a structural hardened washer on top of each leveling nut, 1 washer on each anchor bolt.

Two methods are acceptable to seal between the baseplate and top of the foundation, a closed cell elastomer ring and non-shrink grout. If a closed cell elastomer ring is used, prior to erecting the pole, place the ring within the anchor bolt pattern. The closed cell elastomer ring shall not interfere with the anchor bolt leveling nuts and shall not block the opening in the base plate.

The pole shall be erected so that the centerline of the pole will be plumb after the application of all the dead loads. The pole may be initially installed raked in the opposite direction of the overhead member to obtain the plumb condition. Raking the pole may be accomplished by installing the leveling nuts in a plane other than level.

Install the pole base plate atop the washers resting on the leveling nuts, place a structural hardened washer on each anchor bolt resting it on the top of the base plate, and install (turn) a top nut on each anchor bolt until the nut contacts the washer. The leveling nuts and washers shall be inspected, and if necessary the nuts turned, so that the washers are in full contact with the bottom surface of the base plate.

Tighten the top nuts to a snug tight condition in a star pattern. Snug tight is defined as the maximum rotation resulting from the full effort of one person using a 12.00 inch long wrench or equivalent. A star tightening pattern is one in which the nuts on opposite or near-opposite sides of the bolt circle are successively tightened in a pattern resembling a star (e.g., For an 8-bolt circle with bolt sequentially numbered 1 to 8, tighten nuts in the following bolt order: 1, 5, 7, 3, 8, 4, 6, 2.).

Tighten leveling nuts to a snug tight condition in a star pattern.

Before final tightening of the top nuts, mark the reference position of each top nut in a snug-tight condition with a suitable marking on 1 flat with a corresponding reference mark on the base plate at each bolt. Then incrementally turn the top nuts using a star pattern one-sixth of a turn beyond snug tight. Turn the nuts in at least two full tightening cycles (passes). After tightening, verify the top nut rotation. The top nuts shall have full thread engagement. The distance from the bottom of the leveling nuts to the top of the foundation shall not exceed 1.00 inch.

After erecting the span pole, the span pole shall be electrically grounded by attaching the bare copper grounding conductor to the inside of the hand hole frame with a stainless steel bolt and to the ground rod with a ground clamp. The rigid metal conduit shall be electrically grounded by attaching the bare copper grounding conductor to the insulated bonding bushing and to the ground rod with a ground clamp.

The installation of the span wire shall conform to Article 11.14.03. A span wire pole clamp shall be provided for each span wire connected to the pole. The traffic appurtenances shall be located and mounted on the wire as shown on the cross-sections.

After installation of the traffic appurtenances, the anchor bolt nuts (leveling and top anchor nut) and washers shall be in full contact with the top and bottom surfaces of the pole base plate and the centerline of the pole shall be plumb.

After plumbing the pole, if a closed cell elastomer ring has not been previously installed, seal the opening between the baseplate and foundation with non-shrink grout. The non-shrink grout shall be placed within the anchor bolt pattern so that the anchor bolts will remain visible.

After installation of the traffic appurtenances, a survey shall be performed by the Contractor to confirm that the sag is no less than 5% of the span and to confirm that the minimum vertical clearances from the top of the finished road to the bottom of the traffic appurtenances have been met.

The last character of the span pole identification number shall be stenciled with black paint, unless otherwise specified, on the pole of each span pole. The character shall be 3.00 inches high and placed approximately 12.00 inches above the top of the base plate facing the centerline of the roadway.

Method of Measurement: The work for span poles will be measured for payment by the number of span poles, of the type specified, completed and accepted in place. The work for span wire will be measured for payment by the actual number of linear feet of steel span wire installed and accepted in place.

Basis of Payment: The work for the span poles will be paid for at the Contract unit price each for "XX Steel Span Pole" or "Steel Combination Span Pole", of the type specified, complete in place, which price shall include all equipment, materials, tools and labor incidental to the design, fabrication and installation, of the span pole at the locations specified on the Plans. The work for the span wire will be paid for at the Contract unit price per linear foot for "Span Wire", complete in place, which price shall include pole clamps, thimble eyebolts, nuts, washers, cable rings, and all equipment, materials, tools and labor incidental to the design and installation, at the locations shown on the Plans.

<u>Pay Item</u>	<u>Pay Unit</u>
30' Steel Span Pole	ea.
Span Wire	l.f.

ITEM #1104026A – 25’ STEEL MAST ARM ASSEMBLY

ITEM #1104028A – 30’ STEEL MAST ARM ASSEMBLY

ITEM #1104031A – 35’ STEEL MAST ARM ASSEMBLY

ITEM #1104033A – 40’ STEEL MAST ARM ASSEMBLY

ITEM #1104039A – 55’ STEEL MAST ARM ASSEMBLY

ITEM #1104042A – 60’ STEEL MAST ARM ASSEMBLY

ITEM #1104045A – 70’ STEEL MAST ARM ASSEMBLY

Description: Work under this item shall consist of designing, fabricating and installing a mast arm assembly to carry traffic appurtenances (such as traffic signals, signs, detection equipment, vibration mitigation device, etc.) of the type specified, on a prepared foundation, in accordance with the details shown on the Plans and as ordered by the Engineer.

Materials: The tubular components, such as the pole, mast arm and luminaire arm shall be made of steel with a minimum yield stress no less than 35,000 psi.

The structural plate components, such as the baseplates, hand hole frames, and the plates in the arm to pole ring stiffened, built-up box connection, shall be made of steel that conforms to the requirements of ASTM A709, Grade 50.

Anchorage plates shall conform to the requirements of ASTM A709, Grade 50.

The steel for arm and pole members, structural plate components, such as the baseplates, connection/flange plates, gusset plates, hand hole frames and the plates in the arm to pole connection, shall meet Charpy V-notch impact testing requirements for non-fracture critical members in Zone 2 and the following:

Yield Strength	Thickness in.	Minimum Average Energy, ft.-lbf
$F_y \leq 36 \text{ ksi}$	≤ 4	15 at 40°F
$36 \text{ ksi} < F_y \leq 50 \text{ ksi}$	≤ 2	15 at 40°F
$36 \text{ ksi} < F_y \leq 50 \text{ ksi}$	$2 < t \leq 4$	20 at 40°F
$50 \text{ ksi} < F_y \leq 70 \text{ ksi}$	≤ 4	15 at -20°F
Charpy V-notch sampling and testing shall be in accordance with AASHTO T243, “H” piece frequency.		

The non-structural components, such as hand hole covers, caps and anchor bolt covers, shall be made of steel with minimum yield stress of 35,000 psi.

The filler metal shall have a matching strength relationship with the base metal.

All high strength bolts shall conform to ASTM F3125, Grade A325, Type 1. Nuts shall conform to ASTM A563, Grade DH. Circular, flat, hardened steel washers shall conform to ASTM F436. The bolts, nuts and washers shall be galvanized in accordance with ASTM F2329 or ASTM B695, Class 55. The nuts shall be overtapped to the minimum amount required for the bolt assembly and all surfaces of the nuts shall be lubricated with a lubricant containing a visible dye of any color that contrasts with the color of the galvanizing. The high strength bolts shall conform to the requirements of Subarticle M.06.02-3.

The anchor bolts shall conform to ASTM F1554, Grade 105. The nuts shall conform to ASTM A563, Grade DH. The washers shall conform to ASTM F436. The bolts, nuts and washers shall be galvanized in accordance with ASTM F2329 or ASTM B695, Class 55. The nuts shall be overtapped to the minimum amount required for the bolt assembly and all surfaces of the nuts shall be lubricated with a lubricant containing a visible dye of any color that contrasts with the color of the galvanizing. Prior to shipping the anchor bolts, the nuts and washers shall be installed by hand on the anchor bolts to ensure that the nuts can be run on the threads. Only anchor bolts on which the nuts are free running shall be shipped. The anchor bolts shall be shipped with the nuts and washers on the threads.

All steel components, including anchor bolts, shall be completely galvanized, after fabrication, in accordance with ASTM A123, ASTM F2329 or ASTM B695, Class 55, as applicable. Repairs to damaged areas of the galvanized coatings shall be brush applied and conform to the requirements of ASTM A780. No spray applied repairs to damaged galvanized coating shall be permitted.

Stainless steel hardware and fixtures shall conform to AISI, Type 304.

The silicone sealant shall be a 1-component, 100% silicone sealant recommended for use with galvanized steel.

Neoprene gasket material for the access openings shall conform to ASTM D1056, Grade 2A2 or 2A3. Other grades of neoprene approved by the Engineer may be used.

Closed cell elastomer for sealing the space between the foundation and base plate shall conform to ASTM D1056, Grade 2A2 or 2A3 and shall have a pressure-sensitive adhesive backing on one side for adhesion to steel. Closed cell elastomer contained within the anchor bolt pattern shall not interfere with the anchor bolt leveling nuts and shall not block the opening in the base plate.

Non-shrink grout shall meet the requirements of M.03.05 and be suitable for exterior applications.

Bare copper grounding conductor shall be #8 AWG stranded bare copper wire conforming to M.15.13. The grounding bolt shall be stainless steel with a hex head.

The vibration mitigation device shall be a self-contained, noiseless, mechanical device that reduces the wind load effects due to galloping when attached vertically to the arm of mast arm assemblies. The device shall provide a level of response reduction to satisfy Section 11.7.1.1 of the latest edition of the AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals (AASHTO LRFD LTS Specifications), including the latest interim specifications, available prior to the advertising date of the contract. The device shall have been tested for the number of cycles that will provide an infinite fatigue life for the structure on which it is attached and have no degradation of the device, components or performance. The vibration mitigation device shall not exceed 40 lbs., nor 2.00 square feet front face projected area, nor 0.25 square feet bottom face projected area. The device components shall be made of corrosion resistant materials or otherwise protected from corrosion. All components shall be contained in a sealed metal housing. The mitigation device shall not utilize supplemental struts, cables, or other components which will change the load path on the structure. The use of aerodynamic vibration mitigation devices is not permitted. The mitigation device shall be free of lead. The mitigation device shall not contain fluids.

Vibration mitigations device(s) that can meet the above requirements are:

Mitigator TR1 Traffic Damper
Valmont Structures
28800 Ida Street
Valley, NE 68064-0358
402-359-6735 / 800-825-6668
www.valmontstructures.com

Vibration mitigations devices other than those listed may be used provided they meet the specification requirements and are accepted by the Engineer as “an approved equal”.

All materials used in the finished structure shall be new. The use of materials that have been previously used in a structure or salvaged from a structure is not permitted.

The Contractor shall submit Certified Test Reports and Materials Certificates in conformance with Article 1.06.07 for the steel used in the mast arm members and components, high-strength bolts (including nuts and washers) and anchor bolts (including nuts and washers). The Certified Test Reports shall include the following:

- a. Mill test reports that indicate the place where the material was melted and manufactured.
- b. High-strength bolt test results for proof load tests, wedge tests, and rotational-capacity tests that indicate where the tests were performed, date of tests, location of where the components were manufactured and lot numbers.

ITEM #1104026A, 1104028A, 1104031A, 1104033A,
1104039A, 1104042A, 1104045A

c. Galvanized material test results that indicate the thickness of the galvanizing.

Prior to incorporation into the work, the Contractor shall submit samples in conformance with Article 1.06.02 for the steel used in the mast arm members and components, high-strength bolts (including nuts and washers), anchor bolts (including nuts and washers). U-bolts (including nuts and washers) and threaded rods (including nuts and washers).

Construction Methods: The design and fabrication of the mast arm assembly, including its anchorage (into the foundation), shall conform to the requirements of the latest edition of the AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, including the latest interim specifications, available prior to the advertising date of the Contract, amended as follows:

- The design of the mast arm system shall consider all load effects due to the Strength I, Extreme I, Service II, and Fatigue I limit states.
- The design wind speed shall be 150 mph for the Extreme I limit state.
- The design shall investigate the load effects resulting from applying the maximum and minimum load factors for each applicable limit state.
- The mast arms shall be designed to support fixed mounted traffic signals and signs. The wind drag coefficient, C_d , for traffic signals and luminaires shall be 1.2.
- The maximum luminaire arm length shall be 20 feet.
- Limitations and requirements for the pole, arm, bolt circle diameters and use of vibration mitigation devices are as follows:

Arm Length (S)			Maximum Diameter of Pole at Base	Maximum Diameter of Arm at Base	Anchor Rod Circle Diameter	Vibration Mitigation Device
	S	≤ 40 ft.	18"	18"	diameter of pole at base plus 6" +/- 1"	Not Permitted
40 ft. <	S	≤ 50 ft.	19"	19"		Required
50 ft. <	S	≤ 60 ft.	20"	20"		Required
60 ft. <	S	≤ 70 ft.	21"	21"		Required

- The diameter of the arm at the arm/pole connection shall be no less than the diameter of the pole at the connection and no greater than the diameter of the pole at the base.
- The height and exposure factor, K_z , shall be determined based on the highest elevation of the structure or the appurtenances. The factor shall be considered constant in all pressure computations required for the design of the structure. The height and exposure factor shall be no less than 1.05.
- The mast arms shall be designed for fatigue category I for cantilevered structures, unless otherwise noted. The mast arms shall be designed for the wind load effects due to galloping, natural wind gusts and truck-induced gusts. The luminaire arms shall be designed for the wind load effects due to natural wind gusts. The design pressure for the truck-induced gust shall be based on a truck speed of 65 mph. The design of the mast arms not to be constructed with a vibration mitigation device shall assume that vibration mitigation devices will not be installed. Mast arms to be constructed with vibration mitigation devices shall be designed for fatigue category II for the galloping fatigue design load and fatigue category I for the natural wind gust and truck-induced gust fatigue design loads.
- The vertical deflection of the free end of the arm due to the wind load effects of galloping and truck-induced gusts shall not exceed 8.00 inches.
- The minimum effective length factor, K , shall be as follows:

For the poles, $k = 2.1$

For cantilevered mast arm member, $k \geq 1.2$

- For any structure components subject to combined forces, the combined force interaction (CFI) ratio due to each limit state shall not exceed 0.70. For any structure components not subject to combined forces, the ratio of the computed force (or stress) to the force (or stress) limit due to each limit state shall not exceed 0.70.
- All tubular members on a structure shall have the same material designation.
- The arm, luminaire arm and pole shall be tubular members with either round or multisided cross-sections. Multisided tubular members with other than 8, 12 or 16 sides are not permitted. Multisided tubular members with fluted sides are not permitted. The arm and luminaire arm shall be fabricated with a taper (change in diameter).

- Multisided tubular members with diameters less than or equal to 13.00 inches shall have a minimum of 8 sides. Multisided tubular members with diameters greater than 13.00 inches and less than or equal to 18.00 inches shall have no less than 12 sides.
- Multisided tubular members shall have a minimum internal bend radius of 5 times the tubular member thickness or 1.00 inch, whichever is greater.
- The minimum wall thickness of the arm at the pole connection and the pole shall be 0.3125 inches. The wall thickness of the pole and arm component members shall be uniform throughout their lengths. The use of multiple plies (laminations) to obtain the required arm and pole thickness is not permitted. The use of shop-fabricated stepped members is not permitted.
- Joining 2 tubular members together with a circumferential weld to fabricate a pole is not permitted.
- The use of slip-type field splices are permitted in the arm. Slip-type field splices are not permitted in the pole. No welding shall be done to areas covered with galvanized coating.
- A maximum of 1 longitudinal seam weld is permitted in the arm. The pole may be fabricated with no more than 2 longitudinal seam welds. The seam welds shall be ground smooth and flush with the adjacent base metal. The use of external longitudinal reinforcement bars at longitudinal seam welds is not permitted. The use of spiral seam welds is not permitted.
- The longitudinal seam welds within 6.00 inches of the member ends shall be complete joint penetration groove welds.
- Non-destructively test 100% of partial joint penetration longitudinal seam welds in accordance with the magnetic particle method. Non-destructively test 100 % of complete joint penetration seam welds in members less than 0.25 inches thick in accordance with the magnetic particle method on both the inside and outside surfaces. Non-destructively test 100% of complete joint penetration seam welds in members greater than or equal to 0.25 inches thick in accordance with the ultrasonic method in accordance with AWS D1.1 Annex S.
- All tubular member to transverse plate connections shall be made with a complete joint penetration groove weld with a backing ring attached to the plate with a continuous fillet weld. Non-destructively test 100% of the complete joint penetration groove welds by the ultrasonic method after fabrication and prior to galvanizing. Non-destructively test 100% of the complete joint penetration groove welds by the ultrasonic method for toe cracks after galvanizing. Non-

destructively test 100% of backing ring fillet welds by the magnetic particle method after fabrication prior to galvanizing. After galvanizing, the joint between the backing ring and tubular member shall be sealed with silicone sealant to prevent the ingress of moisture.

- The use of stiffeners at tubular member to transverse plate connections is not permitted.
- The strength of a connection made with a complete joint penetration groove weld shall be no greater than the strength of the base metal. In connections joining base metal with different yield strengths, the base metal with the lower yield strength shall govern the design.
- The flange plate connection in the arm to pole in the ring stiffened, built-up box connection shall be designed as slip critical connections with standard holes. The minimum number of high-strength bolts in a flange splice shall be 8. Consideration shall be given to the use of smaller diameter bolts since they require lower specified minimum bolt tensions.
- The minimum flange plate thickness shall no less than 2.00 inches. The determination of the plate thickness in the tubular member to transverse plate connections shall consider the potential for the plate to warp due to the heat from welding. Consideration shall be given to the use of thicker plates to allow for subsequent machining of warped plates to a flat surface so that removal of material will not compromise the required strength of the plate.
- The minimum thickness of the ring plates and gusset plates in the ring stiffened, built-up box connection shall be 0.5 inches.
- The size of fillet welds specified in designed connections shall be no less than 0.3125 inches. The use of seal and tack welds is not permitted. No welding shall be performed after galvanizing.
- The minimum base plate thickness shall be no less than 2.5 inches or at least as thick as the anchor bolt diameter, whichever is greater. The determination of the plate thickness in the tubular member to transverse plate connections shall consider the potential for the plate to warp due to the heat from welding. Consideration shall be given to the use of thicker plates to allow for subsequent machining of warped plates to a flat surface so that removal of material will not compromise the required strength of the plate.
- The opening in the base plate shall be sized to allow for proper galvanizing and allow conduits projecting from the foundation to pass through it. The size of the opening shall be kept to a minimum to reduce the flexibility of the baseplate.

- The anchor bolt to base plate connection shall be designed as a double-nut connection with shear holes. The minimum distance from the center of the anchor bolt hole to the edge of the base plate shall be no less than 2 times the diameter of the anchor bolt. The anchor bolts shall use an embedded anchorage plate, 0.5 inch minimum thickness, to transmit loads from the pole base to the concrete foundation. The use of hooked anchor bolts is not permitted. The minimum number of anchor bolts shall be 8. The minimum anchor bolt diameter shall be 2.00 inches. The minimum anchor bolt embedment, the distance from the top of the foundation to the top of the embedded anchorage plate, shall be 3.5 feet or the tension development length of the vertical foundation reinforcement plus the end concrete cover, whichever is greater. Each anchor bolt shall be supplied with 4 nuts and 4 washers. Washers shall be placed on the top and bottom surfaces of the pole base plate and anchorage plate. Welding to the anchor bolts is not permitted. The use of lock washers with the anchor bolt assembly is not permitted.

The mast arm assemblies shall be designed for the load effects due to the actual traffic appurtenances (signals, signs, luminaires, cameras, vibration mitigation devices, etc.) and any future traffic appurtenances arranged, positioned and located as shown on the Plans. To ensure the traffic appurtenances can be adjusted to meet field conditions, mast arm assemblies shall be designed to allow the traffic appurtenances, both actual and future, to be relocated up to 2 feet further away from the pole than shown on the Plans. Mast arm assemblies shall be designed assuming video detection equipment is located at the tip of the arm allowing the equipment to be field located anywhere along the arm. The mast arm assemblies shall also be designed for load effects during all stages of construction that may exist during the Project under which the mast arm is installed.

The mast arm assemblies shall be designed to support traffic appurtenances with properties no less than those tabulated on the Plans. If multiple appurtenances are attached at the same location on the structure, the load effects on the structure shall be based on the sum of the applicable traffic appurtenance properties. For load effects based on the projected front face area of traffic appurtenances, the area shall be assumed oriented in a plane parallel to the plane formed by the arm and the pole.

The dimensions of the mast arm assemblies are shown on the traffic Plans, elevations, cross-sections or in the special provisions. The arm, luminaire arm and pole lengths and the attachment heights shall be verified by the Contractor based on the finished grade at the site, top of foundation elevation, the locations of overhead utility cables and the traffic appurtenance mounting heights. If either the arm or pole length is inadequate, the Contractor shall notify the Engineer.

The minimum vertical clearance from the top of the finished road to the bottom of the traffic signals shall be 16.0 feet. The maximum vertical clearance from the top of the finished road to the bottom of the traffic signals shall be 18.0 feet. The traffic signals shall be installed so that the bottom of all the signals for each approach is at the same elevation.

The minimum clearance from the utility communication cables to the mast arm assembly shall be 2.0 feet. In all other respects, the design and erection of the mast arm assembly shall comply with the National Electrical Safety Code, specifically rules 233, 234, 235, and 238 regarding the clearances between overhead utilities and adjacent support structures and cables. Contractor shall verify all clearances based on the grade at the site, top of the foundation elevation, and the location of overhead utility cables. If minimum clearances cannot be achieved, Contractor shall notify the Engineer prior to designing mast arm assembly.

The arm to pole connection shall be made with a ring stiffened, built-up box. The luminaire arm to pole connection shall be made with either a built-up box or a ring stiffened built-up box. A minimum of 8 high-strength bolts shall be used to connect the arm flange plate to the built-up box connection plate. A minimum of 4 high-strength bolts shall be used to connect the luminaire arm flange plate to the built-up box connection plate. All fasteners and their components used in each connection shall be visible. The use of tapped holes in the plates of each connection is not permitted. A hole(s) shall be provided in each connection to allow cables to pass from the pole to the arm and luminaire arm. The sides of all holes in each connection shall be ground smooth and the edges rounded by grinding to prevent the cables from chafing.

Vent and drain holes shall be provided for galvanizing. The number, size and location of vent and drain holes shall be coordinated with the galvanizer prior to the submission of the working drawings and design computations. The area of vent and drain holes at each end of a member shall be at least 30% of the inside area of the member for members with diameters 3.00 inches and greater and 45% of the inside area of the member for members with diameters less than 3.00 inches. The vent and drain holes shall be strategically located for reducing stress and for proper galvanizing. The holes shall be made by drilling. Flame cut holes are not permitted. The edges of all holes shall be rounded by grinding. After galvanizing, exposed holes placed in the mast arm assembly components for galvanizing shall be sealed with neoprene plugs.

A J-hook shall be welded to the inside of the pole at the top for wire handling and support.

The mast arm shall have a hand hole, reinforced with a frame, located at the base of the pole. The hand hole shall be located with a normal direction that is 90° to the plane formed by the pole and arm. The clear distance from the top of the baseplate to the outside face of the bottom of the hand hole frame shall be no less than the diameter of the tubular member plus 1.00 inch and no greater than the diameter of the tubular member plus 3.00 inches. The hand hole frame shall have a minimum 4.00 inch wide by minimum 6.00 inch high clear opening. The maximum width of the hand hole opening, the clear opening plus twice the frame thickness, shall not be greater than 40% of the tubular member diameter at that section. The inside corners of the hand hole frame shall be rounded to a radius of 30% to 50% of the width of the clear opening. The minimum thickness of the hand hole frame shall be no less than the thickness of the pole or 0.3125 inches, whichever is greater. The hand hole frame shall be connected to the pole with a partial joint penetration groove weld reinforced with a fillet weld. The hand hole weld shall start and end at the point that is coincident with the longitudinal axis of symmetry of the tubular member and the longitudinal axis of symmetry of the hand hole frame. 100% of the weld shall

be non-destructively tested in accordance with the magnetic particle method. The hand hole shall be provided with a cover connected to the frame with no less than 2 stainless steel screws. The cover shall be installed with a neoprene gasket matching the dimensions of the cover. The cover and the gasket and the hand hole frame shall be in firm and continuous contact after tightening the fasteners. The cover shall also be attached to the frame with a 1.5 foot long stainless steel chain. The inside bottom of the frame shall have a hole tapped for the stainless steel grounding bolt.

The mast arm shall be supplied with a pole cap plate, arm cap plate, and anchor bolt covers. The cap plates shall be attached with no less than 3 threaded fasteners. The joint between the tubular member and plate shall be sealed with a neoprene gasket matching the dimensions of the plate.

The design of the mast arm and the anchorage shall be coordinated with the design of the foundation to ensure that the foundation is adequate for the support reactions and to avoid conflicts between the embedded anchorage and the foundation reinforcement.

The luminaire arms shall be fabricated of pipe with a minimum thickness equal to schedule 40. Single arm luminaires shall be used for luminaires with arm lengths less than or equal to 8.0 feet. Truss type luminaires shall be used for luminaires with arm lengths greater than 8.0 feet. The truss type luminaires shall consist of an upper and lower members joined with vertical members at the tip and midspan. To accommodate the luminaire fixture, the size of the pipe in the luminaire arm at the tip shall be 2.00 inch diameter, schedule 40. If necessary, a reducing tenon shall be installed at the tip of the arm to accommodate the luminaire fixture.

The luminaire arm(s) shall be connected to the pole with clamp connections. Each clamp connection shall use 4 high-strength bolts. The installed nuts shall be prevented from loosening while in service. The use of lock washers to meet this requirement is not permitted. The arms shall be fillet welded, all-around, to the clamp(s). The size of the weld shall be no less than 0.25 inches. A hole shall be provided in the clamp, (upper arm clamp for truss type arms) and pole to allow for cables to pass from the pole to the luminaire arm. The sides of all holes in the connection shall be ground smooth and edges rounded by grinding to prevent the cables from chafing.

Prior to designing each mast arm assembly, the Contractor shall prepare and submit a layout drawing(s) based on a field survey for each mast arm assembly to the Engineer for review in accordance with 1.05.02. The layout drawing(s) shall be drawn to scale and include a plan and elevation (cross-section) of each mast arm. At an intersection, 1 plan may be used for multiple mast arm assemblies. The elevation of the mast arm assembly shall be parallel to the plane formed by the pole and the arm. A layout drawing is a working drawing for permanent construction.

The layout drawing shall include, but not be limited to the following:

- Project number, town, location (route number/road name, direction), station (if applicable), and structure number

- Location and dimensions of travel lanes and shoulders
- Location and elevation of the high point of the road
- Top and bottom of slope elevations. Slope of finished grade at foundations
- Locations of overhead utilities
- Locations of drainage facilities
- Type of protection (metal beam rail/barrier), dimension from the front face of metal beam rail /barrier to the edge of the foundation, and dimension from the back side of the metal beam rail post to the edge of the foundation
- Elevation of the top of the foundation(s)
- Dimension from top of foundation to centerline of arm member
- Dimension from top of foundation to top of vertical pole
- Length of arm member, dimension from centerline of pole to free end of arm
- Actual and, if applicable, future traffic appurtenances
- Location of traffic appurtenances along the arm relative to the centerline of the foundations/pole. The appurtenance locations shall not include the 2 foot design tolerance.
- Minimum dimensions from high point of the road to bottom of the lowest traffic appurtenance

If there are any changes to the proposed location of the mast arm assembly and foundation prior to the construction of the foundation, the layout drawing shall be re-submitted for review. Prior to fabrication, the Contractor shall submit working drawings and design computations, **based on the reviewed layout drawing**, for each mast arm assembly, with all details and documents necessary for fabrication and erection of the structure and its components, for review in accordance with Article 1.05.02.

The working drawings and design computations for the mast arm assemblies shall conform to working drawing requirements for permanent construction. **A single set of drawings with tabulated data for multiple mast arm locations is not permitted.** Each mast arm shall be referenced with an alpha-numeric identifier noted on the Contract documents. Combining working drawing submittals for mast arm structures with submittals for foundations is not

permitted. The working drawings and computations shall be prepared in Customary U.S. units. Working drawings for the erection of the structure shall conform to Subarticle 6.03.03-3(d).

The mast arm working drawing and calculation submittal shall include the following:

- title sheet
- table of contents
- contact information for designer, fabricator and galvanizer – contact information shall include name and address of each firm and the name of contact person with phone number and email address
- copy of fabricator's AISC certification
- copy of the traffic signal control plan detailing mast arm assembly
- copy of reviewed layout drawing
- mast arm assembly working drawings
- mast arm assembly design computations
- mast arm installation procedure, including the method to plumb the pole
- Vibration mitigation device working drawings, computations, and supporting documentation. See requirements below.

The working drawings shall include complete details of all mast arm components. The drawings shall include, but not be limited to the following:

- the Project number, town and mast arm alpha-numeric identification number
- reference to the design specifications, including interim specifications
- reference to the design specifications design criteria, such as design wind speed, minimum design life, fatigue category, vehicle speed, etc.
- material specifications/designations for all components
- material specifications/designations for the arm and pole, with an explanation of the alpha numeric characters (equivalent thickness, in inches, shall be provided for gage numbers)

- non-destructive weld testing requirements
- details of the location of the longitudinal seam welds in the arm, luminaire arm and pole
- vent and drain holes for galvanizing
- dead load and permanent camber
- a plan view of the anchor bolt layout relative to the orientation of the arm
- anchor bolt dimensions, including embedment and projection
- number of vibration mitigation devices required per arm and allowable locations for vibration mitigation device installation along arm based on analysis (maximum distance from free end of arm).
- mast arm installation procedure, including the method to plumb the pole

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

- the Project number, town and alpha-numeric mast arm identifier
- references to design specifications, including interim specifications, and the applicable code section and articles
- description/documentation for all computer programs used in the design
- drawings/models of the structure, components and connections, with dimensions, loads and references to the local and global coordinate systems used (as applicable), to facilitate review of the results
- coefficients and factors used in the design
- summary sheet of the analysis results, including but not limited to the following:
 - the maximum CFI ratios for the following structure components, for each limit state:
 - the arm at the pole connection
 - the arm at the slip splice
 - the bolts connecting the arm to pole
 - the arm flange plate

- the pole at the base
- the base plate
- the anchor bolts
- the maximum fatigue stress ratio (ratio of computed stress to the stress limit) for the following structure components, for each applicable fatigue load:
 - the arm at the pole connection
 - the bolts connecting the arm flange plate to the built-up box connection plate
 - the pole below the arm connection
 - the pole base hand hole
 - the pole at the base
 - the anchor bolts
- the maximum reactions applied to the foundation due to each limit state
- horizontal and vertical deflections due to all applicable limit states
- vertical deflection of the free end of the arm due to the wind load effects of galloping and truck-induced gusts

The vibration mitigation device working drawings, computations, and supporting documentation shall include, but not be limited to the following:

- Device specifications and data sheets produced and provided by the device manufacturer.
- A letter from the device's manufacturer, signed and sealed by a Professional Engineer licensed in the State of Connecticut, addressing the following:
 - the adequacy of the device to provide an effective level of response reduction to satisfy Section 11.7.1.1 of the AASHTO LRFD LTS Specifications for the structure which it will be attached to
 - the response reduction that the device will achieve for the mast arm assemblies on which it is installed
 - the adequacy of the device to provide an infinite fatigue life for the structures on which it is attached and have no degradation of the device, components, or performance
- Calculations clearly listing all assumptions along with all references, software, and software versions used for the analysis. All inputs to the software programs used shall be clearly stated and verifiable to the reviewing Engineer.

- The manufacturer shall provide test results and an associated model calculation which demonstrates the ability of the software to accurately predict the performance of the device.
- Allowable locations for device installation along arm based on analysis (maximum distance from free end of arm). Installation of multiple mitigation devices on a single arm may be necessary.
- Mitigation device attachment details which shall be specified by the device manufacturer and shall be appropriate for use on tapered mast arms
- Suggested sequence of installation of the vibration mitigation device and other traffic appurtenances
- Documentation showing that the Contractor has coordinated with the mitigation device manufacturer and the manufacturers of any proposed vibration sensitive appurtenances to ensure that the level of response reduction is adequate for the proper function of the vibration sensitive devices.

Prior to fabrication, the Contractor shall submit welding procedures in accordance with Subarticle 1.05.17.

The steel fabricator shall be AISC certified for the fabrication to the Standard for Bridge and Highway Metal Component Manufacturers (CPT).

Fabrication of the mast arm may begin only after the working drawings and design computations have been reviewed and the Engineer has authorized fabrication to begin.

Notification of shop fabrication shall conform to Subarticle 6.03.03-4(a).

No changes may be made during fabrication without prior written approval by the Department.

Inspection of shop fabrication shall conform to Subarticle 6.03.03-4(e).

All welding details, procedures and nondestructive testing shall conform to the requirements of AWS D1.1 Structural Welding Code - Steel. Welders shall meet the requirements of Sub-article 6.03.03-1(b).

Nondestructive testing shall conform to Subarticle 6.03.03-4(f).

All members and components shall be hot-dip galvanized in a single dip. Double-dipping of members and components is not permitted. All exterior and interior surfaces of the mast arm members and components, including the interior of the ring-stiffened built-up box connection, shall be completely galvanized.

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1104039A, 1104042A, 1104045A

Galvanized members and components shall be free from uncoated areas, blisters, flux deposits, and gross inclusions. Lumps, projections, globules, or heavy deposits of zinc which will interfere with the intended use of the material will not be permitted.

After galvanizing the joint between the backing ring and the tubular member shall be sealed with silicone sealant to prevent the ingress of moisture.

All damaged areas of the hot-dip galvanized surfaces 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 shall not be 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.

Prior to shipping, all galvanized surfaces of the members and components shall be inspected, in the presence of the Engineer, to determine the acceptability of the galvanized coating. Galvanized coatings may be found acceptable by the Engineer if all surfaces of the members and components meet the galvanizing requirements herein. Only mast arm members and components with acceptable galvanized coatings shall be shipped. If the galvanized coating on any member or component is found to be unacceptable, the Contractor shall submit a repair procedure to the Engineer for review.

After fabrication, the arm to pole bolted connection shall be assembled in the fabricator's shop, in the presence of the Engineer, to determine the acceptability of the connection. The faying surfaces shall be free of dirt, loose scale, burrs, other foreign material and other defects that would prevent solid seating of the parts. Prior to assembly, the galvanized faying surfaces shall be scored by wire brushing. The faying surfaces of the connection plates shall be checked with a straight edge to ensure that the surfaces are not distorted and the entire faying surface of each plate will be in contact when assembled. The high-strength bolts, including nuts and washes, shall be installed and tensioned in accordance with Subarticle 6.03.03-5(f). A connection may be found acceptable by the Engineer if the faying surfaces of the flange (connection) plates are in firm, continuous contact after properly tensioning the bolts. Only mast arm assemblies with acceptable arm to pole bolted connections shall be shipped. If a bolted connection is found unacceptable, the Contractor shall submit a procedure to repair the connection to the Engineer for review. The use or installation of galvanized hardened steel washer between the faying surfaces of the connection is not permitted. Galvanized surfaces damaged by the repair procedure shall be hot dip galvanized. Repair of the damaged galvanized surfaces in accordance with the requirements of ASTM A780 or with a galvanizing repair stick is not permitted. Bolts, nuts and washers used for the trial shop fit-up shall not be reused in the final field assembly.

After fabrication and prior to shipping, aluminum identification tags shall be attached to the arm and pole members with self-tapping tamper resistant screws.

The finished members and components shall be protected with sufficient dunnage and padding to protect them from damage and distortion during transportation. Damage to any material during transportation, improper storage, faulty erection, or undocumented fabrication errors may be cause for rejection of said material at the Project site. All costs associated with any corrective action will be borne by the Contractor.

Following delivery to the Project site, the Engineer will perform a visual inspection of all material to verify shipping documents, fabricator markings, and that there was no damage to the material or coatings during transportation and handling.

The Engineer is not responsible for approving or accepting any fabricated materials prior to final erection and assembly at the Project site.

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

The mast arm shall be erected, assembled and installed in accordance with these specifications and the procedures and methods submitted with the working drawings. The Contractor and the mast arm designer are responsible to ensure that the erection and assembly procedures and methods in this specification are acceptable for use with the mast arm assembly. Changes to these method and procedures shall be submitted with the working drawings and computations.

Prior to installation of the mast arm pole, the exposed threads of all the embedded anchor bolts shall be cleaned of accumulated dirt and concrete and shall be lubricated. The threads and bearing surfaces of all the anchor bolt nuts shall be cleaned and lubricated. The anchor bolts and nuts are properly lubricated if the nuts can be turned by hand on the anchor bolt threads. The lubricant shall contain a visible dye of any color that contrasts with the color of the galvanizing. Re-lubricate the threads of the anchor bolts and nuts if more than 24 hours has elapsed since earlier lubrication, or if the anchor bolts and nuts have become wet since they were first lubricated.

Install (turn) the leveling nuts onto the anchor bolts and align the nuts to the same elevation or plane. The distance from the bottom of the leveling nuts to the top of the foundation shall not exceed 1.00 inch. Place a structural hardened washer on top of each leveling nut, 1 washer on each anchor bolt.

Two methods are acceptable to seal between the baseplate and top of the foundation, a closed cell elastomer ring and non-shrink grout. If a closed cell elastomer ring is used, prior to erecting the pole, place the ring within the anchor bolt pattern. The closed sell elastomer ring shall not interfere with the anchor bolt leveling nuts and shall not block the opening in the base plate.

The pole shall be erected so that the centerline of the pole will be plumb after the application of all the dead loads. The pole may be initially installed raked in the opposite direction of the overhead member to obtain the plumb condition. Raking the pole may be accomplished by installing the leveling nuts in a plane other than level.

Install the pole base plate atop the washers resting on the leveling nuts, place a structural hardened washer on each anchor bolt resting it on the top of the base plate, and install (turn) a top nut on each anchor bolt until the nut contacts the washer. The leveling nuts and washers shall be inspected, and if necessary the nuts (turned), so that the washers are in full contact with the bottom surface of the base plate.

Tighten the top nuts to a snug tight condition in a star pattern. Snug tight is defined as the maximum rotation resulting from the full effort of one person using a 12.00 inch long wrench or equivalent. A star tightening pattern is one in which the nuts on opposite or near-opposite sides of the bolt circle are successively tightened in a pattern resembling a star (e.g., For an 8-bolt circle with bolt sequentially numbered 1 to 8, tighten nuts in the following bolt order: 1, 5, 7, 3, 8, 4, 6, 2.).

Tighten leveling nuts to a snug tight condition in a star pattern.

Before final tightening of the top nuts, mark the reference position of each top nut in a snug-tight condition with a suitable marking on 1 flat with a corresponding reference mark on the base plate at each bolt. Then incrementally turn the top nuts using a star pattern one-sixth of a turn beyond snug tight. Turn the nuts in at least two full tightening cycles (passes). After tightening, verify the top nut rotation. The top nuts shall have full thread engagement. The distance from the bottom of the leveling nuts to the top of the foundation shall not exceed 1.00 inch.

High-strength bolts, including nuts and washes, shall be installed and tensioned in accordance with Subarticle 6.03.03-5(f). The arm shall be temporarily and fully supported while all the high-strength bolts are installed and tensioned. The temporary arm support shall not be removed until the Engineer has confirmed that the faying surfaces of the flange (connection) plates are in firm, continuous contact and the high-strength bolts were properly installed and tensioned. All high-strength bolts in the arm to pole bolted connection shall be inspected (in accordance with Subarticle 6.03.03-5(f)) to confirm the high-strength bolts were properly tensioned. The use or installation of galvanized hardened steel washer between the faying surfaces of the connection is not permitted.

After erecting the mast arm, the mast arm shall be electrically grounded by attaching the bare copper grounding conductor to the inside of the hand hole frame with a stainless steel bolt and to the ground rod with a ground clamp. The rigid metal conduit shall be electrically grounded by attaching the bare copper grounding conductor to the insulated bonding bushing and to the ground rod with a ground clamp.

After erection of the mast arm and before the installation of the traffic appurtenances, if the structure exhibits excessive vibration, oscillations or deflections as determined by the Engineer, the Contractor shall immediately stabilize the structure to the satisfaction of the Engineer. Stabilizing the structure may require the removal of a portion of the structure or the entire structure.

The traffic appurtenances shall be located and mounted on the arm as shown on the cross-sections. Holes, if required for cables, shall be located adjacent to the appurtenances and shall be drilled in the bottom of the arm. A rubber grommet shall be installed in each hole to protect the cables from chafing.

After installation of the traffic appurtenances, the anchor bolt nuts (leveling and top anchor nut) and washers shall be in full contact with the top and bottom surfaces of the pole base plate and the centerline of the pole shall be plumb.

After plumbing the pole, if a closed cell elastomer ring has not been previously installed, seal the opening between the baseplate and foundation with non-shrink grout. The non-shrink grout shall be placed within the anchor bolt pattern so that the anchor bolts will remain visible.

The Contractor shall install vibration mitigation devices for mast arms designed with a vibration mitigation device after the pole has been plumbed. The vibration mitigation device shall be installed at the location and orientation as required by the manufacturer and as shown in the working drawings.

After installation of the traffic appurtenances, if the structure exhibits excessive vibration, oscillations or deflections as determined by the Engineer, the Contractor shall design and construct devices to mitigate the movements. The Contractor is responsible for immediately stabilizing the structure to the satisfaction of the Engineer. Stabilizing the structure may require the removal of the traffic appurtenances or the entire structure. Prior to installation of any mitigation device, the Contractor shall submit drawings, design computations other documentation to the Engineer for review in accordance with Article 1.05.02.

The last character of the mast arm identification number shall be stenciled with black paint, unless otherwise specified, on the pole of each mast arm. The character shall be 3.00 inches high and placed approximately 12.00 inches above the top of the base plate facing the centerline of the roadway.

Method of Measurement: This work will be measured for payment by the number of steel mast arm assemblies of the type specified, completed and accepted in place.

Basis of Payment: This work will be paid for at the Contract unit price each for "XX Steel Mast Arm Assembly" or "XX Steel Combination Mast Arm Assembly", of the type specified, complete in place, which price shall include all equipment, materials, tools and labor incidental to the design, fabrication and installation, including mitigation devices if required, of the mast arms at the locations specified on the Plans.

<u>Pay Item</u>	<u>Pay Unit</u>
25' Steel Mast Arm Assembly	ea.
30' Steel Mast Arm Assembly	ea.
35' Steel Mast Arm Assembly	ea.
40' Steel Mast Arm Assembly	ea.
55' Steel Mast Arm Assembly	ea.
60' Steel Mast Arm Assembly	ea.
70' Steel Mast Arm Assembly	ea.
75' Steel Mast Arm Assembly	ea.

ITEM #1105150A - 1 WAY, 3 SECTION MAST ARM TRAFFIC SIGNAL, PROGRAMMED

SECTION 11.05 – TRAFFIC SIGNALS *is amended and supplemented as follows:*

Article 11.05.02 – Materials:

Amend as follows:

Article M.16.06 - Traffic Signals

Sub Article 3 - Housing:

In the last sentence of the third paragraph, between the words “housing” and “shall” add “and all internal hardware”.

Add the following after the last paragraph:

Each section of the housing shall be provided with a removable visor. The visor shall be the cap type, unless otherwise noted on the plan. The visor shall be a minimum 0.05 inch thick. The visor shall be the twist on type and secured to the signal by four equidistant flat tabs screwed to the signal head. The visor shall fit snugly against the door and shall not permit any perceptible filtration of light between the door and visor.

Sub Article 4 - Brackets:

Remove the second paragraph.

Replace the last paragraph with the following:

When indicated on the plans, a backplate constructed of 5052-H32 aluminum alloy sheet between 0.050-inch to 0.065-inch thickness meeting the requirements of ASTM B209 shall be attached to the signal head housing. The front surface of backplate per MUTCD requirements shall have a dull black finish to minimize light reflection and to increase contrast between the signal indication and its background.

Backplates shall be 5 inches wide and louvered.

Install a 2 inches wide fluorescent yellow retroreflective strip (Type XI sheeting) along the perimeter of the face of the backplate.

Sub Article 5 – Optical Unit and Sub Article 6 – Lamp Socket *Delete both subarticles and replace with the following:*

Optical Unit, Light Emitting Diode:

(a) General:

Only Optical Units that meet the requirements contained herein, supplied by the manufacturers noted below or approved equal, will be accepted. Final review of model numbers will be done at the time of the product data submittals.

Dialight
1501 Foute 34 South
Farmingdale, NJ 07727

Leotek
726 South Hillview Drive
Milpitas, CA 95035

The materials for Light Emitting Diode (LED), Optical Unit, circular and arrow, shall meet the following requirements:

- The ITE Performance Specification for Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Circular Signal Supplement for circular indications dated June 27, 2005.
- The ITE Performance Specification for Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Vehicle Arrow Traffic Signal Supplement for arrow indications dated July 1, 2007.
- Military grade connectors.
- Circular indications shall have a 20-year design life conformal coated driver board
- Solid connection between driver board and LED light engine for enhanced corrosion resistance
- Robust solder joints on the back of the printed circuit board.
- The optical unit for circular indications shall exceed ITE mandated light intensity for over 15 years. Specific model numbers ITE compliant listed with ETL Intertek
- Sealed against dust and moisture intrusion per Mil-Std-810F Method 506.4, Procedure 1 – Rain and Blowing Rain.
- LED unit shall have an incandescent appearance, not pixelated, when illuminated.
- Non-electrolytic capacitors to prevent failure from drying out
- The LED unit shall have a manufacturer-provided warranty of 15 years from the date of delivery
- The LED unit for bi-colored arrow and U-turn arrow indications shall have a manufacturer-provided warranty of 60 months from the date of delivery

Section 4, Adjustable Traffic Signals and General Housing sections of the **CT Department of Transportation Functional Specifications for Traffic Control Equipment, current edition governs**. Where the Department of Transportation Functional Specifications conflict with this Special Provision or the 2005/2007 ITE Performance Specifications, this Special Provision and the 2005/2007 ITE Performance Specifications shall govern.

The Optical Unit shall have an Incandescent look and shall be made up of a smooth surfaced outer shell. The Optical Unit shall have multiple LED light sources, a filtered power supply and a back cover, assembled into a sealed unit. The Optical Unit shall be certified as meeting the current ITE Specifications by Intertek Testing Services, Inc. (ITSNA, formerly ETL) or another organization currently recognized by the Occupational Safety and Health Administration (OSHA) as a Nationally Recognized Testing Laboratory. The Optical Unit shall

perform to the requirements of the ITE Specification for a minimum of 15 years. The Optical Unit for bi-colored arrow indications shall perform to the requirements of the ITE Specification for a minimum of 60 months.

The Arrow Optical Unit shall be “Omni-Directional” so that it may be oriented in any configuration without degradation of performance.

(b) Electrical Requirement:

Operating voltage:

- 80 to 135 Volts AC with cutoff voltage (no visible indication) below 35Volts AC.

Power requirements:

- Circular Indications: 12 inch - no more than 13 Watts
- Circular Indications: 8 inch - no more than 7 Watts
- Arrows Indications: 12 inch - no more than 13 Watts

Power Supply:

- Fused and filtered to provide excess current protection and over voltage protection from electrical surges and transient voltages.

(c) Photometric Requirement:

Beam Color:

- Meet current ITE Specifications

(d) Mechanical Requirements:

Diameter:

- The Circular Optical Unit shall fit into standard 12 inch or 8-inch housing. The Arrow Optical Unit shall fit 12-inch housings only.

Enclosure:

- Clear lens cover for all Red, Yellow and Green Circular Optical Units.
- Incandescent appearance, not pixelated, when illuminated.
- For Arrow Optical Units the arrow indication segment of the lens shall be clear.
- Enclosure sealed and waterproofed to eliminate dirt contamination and be suitable for installation in all weather conditions.
- Clearly mark on the housing the following information:
 - Manufacturer & model number
 - Date of manufacture
- The model number shall end with the number of LEDs used to comprise the unit as the last digits of the model number. For example, if the unit is comprised of 3 LEDs and the model is x12y, then the new model number shall read x12y3.

Operating temperature:

- Meet current ITE Specifications

Wiring: LED lamps shall have **color coded 16 AWG wires** for identification of heads as follows:

RED LED Lamps	RED with WHITE neutral
YELLOW LED Lamps	YELLOW with WHITE neutral
GREEN LED Lamps	GREEN or BROWN with WHITE neutral
RED LED ARROWS	RED/WHITE with WHITE neutral
YELLOW LED ARROWS	YELLOW/WHITE with WHITE neutral
GREEN LED ARROWS	GREEN/WHITE or BROWN/WHITE with WHITE neutral
GREEN/YELLOW LED ARROWS	GREEN/WHITE or BROWN/WHITE, YELLOW/WHITE, with WHITE neutral

- Wires shall be terminated with a Block Spade, 6-8 stud/ 16-14 wire size.
- All Circular Optical Units shall be supplied with a minimum 40-inch long pigtail and all Arrow Optical Units shall be supplied with a minimum 60-inch long pigtail.

Delete Sub Article 8 – Dual Color Fiber Optic Section

Article 11.05.03 – Construction Methods:

Add the following paragraph:

Circular indications that have an identification mark (such as an arrow) on the top of the lens shall be installed with that mark at the 12 o'clock position.

NTC – TRAFFIC SIGNAL POLYCARBONATE LISTS ITEM 1105114A

**ITEM #1105415A—1 WAY, 3 SECTION TRAFFIC SIGNAL
POLYCARBONATE**

**ITEM #1105416A—1 WAY, 4 SECTION TRAFFIC SIGNAL
POLYCARBONATE**

**ITEM #1105417A—1 WAY, 5 SECTION TRAFFIC SIGNAL
POLYCARBONATE**

Section 11.05—Traffic Signals *is supplemented and amended as follows:*

11.05.02—Materials:

Section M.16 – Traffic Control Signals *is supplemented and amended as follows:*

M.16.06-2 – Traffic Control Signals:

Replace the last sentence with the following:

All signal heads in this contract shall be of the same type unless otherwise noted on the plan.

M.16.06-3 - Housing:

Replace the first paragraph with the following:

The signal head housing shall be made of ultraviolet and heat-stabilized polycarbonate. Signal head hardware provided shall be either span, mast arm, pole, or pedestal mounted as indicated on plans. The signal head housing shall be expansible type, for vertical mounting, substantially secured together in a watertight and rigid manner to form a unit of pleasing appearance.

Delete the third paragraph and replace with the following:

There shall be a round opening in the top and bottom of each head to receive a 1.5 inch supporting pipe frame. The portion of the housing section around the opening shall be reinforced and serrated so that serrated fittings may be used to secure the housing. The top and bottom of the housing shall be reinforced with stiffening plates to improve durability. The top and bottom of the housing shall include such other openings as are necessary to accommodate fastening devices to hold sections together, and such openings shall not permit entrance of foreign particles. Each section shall be positively indexed with respect to an adjacent section to prevent misalignment. Each housing section shall be equipped with a door with an opening and fittings for the optical unit and visor. The door shall be arranged for easy access to the optical unit

components and wiring. It shall be hinged on its left side at 2 points, so that the door cannot be removed without the use of tools and shall be provided with a simple, positive-acting door locking device made from stainless steel to assure tight closure. Neoprene or EPDM (ethylene propylene diene monomer) rubber gaskets shall be used on both the housing and the door to seal the interior and create a weather tight unit. The body and door of each housing section shall be of ultraviolet and heat resistant polycarbonate and shall be clean, smooth, and free from flaws, cracks, blow holes, or other imperfections. The door locking device and visor fastening screws shall be made of stainless steel. All other screws, nuts, washers, hinge pins, latch parts, clips and parts used in the assembly of the signal housing shall be made of stainless steel. Each section of the housing shall be provided a removable visor of the cap type, unless otherwise noted on the plan. The visor shall be constructed of polycarbonate have a minimum thickness of 0.1 inch. The visor mounting shall be of the twist-on type and secured to the signal by four equidistant flat tabs screwed to the signal head. The visor shall fit snugly against the door and shall not permit any perceptible filtration of light between the door and the visor.

M.16.06-4 - Brackets:

Delete the second paragraph and replace the last paragraph with the following:

When indicated on the plans, a backplate constructed of ABS (acrylonitrile butadiene styrene) ultraviolet and heat resistant material, with a thickness of 0.1 inch shall be attached to the signal head housing. The backplate, per MUTCD, shall be pre-colored dull black throughout the thickness of the ABS material, to minimize light reflection and to increase contrast between the signal indication and its background.

Backplates shall be 5 inches wide and louvered.

Install a 2 inch wide fluorescent yellow retroreflective strip (Type XI sheeting) along the perimeter of the face of the backplate.

M.16.06-5 - Optical Unit and M.16.06-6 – Lamp Socket:

Delete both articles in their entireties and replace with the following:

Optical Unit, Light Emitting Diode:

(a) General:

Only Optical Units that meet the requirements contained herein, supplied by the manufacturers noted below or approved equal, will be accepted. Final review of model numbers will be done at the time of the Product Data submittals.

Dialight

1501 Route 34 South
Farmingdale, NJ 07727

Leotek

726 South Hillview Drive
Milpitas, CA 95035

The materials for Light Emitting Diode (LED), Optical Unit, circular and arrow, shall meet the following requirements:

- The ITE Performance Specification for Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Circular Signal Supplement for circular indications

- The ITE Performance Specification for Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Vehicle Arrow Traffic Signal Supplement for arrow indications
- Military grade connectors
- 20 year design life conformal coated driver board
- Solid connection between driver board and LED light engine for enhanced corrosion resistance
- Robust solder joints on the back of the printed circuit board
- Exceed ITE mandated light intensity for over 15 years. Specific model numbers ITE compliant listed with ETL Intertek
- Sealed against dust and moisture intrusion per Mil-Std- MILSPEC-810 Method 506.4, Procedure 1 – Rain and Blowing Rain
- LED unit shall have an incandescent appearance, not pixelated, when illuminated
- Non-electrolytic capacitors to prevent failure from drying out
- The LED unit shall have a manufacturer-provided warranty of 15 years from the date of delivery
- The LED unit for U-turn and bi-colored arrow indications shall have a manufacturer-provided warranty of 60 months from the date of delivery

Section 4, Adjustable Traffic Signals subsections General and Housing of the **Department of Transportation Functional Specifications for Traffic Control Equipment, current edition govern.** Where the Department of Transportation Functional Specifications conflict with this Special Provision or the ITE Performance Specifications, this Special Provision and the ITE Performance Specifications shall govern.

The Optical Unit shall have an Incandescent look and be made up of a smooth surfaced outer shell. The Optical Unit shall have multiple LED light sources, a filtered power supply and a back cover, assembled into a sealed unit. The Optical Unit shall be certified as meeting the current ITE Specifications by Intertek Testing Services, Inc. (ITSNA, formerly ETL) or another organization currently recognized by the Occupational Safety and Health Administration (OSHA) as a Nationally Recognized Testing Laboratory. The Optical Unit shall perform to the requirements of the ITE Specification for a minimum of 15 years.

The Arrow Optical Unit shall be “Omni-Directional” so that it may be oriented in any configuration without degradation of performance.

(b) Electrical Requirements:

Operating voltage:

- 80 to 135 Volts AC with cutoff voltage (no visible indication) below 35Volts AC

Power requirements:

- Circular Indications: 12 inches - no more than 13 Watts
- Circular Indications: 8 inches - no more than 7 Watts
- Arrows Indications: 12 inches - no more than 13 Watts

Power Supply:

- Fused and filtered to provide excess current protection and over voltage protection from electrical surges and transient voltages

(c) Photometric Requirement:

Beam Color: Meet current ITE Specifications

(d) Mechanical Requirements:

Diameter:

- The Circular Optical Unit shall fit into standard 12 inch or 8 inch housings. The Arrow Optical Unit shall fit 12 inch housings only

Enclosure:

- Clear lenses cover for all Red, Yellow and Green Circular Optical Units
- Incandescent appearance, not pixelated, when illuminated
- For Arrow Optical Units the arrow indication segment of the lens shall be clear
- Enclosure sealed and waterproofed to eliminate dirt contamination and be suitable for installation in all weather conditions
- Clearly mark on the housing the following information:
 - Manufacturer and model number
 - Date of manufacture
- The model number shall list the number of LEDs used to comprise the unit as the last digits of the model number. For example, if the unit is comprised of 3 LEDs and the model is x12y, then the new model number shall read x12y3

Operating temperature:

- Meet current ITE Specifications

Wiring: L.E.D. lamps shall have **color coded 16 AWG wires** for identification of signal heads as follows:

RED LED Lamps	RED with WHITE neutral
YELLOW LED Lamps	YELLOW with WHITE neutral
GREEN LED Lamps	GREEN or BROWN with WHITE neutral
RED LED ARROWS	RED/WHITE with WHITE neutral
YELLOW LED ARROWS	YELLOW/WHITE with WHITE neutral
GREEN LED ARROWS	GREEN/WHITE or BROWN/WHITE with WHITE neutral
GREEN/YELLOW LED ARROWS	GREEN/WHITE or BROWN/WHITE, YELLOW/WHITE, with WHITE neutral

- Wires shall be terminated with a Block Spade, 6-8 stud / 16-14 wire size
- All Circular Optical Units shall be supplied with a minimum 40 inch-long pigtail and all Arrow Optical Units shall be supplied with a minimum 60 inch-long pigtail

M.16.06-8 – Dual Color Fiber Optic Section:

Delete the entire subarticle.

M.16.06-9 – Painting:

Replace with the following:

The housing, housing door, outside of visor, and the backplate shall be black, pre-colored opaque and permanently colored by the manufacturer throughout the thickness of the material.

All brackets and hardware shall be painted black by the manufacturer.

At intersections at Merritt Parkway interchanges, the housing, housing door, and the backplate shall be dark green, pre-colored opaque and permanently colored by the manufacturer throughout the thickness of the material.

The visors per MUTCD shall be pre-colored opaque and permanently colored dull black to minimize light reflection and to increase contrast between the signal indication and its background.

11.05.03 – Construction Methods:

Add the following paragraph:

Circular indications that have an identification mark (such as an arrow) on the top of the lens shall be installed with that mark at the 12 o'clock position.

ITEM #1105503A - FLASHER CABINET

DESCRIPTION:

This item shall consist of furnishing and installing a Flasher Cabinet and Flasher at the location shown on the plans and in conformity with specifications.

MATERIALS:

Each cabinet shall be made of rigid metal with a suitable finish. The cabinet shall be of clean-cut design and appearance and shall be substantially constructed of aluminum. The pedestal-mounted and pole-mounted cabinets shall be approximately 12 $\frac{3}{4}$ " (325mm) x 16" (406mm) x 25" (635mm) in size or the equivalent in volume. The cabinet shall have a main door which shall be equipped with a special CONN-1 lock and key. Door hinge pins shall be of stainless steel material. Two keys shall be furnished for each lock. When closed, doors shall fit tightly to neoprene gasket material. The cabinet shall contain a suitably designed vent for the purpose of releasing any explosive gases which may enter the cabinet.

All panel wiring shall be neat and firm, and the panel which shall be mounted in the rear of the cabinet shall mount the following:

1. Neutral Bus Bar, for neutral side of power supply line. This Bus Bar shall be rated for 30 amperes.
2. Terminals for conductors of cable - one for each circuit and one or more terminals for the common conductors. This terminal bus shall be rated for 30 amperes. No pressure-type terminal blocks will be accepted.
3. A one piece 120 volt convenience outlet and lamp receptacle. A heavy duty 15 ampere circuit breaker shall be mounted on the left side of the cabinet.

The cabinet shall have a hole for cable entrance into the bottom of the cabinet of at least 2" (50mm) in diameter. There shall be an adapter for mounting the cabinet on a 4" (100mm) pipe.

All conductors shall be provided with lugs for attachment to binding posts. Combining of conductors to one lug will not be allowed. Non-hygroscopic materials, having good insulating qualities, shall be used for all insulating purposes. All internal wiring shall be #14 AWG stranded copper. Wiring shall be cabled.

FLASHER:

Two (2) Circuit Solid State: The Flasher shall conform to the latest NEMA Publication, Part 8, with the following additions:

Only type 2 Flashers will be accepted. The output shall be from optically-isolated solid state relays. The Flasher shall have L.E.D. indicators connected to the output for visual reference.

The radio interference filter shall be designed to operate on 15 amperes, 120 volts, 60 cycle A.C. and shall meet the standards of the Underwriters Laboratory and the Radio and Television Manufacturer's Association.

All flashers inputs and outputs shall be wired to a terminal block in the cabinet.

Flasher jack panel to be of the female type.

CONSTRUCTION METHODS:

The cabinet shall be mounted at the location shown on the plans or as directed by the Engineer.

METHOD OF MEASUREMENT:

This item shall be measured for payment by the actual number of "Flasher Cabinets" installed and accepted.

BASIS OF PAYMENT:

This item shall be paid for at the contract unit price each for "Flasher Cabinet" which price shall include mounting hardware, tools, labor and incidentals.

ITEM#1106001A- 1 WAY PEDESTRIAN SIGNAL POLE MOUNTED

ITEM#1106003A- 1 WAY PEDESTRIAN SIGNAL PEDESTAL MOUNTED

ITEM#1106004A- 2 WAY PEDESTRIAN SIGNAL PEDESTAL MOUNTED

Section 11.06 is modified as follows:

Article 11.06.02 Pedestrian Signal, Materials

Article M.16.07 C. Optical Unit

Delete 2. LED: and replace with the following:

General

- Meet requirements of current MUTCD Section 4E.
- Meet current ITE specifications for Pedestrian Traffic Control Signal Indications - (PTCSI) Part 2: Light Emitting Diode (LED).
- Meet CT DOT, 2008 - 2010 Functional Specifications for Traffic Control Equipment; Section 5D, LED Pedestrian Signal with Countdown Timer.
- Meet EPA Energy Star® requirements for LED Pedestrian Signal Modules.

Operational

- Countdown display only during the flashing Pedestrian Clearance (Ped Clr) Interval. Timer goes blank at end of flashing ped clr even if countdown has not reached zero.

Physical

- Sealed optical module to prevent entrance of moisture and dust.
- Self-contained optical module, including necessary power supplies.
- Designed to securely fit into standard housing without the use of special tools or modifications to the housing.
- Identification information on module: manufacturer's name, model number, serial number, and date code.

Optical

- Multiple LED sources; capable of partial loss of LED's without loss of symbol or countdown message.
- Two complete self-contained optical systems. One to display the walking person symbol (walk) and the hand symbol (don't walk). One to display the countdown timer digits.
- Visual Image similar to incandescent display; smooth, non-pixelated.
- Symbol and countdown digit size as shown on the plan.
- Solid hand/person symbol; outline display not allowed.

- Overlaid hand/person symbols and countdown digits arranged side by side.
- Countdown digit display color: Portland Orange in accordance with ITE requirements.
- Countdown digits comprised of two seven segments, each in a figure 8 pattern.
- Photometric Requirements: Luminance, Uniformity, and Distribution in accordance with ITE requirements.
- Color Uniformity in accordance with ITE requirements.
- Blank-Out design; symbols and digits illegible even in direct sunlight when not illuminated.

Electrical

- Operating voltage: 89 VAC to 135 VAC.
- Low Voltage Turn-Off: 35 VAC.
- Turn-On and Turn-Off times in accordance with ITE specifications.
- Combined Hand – Countdown Digits wattage: ≥ 20 Watts.
- Input impedance at 60 Hertz sufficient to satisfy Malfunction Management Unit (MMU) requirements.
- Two separate power supplies. One to power the walking person symbol. One to power the hand symbol and the countdown digits.
- Meet Federal Communication Commission (FCC) regulations concerning electronic noise.
- Filtered and protected against electrical transients and surges.

Warranty

- Five years from date ownership is accepted.

ITEM #1107011A - ACCESSIBLE PEDESTRIAN SIGNAL AND DETECTOR (TYPE A)

Description:

Furnish and install an Accessible Pedestrian Signal and Detector (APS&D). The APS&D provides audio and tactile information to augment the visual pedestrian signal.

Type A provides a low frequency percussive tone or a speech message during the walk interval and is used where there is an exclusive or a concurrent pedestrian phase.

Material:

A. General:

- Conform to applicable sections of the current MUTCD Chapter 4E, Pedestrian Control Features as specified herein.
- All features fully operational when the traffic signal is in colors mode.
- All features non-operational when the traffic signal is in flash mode.
- Interchangeable with a non-accessible type pedestrian pushbutton with no modifications to the Controller Assembly (CA) or Controller Unit.
- Audible transducer integral with the APS&D housing, adjacent to the pushbutton.
- Operation programming method: Either or combination of:
 - Mechanically by dip switches or circuit board jumpers
 - Infrared remote-control hand-held device

B. Electrical:

- Metallic components either grounded or insulated to preclude an electrical hazard to pedestrians under all weather conditions.
- All features powered by the 110VAC Walk signal and the 110VAC Don't Walk signal so that additional conductors from the CA are not needed.

C. Audible Pushbutton Locator Tone

- Frequency: repeating tone at one (1) second intervals
- Tone duration: ≤ 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 APS&Ds at the intersection.
 - May be disabled without affecting operation of other features.
- Silent only during walk interval. Active all other times.

D. Vibrotactile Arrow Pushbutton

- Pushbutton contained in a circular assembly which fits inside the housing and is attached to the housing with 4 screws.
- Actuation of pushbutton acknowledged by confirmation light.
- Actuation of pushbutton initiates speech message "Wait".
- ADA compliant: Size: ≥ 2.0 " (50) diameter, Actuation force: ≤ 5 ft-lb (22.2 N)

- 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.
- Operation: Vibrates only during the walk interval (when the walk indication is displayed).
- Tactile Arrow:
 - Attached to surface of the button assembly by a tamperproof method.
 - Raised slightly above surface of pushbutton, minimum 0.125" (0.3)
 - Size: Length $\geq$ 1.5" (38), Height $\geq$ 1.0" (25)
 - Color: Sharp contrast to background color of pushbutton and housing

E. Audible Walk Interval

1. General:

- Operation independent of other APS&Ds at intersection.
- Active only during the walk interval (when the walk indication is displayed).
- 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.
 - Automatic volume adjustment independent of other APS&Ds at the intersection.
 - Maximum volume: 100 dBA which is the approximate sound pressure of a gasoline powered lawn mower nearby.
- Duration:
 - Default method: Automatically set by the duration of the visual walk signal display.
 - When selected: Manually set when rest-in-walk is used for a concurrent pedestrian movement.
- Audible sounds that mimic any bird call are not allowed.

2. Percussive Tone where called for on the signal plan:

- Repeating tone at eight (8) to ten (10) ticks per second.
- Tone frequency: Multiple frequencies with a dominant component at 880 Hz which creates a "tick - tick - tick..." sound.

3. Speech Message where called for on the signal plan:

- Clearly enunciate the name of the travel way to be crossed and the message that the walk signal is on for that crossing.. See signal plan for specific message.

F. Pushbutton Housing/Sign Frame/Sign

- One piece die cast aluminum meeting requirements of ASTM B85.
- Sign frame designed to accept 9" x 15" (230 x 380) four-hole advisory sign.
- Flat back to facilitate surface mount.
- Available brackets to either pedestal top-mount or pole side-mount on pole diameter range of 3½" (89) to 15" (380).
- Available brackets to allow mounting two (2) APS&Ds to the same 3½" (89) pole, facing $\geq$ 60 degrees apart, at the same height.
- Available extension bracket of a size indicated on the plan – 18" maximum.
- Wire entrance through the rear.
- Stainless steel mounting hardware.
- Color: The color shall be black AMS-STD-595 Color No. 17038.
- Finish: Housing/Frame and all mounting brackets either:

1. Painted with 3 coats of infrared oven-baked paint before assembly.
 - o Primer: Baked iron oxide which meets or exceeds FS TT-P-636.
 - o Second coat: Exterior-baking enamel, light gray, which meets or exceeds FS TT-E-527.
 - o Third coat: Exterior-baking enamel, which meets or exceeds FS TT-E-489.
 2. Electrostatic powder coated after chemically cleaned.
- Sign: CT DOT Sign No. 31-0856

Construction Methods:

Install the APS&D according to the manufacturer's instructions. Position the APS&D 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 APS&D as shown on the plan. Set the minimum sound levels of the locator tone and the audible walk indication when there is little or no ambient noise as in night time operation. Set the volume of audible walk indications and pushbutton locator tones to a maximum of 5dBA louder than ambient sound. The locator tone should be audible 6' to 12' (1.8 m to 3.6 m) from the pushbutton or to the building line, whichever is less. Confirm the volume of both audible walk indication and the locator tone increases with an increase in ambient sound and subsequently decreases when the ambient noise decreases.

If programming method is remote, by an infrared hand-held device, provide one device and operation manual for each intersection where APS&D is installed.

Method of Measurement:

This work is measured by the number of APS&Ds of the type specified, installed, tested, fully operational, and accepted.

Basis of Payment:

Payment for this work is based on the installation, inspection, successful completion of the 30 day test period, and final acceptance of the Accessible Pedestrian Signal and Detector of the type specified. Payment includes the sign, mounting brackets for adjacent buttons on the same structure, extension brackets, all necessary cable, all incidental materials, labor, tools, and equipment necessary to complete the installation. Payment also includes the warrantee, installation manual, and operation manual.

If programming method is remote by an infrared hand-held device, the total bid price of all APS&Ds includes one remote programming device and accompanying operation manual for each intersection where APS&D is installed.

Pay Item	Pay Unit
Accessible Pedestrian Signal and Detector (Type A)	Each

ITEM #1108117A - FULL ACTUATED CONTROLLER W/ACTUATED PEDESTRIAN PHASE (16 PHASE)

Description: This item shall consist of furnishing and installing an actuated controller, which shall be a completely digital solid-state unit, for controlling the operation of the traffic signals.

The controller shall be completely furnished with the number of phases called for on the plans. The cabinet to house the controller shall be completely wired and all sub-bases shall be complete with load switches and flash relays as specified. The cabinet shall also have all necessary auxiliary equipment required to provide the sequence and timing indicated on the plans.

Materials: All materials furnished, assembled, fabricated, or installed shall be new, corrosion resistant, and in strict accordance with the current edition of the State of Connecticut Department of Transportation Functional Specifications for Traffic Control Equipment. All equipment furnished under this item shall be current production equipment, compatible with the City of Waterbury's traffic signal system.

1. **Controller:** The Controller shall be the "*Commander*" Model operating in mode "0" as manufactured by Trafficware. The Controller shall be supplied and installed with all necessary interfaces required to support the controller operating in a NEMA TS2, type 2 cabinet platform. The controller shall conform to the ATC 5201 v06.25 Advanced Transportation Controller (ATC) and the NEMA TS-2, 2016 Standard. The controller shall be capable of providing complex phasing, detector processing, coordination, communications, adaptive timing and systems operation as a master or secondary controller.

The controller shall be equipped with LCD display and menu-driven software for programming and built-in diagnostics to evaluate the operational status. The controller shall be fully compliant with NTCIP 1201 and 1202 standards and include a minimum of three (3) High Speed USB 2.0 ports and a minimum of three (3) 10/100 Base T, RJ45 Ethernet connector ports. The Controller shall utilize a Front Panel mounted USB port to facilitate upgrades and file access. The controller shall be Ethernet-enabled to allow communication across a TCP/IP network.

The controller shall be supplied and installed with the ability to collect, store, and report various measures of effectiveness (MOE's). the controller shall collect and process all 255 high resolution enumerations as defined in the report (Indiana Traffic Signal Hi Resolution Data Enumerations), dated November 2012. This data shall be processed in the controller and available via download from the controller USB Ethernet port or, if available, via system communications to a remote system server. As a minimum, the controller shall be set up to provide the following performance reports:

-Approach Delay	-Purdue Coordination Diagrams
-Pre-Emption events	-Arrivals on Red
-Transit Priority Events	-Arrivals on Green
-Split Monitor	-Phase Termination
Approach Volumes	-Pedestrian Delay

2. **Cabinet:** Each controller assembly shall be completely wired and housed in a rigid metal cabinet with a painted color "CT Gray" finish. The cabinet shall be a NEMA P-44 Traffic Control Cabinet of clean-cut design and appearance and shall be substantially constructed of aluminum alloy. Door handle and hinges shall be stainless steel.

The cabinet shall be supplied with a $\frac{3}{4}$ " diameter shank, stainless steel latching handle for each door. The latching handle shall have a provision for padlocking the door in a closed position.

The cabinet shall be mase mounted with approximate dimensions of 54" high x 44" wide x 26" deep. The cabinet shall have a single front door with #2 Corbins lock. The cabinet door shall have an auxiliary door which shall be equipped with a lock and a police key. Two keys shall be furnished for each lock. When closed, all doors shall fit tightly to neoprene gasket material.

provide 16 channels and be completely wired to operate with a Trafficware NEMA/ATC Commander TS2-Type 2 Controller Unit.

The Cabinet shall be a NEMA P-44 rigid metal cabinet approximately 59" high, 44" width, and 26" deep in size. The cabinet shall be of clean-cut design and appearance and shall be substantially constructed of aluminum alloy. The cabinet shall have a single door with #2 Corbins lock and key. Door hinge pins shall be of stainless steel material. Two keys shall be furnished for each lock. When closed, all doors shall fit tightly to neoprene gasket material. The cabinet door shall have an auxiliary door which shall be equipped with a lock and a police key.

The cabinet ventilation shall include two intakes, exhausts, filtrations, two fans, and one thermostat assembly. Each electric fan shall be equipped with ball or roller bearings and with a capacity of at least 100 cfm. The fans shall be mounted inside the front top of the cabinet ventilation holes. The fans shall be controlled by one manually adjustable thermostat. The thermostat shall be mounted on the top interior of the cabinet and user adjustable to allow for temperature settings from a minimum of 70°F to 140°F and capable of activating the fans within plus or minus five degrees of the set temperature. The fan blades shall be supplied with a safety screen to prevent accidental contact with the blades. The intake vent shall be rain tight and located on the bottom half of the cabinet, covered with a removable air filter.

One pullout drawer shall be provided mounted under the bottom shelf in the cabinet. The drawer shall be approx. 1 inch high x 13 inches deep x 16 inches wide and capable of holding 40 lbs in weight when the drawer is extended. This drawer shall have a flip up lid to place a Laptop computer on top when extended while protecting any documentation in the drawer when the cabinet door is open. The top of the drawer shall be covered with a non-conductive, non-skid material.

The cabinet shall be supplied with a police door panel located in the middle area of the main door. The switches shall be mounted in the police panel and labelled as to function. Four switches shall be supplied as follows:

- a. Power On/Off
- b. Signal On/Off
- c. Signal/Flash
- d. Manual/Auto with cord

The manual control cord shall be a coiled type. Sealed weather-proof covered hand switch extending to six feet with fully stretched. The cord shall be fastened to the cabinet via a compression type connector to provide strain relief for the cord's electrical connections. The police door panel shall be of sufficient size so as to store the manual control cord when panel door is closed.

The cabinet shall be supplied with a technicians panel mounted on the back of the police panel. This panel shall be supplied with the following switches

- a. Controller On/Off
- b. Flash/Auto (Allows the controller to cycle while flashing)
- c. Signals On/Off (Allows the controller to cycle with signal displays being dark)
- d. Stop Time Normal/On (Provides the ability to manually activate a controller stop time input)

The cabinet shall be configured to eliminate arc flash. All electrical equipment will be dead front, no open terminals, busbars, breakers, or exposed terminal strips. The cabinet shall be designed, constructed and installed with all necessary provisions to comply with the latest NFPA 70e requirements. All electrically live parts over 50 volts shall be covered with Lexan or a suitable physical barrier to eliminate the possibility of an arc flash.

The cabinet shall be supplied with white LED light panels which shall automatically illuminate viz a door open switch whenever the main cabinet door is opened. The LED panels shall produce a minimum of 950 lumens and be protected by a clear shatterproof shield. The cabinet shall contain four light panels; two at the interior top of the cabinet and two mounted under the bottom shelf. A second door open status switch shall activate a controller input to log a report event that the door was opened.

The cabinet shall be supplied with a permanent label mounted on the upper portion of the inside front main door which contrails the name of the cabinet manufacturer, controller manufacturer, model/part number and year/month of assembly.

The cabinet shall be supplied with a laminated door sticker. This sticker shall be permanently affixed to the inside of the main cabinet door. At a minimum, the sticker shall contain the following information:

- Vehicle detection information including detector channel assignment, phase assigned, approach and cabinet termination points.
- If applicable, network communications information for all in-cabinet devices. This includes system address, IP addresses, subnet mask and MAC address.
- Per approach pre-emption information including channel, approach/direction and termination points.
- Field termination chart showing per approach/per phase numbering of all signal circuits.
- Signal phasing and signal plan with intersection geometry and signal head designations.

The cabinet main doors shall be provided with a stop to limit door opening to both 90° and 180° ±10°. The door stop bar shall be a captive type mechanism that serves to keep the bar in contact with the cabinet at both stop bar ends and provided with a catch that can be operated when the door reaches these 2 positions and will hold the door open securely until released. The cabinet shall be supplied with a three-point draw roller latching system consisting of the following latching points:

- Center of the cabinet (lock)
- Top of the cabinet – controlled by door handle
- Bottom of the cabinet – controlled by door handle

The latching points on the top and bottom of the cabinet door shall remain in the locked position until the door lock is disengaged. The locking mechanism shall be equipped with nylon rollers to secure the top and bottom of the door.

The controller cabinet shall be effectively grounded using a 5/8" by 10' minimum copper clad steel rod with #8 AWG solid, bare, tinned copper wire attached to the controller cabinet and to the ground rod by a square head bolt clamp. Maximum resistance to ground to be 25 ohms. An additional rod shall be supplied and installed and connected to the ground system if 25 ohms is not obtained with a single rod.

Electrical Filtering/surge protection shall be supplied and installed in each cabinet in accordance with NEMA requirements and the manufacturers recommendations. At a minimum, surge suppression shall provide for all incoming electric utility power conductors, all signal control circuits, vehicle detection, pedestrian detection, communications and pre-emption system terminations.

Three copies of the database programming for all in cabinet devices shall be provided with each cabinet. The database programming sheets shall reflect as-built programming resident in each unit at the time of acceptance.

3. **Malfunction Management Unit:** Malfunction Management Unit (MMU) shall be shelf-mountable, sixteen channel, LCD display, solid state Malfunction Management Unit. The MMU shall be a MMU2 model fully compliant with the most recent NEMA standards including amendment 4-2012 providing the ability of the unit to fully support Flashing Yellow Arrow (FYA) operation. The MMU shall meet the following requirements:
 - a. No circuit cuts shall be allowed on circuit boards in any of the equipment supplied. Any wire jumpers included on circuit boards shall be placed in plated through holes that are specifically designed to contain them. Jumpers that are tack soldered to circuit traces or are added to correct board layout errors are not acceptable.
 - b. MMU shall have an Ethernet connector and shall be connected to the switch.
 - c. The design shall allow for removal or replacement of a circuit board without unplugging or removing other circuit boards.
 - d. No more than two circuit boards shall be attached to each other to constitute a circuit assembly. Attaching hardware shall use captive nuts or other acceptable method to secure the boards together. If alternate methods are to be used, the method shall be identified and submitted in writing to the City for review and approval. The boards shall be designed so that the purchaser can test and operate the controller unit with the boards separated.
 - e. If this specification is used to support the purchase of a complete controller assembly, the unused red circuits shall be connected to the AC Line in the controller cabinet.

- f. A RS232 port shall be accessible from the front panel of the MMU. The RS232 port shall be compatible with a portable computer and/or a smart phone or tablet device that provides the following information:
- Programming Report
 - Analyzer Report
 - History Report
 - Clear Report Logs
 - Download Real-Time Clock

A RS232 Communication Cable shall be supplied to interface the MMU to the controller.

- g. Each Malfunction Monitoring Unit shall have a unique serial number that is permanently and neatly displayed on the face of the unit. If this serial number is not on the face of the unit, then an additional temporary label that is neatly printed or typed shall be affixed to the MMU. The MMU supplied must be the Enhanced model with RS232 communication or City approved equal. One MMU shall be provided.

4. **Auxiliary Equipment:** All other equipment, flasher units, load switches, wiring, fittings, and other cabinet requirements shall conform to the current edition of the State of Connecticut, Department of Transportation Functional Specifications for Traffic Signal Control Equipment. The Functional Specifications are available on the Departments website at the following link:

<https://portal.ct.gov/dot/-/media/dot/traffic-design/2020-2023functionalspecs.pdf?rev=9b9e4e54bcb44f4a80908ac8e31ce4ed>

5. **Cabinet Device Security:** Where applicable, the Contractor shall reconfigure the default username and passwords on all communications/control equipment within the Controller and Cabinet. This includes the traffic controller, ancillary equipment, video detection equipment, Ethernet switches, and routers. The new username and passwords shall be created in coordination with the City of Waterbury staff or as directed by the engineer; no manufacturer default level passwords shall be allowed. The Contractor shall utilize network communications encryption settings on all forms of wired Ethernet data paths. No “in the clear” communications shall be allowed. At a minimum all wired Ethernet connections shall meet 802.1AE standards. The Contractor shall supply and configure a Cyber Intrusion and Prevention Device (CIPD) in each ATC cabinet. The CIPD shall prevent any unauthorized access/connections to the traffic control system. Upon detection of unauthorized attempts, the CIPD shall notify the agency via SMS message and or email and log the event. The CIPD shall be installed prior to any remote access device. The Contractor shall coordinate with the City of Waterbury’s Information Technology and Operational Technology (IT/OT) staff or the Engineer for final configuration of the CIPD. No direct access to the traffic system shall be allowed without the installation of the CIPD and or Router/Firewall.
6. **24 VOLT RELAY:** All 24 Volt relays shall meet the following requirements:
- a. Diodes shall be installed across the coils of all direct current relays to shunt the reverse voltage generated when the coil de-energizes.
 - b. All diodes shall be general purpose ECG 125 1000prv @ 25A or equivalent, rated at least .5 amp forward biased.
 - c. Diodes shall be external to the relay, not enclosed in the dust cover.

TYPE A: Midland Ross, Midtex 155-92 or equivalent.

DESCRIPTION: This relay shall be enclosed in a clear polycarbonate removable dust cover. It shall have a mechanical life of more than 100,000 operations at rated load.

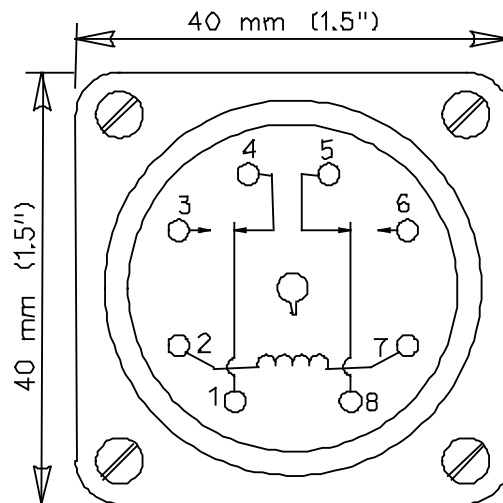
CONTACTS: The contacts shall be 2 form C (D.P.D.T), U.L. rated at 5 amps 120 volts A.C. The contacts shall be pure fine silver (gold flash). There shall be no tungsten (lamp) load on the contacts of this relay.

COIL: The coil shall operate on 24 V.D.C. and have no less than 450 OHMS impedance.

SIZE: The relay shall be no larger than 65mm(2.5") H x 40mm(1.5") L x 40mm(1.5") W.

BASE: This relay shall have an eight pin octal plug-in base with the pin designation shown below:

1. Common (1)
2. Coil
3. Normally open (1)
4. Normally closed (1)
5. N.C. (2)
6. N.O. (2)
7. Coil (2)
8. Comm.



Bottom View And Wiring Diagram

SOCKET: The socket shall be a closed back, screw terminal type. The front mounted screws shall be 6-32 capable of accepting #14 AWG wire.

7. 110 VOLT RELAY: All 110 volt relays shall meet the requirements of one of the following two types. Across the coil of each relay there shall be a molded suppressor rated at .1uf - 47 ohm @ 600V to suppress electrical noise created by the energization / de-energization of the relay.

TYPE F: Midland Ross, Midtex 136-62T3A1 or equivalent

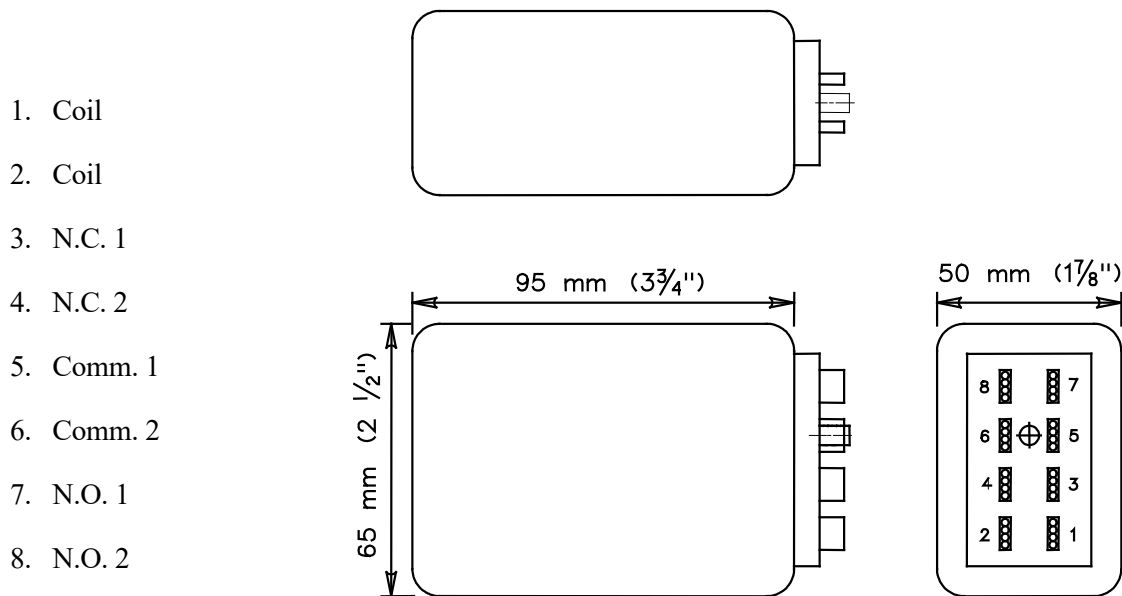
DESCRIPTION: Relays of this type shall function as flash transfer, power switching and signal drive. Other uses are acceptable, however, type G relays cannot be used for the above applications.

CONTACTS: The contacts shall be in the D.P.D.T. form and consist of 10mm (3/8") diameter silver cadmium oxide, rated at 20 Amps @ 117 VAC resistive.

COIL: The coil shall operate on 110 VAC. No semi-conductors will be allowed in the coil circuit of this relay.

SIZE: The relay shall be enclosed in a clear plastic dust cover. The overall dimensions shall be no larger than 63mm(2 1/2") x 94mm(3 3/4") x 47mm(1 7/8") as illustrated below.

BASE: This relay shall have an eight blade plug-in base, Ventron Beau Plug P-5408 or equivalent with the pin designations as shown below:



SOCKET: The socket shall be Ventron Beau Plug S-5408 or equivalent, contacts rated at 15 Amps @ 1750 VRMS.

TYPE G: Magnecraft, W 88 ACXP-8 or equivalent

DESCRIPTION: Relays of this type shall function in low current switching applications such as interconnect interface or pre-emption circuits. A clear polycarbonate plastic enclosure shall cover the relay mechanism.

CONTACTS: The contacts shall be in the D.P.D.T. form and consist of 5mm (3/16") diameter gold flashed, silver alloy, rated at 10 Amps @ 120 VAC resistive.

COIL: The coil shall operate on 120 Volts AC and require a nominal 3 VA.

SIZE: Height, length and width dimensions shall be the same as the 24 volt relay Type A: 35mm (1 3/8") x 60mm (2 3/8") x 35mm (1 3/8").

BASE: The base shall be an octal plug with the pin designations the same as the 24 volt relay Type A.

SOCKET: The socket shall be the same as that for the 24 volt relay Type A.

Construction Methods: The controller, mounted in controller cabinet, shall be installed at the locations shown on the plans in the following manner:

The cabinet shall have the base casting attached to the foundation and leveled before the cabinet proper is bolted to the base. A mastic type compound meeting the requirements of ASTM C647 shall be used between the cabinet and the base casting to make the two units rain-tight.

Method of Measurement: This work will be measured for payment by the number of controllers completed, operating, and accepted in place.

Basis of Payment: This work will be paid for at the Contract unit price each for "FULL ACTUATED CONTROLLER W/ACTUATED PEDESTRIAN PHASE (16 PHASE)", which price shall include controller, controller cabinet, malfunction management unit, auxiliary equipment, wiring, miscellaneous fittings, paint and painting, and all materials, equipment, tools and labor incidental thereto.

<u>Pay Item</u>	<u>Pay Unit</u>
FULL ACTUATED CONTROLLER W/ACTUATED PEDESTRIAN PHASE (16 PHASE)	EA

ITEM #1108187A – SYSTEM INTEGRATION

Description:

This item shall consist of the integration of all controller units and system devices furnished or modified under this contract with the City's Central Transportation Management System (CTMS). This item shall include all required creations, additions and modifications to the City's Central Transportation Management System, graphics subsystem, system data bases, intersection graphics and all required system software, hardware and to complete the integration of all traffic signals and video detection systems into the City of Waterbury System and virtual server. The system integration shall include the development of a per location, electronic file containing a digital photograph of the exterior of each proposed traffic signal cabinet, a spreadsheet containing a listing of all in-cabinet equipment including model, software level, serial numbers, IP address information as well as copy of the intersection plan and cabinet wiring diagrams. The Contractor shall be responsible for documenting, labelling, and preparing As-Built plans for all new cables entering the equipment racks and devices at the console to ensure that the cable terminations for the new cabinet are correct.

Under this item, the Contractor shall supply the most current central traffic signal controller software licenses for all 10 intersections to be integrated under this project. The Central traffic signal controller software licenses must be compatible with the City's ATMS.now central system and be the current version. The licenses shall include a ten-year maintenance agreement.

The Contractor shall contact the City of Waterbury City Engineer at rcavanaugh@waterburyct.org to coordinate this work prior to starting.

Materials:

As required. Materials required for this item shall be manufactured by Cubic/Trafficware.

Construction Methods:

Integration shall be accomplished with minimal to no interruption to the operation of the existing local traffic controller and coordination system. Any required down time of the existing local traffic controllers and coordination system, or down time of the existing communication system needed to integrate the proposed system shall be approved by the Engineer and the City of Waterbury in advance. Existing communications means between central and existing controllers shall be retained during the system integration process. System integration shall include all hardware and software/firmware elements of the system. The Contractor shall inform the City of Waterbury in writing in advance of all ongoing work efforts, schedules and in progress tasks. When appropriate, the City of Waterbury is to partake in observing the system integration as it progresses. The work under this item shall also include management of the existing communication and electrical wiring at the operations center in the cabinets and to all equipment under this project.

ITEM #1108187A

The Contractor shall create a system wide architecture diagram of all intersections and upgrade the existing system GIS map to include intersections under this contract, as well as all existing system controllers, for the purpose of monitoring system status. The Contractor shall develop a system wide map for use in the ATMS.now central system. This system map shall be able to display the status of all intersections installed within. Displays of the intersection operation status shall include the following:

- Intersection operating plan
- System parameter status
- Time and date
- Cabinet door status
- Police door status
- Master Cycle Timer
- Local Cycle Timer
- Active Splits
- Overlap Indications
- Offset selection
- Plan offset value
- Plan cycle length value
- Times of day outputs
- CMU complete monitor status including field status, fault status, and configuration
- programming.

The Contractor shall provide the qualifications and resume of the designated System Integration Manager to be responsible for coordinating all system integration activities for the project. The required minimum qualifications for the System Integration Manager and all personnel, and subcontractors involved with any levels of system integration shall be as defined in the following table. The Contractor shall submit all required qualifications to the Engineer for review and approval 30 days prior to the start of work. The Contractor shall not commence any system integration work unless the personnel and subcontractor's qualifications have been approved by the City of Waterbury. All work associated with the City of Waterbury Traffic Control software (ATMS.now) integration at the Traffic Operations Center (TOC) shall be performed only by the central system software manufacturer or its authorized and certified representative, no substitutions or exceptions are allowed.

TABLE - SYSTEM INTEGRATORS MINIMUM REQUIREMENTS

ITEM	MIN. YRS OF EXPERIENCE	MIN. NO. OF SIMILAR INSTALLATION	OTHER REQUIREMENTS
Proposed Controllers	10	100	Resume, Integrator shall be the manufacturer or qualified representative
Existing Controllers	10	100	Resume, Integrator shall be the manufacturer or qualified representative
Central Software	3	25	Resume, Integrator shall be the manufacturer or qualified representative

The integration work shall be accomplished with minimal interruption to the operation of the existing system, local controllers, and coordinated operation.

The Contractor shall be responsible for a plan detailing tasks to be performed and estimated downtime of existing system operation. The system integration plan shall be submitted to the Engineer for review and approval prior to the start of the work.

The Contractor shall inform the City in advance of all on-going work efforts (by Bi-weekly or monthly schedule as noted in previous items), schedules and in progress tasks.

System Acceptance:

System acceptance will be conditional based upon successful system integration of all required elements according to the plans and specifications, the system is fully operational to the satisfaction of the Engineer, testing has been completed as described below, and the system has performed in accordance with the Plans and specifications without any failure throughout a thirty (30) day test period. During the thirty (30) day test period, the Contractor shall maintain and make available to the Engineer on a daily basis a log of all activities, including significant events, failures, and failure correction actions.

Testing Requirements:

Upon completion of work, tests shall be conducted to ensure that the system integration has been fully performed and all requirements have been met. All tests shall be conducted in accordance with approved test procedures. The Contractor shall submit test procedures and forms/checklist for review and approval to the Engineer. As part of the system integration testing, the Contractor shall be required to verify all system and intersection dynamic graphic displays against observed field conditions. This will require that a person be in the field while another person is at central (TOC) to ensure that what the operator observes at central matches what is actually occurring in the field at each local intersection. In addition to verification of dynamic graphical displays, the testing shall verify report functions, per channel/phase vehicle detection and pedestrian detection.

The Contractor shall propose testing plans and submit the test plan(s) and procedures as detailed herein. Each of the test plans shall contain the following elements:

- Proposed date, time, and location of the testing
- Names and credential of the Contractor personnel who will be conducting the testing
- Descriptive overview of the proposed test procedure
- List of test equipment required to perform the testing
- Test cases and test logging forms which detail every step of the test procedure:

Test logging forms shall be presented in tabular format, with separate columns for each of the following:

- Test case description detailing the test step to be performed.
- Expected result
- Actual result
- Pass/fail
- Comments

The Contractor shall supply separate test logging forms at the time of testing for each test plan, and for each device location. The test logging forms shall show the device location, date, and the start and end times of the test.

At the end of each test logging form, there shall be signature and date locations for each of the following:

- Contractor personnel conducting the test
- City/Engineer representative witness

Signatures on the test logging form will signify only that the test was performed and witnessed, not that it passed or failed.

The detailed Test Plans shall be submitted to the Engineer no later than 30 days prior to the beginning of each test phase.

The Contractor shall have approved test plans prior to submitting a request to schedule the start of any test activities. The Contractor shall notify the Engineer no less than seven (7) days prior to the beginning of any equipment or systems testing.

Testing shall provide verification and documentation that all requirements for the System Integration as indicated in the Contract Documents are met. The Test Plans shall be developed by the Contractor to provide a mechanism that ensures that all contract requirements have been met and tested successfully and verified.

If any deviations or changes to the approved Test Plans arise, it shall be resubmitted for review and approval by the Engineer at least 14 calendar days prior to any planned test activity stage. No tests shall be conducted until the Engineer has approved the test plan.

A summary of all tests shall be produced at the completion of each testing phase of the project to ensure that all requirements defined by the system are satisfied.

The City of Waterbury reserves the right to examine and test or retest any or all materials furnished by the Contractor for the project to determine if they meet the requirements specified within the Contract Documents.

If the City/Engineer decides that any material used in the construction of this project is defective or otherwise unsuitable, and the workmanship does not conform to the requirements of this contract, the Contractor shall replace such defective parts and material at no cost to the Project.

The times and dates of the tests shall be approved by the Engineer. The Contractor shall conduct all tests in the presence of the City of Waterbury (or its representative). Testing shall take place only on weekdays that are official working days of the City. The Contractor shall make a request in writing at least 14 days prior to the proposed testing, and schedule tests only if permission is granted by the City/Engineer in writing. The Contractor shall be responsible for the conduct and documentation of the results of these tests that will be countersigned by the Engineer at the end of each test. The signature of the Engineer implies only proof of presence. Test results shall be approved by the Engineer. Test phase shall begin until all prior test phases have been completed, and test results have been approved by the Engineer.

The Contractor shall provide any vendor supplied or test specific software for testing, as needed.

Warranty:

The ATMS.now Central System Software, all work performed, and all materials supplied under this item shall be guaranteed free of workmanship and manufacturing defects by the Contractor for a period of five (5) years after system acceptance. The Central System Software shall include a 10-year maintenance agreement. All warranties provided by the original equipment manufacturer shall be legally binding and passed to the City of Waterbury and shall be in force for a time period as specified by the original equipment manufacturer.

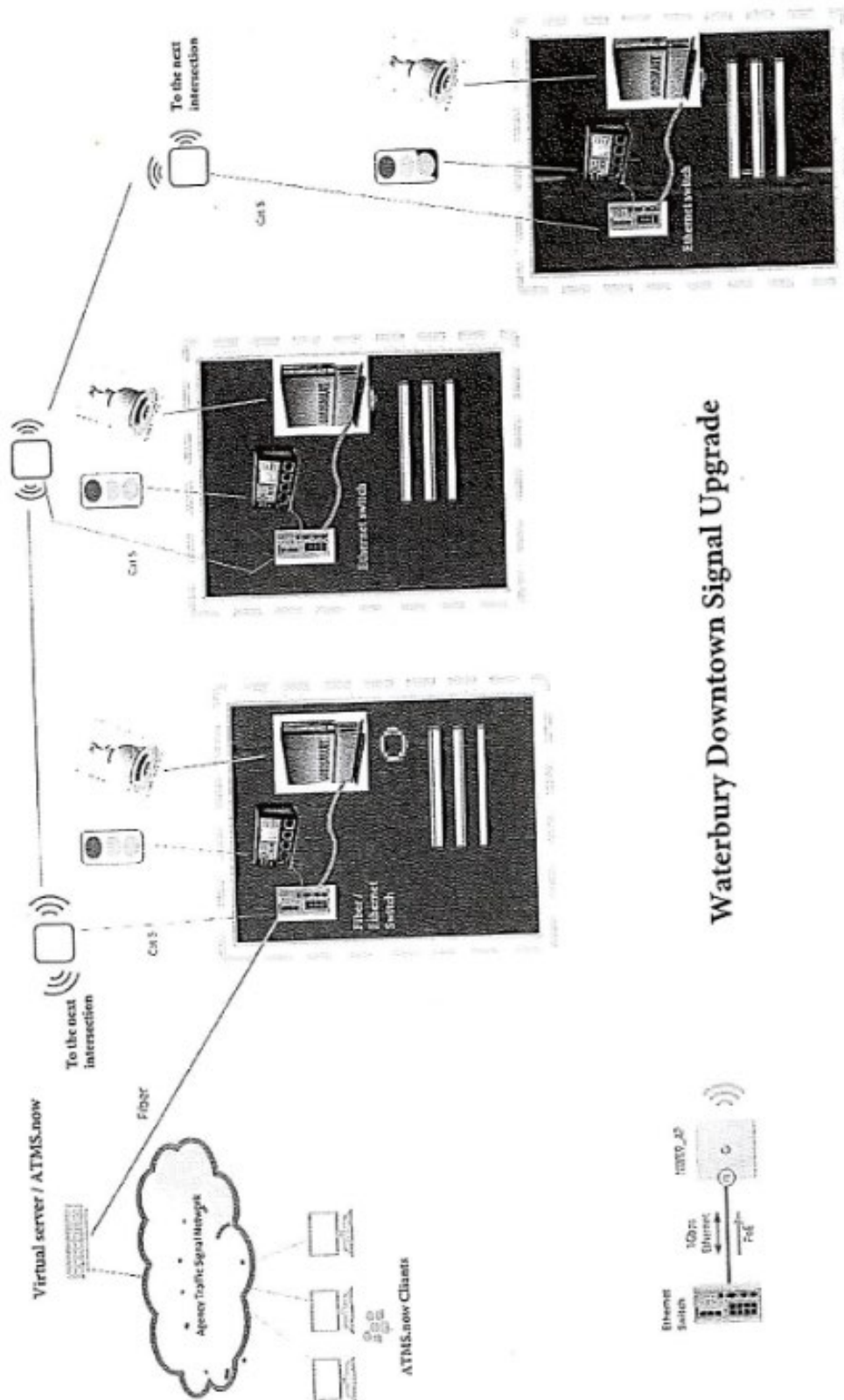
Method of Measurement:

This item will not be measured for payment but will be at the contract lump sum unit for the successful integration of all intersections under this contract into the City of Waterbury system, tested and accepted, and to the satisfaction of the City of Waterbury. There will be no partial measurements for partial work completed under this item.

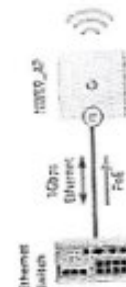
Basis of Payment:

System Integration will be paid at the contract lump sum price. The lump sum contract price shall include supplying central traffic signal controller software licenses, all software and hardware modifications, graphics, creations of system and per location database, video interface, communications elements, integration of field elements and data, materials, equipment, tools, labor, and incidentals thereto. The lump sum price shall also include furnishing all labor, tools, materials, equipment, cables, cable management hardware, documentation, storage, transportation, and other incidentals necessary to complete the work.

<u>Pay Item</u>	<u>Unit</u>
System Integration	LS



Waterbury Downtown Signal Upgrade



ITEM #1108660A – ETHERNET SWITCH

Description:

Under this item, the contractor shall furnish, install, configure, and test the Fiber Optic Ethernet Switch, all cable and wiring, and all other equipment, materials and incidental costs necessary to provide a complete, fully operational network system within some field cabinets, as shown in the Plans, and shall conduct acceptance tests for this system under this specification. The Contractor shall coordinate with the City of Waterbury, Roy Cavanaugh – City Engineer, rcavanaugh@waterburyct.org to ensure this item is compatible with the City signal system.

- A. The Ethernet Switch shall be a fully managed, Layer 2 device, with Layer 3 functionality.
- B. The Ethernet Switch shall be manufactured by Communication Networks.
- C. The Ethernet Switch shall have a lifetime warranty.
- D. All accessories, including but not limited to power supplies and SFP modules, shall only be manufactured by ethernet switch manufacturer, and shall be intended by the manufacturer to be compatible with the Ethernet Switch.
- E. The Ethernet Switch shall be a self-contained unit capable of 24 hour per day unattended operation.
- F. The Ethernet Switch shall be supplied, assembled by the Contractor, configured, and tested by an authorized network installer. The Contractor shall provide credentials of the network installer to the Engineer 30 days prior to the installation of Ethernet Switches for review and approval.
- G. The Ethernet Switch shall be managed and hardened, of rugged design and suitable for reliable indoor/outdoor operation. The Ethernet Switch shall be configured for minimum maintenance and need for adjustment after initial setup. The Ethernet Switch, power supply and SFP's shall be rated by its manufacturer for operation over the temperature range -40C to +75C and meet the requirements of NEMA TS2 for traffic control equipment.
- H. All single mode fiber optic ports of Ethernet switches supplied on the project shall be fully compatible with each other, as well as with existing Ethernet switches on adjacent projects, if any, with which they must connect and interoperate. This compatibility shall include, but not be limited to, such characteristics as optical operating wavelength(s), transmit power, receive sensitivity, and operating protocols.
- I. The Ethernet Switch shall be designed to operate on a mains voltage of 120 VAC $\pm$ 20 VAC and or provide a hardened power supply to convert from 120VAC to 12 to 57VDC.
- J. The Ethernet Switch shall have a minimum of 8 each 10/100 Mbps copper RJ-45 ports, plus 3 each 100/1000 Mbps small form factor pluggable (SFP) slots. 1 SFP shall be 100/1000FX, 2 shall be 100/1000/2.5Gbps
- K. The 8 each 10/100 Mbps Ethernet ports shall support the following network standards:
 - IEEE-802.3 10 Base-T
 - IEEE-802.3u 100 Base-T

- L. Two of the SFP slots shall be populated with single mode fiber optic small form factor pluggable (SFP) modules. The SFP modules shall meet the following requirements:
- The SFP modules shall be manufactured by the same firm that manufactures the Ethernet Switch. The optical emitters shall be laser diode type.
 - The SFP modules shall have an operating wavelength of 1310 nm, single mode and/or 1550 nm, single mode. The optical wavelength chosen shall be consistent with and compatible with the optical wavelength chosen for all Ethernet switches with which the Ethernet Switch must communicate optically, including like switches as well as existing switches.
 - The SFP modules shall each have an optical power budget that is equal or greater than the actual worst case link optical loss based on an analysis of all 1000 Mbps optical links on the project, plus a safety margin of 4 dB.
 - Each SFP module shall accommodate two fiber optic strands.
 - The SFP modules shall provide digital optical monitoring (DOM).
 - Each SFP module shall have a distance capability as needed to provide stable, reliable communications to the locations shown in the Plans; however, the SFP shall have a minimum distance capability of 15 kilometers.
- M. Each SFP module shall have LC type fiber optic connectors, or as directed by the Engineer. The single mode fiber optic ports shall support the following network standards:
- IEEE.802.3u 100 Base-FX
 - IEEE.802.3z 1000 Base-FX
- N. The Ethernet Switch shall allow for remote configuration and status using web based tools via Internet Explorer 6 or higher and Command Line Interface
- O. LED indicators for each Ethernet ports. Indicators shall be for:
- Power.
 - Collisions (1 LED for 10MB or 100MB or 1000MB).
 - LK (steady on when twisted pair link is operational).
 - RX (Activity, flashing when port is receiving data).
- P. Auto-reconnect after one packet of error free transmission.
- Q. The Ethernet Switch shall have a switching method: store and forward and have the following properties:
- Switching latency 7 μ s
 - Switching bandwidth 13.6 Gbps
 - VLANs Voice, Private, Multicast
 - Max. Available VLANs 256
 - IGMP multicast groups 128 for each VLAN
 - Port rate limiting User Defined
 - Processing Store-and-Forward
 - Priority Queues 8
 - Network Redundancy STP RSTP MSTP ERPS
 - MAC Table 8K MAC Addresses
 - Jumbo Frame Up to 9.6K Bytes
 - Static Routing 32 Routes

R. The Ethernet Switch shall support the following protocols:

- IEEE 802.1p Class of Service (CoS)
- Support for IGMP Multicast and MLJ v1/v2 for filtering multicast traffic
- IEEE 802.3x for Flow Control
- IEEE 802.3ad for LACP
- IEEE 802.1Q for VLAN Tagging
- IEEE 802.1D for STP (Spanning Tree Protocol)
- IEEE 802.1w for RSTP (Rapid Spanning Tree Protocol)
- IEEE 802.1s for MSTP (Multiple Spanning Tree Protocol)
- IEEE 802.1x for Authentication
- IEEE 802.1AB for LLDP (Link Layer Discovery Protocol)
- IEEE 802.3az Energy Efficient Ethernet
- ITU-T G.8032v1/v2 Ethernet Ring Protection Switching (ERPS)
- TCP/IP with full multicast support
- DHCP Client/Server, DHCP Snooping, DHCP Relay
- Custom User Access Rights (15 Levels)
- Static and LACP Link Aggregation
- Multicast VLAN Registration (MVR)
- Supports IP Multicast Profile (IPMC)
- Link Layer Discovery Protocol (LLDP)
- Voice VLAN support
- Layer 3 Static Routing capability

S. The Ethernet Switch shall support the following network management protocols:

- SNMP V1, V2c, V3
- RMON for Ethernet agent
- Telnet/TFTP

T. The Ethernet Switch shall have the following Security Features

- Port Guardian prevents network intrusion through intelligent physical port lockout
- Device Binding security feature
- Enable/disable ports, MAC based port security
- Port based network access control (802.1x)
- VLAN (802.1Q) to segregate and secure network traffic
- Radius centralized password management
- SNMPv3 encrypted authentication and access security
- https / SSH enhanced network security
- Switch/port based, NAS, ACL, ARP inspection and IP sourceguard
- AAA radius server authentication
- TACACS+
- SNTF

U. The Ethernet Switch shall meet the following standards:

- UL 94-flame rated PCB board: 94V0
- EMI ECC Part 15, CISPR (EN55022) class A

- EMS EN61000-4-2 (ESD), EN61000-4-3 (RS), EN61000-4-4 (EFT), EN61000-4-5 (Surge), EN61000-4-6 (CS), EN61000-4-8, EN61000-4-11
 - Shock IEC60068-2-27
 - Free Fall IEC60068-2-32
 - Vibration IEC60068-2-6
 - Safety EN60950-1
 - Traffic NEMA TS2
- V. The Ethernet Switch shall meet the following mechanical and environmental standards;
- Size (HxWxD): 6" x 3.5" x 4.5" (15.24 x 8.89 x 11.43 cm)
 - Installation: DIN-Rail or Wall Mount
 - Weight: 2.6 lb/1.2kg
 - MTBF: >100,000 Hours
 - Operating Temp: -40° C to +75° C
 - Storage Temp: -40° C to +85° C
 - Relative Humidity: 5% to 95% (non-condensing).
- W. The Ethernet Switch shall include all software required for monitoring and updating the Ethernet Switch from another computer within the Engineer HOC, including configuration changes as well as firmware updates.
- X. The Ethernet Switch shall include all items needed to form a full and complete installation, configuration and testing, including but not limited to furnishing all labor, tools, materials, rack mounting hardware, power supplies, cooling equipment, Ethernet cables, power cables, software, maintenance agreement, STP modules, documentation, equipment, storage, transportation, and other incidentals necessary to complete the work.
- Y. The Ethernet Switch shall be connected to other equipment as shown on the plans and as directed by the Engineer.
- Z. All hardware, cables, and other incidentals needed to install the Ethernet Switch shall be furnished and installed by the Contractor.
- AA. The Ethernet Switch shall be fully configured, integrated, and tested by an authorized network installer in order to form a complete, fully functional network system as required in the contract documents.
- BB. The Ethernet Switch shall be configured for supporting all Ethernet ready field equipment on separate VLANs, if so directed by the Engineer.
- CC. The contractor shall coordinate with the IT Department for programming addresses of the Ethernet Switch.
- DD. Serial numbers and model numbers of the Ethernet Switch as well as all removable components thereof, shall be permanently engraved on the associated equipment.
- EE. The Ethernet Switch shall be configured for auto fail-over, such that it will take full advantage of the collapsed ring fiber optic cable architecture used on some portions of the project. In the event that a fiber optic link connecting the Ethernet Switch to a collapsed fiber optic ring in the field fails for any reason, the Ethernet Switch shall automatically redirect its communications to the fiber optic port on the Ethernet Switch that feeds the same collapsed ring, but from the opposite direction. The Contractor shall demonstrate that under failed conditions communication is automatically redirected.

- FF. The Contractor shall provide an electronic copy as well as four (4) complete sets of operation and maintenance manuals. The manuals shall, as a minimum, include the following:
- Complete and accurate as-built schematic diagrams showing the connections between the Ethernet Switch and all other devices to which it is connected.
 - Complete parts list including names of vendors.
 - Complete maintenance and trouble-shooting procedures.
 - Login information in MS-Excel format.
- GG. The Contractor shall provide a network connectivity diagram showing all sites with Ethernet switches on the project.
- HH. Thirty (30) days prior to installation, four (4) copies of the Contractors Installation Practices shall be submitted to the Engineer for review and approval. This shall include credentials of authorized network installer, installation methods, list of installation equipment, and test equipment. Quality control procedures shall be detailed as well as procedures for corrective action.
- II. The Contractor shall provide the City a list of which device is plugged into which ethernet port of the switch. This information shall be provided in the cabinet documentation for each site as well.
- JJ. All equipment connected to the switch shall be completed in the same configuration for each respectively similar site across the project.

Warranty:

The Ethernet Switch shall have a lifetime warranty and be guaranteed free of design and manufacturing defects by the Manufacturer.

In addition, this item shall require the Manufacturer to furnish and install all supplied firmware and software fixes and updates to the City for a period of five (5) years after system acceptance.

Method of Measurement:

The quantity of Ethernet Switch to be paid will be measured as the number of switches actually furnished and installed.

Basis of Payment:

The unit price paid for Ethernet Switch shall include the cost of furnishing, installing, connecting and testing of the Ethernet Switch. The price shall also include furnishing all labor, tools, materials, rack mounting hardware, power supplies, cooling equipment, cables, software, configuration, testing, maintenance agreement, warranty, SFP modules, documentation, equipment, storage, transportation, and other incidentals necessary to complete the work.

Pay Item
Ethernet Switch

Pay Unit
EA

ITEM #1108808A –TRAINING

Description:

Training shall be arranged by the Contractor for the detection system included in the Contract.

Construction Methods:

Equipment Type:

- 360 Degree Video Detection System

Training:

The Training shall be provided by the manufacturer's certified trainer. For each type of equipment listed above, provide a minimum of six (6) hours of training for up to eight (8) representatives from the offices of City of Waterbury Engineering Department. Include three (3) hours of classroom instruction and three (3) hours of hands-on instruction focusing on the following:

- Theory of operation; Program and operation instructions; Circuit description
- Troubleshooting; Preventative maintenance; field diagnostics; field adjustments
- Proper installation techniques

Training sessions shall be scheduled at a mutually agreed time and location after installation of the equipment.

Method of Measurement: Training will be measured for payment as a lump sum at the completion of all training sessions.

Basis of Payment: The Contract lump sum price for "Training" shall include all necessary instruction manuals, maintenance manuals, schematics of all equipment, and instruction for all attendees of the training sessions.

Pay Item	Pay Unit
Traffic Equipment Training	1.s.

ITEM #1111201A – TEMPORARY DETECTION (SITE NO. 1)

ITEM #1111202A – TEMPORARY DETECTION (SITE NO. 2)

ITEM #1111203A – TEMPORARY DETECTION (SITE NO. 3)

ITEM #1111204A – TEMPORARY DETECTION (SITE NO. 4)

ITEM #1111205A – TEMPORARY DETECTION (SITE NO. 5)

ITEM #1111206A – TEMPORARY DETECTION (SITE NO. 6)

ITEM #1111207A – TEMPORARY DETECTION (SITE NO. 7)

ITEM #1111208A – TEMPORARY DETECTION (SITE NO. 8)

Description:

Provide a Temporary Detection (TD) system at signalized intersections throughout the duration of construction, as noted on the contract plans or directed by the Engineer. TD is intended to provide an efficient traffic-responsive operation which will reduce unused time for motorists travelling through the intersection. A TD system shall consist of all material, such as pedestrian pushbutton, accessible pedestrian signal, conduit, handholes, cable, messenger, sawcut, loop amplifier, microwave detector, Video Image Detection System (VIDS), Self-Powered Vehicle Detector (SPVD), and any additional components needed to achieve an actuated traffic signal operation.

Materials:

Material used for TD is either owned by the Contractor and in good working condition, or existing material that will be removed upon completion of the contract. Approval by the Engineer is needed prior to using existing material that will be incorporated into the permanent installation. New material that will become part of the permanent installation is not included or paid for under TD.

Construction Methods:

The work for this item includes furnishing, installation, relocating, realigning, and maintaining the necessary detection systems as to provide vehicle and pedestrian detection during each phase of construction. If not shown on the plan, program the TD modes (pulse or presence) as the existing detectors or as directed by the Engineer. If the TD method is not specified elsewhere in the Contract, (loops, SPVD, microwave, VIDS, pushbutton, or other) it may be the Contractor's choice. The method chosen for TD must be indicated on the TD Plan submission.

The traffic signal plan-of-record, if not in the controller cabinet will be provided upon request. Ensure the controller phase mode (recall, lock, non-lock) and phase timing are correct for the TD. Adjust these settings as needed or as directed by the Engineer.

At least 30 days prior to implementation of each phase of construction submit a TD proposal to the Engineer for approval. Submit the TD proposal at the same time as the Temporary Signalization plan. Indicate the following information for each intersection approach:

- Phase Mode
- Temporary Detection Method
- Area of Detection
- Detector Mode

Submit the proposed temporary phase timing settings and the TD installation schedule with the TD proposal. See the example below.

Example Proposed Temporary Detection and Timing

Site 1

Warren, Rt. 45 at Rt. 341, Location #149-201

Approach	Phase	Phase Mode	TD Method	Area of Detection	Det Mode
Rt. 45 NB	2	Min Recall	VIDS	150' from Stop Bar	Presence
Rt. 45 SB	2	Min Recall	SPVD	150' from Stop Bar	Pulse
Rt. 341	4	Lock	Microwave	30' from Stop Bar	Pulse
Rt. 341	4	Lock	Pushbutton	At SE & SW corners	n/a

Temporary Phase Timing Settings:

Phase	Min	Ped	Ped Clr	Ext	Max 1	Max2	Yel	Red
2	20	0	0	6	45	60	4	1
4	14	7	9	3	27	35	3	1

Scheduled TD: **July 4, 2011** Site 2

Scotland, Rt. 14 at Rt. 97, Location #123-201

Approach	Phase	Phase Mode	TD Method	Area of Detection	Det Mode
Rt. 15 WB Left Turn	1	Non-Lock	VIDS	5' in front to 10' Behind Stop Bar	Presence
Rt. 14 EB	2	Min Recall	Existing Loop	150' from Stop Bar	Pulse
Ped Phase	3	Non-Lock	Pushbutton	At all corners	n/a
Rt. 14 WB	6	Min Recall	VIDS	150' from Stop Bar	Presence
Rt. 97	4	Lock	Loop, Pre-formed	20' from Stop Bar	Pulse

Temporary Phase Timing Settings:

Phase	Min	Ped	Ped Clr	Ext	Max 1	Max2	Yel	Red
1	5	0	0	2	12	18	3	1
2 & 6	24	0	4	4	26	36	4	1
3	16	7	9	0	16	16	4	1
4	14	7	9	3	27	35	3	1

Scheduled TD: **July 4, 2011**

When at any time during construction the existing vehicle or pushbutton detection becomes damaged, removed, or disconnected, install TD to actuate the affected approaches. Install and make TD operational prior to removing existing detection. TD must be operational throughout all construction phases.

Provide a list of telephone numbers of personnel who will be responsible for the TD to the Engineer. If the TD malfunctions or is damaged, notify the Engineer and place the associated phase on max recall. Respond to TD malfunctions by having a qualified representative at the site within three (3) hours. Restore detection to the condition prior to the malfunction within twenty-four (24) hours.

If the Engineer determines that the nature of a malfunction requires immediate attention and the Contractor does not respond within three (3) hours following the initial contact, then an alternative maintenance service will be called to restore TD. Expenses incurred by the State for alternative service will be deducted from monies due to the Contractor with a minimum deduction of \$500.00 for each service call. The alternate maintenance service may be the traffic signal owner or another qualified Contractor.

TD shall be terminated when the detection is no longer required. This may be either when the temporary signal is taken out of service or when the permanent detectors are in place and fully operational.

Any material and equipment supplied by the Contractor specifically for TD shall remain the Contractor's property. Existing material not designated as scrap or salvage shall become the property of the Contractor. Return and deliver to the owner all existing equipment used as TD that is removed and designated as salvage.

Method of Measurement:

Temporary Detection (TD) shall be measured for payment as follows:

Fifty percent (50%) will be paid when Temporary Detection is initially set up, approved, and becomes fully operational.

Fifty percent (50%) will be paid when Temporary Detection terminates and all temporary equipment is removed to the satisfaction of the Engineer.

Basis of Payment:

This work will be paid at the contract Lump Sum price for "Temporary Detection (Site No.)". The price includes furnishing, installing, relocating, realigning, maintaining, and removing, the necessary detection systems and all incidental material, labor, tools, and equipment. This price also includes any detector mode setting changes, timing or program modifications to the controller that are associated with TD. All Contractor supplied material that will remain the Contractor's property will be included in the contract Lump Sum price for "Temporary Detection (Site No.)". Any items installed for TD that will become part of the permanent installation will not be paid for under this item but are paid for under the bid item for that work.

<u>Pay Item</u>	<u>Pay Unit</u>
Temporary Detection (Site No.)	L. S.

ITEM #1111401A - LOOP VEHICLE DETECTOR

ITEM #1111451A - LOOP DETECTOR SAWCUT

Replace Section 11.11, LOOP VEHICLE DETECTOR AND SAWCUT, with the following:

11.11.01 – Description:

1. Furnish and install a loop vehicle detector amplifier.
2. Sawcut pavement. Furnish and install loop detector wire in sawcut.

11.11.02 – Materials:

Article M.16.12

M.16.12 - LOOP VEHICLE DETECTOR AND SAWCUT

1. Loop Vehicle Detector:

- Comply with National Electrical Manufacturers Association (NEMA) standards, Section 6.5, Inductive Loop Detectors.
- Comply with the current CT DOT Functional Specifications for Traffic Control Equipment, Section 3 B, Loop Vehicle Detector with Delay/Extend Option.

2. Sawcut:

(a) Wire in sawcut:

- International Municipal Signal Association (IMSA) Specification 51-7, single conductor cross-linked polyethylene insulation inside polyethylene tube.
- # 14 AWG

(b) Sealant:

(1) Polyester Resin Compound

- Two part polyester which to cure, requires a liquid hardener.
- Use of a respirator not necessary when applied in an open air environment.
- Cure time dependent on amount of hardener mixed.
- Flow characteristics to guarantee encapsulation of loop wires.
- Viscosity: 4000 CPS to 7000 CPS at 77 degrees Fahrenheit (25° C).
- Form a tack-free skin within 25 minutes and full-cure within 60 minutes at 77 degrees Fahrenheit (25° C).
- When cured, resist effects of weather, vehicular abrasion, motor oil, gasoline, antifreeze, brake fluid, de-icing chemicals, salt, acid, hydrocarbons, and normal roadway encounters.
- When cured, maintain physical characteristics throughout the ambient temperature ranges experienced within the State of Connecticut.
- When cured, bonds (adheres) to all types of road surfaces.
- Weight per Gallon (3.8 l): 11 lbs ± 1 lb (5kg ± .45kg)

- Show no visible signs of shrinkage after curing.
- 12 month shelf life of unopened containers when stored under manufacturers specified conditions.
- Cured testing requirements:
 - Gel time at 77 degrees F (25° C): 15 - 20 minutes, ASTM C881, D-2471
 - Shore D Hardness at 24 hours: 55-78, ASTM D-2240
 - Tensile Strength: > 1000 psi (6895 kPa), ASTM D-638
 - Elongation: 18 - 20 %, ASTM D-638
 - Adhesion to steel: 700 - 900 psi (4826 - 6205 kPa), ASTM D-3163
 - Absorption of water, sodium chloride, oil, and gasoline: < 0.2%, ASTM D-570
- Include in the Certificate of Compliance:
 - Manufacturer's confirmation of the uncured and cured physical properties stated above.
 - Material Safety Data Sheet (MSDS) stating sealant may be applied without a respirator in an open air environment.
- Designed to allow clean-up without the use of solvent that is harmful to the workers and the environment.

(2) Elastosmeric Urethane Compound:

- One part urethane which to cure, does not require a reactor initiator, or a source of thermal energy prior to or during its installation.
- Use of a respirator not necessary when applied in an open air environment.
- Cure only in the presence of moisture.
- Flow characteristics to guarantee encapsulation of loop wires.
- Viscosity such that it does not run out of the sawcut in sloped pavement during installation; 5000 CPS to 85,000 CPS.
- Form a tack-free skin within 24 hours and 0.125 inch (0.33mm) cure within 30 hours at 75 degrees Fahrenheit (24° C).
- When cured, resist effects of weather, vehicular abrasion, motor oil, gasoline, antifreeze, brake fluid, de-icing chemicals, salt, acid, hydrocarbons, and normal roadway encounters.
- When cured, maintain physical characteristics throughout the ambient temperature ranges experienced within the State of Connecticut.
- Show no visible signs of shrinkage after curing.
- Shelf life when stored under manufacturers specified conditions:
 - Caulk type cartridges: minimum 9 months
 - Five gallon containers: minimum 12 months
- Designed for application when the pavement surface temperature is between 40 and 100 degrees Fahrenheit (4° and 38° C).
- Uncured testing requirements:
 - Weight/Gallon: ASTM D-1875
 - Determination of Non-volatile Content: ASTM D-2834
 - Viscosity: ASTM D-1048B
 - Tack-free Time: ASTM D-1640
- Cured testing requirements:
 - Hardness: ASTM D-2240
 - Tensile Strength & Elongation: ASTM D-412A
- Include in the Certificate of Compliance:
 - Manufacturer's confirmation of the uncured and cured physical properties stated above.
 - Material Safety Data Sheet (MSDS) stating sealant may be applied without a respirator in an open air environment.

- Designed to allow clean-up without the use of solvent that is harmful to the workers and the environment.

3. Miscellaneous:

- (a) Liquidtight Flexible Nonmetallic Conduit
 - UL listed for direct burial
 - UL 1660
 - Smooth polyvinyl chloride inner surface
- (b) Water Resistant Pressure Type Wire Connector
 - UL listed for direct burial and wet locations
 - UL 486D

11.11.03 - Construction methods:

1. Loop Vehicle Detector

- Shelf-mount the detector amplifier in the controller cabinet.
- Terminate the harness conductors with crimped spade connectors. Connect conductors to appropriate terminals, eg, black wire to 110vac, white wire to 110vac neutral.
- Tie loop harness and conductors to controller cabinet wiring harness. Leave enough slack in loop harness so that amplifier may be moved around on cabinet shelf; ± 2 feet (0.6 meter) slack.
- Attach a loop identification tag to the harness. Record pertinent detector information on the tag with indelible ink. See example below.
 - Loop No.: *D4*
 - Phase Call: *Phase 4*
 - Field Location: *Rt. 411(West St.)*
 - *Eastbound, Left Lane*
 - Detector No.: *4*
 - Cabinet Terminals: *234, 235*

2. Loop Detector Sawcut

- Loop size, number of turns, and location is shown on the intersection plan.
- Do not cut through a patched trench, damaged or poor quality pavement without the approval of the Engineer.
- Wet-cut pavement with a power saw using a diamond blade $\frac{3}{8}$ inch (9.5mm) wide. Dry-cut is not allowed.
- Ensure slot depth is between 1 $\frac{3}{4}$ inch to 2.0 inch (45mm to 50mm).
- Overlap corners to ensure full depth of cut.
- To prevent wire kinking and insulation damage, chamfer inside of corners that are ≤ 120 degrees.
- Clean all cutting residue and moisture from slot with oil-free compressed air. Ensure slot is dry before inserting wire and sealing sawcut.
- Cut home-run, from loop to curb or edge-of-road, as shown on the typical installation sheet.
- To prevent cross-talk and minimize electrical interference, twist home-run wires, from edge of road to handhole, with at least 5 turns per foot (16 turns per meter). Tape together twisted home-run wires at 2 foot (0.6 meter) $\pm$ intervals.
- In new or resurfaced pavement, install loops in the wearing course. If the wearing course is not scheduled for immediate placement (within 24 hours) after the base course, provide temporary detection when directed by the Engineer. Temporary detection may be sawcut

loops, preformed loops, microwave sensor, video, or other method approved by the Engineer.

- Splice(s) not allowed anywhere in loop wire either in loop or in home-run.
- Ensure wires are held in place at bottom of slot by inserting at 2 foot (0.6 m) intervals, 1 inch sections of foam backer rod or wedges formed from 1 inch (25mm) sections of the polyethylene tubing. Loop detectors with wires that have floated to the top of the sealant will not be accepted.
- To create a uniform magnetic field in the detection zone, wind adjacent loops in opposite directions.
- Use **polyester compound** as the sealant unless another type is allowed by the Engineer.
- Mix hardening agent into polyester resin with a power mixer or in an application machine designed for this type of sealant in accordance with the manufacturer's instructions.
- Apply the loop sealant in accordance with the manufacturer's instructions and the typical installation sheet. Do not apply sealant when pavement temperature is outside the manufacturers recommended application range.
- Solder splice the loop wires to the lead-in cable and install water resistant connector as shown on the typical installation sheet.
- Test the loop circuit resistance, inductance, and amplifier power-interruption as shown on the typical installation sheet. Document all test results.

3. Damaged, Patched, or Excessively Worn Pavement

- Where the existing pavement is damaged, patched or excessively worn and is found to be not suitable for reliable loop detection, notify the Engineer.
- When directed by the Engineer, remove and replace an area of pavement to allow the proper installation of the loop.
- Remove a minimum of 3 inches (75mm) depth.
- Comply with the applicable construction methods of Section 2.02 Roadway Excavation, Formation Of Embankment and Disposal of Surplus Material, and Section 4.06 Bituminous Concrete, such as:
 - Cut Bituminous Concrete
 - Material for Tack Coat
 - Bituminous Concrete Class 1

4. Re-surface/Overlay Project

- Prior to disconnecting the existing loop confirm that the amplifier is operating properly and is programmed according to plan. Document loop operation. Report any discrepancies and malfunctions to Engineer.
- Remove all abandoned sawcut home-run wire from handhole.
- Sawcut new loop according to plan.
- Solder splice new loop wires to the existing lead-in cable and install new water resistant twist connectors as shown on the typical installation sheet. Do not re-use the removed connectors.
- Test the loop circuit resistance and inductance. Document results.
- Ensure the existing loop amplifier has re-tuned to the new loop and is operating according to plan.

11.11.04 – Method of Measurement:

1. Loop Vehicle Detector is measured by the number of installed, operating, tested, and accepted vehicle detector amplifiers of the type specified.
2. Loop Detector Sawcut is measured by the number of linear feet (meters) of installed, tested, operating, and accepted sawcut only where there is loop wire. Over-cuts at corners that do not contain wire are not measured.

11.11.05 – Basis of Payment:

1. Loop Vehicle Detector is paid at the contract unit price each of the type specified.
2. Loop Detector Sawcut is paid at the contract unit price per linear foot (meter). The price includes sawcut, loop wire, sealant, liquidtight flexible nonmetallic conduit, duct seal, water resistant splice connectors, testing, incidental material, equipment, and labor.

<u>Pay Item</u>	<u>Pay Unit</u>
Loop Vehicle Detector	ea.
Loop Detector Sawcut	l.f.

ITEM #1111600A – EXTENSION BRACKET

Description:

Furnish and install an Extension Bracket as shown on the plans or as directed by the Engineer. This item includes both horizontal and vertical extension brackets. The Extension Bracket consists of mounting hardware, equipment and labor necessary to provide the specified vertical height or horizontal length.

Materials:

All hardware shall be new, corrosion resistant. All equipment shall be of current production.

Horizontal Extension Bracket:

- Single arm [8' (2.5m) or less], or Truss type [8' (2.5m) or greater].
- Length shown on plan.
- Clamp-on attachment to pole shaft 1' (300mm) from top of pole.
- Designed to support minimum 30 lbs. (13.6 Kg), 2 sq. ft. (.2 sq. M) end load with minimal movement from wind.
- Schedule 40, 2" IPS galvanized pipe.
- Heavy duty galvanized finish.
- Refer to detail drawing contained herein.

Vertical Extension Bracket:

- 10' Maximum Length.
- Schedule 40, 1.5" galvanized pipe.
- Astro-Brac banded bracket.
- Designed to support minimum 30 lbs. (13.6 Kg), 2 sq. ft. (.2 sq. M) end load with minimal movement from wind.
- Length shown on plan.
- Heavy duty galvanized finish.
- Refer to detail drawing contained herein.

Construction Methods:

Install Extension Bracket equipment in accordance with the manufacturer instructions. The Contractor shall install Extension Brackets as shown in the plans. Leave proper clearance(s) surrounding overhead utilities in accordance with current PURA and NESC regulations.

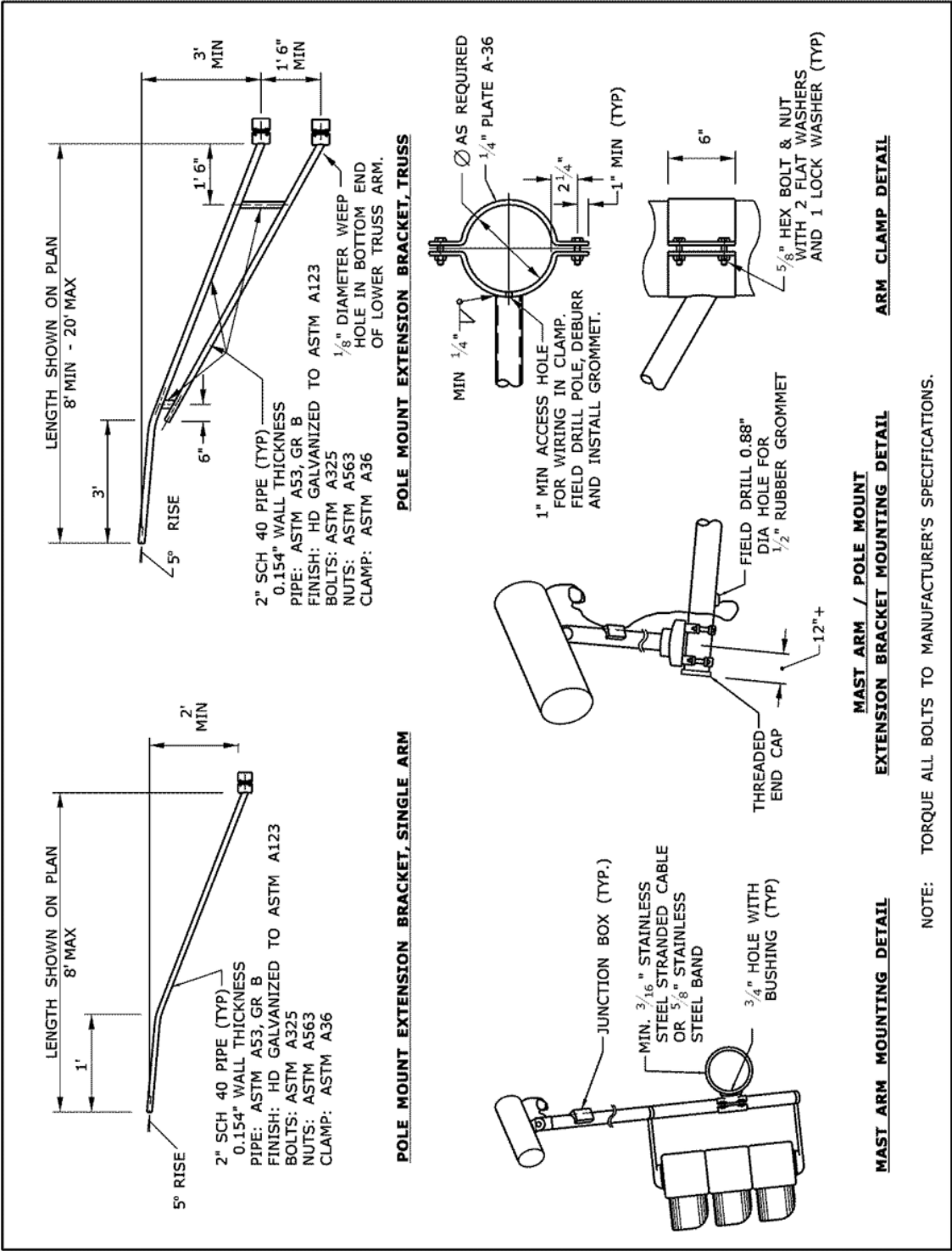
Method of Measurement:

The Extension Bracket will be measured for payment as the number of brackets furnished, installed and accepted.

Basis of Payment:

The unit bid price for Extension Bracket includes all labor, tools, material, and equipment necessary to install an extension bracket as specified on plans.

<u>Pay Item</u>	<u>Pay Unit</u>
Extension Bracket	Ea.



ITEM #1112286A – 360 DEGREE CAMERA ASSEMBLY

ITEM #1112287A – 360 DEGREE VIDEO DETECTION PROCESSOR

ITEM #1113182A – 360 DEGREE SYSTEM LONG RANGE CABLE

ITEM #1113725A – 23 AWG 4 TWISTED PAIR CATEGORY 6 CABLE

Description:

Furnish and install a 360 Degree Video Image Detection System (360VIDS) as shown on the plans or as directed by the Engineer. The 360VIDS consists of a 360 Degree Camera Assembly (360CA), 360 Degree Video Detection Processor (360VDP), 360 Degree System Long Range Cable or 23 AWG 4 Twisted Pair Category 6 Cable, and any incidental items including surge suppression, junction boxes, connectors, mounts and management software.

Materials:

All hardware shall be new, corrosion resistant. All equipment shall be current production.

360 Degree Camera Assembly:

All 360 Degree Camera Assemblies shall be GRIDSMART Technologies, Inc. Bell Camera.

Camera:

- No-aim, no-focus camera
- Downward facing lens and camera shroud
- Single Power Over Ethernet (POE) connection for power and data collection.
- Color image camera with 360 degree point of view (POV)
- Active picture elements (pixels): 2560 (H) x 1920 (V), minimum.
- Signal to noise ratio : $\geq 55\text{dB}$
- Heated camera
- IP addressable

Camera Enclosure:

- Tamper proof constructed of painted or powder coated aluminum of at least 0.25 inch thickness.
- IP66-rated camera housing.

Camera Mounting Hardware:

- Smartmount bracket.
- Junction box.
- Banded bracket.
- 90 degree vertical riser:

- For mast arms, use vertical riser height specified on the plans
- For span poles with horizontal extension brackets, use shortest vertical riser height physically possible
- For span poles with no horizontal extension brackets (Shaft mounted), use vertical riser height specified on the plans

360 Degree Video Detection Processor:

All 360 Degree Video Detection Processors shall be GRIDSMART Technologies, Inc. GS3.

Functional:

- Connectivity: Local Area Network (LAN), Wide Area Network (WAN), Camera interfaces.
- NEMA TS1/ TS2, ATC, Type 170, and 2070 compatible
- Four (4) USB 3.0 expansion ports.
- Front panel LED indicators displays call states.
- I/O controller.
- Two (2) camera ports – Up to two (2) 360 Degree Camera Assembly; or one (1) 360 Degree Camera Assembly and four (4) IP video detection camera assembly or thermal detector assembly; or eight (8) IP video detection camera assembly or thermal detector assembly.
- Phase and detection display.
- Shall include at least a built-in 4g modem (or higher) and be Wi-Fi capable
- Power – 110/220 VAC 50/60 Hz
- Point and click zone drawing feature
- Omni-directional vehicle tracking
- Zone level visibility monitoring
- Monitor phases and loops, generates calls to controllers
- Software required to support collection of data
- Environmental: -30F to +165F, 5-95% non-condensing
- Fail-safe in the event of loss of video from 360CA or loss of power to 360VDP.
- Shall be able to configure and adjust the detection zone with the cabinet mounted Vehicle Detection Monitor (VDM) or remotely.
- Shall be activated to collect and report traffic data such as turning movements/volume counts, vehicle classification, speed, and red/green occupancy.
- Shall be configured to transmit collected traffic data and alarm events from field devices to remote desktop PC.
- Shall be configured to sync with a cloud network resource to allow for data backup including signal performance metrics data such as the Purdue coordination diagram.

Application Software:

- Shall be freely available for installation on any number of computers used to manage the 360VIDS.
- Shall be capable of point and click zone drawing
- Shall support the assignment of a detector output(s) to each zone. These assignments can be modified at any time through the software.
- Shall have the ability to digitally flatten CA image
- Shall have the ability to mask objects that occlude the camera field of view and/or disrupt the camera automatic gain and exposure control.
- Shall store detection zone data non-volatile memory so that after recovery from power interruption, all parameters are returned to latest settings.
- Shall have the ability to import and export program database to notebook PC or remote desktop PC. The program database shall also be allowed to be transferred via an external storage device.
- Shall be capable of superimposing detection zone on real time video image from selected camera with time stamping capabilities.
- Shall be capable of monitoring real time video and adjusting zones in field or remotely while 360VDP is actuating the traffic controller.
- Shall provide visual confirmation of detection by highlighting detection zone symbols.
- Shall allow for remote display of site/camera status for all connected sites.
- Shall provide visual indication of the light state for each zone within the graphical user interface.
- Shall be capable of searching the network for other 360VDP.
- Shall be compatible with Windows operating system supported by the City of Waterbury.
- Shall maintain a historical log of all configurations when site is modified
- Shall feature the ability to digitally pan, tilt, and zoom within the camera assembly's field of view without movement of the camera.
- Shall support quad view video monitoring.
- Shall be capable of syncing with a cloud network resource to allow for group site sharing of site program database information and historical traffic data report generation.
- Shall maintain a database of current and historical traffic data
- Shall allow users to create reports for turning movements/volume counts, vehicle classification, speed, red/green occupancy, and site alerts remotely via the software and online reports/performance measures via the web.
- Shall display data in a graph, chart, and table format.
- Shall display data in 15, 30, and 60-minute intervals.
- Shall provide a means by which alerts can be configured to be delivered to different individuals via email
- Report output formats shall include at minimum PDF, rich text format, and Microsoft Excel formats.

Physical:

- Either shelf mounted, stand-alone design or modular card rack design.
- Aluminum card rack frame capable of accepting four (4) 360VDP modules.
- TS1 harness cable.
- Standard Ethernet and USB connectors for video input and video output.
- Female metal shall connector with latching clamp for NEMA TS1 detector outputs and inputs.
- LED indications to monitor all detector outputs.
- Side or rear mounted connectors and controls are not allowed on stand-alone units.

Antenna:

- Shall be mounted externally on top of traffic cabinet
- Shall be “Multiple-Input and Multiple-Output” (MIMO)
- Shall cover the Cellular, WIFI, DSRC, GPS, and Bluetooth networks
- Shall connect to the 360VDP

Ethernet Switch:

- Power Over Ethernet (POE) switch
- Ports for up-to four (4) IP video detection cameras
- Powder coated aluminum.
- Dual purpose LED port lights.
- RJ-45 CAT6 connectivity.
- Environmental: -29F to +165F.
- NEMA TS2 compliant.

Video Encoder:

- Power Over Ethernet (POE)
- Video: H.264 (MPEG-4 Part 10/AVC) Baseline and Main Profile
- Compression: Motion JPEG
- Resolutions: 176x120 to 720x576, 176x120 to 1536x1152 for quad view.
- Frame rate:
 - H.264: 25/30 (50/60 Hz) fps,
 - 15fps in quad view in full resolution,
 - Motion JPEG: 25/30 (50/60 Hz) fps,
 - 15fps in quad view in full resolution.
- Video Streaming: Multi-stream H.264 and Motion JPEG: One H.264 and one JPEG stream on each channel (8 streams in total) in full frame rate individually configured streams in max. resolution at 25/30 fps; more streams if identical or limited in frame rate/ resolution. Controllable frame rate and bandwidth; VBR/CBR H.264.
- Environmental: -29F to +165F, 10-95% non-condensing.
- NEMA TS2 compliant.

Ethernet Protection Module:

- Either shelf mounted or stand-alone design.
- Protects 360CA, IP video detection camera assembly and 360VDP in the event of a surge or lightning.

Environmental:

- Comply with NEMA TS 2, Section 2 requirements for Controller Assembly.
- Pass following NEMA TS 2 tests and applicable test procedures.
 - Vibration: Section 3.13.3, Section 3.13.8.
 - Shock: Section 3.13.4, Section 3.13.9.
 - Transients, Temperature, Voltage and Humidity: Section 3.13.7.
 - Power Interruption: Section 3.13.10.

Peripherals:

- Separable Keypad & Joystick or Computer Mouse including all necessary cables for connectivity to 360VDP.

360 Degree System Long Range Cable:

For GRIDSMART 360 video detection systems, the following cable shall be used for long range installations:

Gridsmart Fiber Optic/Power Hybrid Cable:

- Supply the 360CA power and return the video signal to the 360VDP.
- Hybrid cable consisting of (4) fibers and (2) copper conductors
- Fibers: OM3 multimode 50/125 Bend Insensitive Fiber (BIF), 10GIG
- Conductors: Stranded Bare Copper (Size - 16 AWG)
- Fibers and conductors shall be encased in a UV-resistant black flame-retardant PVC jacket with an outer diameter of 0.40 to 0.42 in
- Complies with or exceeds IEC 60793-2-10, TIA-492AADD Optical Fiber Specification
- Terminate with compatible connector.
- Shall be installed continuous between the camera and processor Fiber Media Converters.
- Cable shall be installed according to TIA/EIA-568-B. Other type cable may be substituted at the request of the 360VDP manufacturer with the City of Waterbury approval.

23 AWG 4 Twisted Pair Category 6 Cable:

- Supply the 360CA power and return the video signal to the 360VDP.
- Outdoor Aerial CAT6 cable with UV insulation.

- Rated for 48VDC
- 250MHZ, shielded, gel-filled (flooded core) direct burial grade.
- Shall be equipped with a drain wire.
- Terminate with compatible connector.
- Single jacket polyethylene insulation.
- Single jacket cable shall be fully inserted into the connector.
- Shall be installed continuous between the 360CA and 360VDP.
- Cable shall be installed according to TIA/EIA-568-B.
- Other type cable may be substituted at the request of the 360VDP manufacturer with the City of Waterbury approval.

Documentation: (360VDP and 360CA)

Provide to the **City of Waterbury** three (3) copies of equipment manuals furnished by the manufacturer, which includes the following:

- Installation and operation procedures.
- Performance specifications (functions, electrical, mechanical and environmental) of the unit.
- Schematic diagrams (point to point wiring).
- Pictorial of component layout on circuit board.
- List of replaceable parts including names of vendors for parts not identified by universal part numbers such as JEDEC/RETMA or EIA.
- Troubleshooting, diagnostic and maintenance procedures.
- Testing results of grounding, voltage, and cable length measurements. Refer to the manufacturer's best practices guidelines.

Site Survey:

Perform a site survey with the 360VDP manufacturer representative at all 360VIDS locations prior to installation. The site surveys must be conducted in the field to accurately assess the existing conditions at each location. The purpose of the survey is to optimize the performance from the 360VIDS equipment when it is installed. Prior to installation, submit the results of this survey to the Engineer in a report, which lists all 360VIDS locations with any recommended changes to camera locations, mounting adjustments, camera lens adjustments, and desired detection zone locations.

Warranties and Guarantees: (360VDP and 360CA)

Provide warranties and guarantees to the **City of Waterbury**. Warranties for all equipment furnished as part of this Contract are to cover a period of 36 months following successful completion of the entire intersection acceptance test.

Construction Methods:

Install 360VIDS equipment in accordance with the manufacturer instructions. Detection zones shall be replicated as shown in the plans. The Contractor shall install vehicle-counting zones for each lane as shown in the plans. The Contractor shall ensure the vehicle counting zones are as accurate as possible. The Contractor shall contact the Engineer to confirm detection zone and vehicle counting zone locations. The location of the 360CA shown on the plan may be revised as a result of the Site Survey. Peripherals are to be furnished and fully installed in an easily accessible position within the controller cabinet. Leave proper clearance(s) surrounding video monitor to allow for accessible connections and space to utilize surrounding equipment.

The Contractor shall forward the configuration file in electronic format to the City of Waterbury City Engineer at rcavanaugh@waterburyct.org, immediately upon completion of configuration of the detection zones. The Contractor shall address any comments/corrections identified by the City of Waterbury.

Method of Measurement:

The 360 Degree Camera Assembly will be measured for payment as the number of 360 degree cameras furnished, installed operational and accepted.

The 360 Degree Video Detection Processor will be measured for payment as the number of units including all additional work and materials listed in Basis of Payment, furnished, installed, operational and accepted.

360 Degree System Long Range Cable will be measured for payment as linear feet, furnished, installed and accepted.

23 AWG 4 Twisted Pair Category 6 Cable will be measured for payment as linear feet, furnished, installed and accepted.

Basis of Payment:

The unit bid price for each 360 Degree Camera Assembly shall include the 360 degree camera, enclosure, vertical riser and hardware used to attach the 360CA to a support structure, documentation, warranty, labor, tools and equipment necessary to provide the specified video signal to the 360VDP.

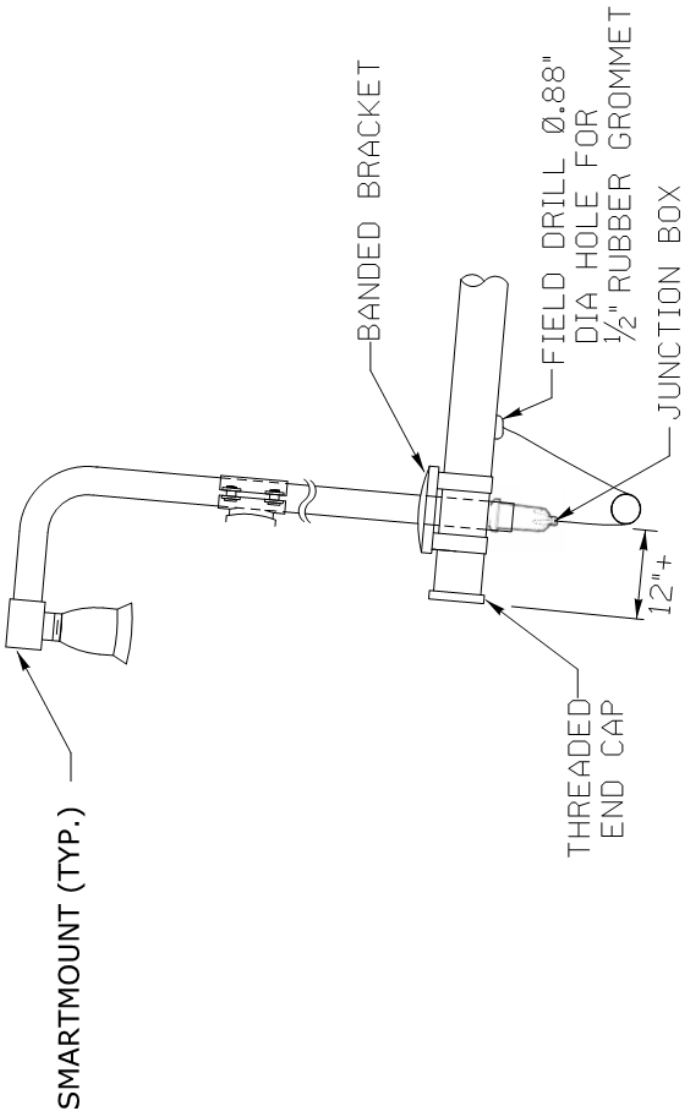
The unit bid price for each 360 degree Video Detection Processor shall include the manufacturers' site survey, unlimited number of any necessary 360VIDS configuration software and license, card rack frame, power supply, all miscellaneous hardware such as PC interface cable with connectors, necessary peripherals such as Ethernet repeater, Ethernet

switch, video encoder, Ethernet protection module, junction boxes, documentation, warranty, labor, tools and equipment necessary to make the 360VIDS fully operational.

The unit bid price per linear foot for 360 Degree System Long Range Cable shall include all connectors, labor, tools and equipment necessary to install the cable between the 360CA and the 360VDP.

The unit bid price per linear foot for 23 AWG 4 Twisted Pair Category 6 Cable shall include all connectors, labor, tools and equipment necessary to install the cable between the 360CA and the 360VDP.

Pay Item	Pay Unit
360 Degree Camera Assembly	ea.
360 Degree Video Detection Processor	ea.
360 Degree System Long Range Cable	l.f.
23 AWG 4 Twisted Pair Category 6 Cable	l.f.

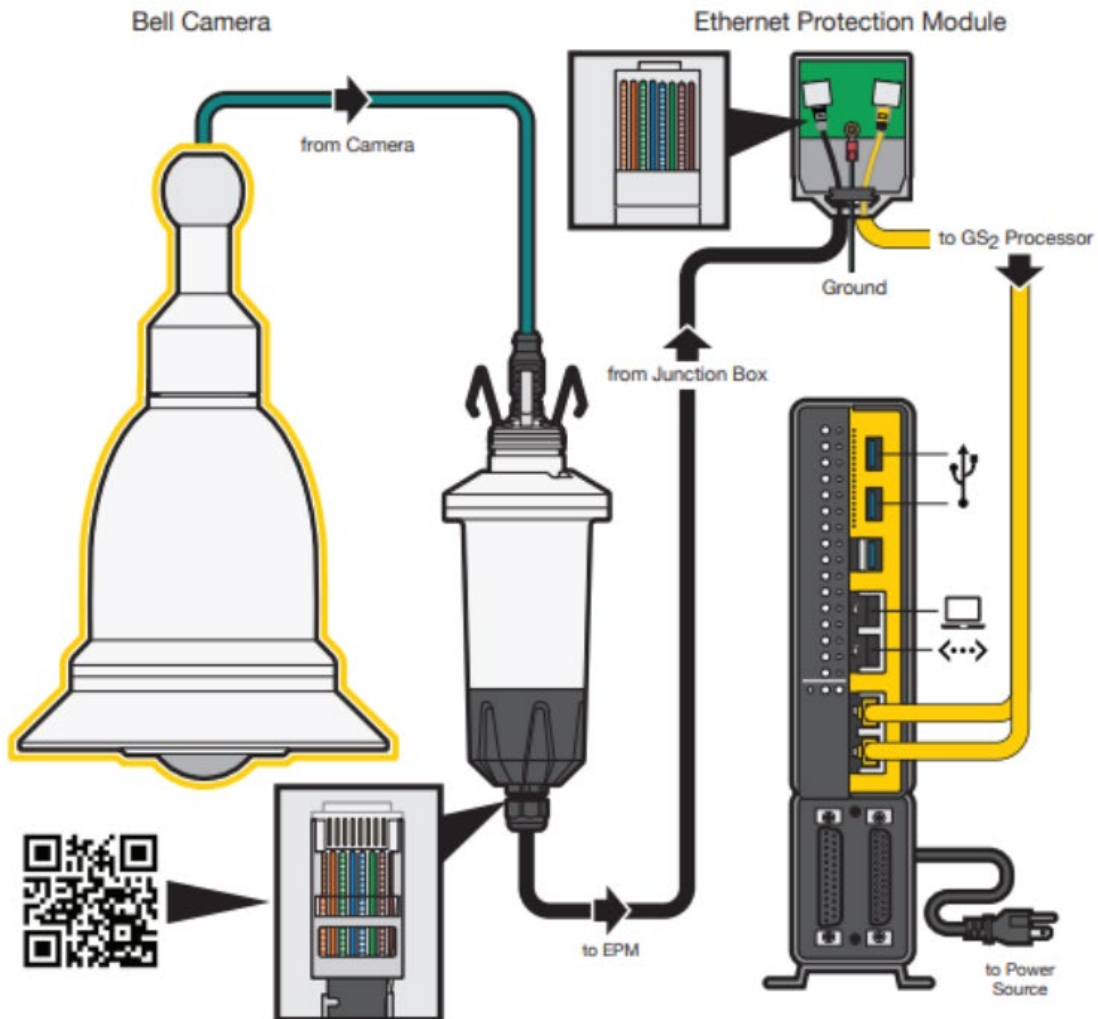


MAST ARM / POLE MOUNT
EXTENSION BRACKET MOUNTING DETAIL

NOTE: TORQUE ALL BOLTS TO MANUFACTURER'S SPECIFICATIONS.

FILENAME: \$FILEL\$ MODEL: \$MODELNAME\$

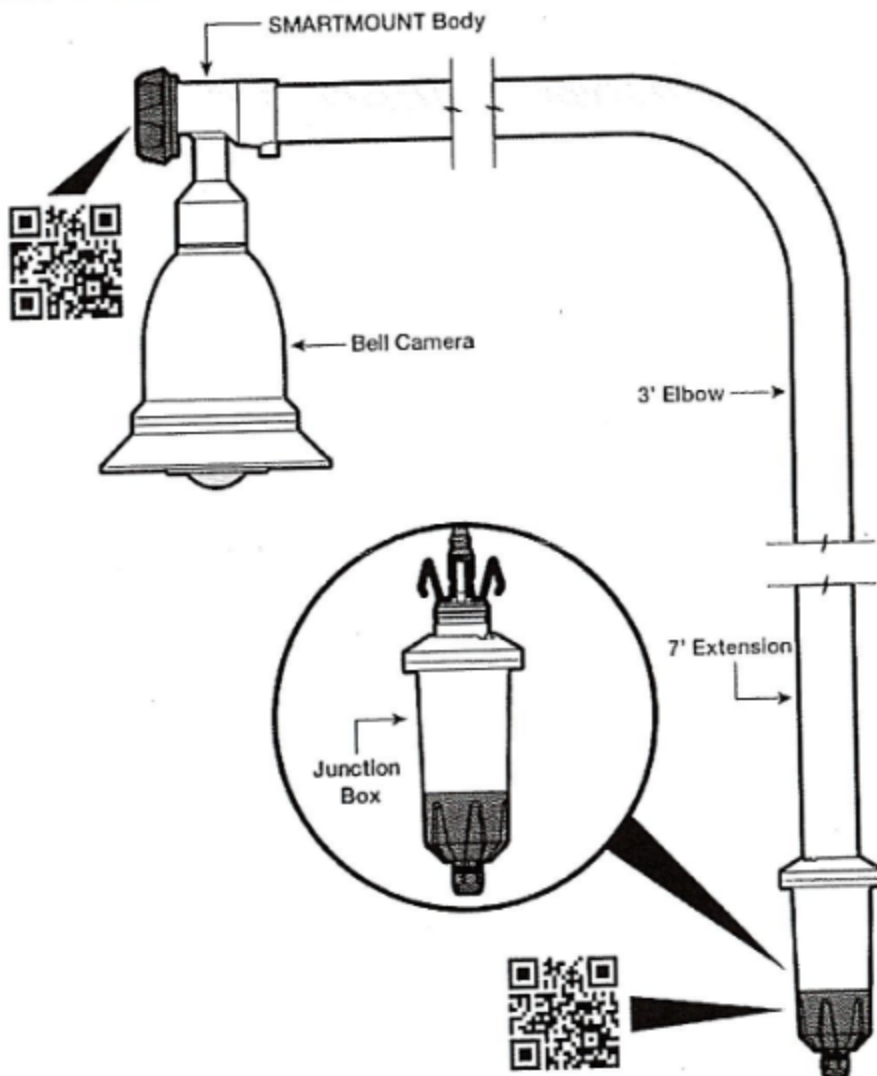
SYSTEM CONNECTIONS



Pro Tips (Before Beginning Installation):

- Test Bell Camera (while still in foam packaging).
- Make sure unit is grounded correctly.
- Make sure Bell Camera is level and in front of stop bar.
- Check TS1 Wiring Harness Insert – TS1 connection.
- Check "Tool List" in installation guide.

SYSTEM OVERVIEW



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marketing@gridsmart.com | 1 800 652 5347 | GRIDSMART.com

GRIDSMART®

INSTALLATION GUIDE

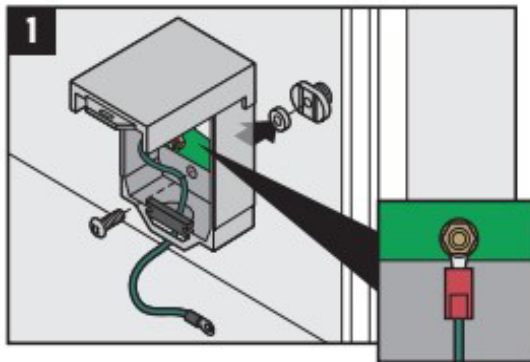
TOOLS AND ITEMS NEEDED

- 7/16" Wrench
- 1/2" Wrench
- 3/4" Wrench
- 1/4" Wrench
- 3/32" Wrench
- 17 mm Wrench
- Utility knife
- Phillips screwdriver
- Flat-head screwdriver
- 1/2" Drill bit
- 5/32" Allen wrench (included)
- Mounting bracket
- CAT5e test cable
- 24AWG Shielded CAT5e cable
- RJ-45 Crimper
- Laptop (with GRIDSMART Client installed)
- EXO Crimp frame
- Ground wire clamp (included)
- USB flash drive
- Cable tester
- Hand level
- DLG Di-120b Tester

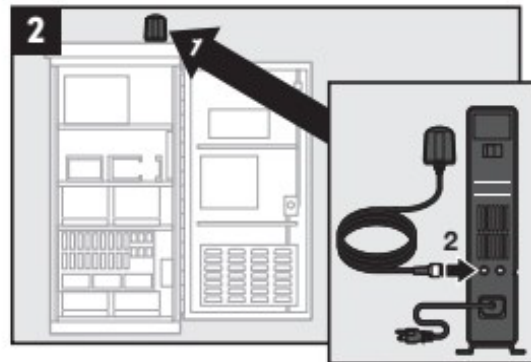


BEFORE INSTALLATION

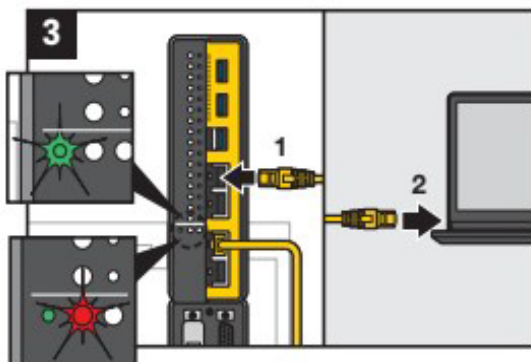
Helpful tip: On your laptop, verify that the GRIDSMART Client is updated to the latest software version. Download the latest update from GRIDSMARTCloud.com.



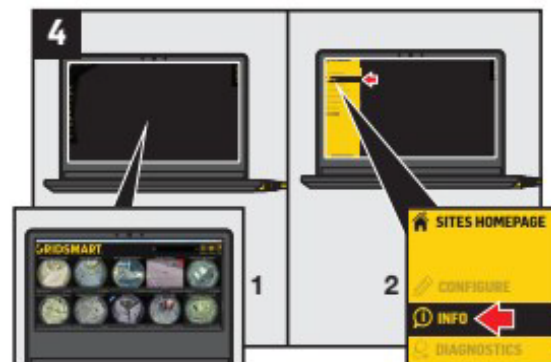
Install EPM onto cabinet DIN rail on opposite side from power distribution. Cut along rubber grommet "X". Connect 10AWG ground wire as close to ground rod as possible using ground wire clamp.



Mount Antenna to top of cabinet using 1/2" drill bit. Connect CELL Antenna lead to female connector on back of Processor.

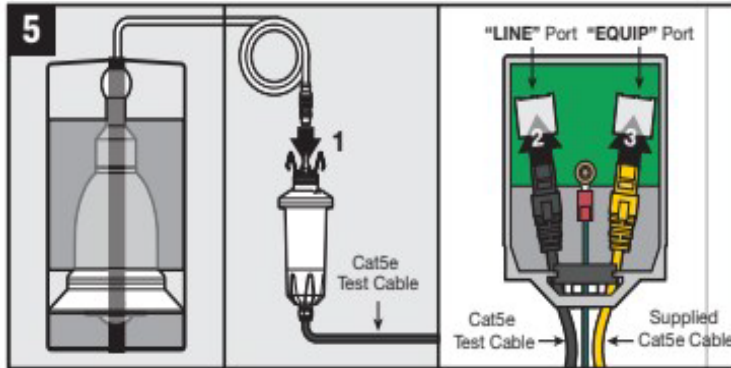


Connect Processor to power source and power on (status light turns green in 2-3 minutes). **DO NOT USE A GFCI TYPE OUTLET.** Connect laptop to "LAPTOP" port on Processor with a CAT5e cable.



Launch GRIDSMART Client on laptop. Select factory default site card. Select "Info", verify "Site Info" version.

NOTE: The Bell Camera has not yet been connected, so there will be no Camera image.

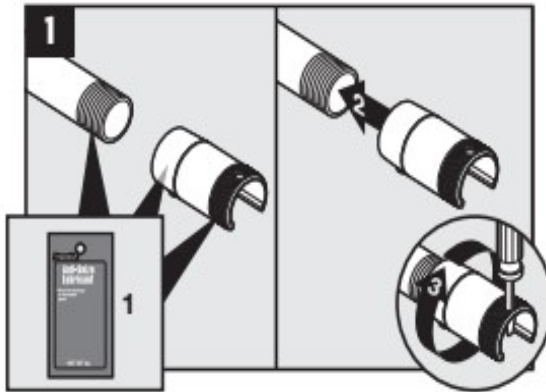
BEFORE INSTALLATION (continued)

With Bell Camera in foam packaging, connect Camera cable to Junction Box upper connection. Connect one end of CAT5e test cable to Junction Box lower connection and remaining end to the EPM Module "LINE" port. Connect one end of supplied CAT5e cable to EPM Module "EQUIP" port and remaining end to Processor. Verify Bell Camera image. Camera status light turns green in 2-3 minutes.

After successful equipment test, disconnect cables to Junction Box, EPM, Processor and laptop. Leave cable connected to Bell Camera.

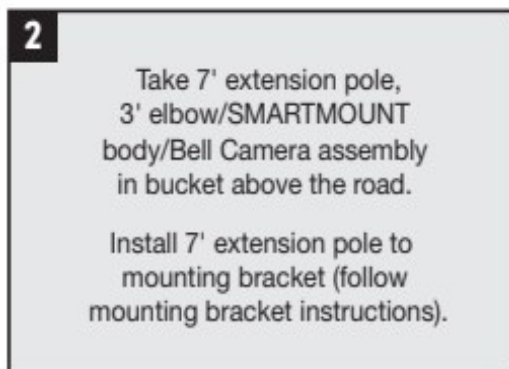
INSTALLATION

Helpful tip: Before proceeding, route 24 AWG gel-filled, shielded, burial grade CAT5e cable from traffic cabinet to the Bell Camera mounting location.



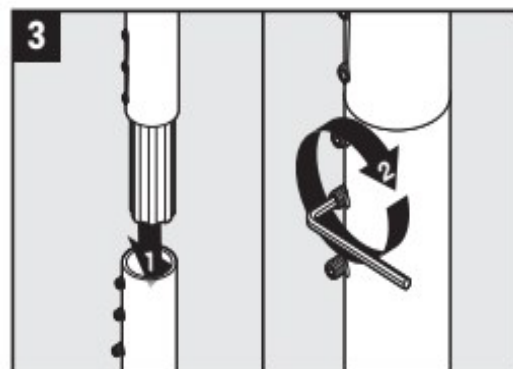
Apply anti-seize to 3' elbow and internal and external threads of SMARTMOUNT body. Install SMARTMOUNT body to upper end of 3' elbow turning clockwise to secure.

NOTE: SMARTMOUNT body opening must be facing down in final position. Tighten center set screw.



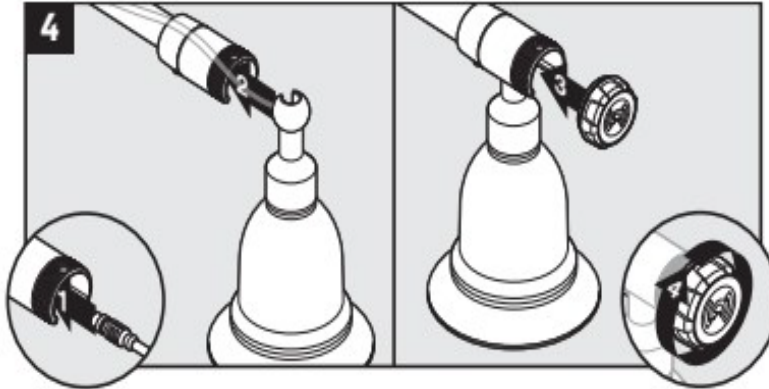
Take 7' extension pole, 3' elbow/SMARTMOUNT body/Bell Camera assembly in bucket above the road.

Install 7' extension pole to mounting bracket (follow mounting bracket instructions).



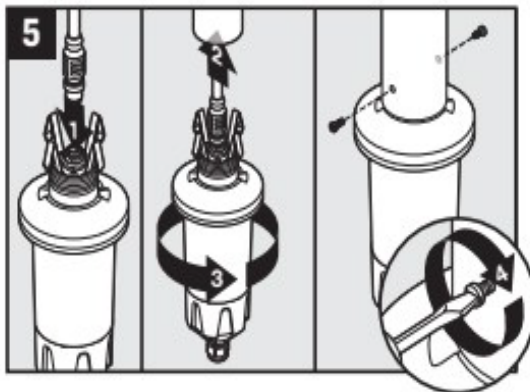
Insert 3' elbow connector into 7' extension using pole connector. Tighten screws with Allen wrench to secure.

INSTALLATION (continued)

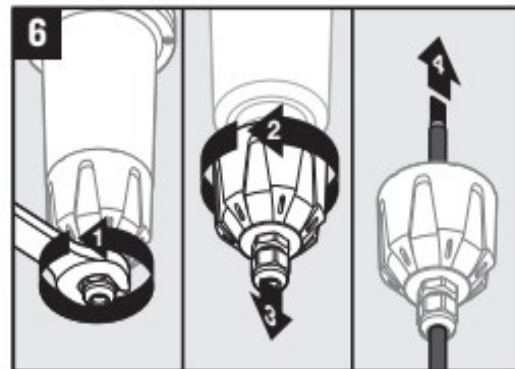


Feed Bell Camera cable through SMARTMOUNT body, 3' elbow and 7' pole extension. Slide Bell Camera ball joint into SMARTMOUNT body, being sure the ball joint opening is well aligned with body/pole opening so as not to damage cable.

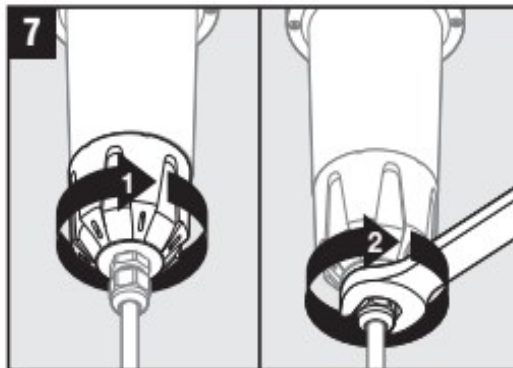
Secure Bell Camera to SMARTMOUNT body with cap. Turn cap clockwise to tighten.



Connect Bell Camera cable from 7' extension to junction box upper connection. Insert Junction Box (turning counter clockwise up to three times to prevent kinking or binding of cable) into 7' extension pole. Install Junction Box set screws to 7' extension pole to secure Junction Box. Tighten with flathead or hexhead screwdriver.

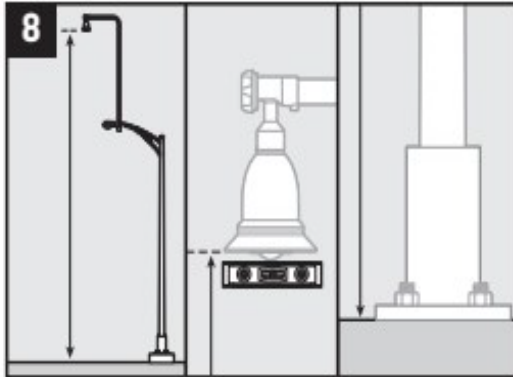


Using a 3/4" wrench, loosen cord grip from cap on bottom of Junction Box. Loosen cap and remove from Junction Box. Push unterminated field cable through cord grip and cap. **Do not tighten cord grip until step 7.** Terminate cable with RJ45, using standard 568B configuration color wiring.



Connect the RJ45 to receptacle and replace cap onto Junction Box (hand-tighten) until fully closed. Tighten cord grip using a 3/4" wrench, to 30 in-lbs max torque.

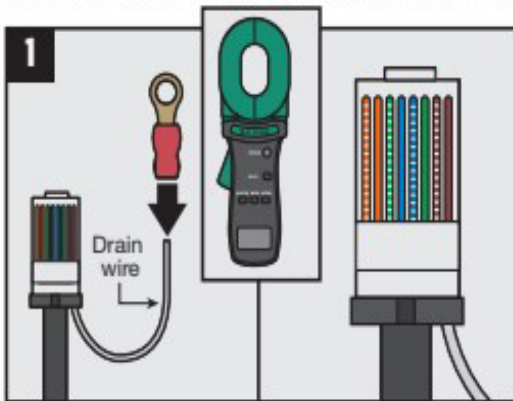
INSTALLATION (continued)



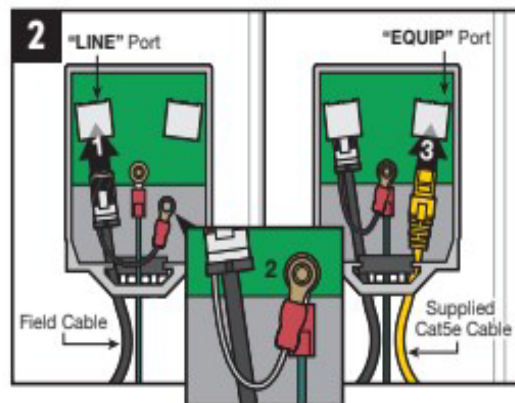
VERY IMPORTANT

Using a tape measure, measure height of Bell Camera. Record the height for use later to set up system. Orient the "G" logo away from area of consequence, level the Bell Camera and tighten the center set screw.

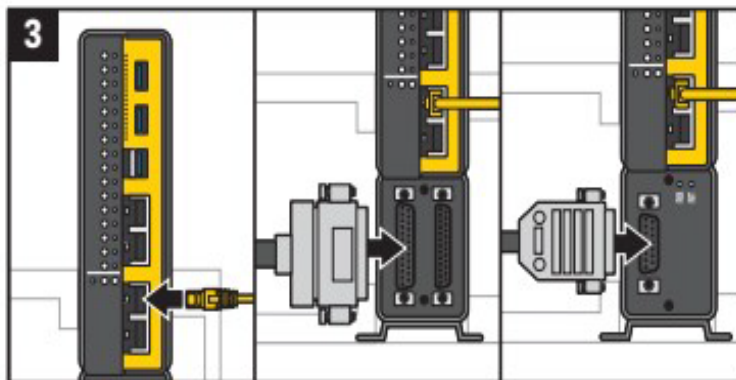
GROUNDING AND FINAL INSTALLATION



Crimp an RJ45 onto remaining end of field cable and verify with cable tester. Crimp the ring terminal to the CAT5e cable drain wire. Verify good crimp on drain wire ring terminal.



Connect field cable to EPM "LINE" port. Connect drain wire ring terminal to the EPM ground to eliminate signal noise and EMI. Connect supplied CAT5e cable EPM "EQUIP" port.



Connect supplied CAT5e to Processor "CAMERA" port. Reconnect the laptop to the "LAPTOP" port. Connect TS1, TS2 or ITS wiring harness to Processor.

1 CABINET GROUNDING

A proper cabinet ground helps mitigate interference from electrical noise at the intersection.

- The U.S. National Electrical Code (NEC) recommends a maximum of 25 ohms for touch safety and telecommunications; PLC industry standards require a maximum of 5.0 ohms for logic reference purposes.
- Use a clamp-on ground meter to verify the cabinet ground.
- GRIDSMART requires the Diligent Instruments DLG Di-120b Tester (<http://www.diligentinstruments.com/di-120.html>).
- If the ground reading is higher than the recommended NEC value, check the connection between the cabinet ground wire and the ground rod for corrosion; clean if corrosion is present. If you are in an area with poor grounds, you may need to add a ground rod to the grounding system to improve the ground.

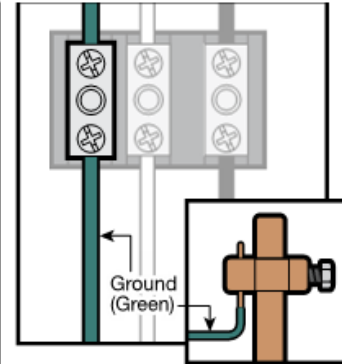
SPECIFICATION:	25 Ohms Max
MEASURED:	

2 AC POWER

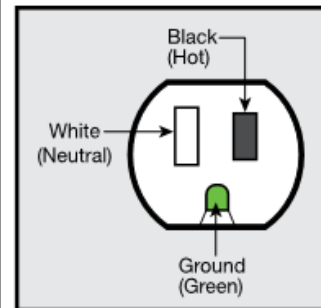
Plug the GRIDSMART Processor into an outlet on the filtered side of the cabinet power. Do not use GFCI type outlet.

- The outlet needs to be checked to verify that all three connections for the outlet are properly connected.
- Using a digital voltmeter (DVM), check the ac voltage from the line to the neutral and the line to ground. Both readings should be ~ 120/240VAC.

SPECIFICATION:	HOT/NEU: 120/240VAC HOT/GND: 120/240VAC
MEASURED:	HOT/NEU: HOT/GND:



DLG Di-120b Tester



GRIDSMART.

GRIDSMART Support 866.652.5347

3 CABLE TYPE & LENGTH

All GRIDSMART installations require burial grade, shielded, gel filled, CAT5e cable with solid core 24 AWG conductors. The shield will protect the data signals from radiated noise which is present in most intersections. LED streetlights have been found to be very noisy electrically and as more streetlights are switched to LED lights, the level of radiated noise will increase. The cable that GRIDSMART supplies and requires for all installations is Vertical Cable part #059-487/S/CMXF.

- The maximum length that a segment of CAT5e can be is 300 feet. If the distance from the EPM to the camera is more than 300 feet, a repeater (RBA) must be used.
- When determining length of the cable, a cable tester that measures the length of the cable is required. Do not rely on sight distance or "walking off" the distance.
- Many times, there are service loops in the pull boxes and at the base of the pole, which will not be accounted for when you do not use a meter for measuring the cable length. GRIDSMART recommends the Triplet Real World Certifier (www.triplett.com/shop/real-world-certifier-rwc1000k/) for testing the cable. The tester will provide length measurements as well as cable quality measurements.

SPECIFICATION:	Cable Length: 300 Ft Max Real World Certification: 100 MB Min Cable Type: Vertical Cable part #059-487/S/CMXF
MEASURED:	Cable Length: Real World Certification: Cable Type:

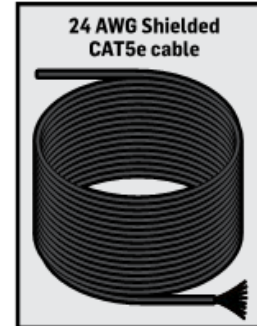
4 CONNECT DRAIN WIRE

The drain wire for the shielded CAT5e cable must be connected to the ground post in the EPM (Ethernet Protection Module). A crimp lug should be attached to the end of drain wire to attach it to the ground post. The drain should only be connected at the EPM end of the cable.

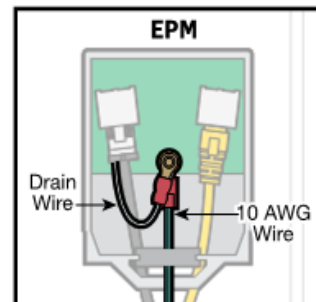
- If you are using an RBA, the drain must be spliced so the drain is continuous from the junction box to the EPM. A 10 AWG Wire is required to connect the EPM ground post to the traffic cabinet ground rod.
- Using a digital voltmeter, you should measure 0 Ohms between the EPM Ground Post and the traffic cabinet ground rod.

SPECIFICATION:	0 Ohms
MEASURED:	

Intersection:	
Camera Serial Number:	
GS₂ Processor Serial Number:	



Triplet Real World Certifier



ITEM #1113550A – DETECTOR CABLE (OPTICAL)

DESCRIPTION:

Detector Cable (Optical) to be installed from the controller to the pre-emption detectors as described in Item No. 111830xA - Relocate Pre-emption SYSTEM (Site No. x).

Materials:

A. Detector Cable (Optical):

1. 3-Conductor cable with shield and ground wire.
2. AWG #20 (7x28) stranded.
3. Individually tinned copper strands.
4. Conductor insulation: 600 volt, 176° F. (75 deg. C).
5. 1 Conductor-yellow; 1 Conductor-blue; 1 Conductor-orange
6. Aluminized mylar shield tape or equivalent.
7. AWG #20 (7x28) stranded uninsulated drain wire
8. DC resistance not to exceed 11.0 ohms per 1000 feet (305m).
9. Capacitance from one conductor to other two conductors and shield not to exceed 48 pf/ft. (157pf/m).
10. Jacket: 600 volts, 176° F. (80 deg. C), minimum average wall thickness – 0.045" (1.14mm).
11. Finished O.D.: 0.3" (7.62mm) max.

Construction Methods:

Detector cables shall be continuous with no splices between the optical detector and the Cabinet.

Detector locations shown on the plan are for illustration purposes only. Exact location shall be determined by the contractor or the designated representative for the best possible line of sight.

Method of Measurement:

Detector Cable (Optical) will be measured by the number of linear feet (meters) supplied, installed, and accepted.

Basis of Payment:

Detector Cable (Optical) shall include the item installation cost, including all materials, equipment, and labor incidental thereto.

<u>ITEM NO</u>	<u>Pay Item</u>	<u>Pay Unit</u>
1113550A	Detector Cable (Optical)	LF

ITEM #1117104A – WRONG WAY DETECTION AND WARNING SYSTEM – AC POWERED

ITEM #1117107A – WRONG WAY DETECTION SIGN UNIT

Description:

This item shall consist of furnishing and installing Wrong Way Detection Systems (WWDS) as shown on the plans or as indicated by the Engineer in conformity with these specifications. The WWDS shall automatically detect and verify wrong-way vehicles through detection zones on an off-ramp. Detection shall simultaneously trigger LED warning signs to flash in a synchronized pattern. Continued wrong way behavior shall be confirmed through a second set of detectors. Notifications to authorized personnel shall be sent through a real-time cloud-based web service software. The WWDS shall also acquire visual evidence of the wrong way event through cameras. Detection equipment will be pedestal-mounted with specific mounting height as per manufacturer recommendations. All WWDS equipment shall be AC or solar-powered. The WWDS shall consist of the following manufactured products and shall include all appurtenances as described below.

1. Wrong-Way Detection and Warning System – AC Powered – shall consist of FLIR thermal detectors, CCTV cameras, wireless communication means for simultaneous actuation of the LED warning signs, cellular modem, antennas, repeaters, batteries, battery controller, LED illuminators, equipment cabinet, surge protector, circuit breaker, solid state flash controller, controller modules, TAPCO IWS controller, TAPCO Blinkerbeam, LED Wrong Way sign, pedestal, foundation, and wiring harness as manufactured by Traffic & Parking Control Company, Inc. (TAPCO). Item shall include meter socket for locations that need metered service. The testing and acceptance of each wrong way detection system shall be included in this specification along with any relevant training.
2. Wrong-Way Detection Sign Unit - shall consist of solar panels, batteries, battery controller, wiring harness, wireless communication modules, antennas, equipment cabinet, surge protector, LED Do Not Enter sign, LED Wrong Way sign, pedestal, foundation, and mounting equipment as manufactured by TAPCO. The testing and acceptance of each wrong way detection system shall be included in this specification along with any relevant training.

Materials:

General:

Solar Power Requirements

- Solar engine, battery, and solar charge controller rated to operate at 12V
- Top of pedestal mounted quad 130W solar panel
- Battery to be field replaceable, sealed, and of AGM type
- Minimum of 5 days of autonomy without charging
- Shall come with a manufacturer's warranty of 2 years

AC Electrical Service Requirements

- Shall have a circuit breaker in the traffic signal cabinet for electrical service originating from traffic signal cabinets.
- Shall have a circuit breaker or disconnect in the detection pedestal cabinet for electrical service originating from traffic signal cabinets or utility pole/underground utility service.
- Electrical service shall be 120/240v single phase.
- For metered services, one additional four-foot pedestal with an auxiliary equipment cabinet shall be installed to mount the electrical service meter - All the items associated with the metered services will be paid for under the corresponding separate items.

Equipment Cabinet

- Shall conform to NEMA 3R enclosure specifications
- Shall be constructed of aluminum
- Shall be vented with screening included on all vents
- Finish shall be bare aluminum
- Shall have a replaceable lock installed on the door with two keys included

Pedestals

- 20 foot aluminum pedestal
- 96" deep pre-cast foundation
- Pedestal bases shall be effectively grounded via means of no. 8 bare copper grounding conductor, 5/8" x 10-foot ground rod, and bronze grounding clamp

Wireless Communication

- Shall ensure synchronized flashing of connected LED signs throughout duration of the flash cycle
- Antennas shall be externally mounted in a secure, weatherproof fashion

Wrong Way Detection Sign Unit:

LED Wrong Way Sign

- Consists of TAPCO LegendViz LED Wrong-Way Sign (R5-1A)
- Dimensions: 42" x 30"
- Signs shall come with a manufacturer's warranty of 3 years

LED Do Not Enter Sign

- Consists of TAPCO LegendViz LED Do Not Enter Sign (R5-1)
- Dimensions: 30" x 30"
- Sign shall come with a manufacturer's warranty of 3 years

Construction Methods:

Installation:

The WWDS shall be installed as appropriate for field conditions and as shown on the plans, and in accordance with manufacturer's recommended installation methods.

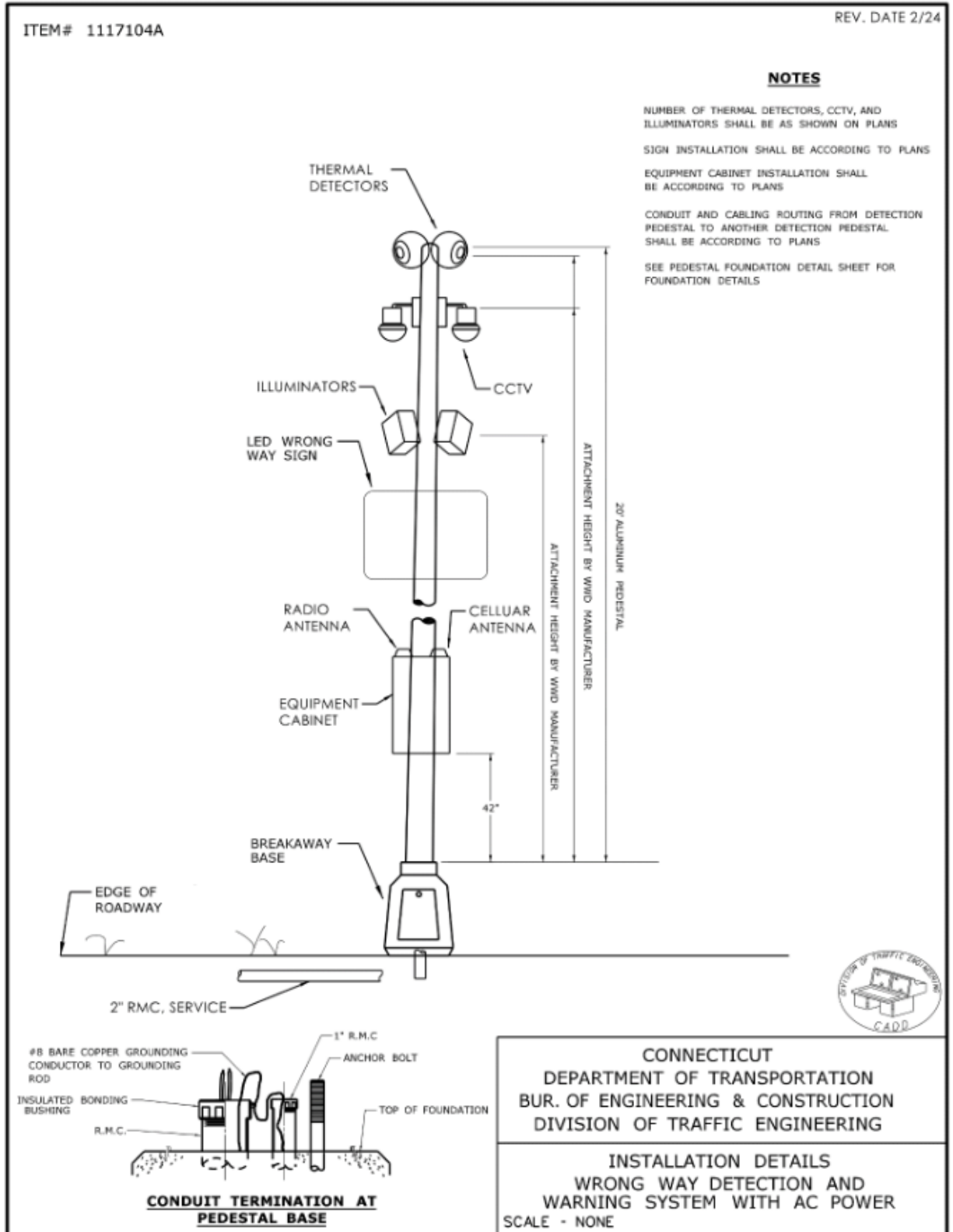
Method of Measurement:

This work will be measured for payment as each WWDS is installed, tested, fully operational and accepted. Any relevant training is also included under this special provision.

Basis of Payment:

Payment for this work is based on the installation, inspection, successful completion of the 60-day test period, and final acceptance of each of the Wrong Way Detection Systems. Payment includes thermal detectors, cameras, controllers, controller modules, cell modems, antennas, radio repeaters, LED illuminators, signs, solar panels, batteries, battery controllers, surge protectors, circuit breakers, cabinets, wiring harness, all necessary cable, pedestals, foundations, all incidental materials, labor, tools, and equipment necessary to complete the installation. Payment also includes the warrantee, installation manual, and operational manual. The testing and acceptance of each wrong way detection system shall be included in this specification along with any relevant training.

Pay Item	Pay Unit
Item #1117104A Wrong Way Detection and Warning System – AC Powered	ea.
Item #1117107A Wrong Way Detection Sign Unit	ea.



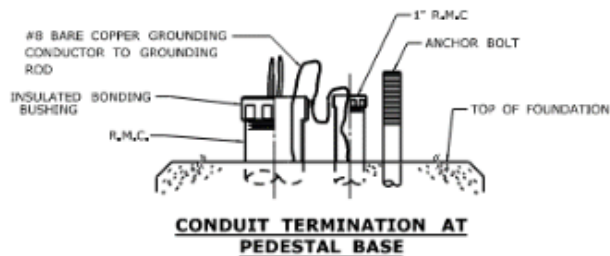
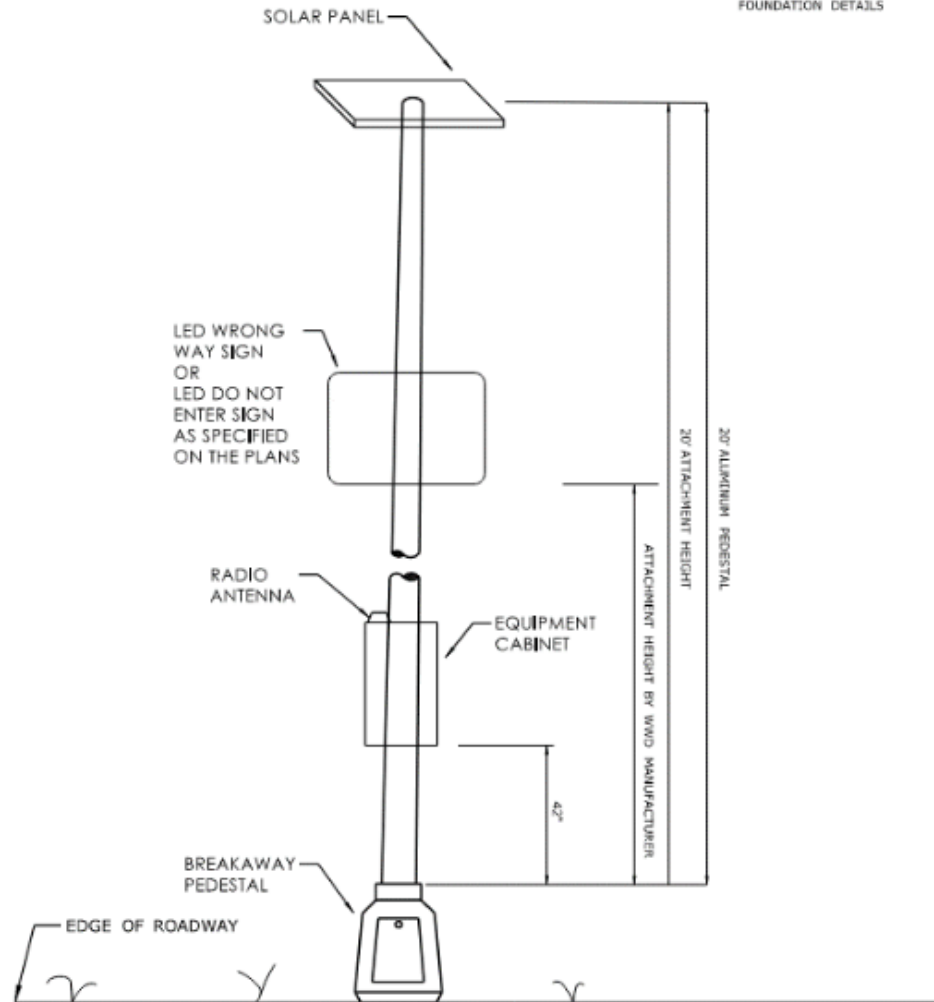
ITEM #1117104A, 1117107A

ITEM# 1117107A

REV. DATE 8/23

NOTES

SEE PEDESTAL FOUNDATION DETAIL SHEET FOR
FOUNDATION DETAILS

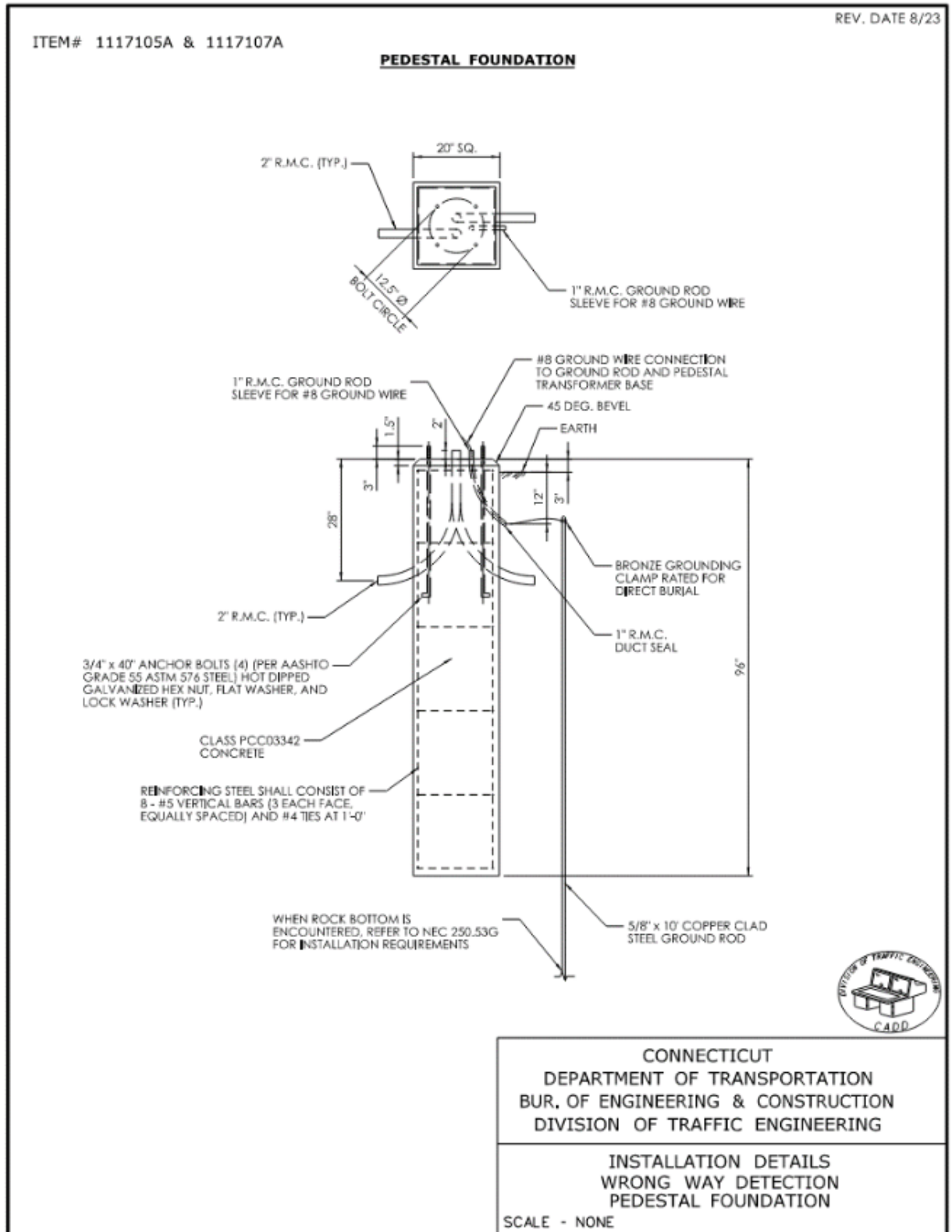


CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUR. OF ENGINEERING & CONSTRUCTION
DIVISION OF TRAFFIC ENGINEERING

INSTALLATION DETAILS
WRONG WAY DETECTION
SIGN UNIT

SCALE - NONE

ITEM #1117104A, 1117107A



ITEM #1117104A, 1117107A

ITEM #1118012A-REMOVAL AND/OR RELOCATION OF TRAFFIC SIGNAL EQUIPMENT

Section 11.18: Replace the entire section with the following:

11.18.01 – Description:

Remove all abandoned traffic signal equipment. Restore the affected area. Where indicated on the plans remove and reinstall existing traffic signal equipment to the location(s) shown. Lead paint is presumed present on the painted surface of all cabinets and structures located within project limits. Any activities performed by the contractor that results in a painted surface being impacted or altered, shall be performed in accordance OSHA Lead in Construction Standard 29CFR 1926.62, or the painted surface shall be tested prior to any paint being disturbed by a qualified third party hired by the contractor to confirm that no lead is present.

11.18.02 – Materials:

The related sections of the following specifications apply to all incidental and additional material required for the proper relocation of existing equipment and the restoration of any area affected by this work.

- Division III, “Materials Section” of the Standard Specifications.
- Current Supplemental Specifications to the Standard Specifications.
- Applicable Special Provisions to the Standard Specifications.
- Current Department of Transportation, Functional Specifications for Traffic Control Equipment.

11.18.03 - Construction Methods:

Schedule/coordinate the removal and/or relocation of existing traffic signal equipment with the installation of new equipment to maintain uninterrupted traffic signal control. This includes vehicle signals and detectors, pedestrian signals and pushbuttons, coordination, and pre-emption.

Abandoned Equipment

The contract traffic signal plan usually does not show existing equipment that will be abandoned. Consult the existing traffic signal plan for the location of abandoned material especially messenger strand, conduit risers, and handholes that are a distance from the intersection. A copy of the existing plan is usually in the existing controller cabinet. If not, a plan is available from the City of Waterbury upon request.

Unless shown on the plans it is not necessary to remove abandoned conduit in-trench and conduit under-roadway.

When a traffic signal support strand, rigid metal conduit, down guy, or other traffic signal equipment is attached to a utility pole, secure from the pole custodian permission to work on the pole. All applicable Public Utility Regulatory Authority (PURA) regulations and utility company requirements govern. Keep utility company apprised of the schedule and the nature of the work. Remove all abandoned hardware, conduit risers, and down guys. Remove anchor rods to 6" below grade.

When underground material is removed, backfill the excavation with clean fill material. Compact the fill to eliminate settling. Remove entirely the following material: pedestal foundation; controller foundation; handhole; pressure sensitive vehicle detector complete with concrete base. Unless otherwise shown on the plan, remove steel span pole and mast arm foundation to a depth of 2 feet below grade. Restore the excavated area to a grade and condition compatible with the surrounding area.

- If in an unpaved area, apply topsoil and establish turf in accordance with Section 9.44 and Section 9.50 of the Standard Specifications.
- If in pavement or sidewalk, restore the excavated area in compliance with the applicable Sections of Division II, "Construction Details" of the Standard Specifications.

Relocated Equipment

In the presence of the Engineer, verify the condition of all material that will be relocated and reused at the site. Carefully remove all material, fittings, and attachments in a manner to safeguard parts from damage or loss. Replace at no additional cost, all material which becomes damaged or lost during removal, storage, or reinstallation.

Municipal Owned Traffic Signal Equipment

Return all municipal owned material, such as pre-emption equipment, to the City. The Contractor shall coordinate with Noreen Brady, Acting Project Manager, nbrady@waterburyct.org, (203)-574-6851 Ext. 7456, regarding this work.

11.18.04 – Method of Measurement:

This work will be measured as a Lump Sum.

11.18.05 – Basis of Payment:

This work will be paid for at the contract lump sum price for "Removal and/or Relocation of Traffic Signal Equipment" which price shall include relocating signal equipment and associated hardware, all equipment, material, tools and labor incidental thereto. This price shall also include removing, loading, transporting, and unloading of signal equipment/materials designated for salvage and all equipment, material, tools and labor incidental thereto. This price shall also include removing and disposing of traffic signal equipment not to be salvaged and all equipment, material, tools and labor incidental thereto.

Payment is at the contract lump sum price for “Removal and/or Relocation of Traffic Signal Equipment” inclusive of all labor, vehicle usage, storage, and incidental material necessary for the complete removal of abandoned equipment/material and/or relocation of existing traffic signal equipment/material. Payment will also include the necessary labor, equipment, and material for the complete restoration of all affected areas.

A credit will be calculated and deducted from monies due the Contractor equal to the listed value of salvage material not returned or that has been damaged and deemed unsalvageable due to the Contractor’s operations.

PAY ITEM	PAY UNIT
Removal and/or Relocation of Traffic Signal Equipment	L.S.

ITEM #1118051A – TEMPORARY SIGNALIZATION (SITE NO. 1)

ITEM #1118052A – TEMPORARY SIGNALIZATION (SITE NO. 2)

ITEM #1118053A – TEMPORARY SIGNALIZATION (SITE NO. 3)

ITEM #1118054A – TEMPORARY SIGNALIZATION (SITE NO. 4)

ITEM #1118055A – TEMPORARY SIGNALIZATION (SITE NO. 5)

ITEM #1118056A – TEMPORARY SIGNALIZATION (SITE NO. 6)

ITEM #1118057A – TEMPORARY SIGNALIZATION (SITE NO. 7)

ITEM #1118058A – TEMPORARY SIGNALIZATION (SITE NO. 8)

Description:

Work under this item shall consist of providing Temporary Signalization (TS) at the intersections shown on the plans

1. Existing Signalized Intersection: The Contractor shall keep each traffic signal completely operational at all times during construction through the use of existing signal equipment, temporary signal equipment, new signal equipment, or any combination thereof once TS has started as noted in the section labeled “Duration.”

2. Unsignalized Intersection: The Contractor shall provide TS during construction activities and convert the temporary condition to a permanent traffic signal upon project completion. The Contractor shall furnish, install, maintain, and relocate equipment to provide a complete temporary traffic signal, including but not limited to the necessary support structures, electrical connection and disconnection (if required) and energy supply, vehicle and pedestrian indications, vehicle and pedestrian detection (paid for under Item #11112XXA – Temporary Detection {Site No. X}), pavement markings, and signing.

Materials:

- Pertinent articles of the Standard Specifications
- Supplemental Specifications and Special Provisions contained in this contract

Construction Methods: The Contractor shall perform a Preliminary Inspection and submit a Temporary Signalization (TS) Plan as described herein. No physical work will be allowed at any location until the requirements of the Preliminary Inspection and Temporary Signalization (TS) Plan have been met.

1. Preliminary Inspection

Prior to beginning any physical work, the Contractor shall meet with the Engineer and a representative from the City of Waterbury, to inspect and document (for the Engineer's concurrence) the existing traffic signal's physical and operational condition prior to implementing any Temporary Signalization (TS.) The inspection shall include, but not be limited to, the condition of the following:

- Controller Assembly (CA)
 - Controller Unit (CU)
 - Detection Equipment
 - Pre-emption Equipment
 - Coordination Equipment
- Vehicle and Pedestrian Signals
- Vehicle and Pedestrian Detectors
- Emergency Vehicle Pre-emption System (EVPS) *
- Interconnect Cable and Splice Enclosures
- Support Structures
- Handholes, Conduit and Cable

It may be necessary to repair or replace equipment that is missing, damaged, or malfunctioning. The Contractor shall prepare a list of items for replacement or repair. If authorized by the Engineer, this work will be considered "Extra Work" under Article 1.09.04.

* At a State owned signal the EVPS equipment is usually owned by the municipality. The Engineer will notify the municipality of the inspection schedule and information relating to its EVPS equipment as required.

The Preliminary Inspection meeting shall also include discussion of potential utility conflicts according to the *Utilities* section under *TS Plan* below.

2. Temporary Signalization (TS) Plan

At least 30 days prior to implementation of each stage, the Contractor shall submit a 1:40 (1:500 metric) scale TS plan in pdf format for each location to the Engineer for review and comment. This TS Plan shall include, but not be limited to the following:

- Survey Ties
- Dimensions of Lanes, Shoulders, and Islands
- Slope Limits
- Clearing and Grubbing Limits
- Signal Phasing and Timing
- Location of Signal Appurtenances such as Supports, Signal Heads, Pedestrian Push buttons, Pedestrian Signals
- Location of Signing and Pavement Markings (stop bars, lane lines, etc.)
- Location, method, and mode of Temporary Detection
- Location of utilities and potential conflicts

Review of the TS plan does not relieve the Contractor of ensuring the TS meets the requirements of the MUTCD. The existing traffic signal plan of record for State-owned traffic signals is available from the Division of Traffic Engineering upon request. The Contractor may request existing traffic signal plans for Town-owned traffic signals from the Town.

It is acceptable to use the existing traffic signal plan as the TS plan by marking up the existing plan to show any needed changes.

The Contractor shall not implement the TS plan until all review comments have been addressed.

The TS Plan shall also address the following elements:

Earthwork

The Contractor shall perform the necessary clearing and grubbing and the grading of slopes required for the installation, maintenance, and removal of the TS equipment. Upon termination of the TS, the Contractor shall restore the affected area to its prior condition and to the satisfaction of the Engineer.

Maintenance and Protection of Traffic

The Contractor shall furnish, install, maintain, relocate, and remove signal-related signing (lane-use, signal ahead, NTOR, etc.), and pavement markings, as needed.

The Contractor shall install, relocate, or remove, equipment in a manner to cause no hazard to pedestrians, traffic or property. The Contractor shall maintain traffic as specified in the Special Provisions "Prosecution and Progress" and "Maintenance and Protection of Traffic" in the Contract.

Utilities

The Contractor shall verify that proposed temporary and/or relocated signal equipment will not conflict with proposed project utility relocations. The Contractor shall ensure that temporary span/temporary poles will not restrict the ability to shift utility cables off of the poles.

The Contractor shall coordinate its TS activities with all utility companies in the project area to ensure that the proposed temporary and/or relocated signal equipment will not be in conflict with existing utilities. The Contractor shall coordinate any utility work that may be needed prior to the Contractor implementing the TS plan.

Electrical Service and Telephone Service at Existing Signalized Intersections

The Contractor shall be responsible for relocating and changing any electrical service or telephone service source if required. Any arrangements with these companies and costs associated with any relocation or change shall be paid for by the Contractor. The Contractor shall ensure that the party previously responsible for the monthly payment of service shall continue to be responsible for that payment during TS.

Electrical Service for TS at Unsignalized Intersections

The Contractor shall be responsible for providing electrical service for TS at unsignalized intersections. All charges and all arrangements with the power company, including service requests, scheduling, and monthly bills in accordance with Section 10.00.12 and Section 10.00.13 of the Standard Specifications shall be the responsibility of the Contractor. The

Contractor shall remove the service or leave the service if it will become permanent as shown on the plans or as directed by the Engineer.

Temporary Signalization

The Contractor shall furnish, install, maintain, relocate, and remove existing, temporary, and proposed traffic signal equipment and all necessary hardware; modifications to or furnishing of a new CA; and reprogramming of the CU phasing and timing; and any other incidentals related to this TS, as many times as necessary for each stage/phase of construction to maintain and protect traffic and pedestrian movements as shown on the plans or as directed by the Engineer.

Inspection

When requested by the Engineer, the TS will be subject to a field review by a representative of the City of Waterbury. The Contractor shall revise the TS as needed to address comments.

Detection

The Contractor shall provide vehicle detection on the existing, temporary, and/or new roadway alignment for all intersection approaches that have existing detection, detection in the final condition as shown on the signal plan, or as directed by the Engineer. The Contractor shall keep existing pedestrian pushbuttons accessible and operational at all times during TS. Temporary Detection is described and is paid for under Item # 11112XXA - Temporary Detection (Site No. X)

Emergency Vehicle Pre-emption System (EVPS)

The Contractor shall furnish, install, maintain, relocate, and remove the equipment necessary to keep the existing EVPS operational as shown on the plan. The Contractor shall not disconnect or alter the EVPS without the knowledge and concurrence of the Engineer and the EVPS owner. The Contractor shall schedule all EVPS relocations so that the system is out of service only when the Contractor is actively working. The Contractor shall ensure EVPS is returned to service and is completely operational at the end of the work day and shall keep the EVPS owner apprised of all changes to the EVPS.

Coordination

The Contractor shall furnish, install, maintain, relocate, and remove the equipment necessary to keep the intersection coordinated to adjacent signals as shown on the plan. The Contractor shall not disconnect the interconnect without the approval of the Engineer.

- Closed Loop System: If it is necessary to disconnect the communication cable, the Contractor will notify the Engineer and the Bridgeport Operation Center (BOC) or the Newington Operation Center (NOC) prior to disconnect and also after it is reconnected.
- Time Base System: The Contractor shall program and synchronize all Time Clock/Time Base Coordination (TC/TBC) units as necessary.

Maintenance

Once TS is in effect, the Contractor shall assume all maintenance responsibilities of the entire installation in accordance with Section 1.07.12 of the Standard Specifications. The

Contractor shall notify the Engineer for the project records the date that Temporary Signalization begins. The Contractor shall coordinate with the Engineer to notify the following parties that maintenance responsibility has been transferred to the Contractor:

Signal Owner
Town Representative
Local Police Department

The Contractor shall provide the Engineer a list of telephone numbers of personnel who will be on-call during TS and shall respond to traffic signal malfunctions by having a representative at the site within three hours from the initial contact. Any traffic signal malfunction shall be made operational according to plan within twenty-four (24) hours.

If the Engineer determines that the nature of a malfunction requires immediate attention and/or the Contractor does not respond within three (3) hours, then an alternate maintenance service will be called to repair the signal. Expenses incurred by the alternate maintenance service for each call will be deducted from monies due to the Contractor with a minimum deduction of \$1,000. The alternate maintenance service may be the owner of the signal or another qualified electrical contractor.

Duration

Temporary Signalization shall commence when the Contractor begins physical work at a particular intersection.

- a) For intersections with a State furnished controller, TS terminates when the inspection of the permanent signal is complete and operational and is accepted by the Engineer.
- b) For intersections with a Contractor furnished controller, Temporary Signalization terminates at the beginning of the 30 day test period for the permanent signal.

Ownership

The Contractor shall remove and deliver any existing equipment that is designated as salvage to its original owner upon completion of use. Any temporary equipment supplied by the Contractor shall be removed by the Contractor unless noted otherwise.

Method of Measurement:

Temporary Signalization (TS) shall be measured for payment as follows:

Fifty percent (50%) shall be paid when the TS for that site is operational as shown on the plan and to the satisfaction of the Engineer.

Fifty percent (50%) shall be paid upon termination of the TS as described herein.

Basis of Payment:

This work shall be paid at the contract Lump Sum price for "Temporary Signalization (Site No.)" for each site. This price includes the preliminary inspection, TS plan for each stage/phase, furnishing, installing, maintaining, relocating and revising traffic signal equipment, controller assembly modifications, controller unit program changes such as phasing and timing, removing existing, temporary, and proposed traffic signal equipment, arrangements with utility companies, towns or cities including the fees necessary for electric and telephone service,

clearing and grubbing, earthwork and grading, area restoration and all necessary hardware, materials, labor, and work incidental thereto.

All material and work for signing and pavement markings is paid for under the appropriate Contract items.

All material and work necessary for vehicle and pedestrian detection for TS is paid for under item 11112XXA - Temporary Detection (Site No. X).

All Contractor supplied items that will remain the Contractor's property shall be included in the contract Lump Sum price for "Temporary Signalization."

Any items installed as part of the permanent installation will be paid for under those separate pay items in the Contract.

<u>Pay Item</u>	<u>Pay Unit</u>
Temporary Signalization (Site No.)	L.S.

ITEM #1118051A, 1118052A, 1118053A, 1118054A,
1118055A, 1118056A, 1118057A, 1118058A

ITEM #1118301A - RELOCATE PRE-EMPTION SYSTEM (SITE NO. 1)

ITEM #1118302A - RELOCATE PRE-EMPTION SYSTEM (SITE NO. 2)

ITEM #1118303A - RELOCATE PRE-EMPTION SYSTEM (SITE NO. 3)

ITEM #1118304A - RELOCATE PRE-EMPTION SYSTEM (SITE NO. 4)

ITEM #1118305A - RELOCATE PRE-EMPTION SYSTEM (SITE NO. 5)

ITEM #1118306A - RELOCATE PRE-EMPTION SYSTEM (SITE NO. 6)

ITEM #1118307A - RELOCATE PRE-EMPTION SYSTEM (SITE NO. 7)

ITEM #1118308A - RELOCATE PRE-EMPTION SYSTEM (SITE NO. 8)

Description:

Relocate existing town owned emergency vehicle pre-emption system (EVPS) (either optical or siren) as shown on the plan or as directed by the Engineer. The EVPS equipment includes but is not limited to the following material:

- Optical Detectors
- Siren Detectors
- Phase Selectors
- System Chassis
- Auxiliary Equipment Cabinets (AEC)
- Confirmation Light
- Detector Cable (where practical)

Install new cable from the controller to the pre-emption detectors where the existing cable cannot be practically relocated.

Material:

All material is existing except for miscellaneous hardware necessary for reinstallation (e.g. changing detector attachment from span wire to mast arm) and the Detector Cable.

Miscellaneous Hardware:

1. Mounting hardware designed and manufactured specifically for use with the existing EVPS.
2. Corrosion and rust resistant.

Detector Cable (Optical):

1. 3-Conductor cable with shield and ground wire.
2. AWG #20 (7x28) stranded.
3. Individually tinned copper strands.
4. Conductor insulation: 600 volt, 167° F (75 deg. C).
5. 1 Conductor-yellow; 1 Conductor-blue; 1 Conductor-orange.
6. Aluminized mylar shield tape or equivalent.

7. AWG #20 (7x28) stranded uninsulated drain wire
8. DC resistance not to exceed 11.0 ohms per 1000 feet (305M).
9. Capacitance from one conductor to other two conductors and shield not to exceed 157pf/M (48 pf./ft.).
10. Jacket: 600 volts, 176^o F (80 deg. C), minimum average wall thickness - 0.045" (1.14mm).
11. Finished O.D.: 0.3" (7.62mm) max.

Detector Cable (Audio):

1. 2-Conductor cable with shield and ground wire.
2. AWG #14.
3. IMSA Spec 50-2 Detector Lead-In.

Construction Methods:

Conduct an initial evaluation test before removal and a final test after reinstallation. Thirty days prior to disconnection and removal of the existing pre-emption equipment, test and verify that the system is operational as shown on the plan. The thirty days is intended to provide the EVPS owner an opportunity to correct and resolve any deficiencies identified during the test. If during the thirty days the owner repairs, replaces, or corrects any malfunctioning, disconnected, or missing components, re-test that feature prior to removal. The contractor is not responsible to correct any part of the EVPS that is found to be malfunctioning, disconnected, or missing during the initial test. If the contractor is to assume maintenance responsibility of the traffic signal during Temporary Signalization, the EVPS equipment will not be included. Maintenance responsibility remains with the owner.

EVPS Test Procedure

1. Notify the system owner/user, such as the municipal fire chief or public works director, of the scheduled inspection.
2. Request a fire department representative and an emergency vehicle, which has an activation device to conduct the test. If not available, the contractor shall provide an activation device.
3. In the presence of the Engineer and the municipal representative, test each pre-empted approach with the emergency vehicle. Test the following items of the system:
 - * Confirm that the emitter or siren activates the phase selector and the phase selector activates the correct pre-emption input to the controller.
 - * Confirm adequate range. The traffic signal must be pre-empted to green sufficiently in advance of the emergency vehicle arrival. The vehicle emitter or siren shall initiate pre-emption at a minimum distance of 548.6M (1800 feet). Exception: An obstructed line-of-sight may reduce the minimum distance. Town concurrence is required.
 - * Confirm there are no false calls. Keep the emitter or siren active as the emergency vehicle passes through the intersection. No other detectors shall activate.
4. Document the test. Provide the Engineer and the municipality copies of the test results. Attached is a sample test procedure form.

Keep the appropriate fire department official apprised of when (day and time) the system is disconnected and taken out of operation.

Store all pre-emption equipment intended for re-installation in a suitable location to prevent damage from elements and construction activities. Return all pre-emption equipment not intended for re-installation to the Town.

Re-install and wire the pre-emption equipment in a neat and orderly manner, as shown on the plan or as directed by the Engineer. Pre-emption detector locations shown on the plan are for illustration purposes only. Field locate the detectors for the best possible line-of-sight. Install the detector cables continuous with no splices between the optical detector and the Cabinet. Make all connections from the phase selector to the “D” harness and to the cabinet wiring at the pre-emption termination panel.

Conduct a final test, identical to the initial test, to verify that the EVPS is as operational as before removal. If the initial test was not conducted, it is assumed the EVPS was fully operational as shown on the plan. The Contractor is then responsible for all damaged; faulty; missing; and replacement material necessary to restore the EVPS to fully operational.

If a malfunction is found other than identified during the initial test, or the system needs adjustment (such as range, emitter intensity, or detector location), schedule a follow-up test. Repeat the test procedure for all approaches that did not pass.

Notify the appropriate fire department official that the EVPS has been re-installed and is operational.

If not present in an existing traffic controller cabinet install a pre-emption disconnect switch. When switched off, the traffic controller shall not be affected by EVPS calls.

Method of Measurement:

Work under this item is measured as Lump-Sum per site. Detector Cable shall be measured by the number of linear feet (meters) supplied and installed.

Basis of Payment:

This work shall be paid at the contract Lump Sum price for “Relocate Pre-Emption System (Site No.)” for each site. This item shall include all prior testing, removal, storage, re-installation, final testing, any corrective adjustments, replacement components if necessary, documentation, disconnect switch if necessary, and all necessary hardware, materials, labor and work incidental thereto.

All material and work necessary for installing detector cable is paid for under item 1113550A – Detector Cable (Optical).

<u>Pay Item</u>	<u>Pay Unit</u>
Relocate Pre-emption System (Site No. X)	L.S.

EVPS TEST PROCEDURE

Confirm that the emitter or siren activates the phase selector and the phase selector activates the correct pre-emption input to the controller.	
Confirm adequate range.	
Confirm there are no false calls.	

ITEM #1206023A - REMOVAL AND RELOCATION OF EXISTING SIGNS

Section 12.06 is supplemented as follows:

Article 12.06.01 – Description is supplemented with the following:

Work under this item shall consist of the removal and/or relocation of designated side-mounted extruded aluminum and sheet aluminum signs, sign posts, sign supports, and foundations where indicated on the plans or as directed by the Engineer. Work under this item shall also include furnishing and installing new sign posts and associated hardware for signs designated for relocation.

Article 12.06.03 – Construction Methods is supplemented with the following:

The Contractor shall take care during the removal and relocation of existing signs, sign posts, and sign supports that are to be relocated so that they are not damaged. Any material that is damaged shall be replaced by the Contractor at no cost to the State.

Foundations and other materials designated for removal shall be removed and disposed of by the Contractor as directed by the Engineer and in accordance with existing standards for Removal of Existing Signing.

Sheet aluminum signs designated for relocation are to be re-installed on new sign posts.

Article 12.06.04 – Method of Measurement is supplemented with the following:

Payment under Removal and Relocation of Existing Signs shall be at the contract lump sum price which shall include all extruded aluminum and sheet aluminum signs, sign posts, and sign supports designated for relocation, all new sign posts and associated hardware for signs designated for relocation, all extruded aluminum signs, sheet aluminum signs, sign posts and sign supports designated for scrap, and foundations and other materials designated for removal and disposal, and all work and equipment required.

Article 12.06.05 – Basis of Payment is supplemented with the following:

This work will be paid for at the contract lump sum price for “Removal and Relocation of Existing Signs” which price shall include relocating designated extruded aluminum and sheet aluminum signs, sign posts, and sign supports, providing new posts and associated hardware for relocated signs, removing and disposing of foundations and other materials, and all equipment, material, tools and labor incidental thereto. This price shall also include removing, loading, transporting, and unloading of extruded aluminum signs, sheet aluminum signs, sign posts, and sign supports designated for scrap and all equipment, material, tools and labor incidental thereto.

<u>Pay Item</u>	<u>Pay Unit</u>
Removal and Relocation of Existing Signs	L.S.

ITEM #1206025A - REMOVAL AND RELOCATION OF EXISTING OVERHEAD SIGNS

Section 12.06 is supplemented as follows:

12.06.01 – Description is supplemented with the following:

Work under this item shall consist of the removal and/or relocation of designated existing overhead signs, sign supports and foundations, where indicated on the plans or as directed by the Engineer.

12.06.02 – Materials:

Materials for non-shrink grout shall be as specified in M.03.05.

Materials for high strength bolts shall be as specified in M.06.02.

12.06.03 - Construction Methods is supplemented with the following:

Overhead sign supports, foundations, and other materials designated for removal shall be removed and disposed of by the Contractor as directed by the Engineer and in accordance with existing standards for Removal of Existing Overhead Signing.

For overhead signs designated for reinstallation and/or relocation, the Contractor shall accomplish the work in a manner so as not to cause twisting, bending or deforming of sign panels, or scratching of the sign face. Any sign panel damaged shall be repaired or replaced at the Contractor's expense. The signs shall be level, correctly aligned as indicated on the plans and shall be properly fastened to the structure or supports with the necessary hardware as indicated on the plans.

In cases where Existing Bridge Mounted Sign Supports are to be removed and existing attachments not re-used, the contractor shall remove the supports from the existing parapet and girders by unbolting or in the case of welded attachments, the weld shall be left intact and the horizontal members cut as close to the girder as possible without causing any damage to the girder. Where horizontal attachments are un-bolted from existing steel girders; the Contractor shall coat the faying surfaces after removal of bolted components with zinc paint and the Contractor shall install new galvanized high strength bolts in any remaining holes in the girder where the support was removed. Where horizontal attachments are welded and removed by cutting as described above, the Contractor shall coat the surfaces with zinc paint. Existing through-bolted attachments to concrete girders or parapets shall have the remaining holes filled with non-shrink grout. The grout shall be made flush with the exterior surface of the concrete. Where existing attachment bolts are cast into the concrete, the bolts shall be cut flush with the concrete and coated with zinc paint. Paints containing zinc dust, if 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. Repair procedures shall be in accordance with the requirements of ASTM A780. The paint shall be brush applied. The use of aerosol spray cans shall not be permitted.

In cases where Existing Overhead Sign Supports are anchored to bridge parapets or concrete median barriers, the bolts shall be cut flush with the concrete and coated with zinc paint. Paints containing zinc dust, if 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. Repair procedures shall be in

accordance with the requirements of ASTM A780. The paint shall be brush applied. The use of aerosol spray cans shall not be permitted. Any voids remaining in the concrete shall be filled at the direction of the Engineer.

Lead paint is presumed present on the painted surfaces of sign supports and bridges to which sign supports may be affixed. Any activities performed by the contractor that results in a painted surface being impacted or altered shall be performed in accordance with OSHA Lead in Construction Standard 29CFR.1926.62, or the painted surface shall be tested prior to being disturbed by a qualified third party hired by the contractor to confirm that no lead is present in the paint system. If the presence of lead is presumed or lead is confirmed by testing and the contractor is unable to remove the sign supports by unbolting with the paint in place (in accordance with OSHA 29CFR 1926.62), the Contractor must submit a plan to the Engineer that outlines their proposed non-mechanical removal methods to accomplish the work.

12.06.04 - Method of Measurement is supplemented with the following:

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

12.06.05 - Basis of Payment is supplemented with the following:

This work will be paid for at the Contract lump sum price for "Removal and Relocation of Existing Overhead Signs." This price shall include the proper removal (including testing for lead paint if warranted), relocation, and permanent installation of overhead signs. The price shall also include all necessary hardware required for the reinstallation of the existing sign panels onto existing or new sign supports, unless such hardware is paid for under other pay items. The price shall include all equipment, material, labor and tools necessary to complete this work. This price shall also include removing, loading, transporting, and unloading of overhead extruded aluminum signs designated for removal and all equipment, material, tools and labor incidental thereto. This price shall also include removing and disposing of sign supports, foundations, and other materials, and all equipment, material, tools and labor incidental thereto.

Pay Item	Pay Unit
Removal and Relocation of Existing Overhead Signs	L.S.

**ITEM #1207041A – SIGN FACE - EXTRUDED ALUMINUM (TYPE XI
RETROREFLECTIVE SHEETING)**

Section 12.07 is supplemented and amended as follows:

Article 12.07.01 – Description is revised as follows:

Replace with the following:

Work under this item shall consist of furnishing and installing sign face extruded aluminum, including all hard and other supplementary materials required, at locations specified in Section 12.00 – General Clauses for Highway Signing or as shown on the plans and supplemented with the sign details that follow.





ITEM #1207041A



Material: Extruded Aluminum
Sign Support No. 20417
Location: Waterbury Route 1-84 E.B. Mileage: 32.30
Project No. 0151-0340

[illegible]

File name: 084E-151-32.30-A Printed: 11/22/2024

[illegible]



SIGN DETAIL
1:85

Material: Extruded Aluminum
Sign Support No. 20418
Location: Waterbury Route I-84 E.B. Mileage: 32.44
Project No. 0151-0340

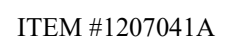
REV'D /

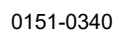
SIGN NUMBER	084E-151-32.44-A
PANEL SIZE	23'-0" x 10'-6"
TOTAL AREA	270.25 Sq.Ft.
MOUNTED	Overhead
BDR INSET/WIDTH	0'/'2"
CORNER RADIUS	12"
BACKGROUND	TYPE: XI COLOR (Main Panel): Green COLOR (Exit Panel): Fluor. Yellow
LEGEND/BORDER	TYPE: XI COLOR (Main Panel): White/White COLOR (Exit Panel): Black/Black

[illegible]

File name: 084E-151-32.46-A Printed: 11/22/2024

[illegible]





[illegible]

0151-0340

Article 12.07.02 – Materials is revised as follows:

Replace the first sentence with the following:

Materials for this work shall meet the requirements of M.18.09, M.18.11, and M.18.12.

Signs shall be fabricated utilizing Direct Applied Copy per manufacturer's recommended Match Component System materials and processes that have been approved by the retroreflective sheeting manufacturer.

Add the following:

All hardware shall be in accordance with standard commercial specifications and shall be approved by the Engineer.

Article 12.07.03 – Construction Methods is revised as follows:

Delete this section and replace with the following:

Retroreflective sheeting shall be applied to the extruded aluminum in such a manner that the finished sign will be wrinkle and bubble free. No splices of the retroreflective sheeting will be permitted on any sign face less than 30 square feet in area with one dimension of 4 feet or less, and no more than one splice will be permitted on any sign without the approval of the Engineer.

The Contractor shall affix data labels to the back of each State-owned and maintained sign in the vicinity of the lower left-hand corner or quadrant. The Contractor shall punch the month and year of sign fabrication and installation on each data label prior to affixing to the back of the sign.

The locations for extruded aluminum signs shall be field staked at the location shown in the contract documents. All stakes shall be reviewed by the Engineer and the Division of Traffic Engineering.

The locations shall be field staked as follows:

- Each overhead sign foundation shall be staked at the location of the front face of the proposed foundation.
- Each side mounted sign shall be staked at the edge of the sign closest to the roadway.
- All stakes shall be labeled with:
 - The sign support number or sign location number
 - Description of what the stake represents.
 - FOF – Face of Foundation
 - EOS – Edge of Sign
 - Examples:
 - Sign Support: 22222 FOF
 - Side Mounted: 084W-155-57.70-A EOS

Side-mounted signs shall be located as follows unless otherwise shown on the plans or directed by the Engineer:

- where there is guide rail: the offset to the near edge of the sign face shall exceed the maximum deflection of the guide rail
- where there is no guide rail: the distance to the near edge of the sign shall exceed the clear zone measured from the edge of the traveled way

Erection of completed sign panels shall be accomplished in a manner so as not to cause twisting, bending, or deforming of sign panels or scratching of the sign face. Sign panels shall be level, correctly aligned as indicated on the plans, and shall be properly fastened to the structure or supports with the necessary hardware as indicated on the plans.

Extruded aluminum signs shall be attached to existing supports with new post clips, brackets, bolt, nuts, washers, or other components as shown in the plans. The Contractor shall be responsible for determining the configuration and size of the attachment components. Working Drawings for this work shall be prepared and submitted in accordance with Article 1.05.02.2. All other hardware used for attachment of the overhead signs to the supports may remain in use and be relocated on the structure as required. Check and tighten all bolts and nuts for attachment hardware which is to remain in use.

Sign panels damaged prior to or during installation shall not be accepted and shall be replaced at the Contractor's expense. If any sign damage occurs between the time of installation and final project acceptance, it shall be repaired or replaced at the direction of the Engineer. For a proposed repair, the Contractor shall submit a repair procedure to the Engineer for review. If said damage is the result of the Contractor's operations, the repair or replacement shall be at the Contractor's expense.

Article 12.07.05 – Basis of Payment is revised as follows:

Replace with the following:

This work will be paid for at the Contract unit price per square foot for "Sign Face-Extruded Aluminum" of the type specified complete in place, which price shall include all data labels, panel bolts, post clip assemblies, hardware, materials, equipment, labor and work incidental thereto.

New vertical attachment members needed to attach new signs to existing supports will be paid for under "Structural Steel – Miscellaneous".

Pay Item	Pay Unit
Sign Face - Extruded Aluminum (Type XI Retroreflective Sheeting)	S.F.

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

ITEM #1208937A – SIGN FACE - SHEET ALUMINUM (TYPE XI RETROREFLECTIVE SHEETING)

Section 12.08 is supplemented and amended as follows:

12.08.01—Description:

Add the following:

All signs shall use Type XI retroreflective sheeting with the exception of side-mounted signs with white background which shall be Type IX.

This item shall also include field testing of metal sign base posts as directed by the Engineer.

Signs shall conform to the sign details located at <https://portal.ct.gov/DOT/Traffic-Engineering/Catalog-of-Signs> with legend for variable signs as shown in the plans.

12.08.03—Construction Methods:

Delete the last sentence and add the following:

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

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

12.08.04—Method of Measurement:

Add the following:

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

12.08.05—Basis of Payment:

Replace the entire Article with the following:

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

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

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

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

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

ITEM #1210110A—4” (WHITE) TYPE I EPOXY RESIN PAVEMENT MARKINGS

ITEM #1210112A—12” (WHITE) TYPE I EPOXY RESIN PAVEMENT MARKINGS

ITEM #1210113A—6” (WHITE) TYPE I EPOXY RESIN PAVEMENT MARKINGS

ITEM #1210114A—6” (YELLOW) TYPE I EPOXY RESIN PAVEMENT MARKINGS

ITEM #1210115A—8” (WHITE) TYPE I EPOXY RESIN PAVEMENT MARKINGS

Section 12.10 is supplemented and amended as follows:

Article 12.10.01—Description:

Replace the entire Article with the following:

This item shall consist of furnishing and installing retroreflective Yellow and White Type I Epoxy Resin Pavement Markings of the width and color specified at the locations indicated on the plans, in conformance with the plans, this specification, and as directed by the Engineer.

Type I Epoxy Resin Pavement Markings include center lines, lane lines, and shoulder lines.

Type I Epoxy Resin Pavement Markings shall be installed in a pavement marking groove. Pavement marking grooves are specified elsewhere in the Contract.

Article 12.10.02—Materials:

Replace the entire Article with the following:

Type I Epoxy Resin Pavement Markings shall meet the requirements of **Article M.07.22 – Epoxy Resin Pavement Markings** amended as follows:

Delete the last sentence and add the following:

(j) Type I Epoxy Resin Pavement Markings shall consist of one of the following mixes of retroreflective beads, or approved equal:

- Potter’s VISIMAX glass bead and a clear glass bead that meets the requirements of AASHTO M 247, Type 4.
- Potter’s VISIULTRA glass bead and a clear glass bead that meets the requirements of AASHTO M 247, Type 1.
- 3M’s tinted microcrystalline ceramic bead with minimum indexes of refraction of 1.89 (dry) and 2.4 (wet) when tested using the ASTM E1967 method and a clear glass bead that meets the requirements of AASHTO M 247, Type 4. Yellow

ITEM #1210110A, 1210112A, 1210113A,
1210114A, 1210115A

tinted beads shall be installed on yellow pavement markings and white tinted beads shall be installed on white pavement markings.

Article 12.10.03—Construction Methods:

*In Subarticle 1. **Equipment**, delete paragraph 1 and add the following:*

Equipment furnished shall include an applicator truck of adequate size and power, together with:

- (a) remote application equipment designed to apply an epoxy resin material in a continuous pattern, and
- (b) portable retroreflective bead applicators, one for each size bead, designed to provide uniform and complete coverage of the epoxy binder by a controlled free-fall method. Pressurized retroreflective bead application shall not be used.

*In Subarticle 2. **Procedures**, delete paragraphs 3, 7, and 8 and add the following:*

All surfaces that are power washed shall be allowed to dry sufficiently prior to the application of the epoxy markings. The areas to be marked shall be broom cleaned immediately prior to the application of the epoxy markings. Retroreflective beads shall be applied immediately after application of the epoxy resin marking to provide an immediate no-track system.

The epoxy for Type I Epoxy Resin Pavement Markings shall be uniformly applied to the surface to be marked to ensure a wet film thickness, without retroreflective beads, of 20 mils $\pm$ 1 mil.

For Potter's VISIMAX glass bead Type I Epoxy Resin Pavement Markings, a first drop consisting of Potter's VISIMAX glass beads shall be applied at the rate of 8 lb./gal. of epoxy pavement marking material, immediately followed by a second drop consisting of glass beads meeting the requirements of AASHTO M 247, Type 4 at the rate of 8 lb./gal. of epoxy pavement marking material. Traffic cones or other acceptable methods shall be used to protect the Type I Epoxy Resin Pavement Markings until cured.

For Potter's VISIULTRA glass bead Type I Epoxy Resin Pavement Markings, a first drop consisting of Potter's VISIULTRA glass beads shall be applied at the rate of 10 lb./gal. of epoxy pavement marking material, immediately followed by a second drop consisting of glass beads meeting the requirements of AASHTO M 247, Type 1 at the rate of 5 lb./gal. of epoxy pavement marking material. Traffic cones or other acceptable methods shall be used to protect the Type I Epoxy Resin Pavement Markings until cured.

For 3M's tinted microcrystalline ceramic bead Type I Epoxy Resin Pavement Markings, a first drop consisting of tinted microcrystalline ceramic beads shall be applied at the rate of 5 lbs./gal. of epoxy pavement marking material, immediately followed by a second drop consisting of glass beads meeting the requirements of AASHTO M 247, Type 4 at the rate of 10 lbs./gal. of epoxy pavement marking material. Traffic cones or other acceptable methods shall be used to protect the Type I Epoxy Resin Pavement Markings until cured.

Replace Subarticle 3. Initial Performance with the following:

The retroreflectivity of the markings applied shall be measured by the Contractor using the procedure and equipment detailed below for the Initial Test Period, Review Period, and Observation Period.

Test Lots: The following test lots will be randomly selected by the Engineer to represent the line markings applied:

Table 12.10.03-3.1: Line Test Lots

<u>Length of line</u>	<u>Number of Lots</u>	<u>Length of Test Lot</u>
< 1000 feet	1	Length of Line
< 1.0 mile	1	1000 feet
≥ 1.0 mile	1 per 1.0 mile	1000 feet

Measurement Equipment and Procedure: Retroreflectometer equipment shall be calibrated using the instructions from the instrument manufacturer within 24 hours prior to use.

Skip line measurement shall be obtained for every other stripe, taking no more than 2 readings per stripe with readings no closer than 20 inches from either end of the marking.

Solid line test lots shall be divided into 10 sub-lots of 100 foot length and measurements obtained at 1 randomly select location within each sub-lot.

The Contractor shall perform retroreflectivity readings on the Type I Epoxy Resin Pavement Markings between 30 and 37 days after installation per the measurement and sampling procedures contained in ASTM D7585 (*Standard Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments*). Portable Retroreflectometer and Mobile Retroreflectometer testing is allowed using the following methods.

- ASTM E1710 (*Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer*);
- ASTM E2177 (*Standard Test Method for Measuring the Coefficient of Retroreflected Luminance (R_L) of Pavement Markings in a Standard Condition of Wetness*).

Additional Contents of Certified Test Report (CTR): The CTR shall also list:

- Project, Route number, and Route direction.
- Geographical location of the test site(s), including distance from the nearest reference point.
- Manufacturer and model of retroreflectometer used.
- Most recent calibration date for equipment used.
- Time of Day the readings are taken.

Recordings shall be certified by the Contractor, reviewed by the Engineer, and provided to the CTDOT Division of Traffic Engineering.

A CTR, in accordance with 1.06.07 or 1.20-1.06.07, shall be submitted to the Engineer no later than 10 days after the measurements are taken.

The Materials Certificates (MC) shall also list:

- Liquid binder application rate.
- Retroreflective bead type(s) and drop rate.

Recordings shall be certified by the Contractor, reviewed by the Engineer, and provided to the CTDOT Division of Traffic Engineering.

The MC, in accordance with 1.06.07 or 1.20-1.06.07, shall be submitted to the Engineer no later than 10 days after the measurements are taken.

Initial Test Period: The minimum initial retroreflectivity readings shall meet or exceed the following minimum values using an observation angle of 1.05 degrees and an entrance angle of 88.8 degrees:

	*Type I White Markings	*Type I Yellow Markings
ASTM E1710 (Dry)	350 mcd/lux/m ²	225 mcd/lux/m ²
ASTM E2177 (Wet Recovery)	300 mcd/lux/m ²	200 mcd/lux/m ²

Review Period: A 90-day Review Period shall be implemented for Type I Epoxy Resin Pavement Markings. The Contractor shall be responsible for any defects in materials and workmanship of the Type I Epoxy Resin Pavement Markings for a period of 90 days from the date the Type I Epoxy Resin Pavement Markings are installed and subjected to live traffic conditions.

At the end of the Review Period, the Engineer will inspect the Type I Epoxy Resin Pavement Markings for durability, color, and retroreflectivity, and inform the Contractor of all rejected pavement markings that require replacement. The Type I Epoxy Resin Pavement Markings will be rejected for any of the following conditions:

- Insufficient thickness or line width, uneven cross-section.
- Poor adhesion or delamination.
- Insufficient groove depth.

The Contractor shall be responsible for replacing all rejected Type I Epoxy Resin Pavement Markings at no cost to the State. All rejected Type I Epoxy Resin Pavement Markings shall be replaced within 14 days of notification to the Contractor of the failed Review Period test. All Type I Epoxy Resin Pavement Markings installed as the result of a failed Review Period test shall meet all testing requirements of the initial performance testing procedures, and shall be subject to an additional Review Period.

Article 12.10.04—Method of Measurement:

Replace the entire Article with the following:

Type I Epoxy Resin Pavement Markings will be measured for payment by the actual number of linear feet of Type I Epoxy Resin Pavement Markings installed on the pavement and accepted by the Engineer.

The cost of all measuring and testing of the retroreflectivity of the Type I Epoxy Resin Pavement Markings by the Contractor will be considered incidental to the cost of the item.

Article 12.10.05—Basis of Payment:

Replace the entire Article with the following:

This work will be paid for at the Contract unit price per linear foot for “Type I Epoxy Resin Pavement Markings” of the width and color specified, installed on the pavement and accepted. These prices shall be for all the work required by this Section and all materials, equipment, tools and labor incidental thereto. Payment will not be made for pavement markings affected by Contractor error and ordered removed.

Pay Item	Pay Unit
(Width) (Color) Type I Epoxy Resin Pavement Markings	l.f.

ITEM #1220027A – CONSTRUCTION SIGNS

Section 12.20 *is supplemented and amended as follows:*

Article 12.20.01 – Description:

Add the following:

The Contractor shall also furnish, install, maintain, and remove Bipartisan Infrastructure Law project signs. The Bipartisan Infrastructure Law project signs shall be of the details, colors and materials as shown on the attached detail sheet.

The sign legend for this Project shall include the U.S. Department of Transportation pictograph on the lower right side of the sign with the legend Federal Highway Administration.

Article 12.20.03 — Construction Methods:

Add the following:

The Contractor shall install the Bipartisan Infrastructure Law (BIL) project signs prior to initiating construction.

The Contractor shall install BIL project sign 80-5957 on each major roadway approach to the construction Site in advance of the Project limit(s).

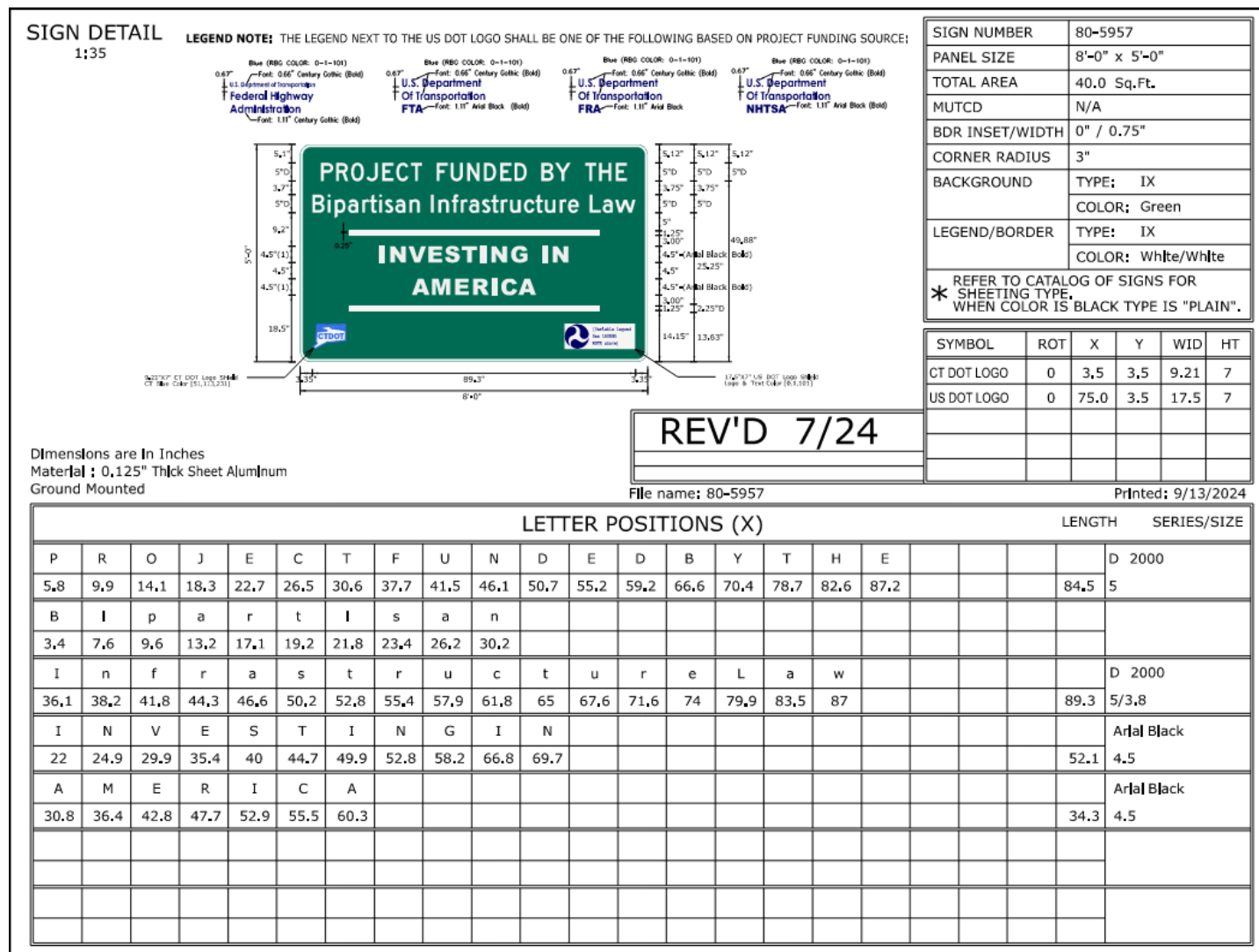
The sign detail is included and is also available at [80-5957](#).

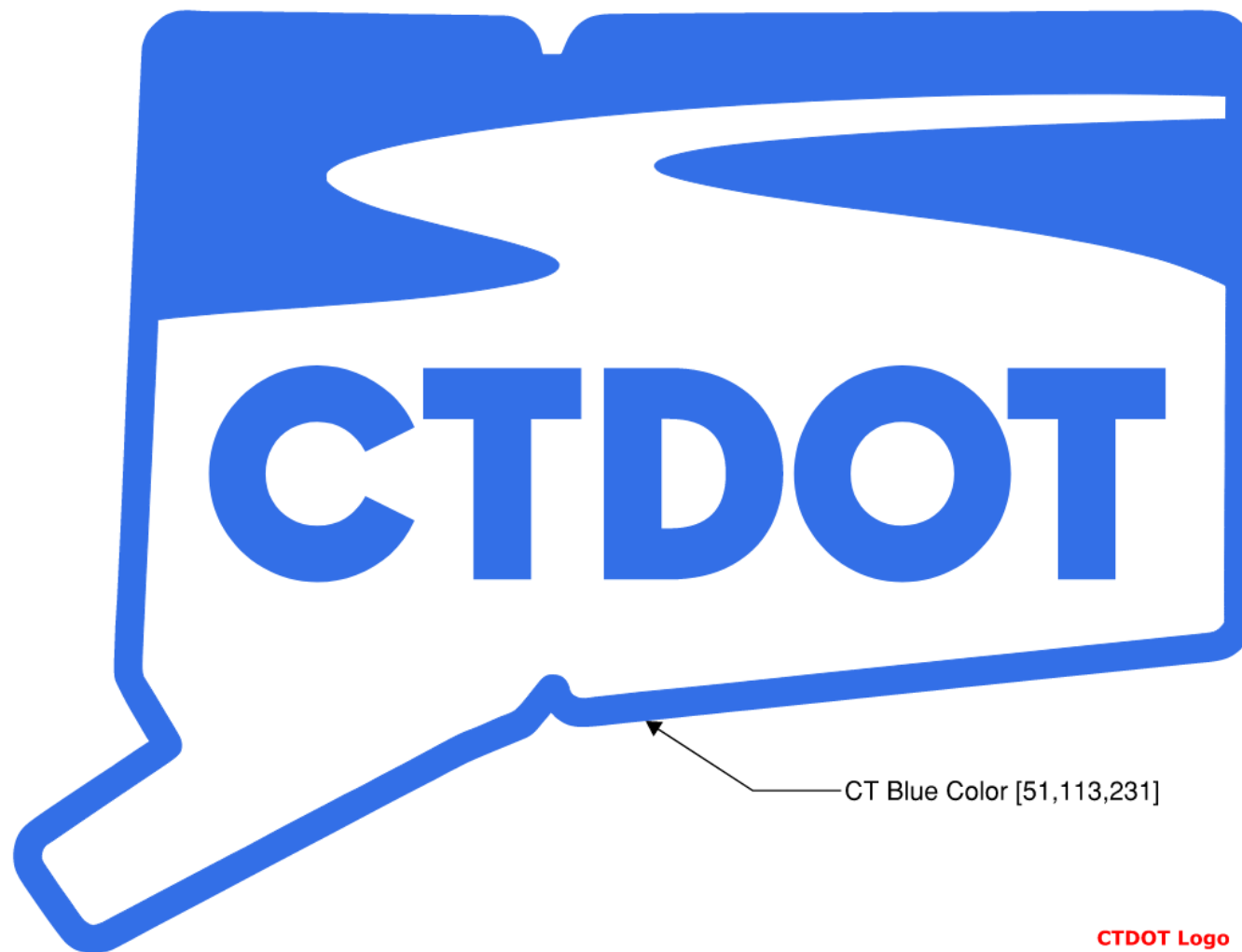
The Contractor shall maintain the BIL project signs for the entire duration of the Project. The Contractor shall relocate the BIL project signs during construction as needed and shall remove the signs after construction work is completed.

Article 12.20.05 – Basis of Payment:

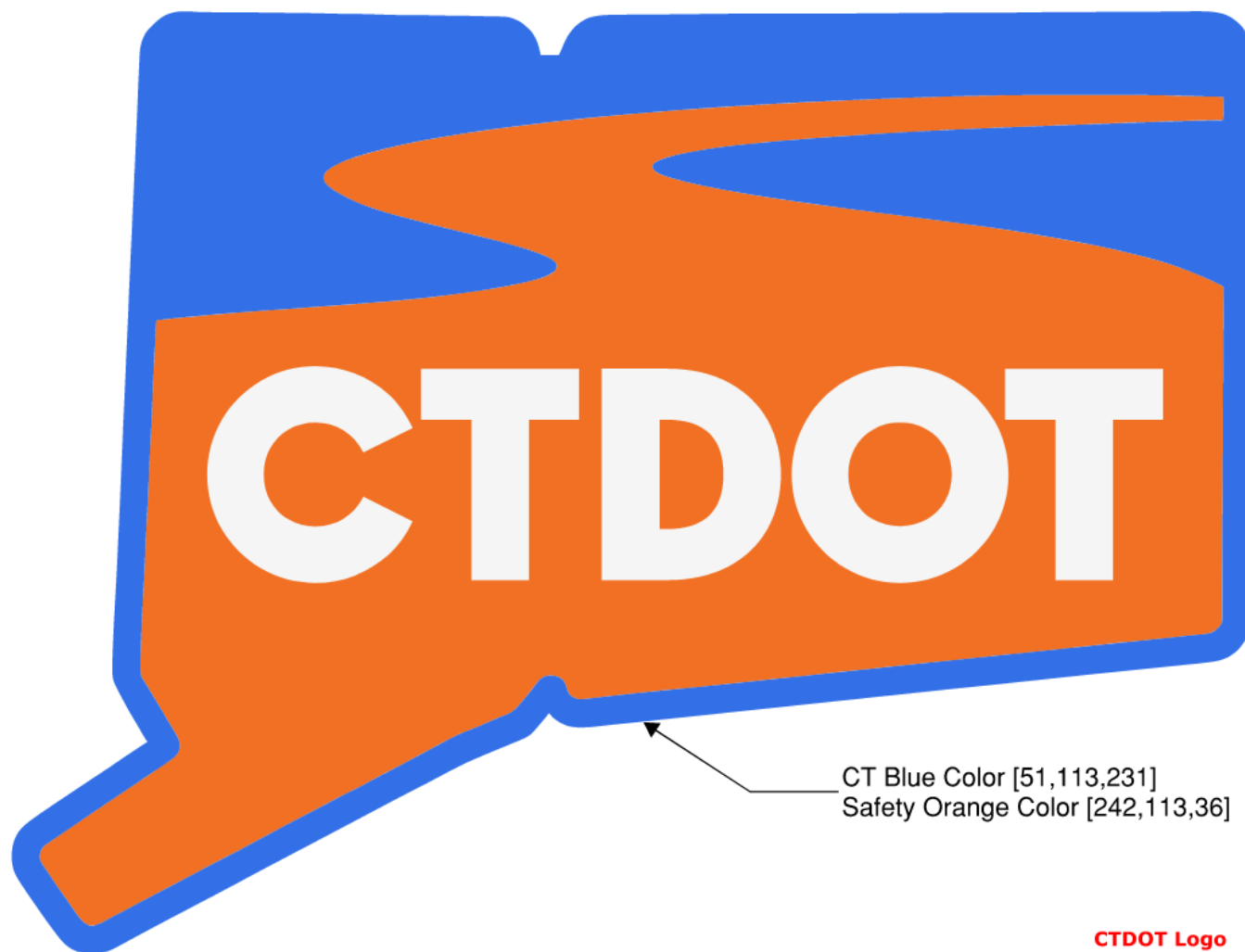
Add the following:

The price shall also include furnishing, installing, maintaining, relocating, and removing the Bipartisan Infrastructure Law project signs and sign posts and all hardware, materials, and labor incidental thereto.

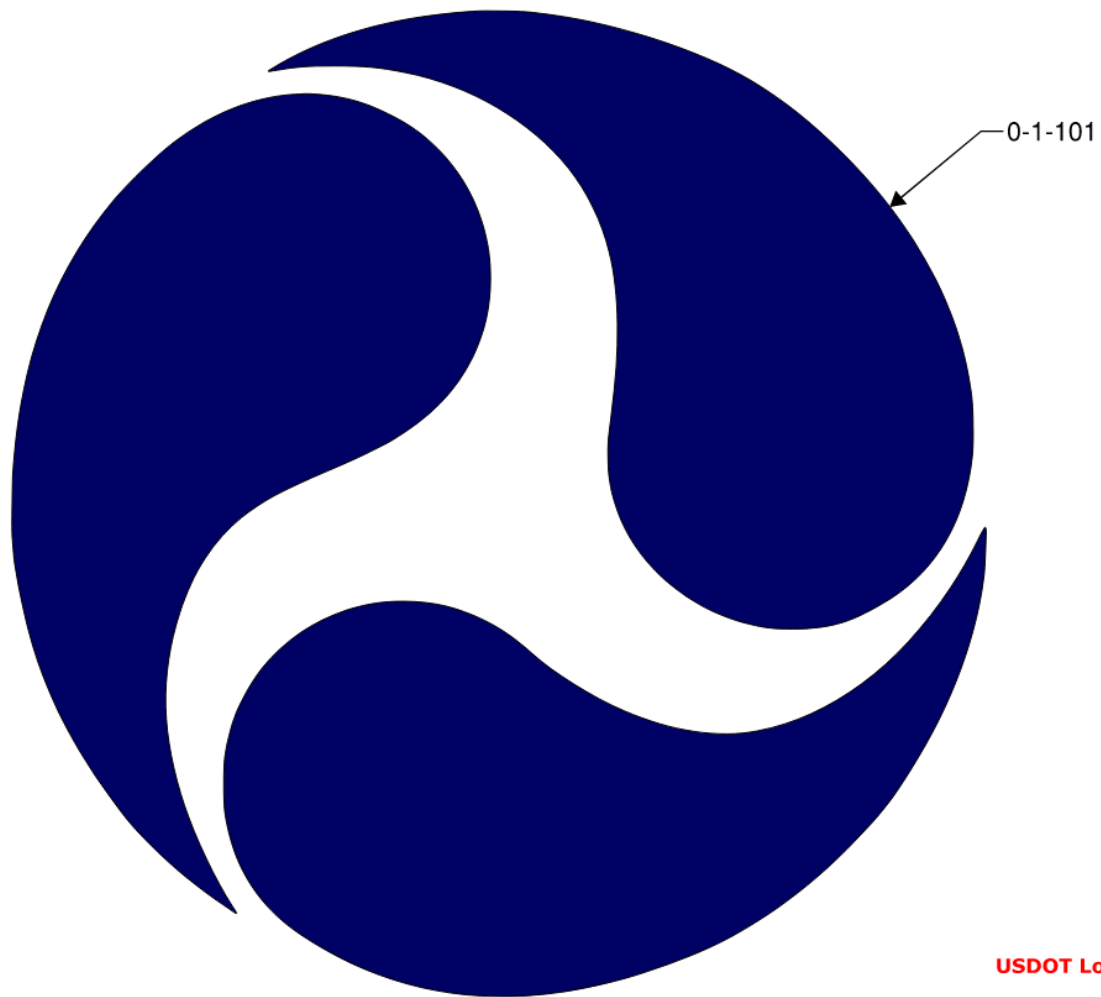




CTDOT Logo



Link to .dgn file: [New_CTDOT_Logos.dgn](#)



USDOT Logo

Link to .dgn file: [USDOT_logo.dgn](#)

ITEM # 1302046A – RESET MANHOLE (WATER)

Description:

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

Materials:

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

MORTAR – Shall conform to Section M.11

MANHOLE RISER SECTIONS – Shall conform to ASTM C-478

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

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

Construction Methods:

The Contractor shall carefully excavate the manhole frame and cover and add or remove brick masonry as necessary to reset the frame and cover to the final grade.

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

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

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

Any material damaged by the Contractor shall be repaired or replaced by the Contractor at no cost to the City of Waterbury or State of Connecticut.

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

Method of Measurement:

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

Basis of Payment:

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

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

<u>Pay Item</u>	<u>Pay Unit</u>
Reset Manhole (Water)	ea.

ITEM #1302061A – ADJUST GATE BOX (WATER)

Description: Reference in this item refers to “Waterbury Water Department”.

The Contractor shall adjust to final grade, the gate boxes and covers appurtenant to the water mains as required to furnish and install extension rings, extension stems, covers, and additional top or bottom sections if necessary, as shown on the Contract Drawings or as directed by the Engineer in accordance with these specifications.

Materials: The Contractor shall furnish standard Waterbury Water Department cast iron QWP type grate box sections and extensions as required, and extension stems according to the detail shown in the Contract Documents and the City of Waterbury’s Standard Details for Construction.

All additional materials, including any resurfacing materials and any additional fill required, shall be furnished and placed by the Contractor. Gravel shall conform to Article M.02.01.

Construction Methods: The Contractor shall carefully excavate around the gate boxes, remove the boxes, install extension stems, reinstall the present gate box if reuseable, adjust the box to final grade using extension rings, if applicable, and refill the excavation. Care shall be taken to prevent materials from filling the inside of the gate box.

Any damage done to Waterbury Water Department facilities by the Contractor shall be repaired or replaced by the Contractor at his expense.

Method of Measurement: The number of adjust gate boxes, complete with extension stems, gate box extension rings, covers, and additional top or bottom sections, if necessary, measured for payment shall be the actual number of each box reset.

Basis of Payment: This work will be paid for at the contract unit price for ”Adjust Gate Box (Water)” complete in place, which price shall include the cost of furnishing material, including labor and equipment to incorporate them into the work. It shall also include the clearing, trenching and disposal of excavated materials, refilling trenches, furnishing the additional materials for refilling, grading, sheeting, bracing, and pumping.

<u>Pay Item</u>	<u>Pay Unit</u>
Adjust Gate Box (Water)	ea.

ITEM #1302062A – ADJUST GATE BOX (GAS)

Description: Reference to “Eversource” in this item refers to “Eversource Energy – Gas Distribution”.

The Contractor shall adjust to final grade, the gate boxes and covers appurtenant to gas mains as shown on the Contract Drawings or as directed by the Engineer in accordance with these specifications.

Materials: The Contractor shall coordinate with Eversource to furnish or acquire the appropriate extension rings used to adjust gate boxes.

Materials shall conform to the Material Standards for Eversource.

All additional materials, including any resurfacing materials and any additional fill required, shall be furnished and placed by the Contractor. Gravel shall conform to Article M.02.01.

Construction Methods: The Contractor shall adjust the box to final grade by carefully excavating around the gate box, adjusting the telescoping gate box and/or using extension rings to meet the final grade, and then refilling the excavation. Care shall be taken to prevent material from filling the inside of the gate box.

The Contractor shall coordinate the work with Eversource, and the work done to adjust gate boxes shall conform with the Connecticut Contractor Work Rules, Operating Procedures, and Material Standards for Eversource.

Any damage done to Eversource facilities by the Contractor shall be repaired or replaced by the Contractor at their expense.

Method of Measurement: The number of adjust gate boxes, complete with gate box extension rings, and covers, shall be the actual number of each box reset.

Basis of Payment: This work will be paid for at the contract unit price for “Adjust Gate Box (Gas)” complete in place, which price shall include the cost of furnishing material, labor, and equipment to necessary to complete the work. It shall also include the clearing, trenching and disposal of excavated materials, refilling trenches, furnishing the additional material for refilling and grading.

<u>Pay Item</u>
Adjust Gate Box (Gas)

<u>Pay Unit</u>
ea.

ITEM #1403501A – RESET MANHOLE (SANITARY SEWER)

Description:

Work under this item shall consist of furnishing and installing Sanitary Sewer Manhole Frame and Covers sourced from Jacobs Engineering (Sanitary Facilities Custodian for the City of Waterbury) as shown on the contract details and Plans. All work to be done shall conform to the pertinent provisions of Sections 5.86, M.06, and M.08.

Materials:

All materials shall conform to those outlined by the contract plan details and in Section 5.86.02.

Construction Methods:

Construction methods shall conform to those outlined by the contract plan details and in Section 5.86.03.

Method of Measurement:

The manhole frame and covers will be measured for payment by the number of units installed, completed, and accepted per Section 5.86.04, 'Replacement of frames, covers, and tops.'

Basis of Payment:

The work will be paid for at the contract unit price each for "Reset Manhole (Sanitary Sewer)", which will include the Sanitary Sewer Manhole Frame and Cover complete in place, including all incidental expense.

<u>Pay Item</u>	<u>Pay Unit</u>
Special Manhole Frame and Cover	ea.

ITEM #1500006A – UTILITY ADJUSTMENT (ESTIMATED COST PLUS)

DESCRIPTION: This item shall consist of payment to Eversource, by the Contractor, for the installation of one streetlight with bracket arm on existing utility pole No. 63615. The luminaire shall be used to illuminate a pedestrian crosswalk. The Contractor is responsible to hire and coordinate with Eversource to install the luminaire and bracket arm. Eversource shall make all necessary electrical connections, and provide all labor, materials, traffic control, travel costs, loading, unloading, and equipment incidental thereto.

This item shall also consist of coordinating with Eversource and the City of Waterbury to upgrade the existing streetlight on utility pole #3833 from 50 watt to 100 watt (approximate).

CONSTRUCTION METHODS: The proposed crosswalk illumination work shall be carried out as detailed on the plans and at the following two locations:

Intersection of South Main Street with McMahon Street and Market Square, Waterbury:

Install one LED luminaire with 6' long bracket arm on existing utility pole No. 63615 located at the northeast corner of the intersection. The luminaire shall be LED with characteristics (approximate) as follows: 13,000 lumens, 100 watts, 3000k CCT, and Type 3 light distribution (Type 2 acceptable if Type 3 not available).

This work will be performed by Eversource or the utility company's authorized subcontractor. The Contractor shall coordinate all construction work with the work to be performed by the utility company.

All labor, materials, traffic control, travel costs, loading, unloading, and equipment supplied by the utility company shall be on a billable basis to the Contractor. The monthly energy costs for the four luminaires shall be paid for by the Town of Plainville.

The Contractor shall contact Mr. Joseph Veturis of CTDOT Facilities Electrical (203-598-5927) to file the required Eversource Request for Service for the luminaire installation and to establish a CRS number. CTDOT will provide The Contractor with the Eversource CRS number once it is issued at which time the Contractor shall contact Eversource to coordinate the work.

Payment of the monthly energy costs associated with the streetlight installed on pole No. 63615 shall be the responsibility of the State of Connecticut Department of Transportation.

Intersection of West Liberty Street and Benedict Street, Waterbury:

This item shall also include the coordination necessary by the Contractor to arrange to have Eversource upgrade the existing 50 watt LED luminaire currently installed on existing utility pole #3833 located at the southwest corner of the intersection.

The proposed luminaire shall be LED with characteristics (approximate) as follows: 13,000 lumens, 100 watts, 3000k CCT, and Type 3 light distribution (Type 2 acceptable if Type 3 not available).

The monthly energy charges for the existing 50 watt luminaire are currently paid for by the City of Waterbury. Payment of the monthly energy charges for the proposed 100w luminaire shall also remain the responsibility of the City of Waterbury. The Contractor shall contact Mr. Roy Cavanaugh (rcavanaugh@waterburyct.org) of the City of Waterbury to file the required Eversource Request for Service for the luminaire installation and to establish a CRS number. The City of Waterbury shall provide the Contractor with the Eversource CRS number once it is issued at which time the Contractor shall contact Eversource to coordinate the work.

There are no Eversource installation costs anticipated for this work.

METHOD OF MEASUREMENT: This work will be measured for payment as an estimated cost.

The sum of money shown on the estimate and in the itemized proposal as “Estimated Cost” for this work will be considered the price bid even though payment will be made only for actual work performed by the utility company and paid for by the Contractor. The Contractor shall furnish receipted invoices to the State clearly documenting work performed by the utility company and paid for by the Contractor. No markup for the Contractor will be considered. Any administrative costs for the Contractor should be considered in the general cost of the work. The estimated cost figure is not to be altered in any manner by the bidder. Should the bidder alter the amount shown, the altered figure will be disregarded, and the original price will be used to determine the total amount bid for the contract.

BASIS OF PAYMENT: Under this item, the Contractor will be reimbursed his actual costs for coordination and work performed by Eversource, which price shall include all materials and labor as indicated above as part of the complete lighting system.

<u>Pay Item</u>	<u>Pay Unit</u>
Utility Adjustment (Estimated Cost Plus)	EST.

ITEM #1806226A – PRE-WARNING VEHICLE

Description: Work under this item shall include furnishing, deploying and maintaining a Truck-Mounted Impact Attenuator equipped with a changeable message sign (CMS) for use as a Pre-Warning Vehicle (PWV) in a rolling road block operation on limited access highways. Impact attenuators shall only be truck-mounted. The message on the sign shall warn motorists of slow or stopped traffic conditions. The Pre-Warning Vehicle will only be paid as such when used as specified herein.

Materials: The Truck-Mounted Impact Attenuator shall meet the requirements of Article 18.06.02, except replace all instances of “flashing arrow,” “arrow sign,” and “arrow” with “CMS”.

The CMS shall meet the requirements of Article 11.31.02, with the following amendments:

1. Physical Characteristics of the CMS

- a) Mounting – The CMS shall be truck mounted only
- b) Sign Display Dimensions – Variable sign size to meet legend requirements as specified below

2. Visual Characteristics of the CMS Display

- a) Sign Type – CMS shall have a LED display only
- b) Color – CMS shall have black background with orange, yellow, or amber legend
- c) Characters – Letter height shall be at least 10 inches; Single stroke
- d) Visibility – CMS brightness must provide for visibility at 1/2 mile
- e) Message – The message shall read as follows, or shall be as directed by the Engineer:

Frame 1: SLOW TRAFFIC AHEAD

Frame 2: PREPARE TO STOP

Or

Frame 1: STOPPED TRAFFIC AHEAD

Frame 2: PREPARE TO STOP

Construction Methods: The PWV shall be initially positioned in the right shoulder ½ mile prior to the rolling road block operation.

If a traffic queue reaches the PWV’s initial location, the Contractor shall slowly reverse the PWV along the shoulder to position itself prior to the new back of queue.

The Contractor shall meet the requirements of Article 18.06.03.

Method of Measurement: This work will be measured for payment by the actual number of hours that the Pre-Warning Vehicle is used in a rolling road block operation during traffic pattern setup and removal. The vehicle may be left in place while not in a rolling road block operation but will be paid for under the item “Truck-Mounted or Trailer-Mounted Impact Attenuator” or under the item “Arrow Board” provided it meets the Contract requirements.

Basis of Payment: This work will be paid for at the Contract unit price per hour for “Pre-Warning Vehicle,” which shall include the furnishing and use of the pre-warning vehicle and a driver, attenuator reflector, flashing lights, changeable message sign, and all equipment, materials, tools, labor, disposal of damaged Truck-Mounted Impact Attenuator components and work incidental thereto.

Pay Item
Pre-Warning Vehicle

Pay Unit
hr

ITEM #2999998A – ON-THE-JOB TRAINING PROGRAM

This On-The-Job Training Program Special Provision supersedes Section 7b of the Required Contract Provision entitled “Specific Equal Employment Opportunity Responsibilities”, as amended, and is included in this contract in implementation of Title 23 U.S.C. Section 140(a) as established by Section 22 of the Federal-Aid Highway Act of 1968.

The Contractor shall provide on-the-job training aimed at developing and retaining full journeypersons in the type of trade involved. The number of trainees or apprentices to be trained under this Contract is determined by dividing the original quantity of hours assigned in the proposal form by 1,000 hours, or the number of hours required under a particular apprenticeship program schedule. In the event the Contractor subcontracts a portion of the contract work, he shall determine how many, if any, of the trainees are to be trained by the subcontractor, provided however, that the Contractor shall retain the primary responsibility for meeting the training requirements imposed by this provision. The Contractor shall also ensure that this On-the-Job Training Special Provision is made applicable to such subcontract.

The Contractor shall submit for approval to the Connecticut Department of Transportation (CTDOT) a training outline for each trainee or apprentice that will be trained on this project. The training outline shall include the trade, the training categories, the number of training hours that will be provided, and if there will be any off-site training. If the Contractor is participating in a bona fide apprenticeship program approved by the Connecticut State Labor Department (CTDOL) Apprentice Training Division, identification of such apprentice program shall also be submitted to CTDOT.

Training, upgrading and retaining minority group workers and women in the various construction trades is a primary objective of this Training Special Provision. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training, whether a member of a minority group or not.

Accordingly, a Contractor choosing to utilize a non-apprenticeship program shall make use of the supportive services consultant and/or make every effort to enroll minority and women trainees or apprentices by conducting systematic and direct recruitment through public and private sources likely to yield minority and women trainees to the extent such persons are available within a reasonable area of recruitment. The Contractor will be given an opportunity and will be responsible for demonstrating the steps that he has taken in pursuance thereof; prior to a determination as to whether the Contractor is in compliance with this Training Special Provision.

No employee shall be employed as a trainee or apprentices in any classification in which he/she has successfully completed a training course leading to journeyperson

status or in which he/she has been employed as a journey person. Trainees, or apprentices, may be employed and trained in the advancement of their training or apprenticeship program.

After award of the Contract, and prior to the order to start date of the physical construction of the project, the Contractor shall, in conjunction with the required schedule of progress or time chart, submit and, obtain approval for, the number of trainees, or apprentices, for each classification selected, the training outline for each classification and an explanation of the start time of each trainee as it relates to the schedule of progress or time chart.

The minimum length and type of training for each classification will be as established in the training program selected by the Contractor and approved by CTDOT and the FHWA. The CTDOT and the FHWA shall approve a program if it is reasonably calculated to meet the equal employment opportunity obligations of the Contractor and to qualify the average trainee or apprentice for journey person status in the classification concerned by the end of the training period. Furthermore, programs approved by the U.S. Department of Labor (USDOL) or CTDOL, including apprenticeship programs, shall be considered acceptable under this On-the-Job Training Program Special Provision, except in those cases where the Secretary of Transportation, the Federal Highway Administrator, or CTDOT, has determined that the program is not administered in a manner consistent with the equal employment obligations of Federal-aid highway construction contracts.

The Contractor shall furnish each trainee or apprentice with a copy of the program that will be followed in providing the training. The Contractor shall provide each trainee or apprentice with a certification showing the type and length of training satisfactorily completed.

The Contractor shall provide for the maintenance of records and furnish monthly and final reports documenting his performance under this On-the-Job Training Special Provision to the Engineer. The monthly updates and final report shall be made on forms provided by CTDOT or by providing signed copies of the "Apprentice Handbook and Progress Record" provided by CTDOL. The CTDOT report forms can be found on the CTDOT webpage at [OJT Page \(ct.gov\)](http://OJT Page (ct.gov)).

If the Contractor intends to transfer a trainee or apprentice to another CTDOT, (FHWA funded) project, the Contractor shall provide CTDOT with a minimum of a 14-day advance notice.

Except as otherwise noted below, the Contractor will be reimbursed at \$1.00 per hour of training given an employee in accordance with an approved training or apprenticeship program. If approved in advance by CTDOT, reimbursement will be made for training hours in excess of the number specified.

Payment for training is made upon completion of the training program on this Contract and not on a monthly basis.

No payment shall be made to the Contractor if either the failure to provide the required training, or the failure to hire the trainee as a journeyperson, is caused by the Contractor. It is normally expected that a trainee or apprentice will remain on the project as long as training opportunities exist in his work classification or until he has completed his training program. It is not required that all trainees or apprentices be on board for the entire length of the Contract. A Contractor will have fulfilled his responsibilities, under this On-the-Job Training Special Provision, if he has provided acceptable training for the number of hours specified.

Trainees will be paid at least 60 percent of the appropriate minimum journeyman's rate specified in the Contract for the first half of the training period, 75 percent for the third quarter of the training period, and 90 percent for the last quarter of the training period, or the CTDOL approved apprentice rates. The appropriate rates approved by the CTDOL in connection with the existing program shall apply to all trainees or apprentices being trained under this On-the-Job Training Program Special Provision.

The number of hours shown on the proposal form for Item #2999998A On-The-Job Training Program is not to be altered in any manner by the bidder. Should the bidder alter the amount shown, the altered figures will be disregarded and the original quantity will be used to determine the amount bid for the contract.

<u>Pay Item</u>	<u>Pay Unit</u>
On-The-Job Training Program	Hour

PERMITS AND/OR REQUIRED PROVISIONS:

The following Permit and/or Required Provisions follow this page and are hereby made part of this Contract.

- **PERMITS AND/OR PERMIT APPLICATIONS**

Permit Name
Storm Water Discharge Permit

Issue Date
Registration occurs prior to Notice to Proceed

- **Construction Contracts - Required Contract Provisions (FHWA Funded Contracts)**

Construction Contracts - Required Contract Provisions (FHWA and State Funded Contracts)

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- EXHIBIT A - FHWA Form 1273 (Begins on page 17)
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EXHIBIT E - State Wage Rates & Other Related Information (Attached at the end)
EXHIBIT F - Federal Wage Rates (Attached at the end)

1. Federal Highway Administration (FHWA) Form 1273

The Contractor shall comply with the Federal Highway Administration (FHWA), Form 1273 attached at Exhibit A, as revised, which is hereby made part of this contract. The Contractor shall also require its subcontractors to comply with the FHWA – Form 1273 and include the FHWA – Form 1273 as an attachment to all subcontracts and purchase orders.

2. Title VI of the Civil Rights Act of 1964 / Nondiscrimination Requirements

The Contractor shall comply with Title VI of the Civil Rights Act of 1964 as amended (42 U.S.C. 2000 et seq.), all requirements imposed by the regulations of the United States Department of Transportation (49 CFR Part 21) issued in implementation thereof, and the Title VI Contractor Assurances attached hereto at Exhibit B, all of which are hereby made a part of this Contract.

3. Requirements of Title 49, Code of Federal Regulations (CFR), Part 26, Participation by DBEs, as may be revised.

Pursuant to 49 CFR 26.13, the following paragraph is part of this Contract and shall be included in each subcontract the Contractor enters into with a subcontractor:

“The Contractor, subrecipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 49 CFR Part 26, Participation by DBEs, in the award and administration of U.S. DOT-assisted contracts. Failure by the Contractor to carry out these requirements is a material breach of this Contract, which may result in the termination of this contract or such other remedy as ConnDOT (recipient) deems appropriate, which may include, but is not limited to: (1) Withholding monthly progress payments, (2) Assessing sanctions, (3) Liquidated damages; and/or, (4) Disqualifying the contractor from future bidding as non-responsible.”

4. Contract Wage Rates

The Contractor shall comply with:

The Federal and State wage rate requirements indicated in Exhibits F and G hereof, as revised, are hereby made part of this Contract. The Federal wage rates (Davis-Bacon Act) applicable to this Contract shall be the Federal wage rates that are current on the US Department of Labor website (<http://www.wdol.gov/dba.aspx>) as may be revised 10 days prior to bid opening. These applicable Federal wage rates will be physically incorporated in the final contract document executed by both parties. The Department will no longer physically include revised Federal wage rates in the bid documents or as part of addenda documents, prior to the bid opening date. During the bid advertisement period, bidders are responsible for obtaining the appropriate Federal wage rates from the US Department of Labor website.

To obtain the latest Federal wage rates go to the US Department of Labor website (link above). Under Davis-Bacon Act, choose “Selecting DBA WDs” and follow the instruction to search the latest wage rates for the State, County and Construction Type. Refer to the Notice to Contractor (NTC) - Federal Wage Determinations (Davis Bacon Act).

If a conflict exists between the Federal and State wage rates, the higher rate shall govern.

Prevailing Wages for Work on State Highways; Annual Adjustments. With respect to contracts for work on state highways and bridges on state highways, the Contractor shall comply with the provisions of Section 31-54 and 31-55a of the Connecticut General Statutes, as revised.

As required by Section 1.05.12 (Payrolls) of the State of Connecticut, Department of Transportation's Standard Specification for Roads, Bridges and Incidental Construction (FORM 819), as may be revised, every Contractor or subcontractor performing project work on a Federal aid project is required to post the relevant prevailing wage rates as determined by the United States Secretary of Labor. The wage rate determinations shall be posted in prominent and easily accessible places at the work site.

5. Americans with Disabilities Act of 1990, as Amended

This provision applies to those Contractors who are or will be responsible for compliance with the terms of the Americans with Disabilities Act of 1990, as amended (42 U.S.C. 12101 et seq.), (Act), during the term of the Contract. The Contractor represents that it is familiar with the terms of this Act and that it is in compliance with the Act. Failure of the Contractor to satisfy this standard as the same applies to performance under this Contract, either now or during the term of the Contract as it may be amended, will render the Contract voidable at the option of the State upon notice to the contractor. The Contractor warrants that it will hold the State harmless and indemnify the State from any liability which may be imposed upon the State as a result of any failure of the Contractor to be in compliance with this Act, as the same applies to performance under this Contract.

6. Connecticut Statutory Labor Requirements

(a) Construction, Alteration or Repair of Public Works Projects; Wage Rates. The Contractor shall comply with Section 31-53 of the Connecticut General Statutes, as revised. The wages paid on an hourly basis to any person performing the work of any mechanic, laborer or worker on the work herein contracted to be done and the amount of payment or contribution paid or payable on behalf of each such person to any employee welfare fund, as defined in subsection (i) of section 31-53 of the Connecticut General Statutes, shall be at a rate equal to the rate customary or prevailing for the same work in the same trade or occupation in the town in which such public works project is being constructed. Any contractor who is not obligated by agreement to make payment or contribution on behalf of such persons to any such employee welfare fund shall pay to each mechanic, laborer or worker as part of such person's wages the amount of payment or contribution for such person's classification on each pay day.

(b) Debarment List. Limitation on Awarding Contracts. The Contractor shall comply with Section 31-53a of the Connecticut General Statutes, as revised.

(c) Construction Safety and Health Course. The Contractor shall comply with section 31-53b of the Connecticut General Statutes, as revised. The contractor shall furnish proof to the Labor Commissioner with the weekly certified payroll form for the first week each employee begins work on such project that any person performing the work of a mechanic, laborer or worker pursuant to the classifications of labor under section 31-53 of the Connecticut General Statutes, as revised, on such public works project, pursuant to such contract, has completed a course of at least ten hours in duration in construction safety and health approved by the federal Occupational Safety and Health Administration or, has completed a new miner training program approved by the Federal Mine Safety and Health Administration in accordance with 30 CFR 48 or, in the case of telecommunications employees, has completed at least ten hours of training in accordance with 29 CFR 1910.268.

Any employee required to complete a construction safety and health course as required that has not completed the course, shall have a maximum of fourteen (14) days to complete the course. If the employee has not been brought into compliance, they shall be removed from the project until such time as they have completed the required training.

Any costs associated with this notice shall be included in the general cost of the contract. In addition, there shall be no time granted to the contractor for compliance with this notice. The contractor's compliance with this notice and any associated regulations shall not be grounds for claims as outlined in Section 1.11 – "Claims".

(d) Awarding of Contracts to Occupational Safety and Health Law Violators Prohibited.

The Contract is subject to Section 31-57b of the Connecticut General Statutes, as revised.

(e) Residents Preference in Work on Other Public Facilities. NOT APPLICABLE TO FEDERAL AID CONTRACTS. Pursuant to Section 31-52a of the Connecticut General Statutes, as revised, in the employment of mechanics, laborers or workmen to perform the work specified herein, preference shall be given to residents of the state who are, and continuously for at least six months prior to the date hereof have been, residents of this state, and if no such person is available, then to residents of other states.

7. Tax Liability - Contractor's Exempt Purchase Certificate (CERT – 141)

The Contractor shall comply with Chapter 219 of the Connecticut General Statutes pertaining to tangible personal property or services rendered that is/are subject to sales tax. The Contractor is responsible for determining its tax liability. If the Contractor purchases materials or supplies pursuant to the Connecticut Department of Revenue Services' "Contractor's Exempt Purchase Certificate (CERT-141)," as may be revised, the Contractor acknowledges and agrees that title to such materials and supplies installed or placed in the project will vest in the State simultaneously with passage of title from the retailers or vendors thereof, and the Contractor will have no property rights in the materials and supplies purchased.

Forms and instructions are available anytime by:

Internet: Visit the DRS website at www.ct.gov/DRS to download and print Connecticut tax forms; or **Telephone:** Call 1-800-382-9463 (Connecticut calls outside the Greater Hartford calling area only) and select Option 2 or call 860-297-4753 (from anywhere).

8. Executive Orders and Other Enactments

- (a) All references in this Contract to any Federal, State, or local law, statute, public or special act, executive order, ordinance, regulation or code (collectively, “Enactments”) shall mean Enactments that apply to the Contract at any time during its term, or that may be made applicable to the Contract during its term. This Contract shall always be read and interpreted in accordance with the latest applicable wording and requirements of the Enactments. Unless otherwise provided by Enactments, the Contractor is not relieved of its obligation to perform under this Contract if it chooses to contest the applicability of the Enactments or the Client Agency’s authority to require compliance with the Enactments.
- (b) This Contract is subject to the provisions of Executive Order No. Three of Governor Thomas J. Meskill, promulgated June 16, 1971, concerning labor employment practices, Executive Order No. Seventeen of Governor Thomas J. Meskill, promulgated February 15, 1973, concerning the listing of employment openings and Executive Order No. Sixteen of Governor John G. Rowland promulgated August 4, 1999, concerning violence in the workplace, all of which are incorporated into and are made a part of this Contract as if they had been fully set forth in it.
- (c) This Contract may be subject to (1) Executive Order No. 14 of Governor M. Jodi Rell, promulgated April 17, 2006, concerning procurement of cleaning products and services; and (2) Executive Order No. 61 of Governor Dannel P. Malloy promulgated December 13, 2017, concerning the Policy for the Management of State Information Technology Projects, as issued by the Office of Policy and Management, Policy ID IT-SDLC-17-04. If any of the Executive Orders referenced in this subsection is applicable, it is deemed to be incorporated into and made a part of this Contract as if fully set forth in it.

9. Non-Discrimination Requirement and Certification (pursuant to section 4a-60 and 4a-60a of the Connecticut General Statutes, as revised): References to “minority business enterprises” in this Section are not applicable to Federal-aid projects/contracts. Federal-aid projects/contracts are instead subject to the Federal Disadvantaged Business Enterprise Program.

- (a) For purposes of this Section, the following terms are defined as follows:
 - i. "Commission" means the Commission on Human Rights and Opportunities;
 - ii. "Contract" and “contract” include any extension or modification of the Contract or contract;
 - iii. "Contractor" and “contractor” include any successors or assigns of the Contractor or contractor;
 - iv. "Gender identity or expression" means a person's gender-related identity, appearance or behavior, whether or not that gender-related identity, appearance or behavior is different from that traditionally associated with the person's physiology or assigned sex at birth, which gender-related identity can be shown by providing evidence including, but not limited to, medical history, care or treatment of the gender-related identity, consistent and uniform assertion of the gender-related identity or any other evidence that the gender-related identity is sincerely held, part of a person's core identity or not being asserted for an improper purpose;
 - v. “good faith” means that degree of diligence which a reasonable person would exercise in the performance of legal duties and obligations;

- vi. "good faith efforts" includes, but is not limited to, those reasonable initial efforts necessary to comply with statutory or regulatory requirements and additional or substituted efforts when it is determined that such initial efforts will not be sufficient to comply with such requirements;
- vii. "marital status" means being single, married as recognized by the state of Connecticut, widowed, separated or divorced;
- viii. "mental disability" means one or more mental disorders, as defined in the most recent edition of the American Psychiatric Association's "Diagnostic and Statistical Manual of Mental Disorders", or a record of or regarding a person as having one or more such disorders;
- ix. "minority business enterprise" means any small contractor (1) fifty-one per cent or more of the capital stock, if any, or assets of which are owned by a person or persons who (a) exercise operational authority over the daily affairs of the enterprise, (b) have the power to direct the management and policies and receive the beneficial interest of the enterprise, (c) possess managerial and technical competence and experience directly related to the principal business activities of the enterprise, and (d) are members of a minority, as defined in C.G.S. § 32-9n, or are individuals with a disability, or (2) which is a nonprofit corporation in which fifty-one per cent or more of the persons who exercise operational authority over the enterprise, (a) possess managerial and technical competence and experience directly related to the principal business activities of the enterprise, (b) have the power to direct the management and policies of the enterprise, and (c) are member of a minority, as defined in C.G.S. § 32-9n, or are individuals with a disability; and
- x. "public works contract" means any agreement (A) for construction, rehabilitation, conversion, extension, demolition or repair of changes or improvements in real property, and (B) that is financed in whole or in part by the state, including, but not limited to, matching expenditures, grants, loans, insurance or guarantees where such funding equals one hundred fifty thousand dollars or more.

For purposes of this Section, the terms "Contract" and "contract" do not include a contract where each contractor is (1) a political subdivision of the state, including, but not limited to, a municipality, unless the contract is a public works contract, (2) any other state, including but not limited to any federally recognized Indian tribal governments, as defined in C.G.S. § 1-267, (3) the federal government, (4) a foreign government, or (5) an agency of a subdivision, state or government described in the immediately preceding enumerated items (1), (2), (3), or (4).

(b) (1) The Contractor agrees and warrants that in the performance of the Contract such Contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of race, color, religious creed, age, marital status, national origin, ancestry, sex, sexual orientation, gender identity or expression, status as a veteran, status as a victim of domestic violence, status as a victim of sexual assault or status as a victim of trafficking in persons, intellectual disability, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by such Contractor that such disability prevents performance of the work involved, in any manner prohibited by the laws of the United States or of the State of Connecticut; and the Contractor further agrees to take affirmative action to ensure that applicants with job-related qualifications are employed and that employees are treated when employed without regard to their race, color, religious creed, age, marital status, national origin, ancestry, sex, gender identity or expression, sexual orientation, status as a veteran, status as a victim of domestic violence, status as a victim of sexual assault or status as a victim of trafficking in persons,

intellectual disability, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by the Contractor that such disability prevents performance of the work involved;

(2) the Contractor agrees, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, to state that it is an "affirmative action-equal opportunity employer" in accordance with regulations adopted by the Commission;

(3) the Contractor agrees to provide each labor union or representative of workers with which the Contractor has a collective bargaining Agreement or other contract or understanding and each vendor with which the Contractor has a contract or understanding, a notice to be provided by the Commission, advising the labor union or workers' representative of the Contractor's commitments under this Section and to post copies of the notice in conspicuous places available to employees and applicants for employment;

(4) the Contractor agrees to comply with each provision of this Section and Connecticut General Statutes §§ 46a-68e and 46a-68f and with each regulation or relevant order issued by said Commission pursuant to Connecticut General Statutes §§ 46a-56, 46a-68e, 46a-68f and 46a-86; and

(5) the Contractor agrees to provide the Commission with such information requested by the Commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the Contractor as relate to the provisions of this Section and Connecticut General Statutes § 46a-56. If the contract is a public works contract, the Contractor agrees and warrants that he or she will make good faith efforts to employ minority business enterprises as subcontractors and suppliers of materials on such public works projects.

(c) Determination of the Contractor's good faith efforts shall include, but shall not be limited to, the following factors: The Contractor's employment and subcontracting policies, patterns and practices; the timing and value of bids; affirmative advertising, recruitment and training; technical assistance activities and such other reasonable activities or efforts as the Commission may prescribe that are designed to ensure the participation of minority business enterprises in public works projects.

(d) The Contractor shall develop and maintain adequate documentation, in a manner prescribed by the Commission, of its good faith efforts.

(e) The Contractor shall include the provisions of subsection (b) of this Section in every subcontract or purchase order entered into in order to fulfill any obligation of a contract with the State, and in every subcontract entered into in order to fulfill any obligation of a public works contract, and such provisions shall be binding on a subcontractor, vendor or manufacturer unless exempted by regulations or orders of the Commission. The Contractor shall take such action with respect to any such subcontract or purchase order as the Commission may direct as a means of enforcing such provisions, including sanctions for noncompliance in accordance with Connecticut General Statutes § 46a-56; provided, if such Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Commission, the Contractor may request the State of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the State and the State may so enter.

(f) The Contractor agrees to comply with the regulations referred to in this Section as they exist on the date of this Contract and as they may be adopted or amended from time to time during the term of this Contract and any amendments thereto.

(g) Pursuant to subsection (c) of section 4a-60 of the Connecticut General Statutes, the Contractor, for itself and its authorized signatory of this Contract, affirms that it understands the obligations of this Section and that it will maintain a policy for the duration of the Contract to assure that the Contract will be performed in compliance with the nondiscrimination requirements of such section. The Contractor and its authorized signatory of this Contract demonstrate their understanding of this obligation by (A) having provided an affirmative response in the required online bid or response to a proposal question which asks if the contractor understands its obligations under such sections, (B) signing this Contract, or (C) initialing this nondiscrimination affirmation in the following box: ☐

10. Whistleblower Provision

The following clause is applicable if the Contract has a value of Five Million Dollars (\$5,000,000) or more.

Whistleblowing. This Contract may be subject to the provisions of Section 4-61dd of the Connecticut General Statutes. In accordance with this statute, if an officer, employee or appointing authority of the Contractor takes or threatens to take any personnel action against any employee of the Contractor in retaliation for such employee's disclosure of information to any employee of the contracting state or quasi-public agency or the Auditors of Public Accounts or the Attorney General under the provisions of subsection (a) of such statute, the Contractor shall be liable for a civil penalty of not more than five thousand dollars for each offense, up to a maximum of twenty per cent of the value of this Contract. Each violation shall be a separate and distinct offense and in the case of a continuing violation, each calendar day's continuance of the violation shall be deemed to be a separate and distinct offense. The State may request that the Attorney General bring a civil action in the Superior Court for the Judicial District of Hartford to seek imposition and recovery of such civil penalty. In accordance with subsection (f) of such statute, each large state contractor, as defined in the statute, shall post a notice of the provisions of the statute relating to large state contractors in a conspicuous place which is readily available for viewing by the employees of the Contractor.

11. Connecticut Freedom of Information Act

(a) **Disclosure of Records.** This Contract may be subject to the provisions of section 1-218 of the Connecticut General Statutes. In accordance with this statute, each contract in excess of two million five hundred thousand dollars between a public agency and a person for the performance of a governmental function shall (a) provide that the public agency is entitled to receive a copy of records and files related to the performance of the governmental function, and (b) indicate that such records and files are subject to FOIA and may be disclosed by the public agency pursuant to FOIA. No request to inspect or copy such records or files shall be valid unless the request is made to the public agency in accordance with FOIA. Any complaint by a person who is denied the right to inspect or copy such records or files shall be brought to the Freedom of Information Commission in accordance with the provisions of sections 1-205 and 1-206 of the Connecticut General Statutes.

(b) **Confidential Information.** The State will afford due regard to the Contractor's request for the protection of proprietary or confidential information which the State receives from the Contractor. However, all materials associated with the Contract are subject to the terms of the FOIA and all corresponding rules, regulations and

interpretations. In making such a request, the Contractor may not merely state generally that the materials are proprietary or confidential in nature and not, therefore, subject to release to third parties. Those particular sentences, paragraphs, pages or sections that the Contractor believes are exempt from disclosure under the FOIA must be specifically identified as such. Convincing explanation and rationale sufficient to justify each exemption consistent with the FOIA must accompany the request. The rationale and explanation must be stated in terms of the prospective harm to the competitive position of the Contractor that would result if the identified material were to be released and the reasons why the materials are legally exempt from release pursuant to the FOIA. To the extent that any other provision or part of the Contract conflicts or is in any way inconsistent with this section, this section controls and shall apply, and the conflicting provision or part shall not be given effect. If the Contractor indicates that certain documentation is submitted in confidence, by specifically and clearly marking the documentation as "CONFIDENTIAL," DOT will first review the Contractor's claim for consistency with the FOIA (that is, review that the documentation is actually a trade secret or commercial or financial information and not required by statute), and if determined to be consistent, will endeavor to keep such information confidential to the extent permitted by law. See, *e.g.*, Conn. Gen. Stat. §1-210(b)(5) (A-B). The State, however, has no obligation to initiate, prosecute or defend any legal proceeding or to seek a protective order or other similar relief to prevent disclosure of any information that is sought pursuant to a FOIA request. Should the State withhold such documentation from a Freedom of Information requester and a complaint be brought to the Freedom of Information Commission, the Contractor shall have the burden of cooperating with DOT in defense of that action and in terms of establishing the availability of any FOIA exemption in any proceeding where it is an issue. In no event shall the State have any liability for the disclosure of any documents or information in its possession which the State believes are required to be disclosed pursuant to the FOIA or other law.

12. Service of Process

The Contractor, if not a resident of the State of Connecticut, or, in the case of a partnership, the partners, if not residents, hereby appoints the Secretary of State of the State of Connecticut, and his successors in office, as agent for service of process for any action arising out of or as a result of this Contract; such appointment to be in effect throughout the life of this Contract and six (6) years thereafter.

13. Substitution of Securities for Retainages on State Contracts and Subcontracts

This Contract is subject to the provisions of Section 3-112a of the General Statutes of the State of Connecticut, as revised.

14. Health Insurance Portability and Accountability Act of 1996 (HIPAA)

The Contractor shall comply, if applicable, with the Health Insurance Portability and Accountability Act of 1996 and, pursuant thereto, the provisions attached at Exhibit D, and hereby made part of this Contract.

15. Forum and Choice of Law

The parties deem the Contract to have been made in the City of Hartford, State of Connecticut. Both parties agree that it is fair and reasonable for the validity and construction of the Contract to be, and it shall be, governed by the laws and court decisions of the State of Connecticut, without giving effect to its principles of conflicts of laws. To the extent that any immunities provided by Federal law or the laws of the State of Connecticut do not bar an action against the State, and to the extent that these courts are courts of competent jurisdiction, for the purpose of venue, the complaint shall be made returnable to the Judicial District of Hartford only or shall be brought in the United States District Court for the District of Connecticut only, and shall not be transferred to any other court, provided, however, that nothing here constitutes a waiver or compromise of the sovereign immunity of the State of Connecticut. The Contractor waives any objection which it may now have or will have to the laying of venue of any Claims in any forum and further irrevocably submits to such jurisdiction in any suit, action or proceeding.

16. Summary of State Ethics Laws

Pursuant to the requirements of section 1-101qq of the Connecticut General Statutes (a) the State has provided to the Contractor the summary of State ethics laws developed by the Office of State Ethics pursuant to section 1-81b of the Connecticut General Statutes, which summary is incorporated by reference into and made a part of this Contract as if the summary had been fully set forth in this Contract; (b) the Contractor represents that the chief executive officer or authorized signatory of the Contract and all key employees of such officer or signatory have read and understood the summary and agree to comply with the provisions of state ethics law; (c) prior to entering into a contract with any subcontractors or consultants, the Contractor shall provide the summary to all subcontractors and consultants and each such contract entered into with a subcontractor or consultant on or after July 1, 2021, shall include a representation that each subcontractor or consultant and the key employees of such subcontractor or consultant have read and understood the summary and agree to comply with the provisions of state ethics law; (d) failure to include such representations in such contracts with subcontractors or consultants shall be cause for termination of the Contract; and (e) each contract with such contractor, subcontractor or consultant shall incorporate such summary by reference as a part of the contract terms.

17. Audit and Inspection of Plants, Places of Business and Records

- (a)** The State and its agents, including, but not limited to, the Connecticut Auditors of Public Accounts, Attorney General and State's Attorney and their respective agents, may, at reasonable hours, inspect and examine all of the parts of the Contractor's and Contractor Parties' plants and places of business which, in any way, are related to, or involved in, the performance of this Contract. For the purposes of this Section, "Contractor Parties" means the Contractor's members, directors, officers, shareholders, partners, managers, principal officers, representatives, agents, servants, consultants, employees or any one of them or any other person or entity with whom the Contractor is in privity of oral or written contract and the Contractor intends for such other person or entity to Perform under the Contract in any capacity.
- (b)** The Contractor shall maintain and shall require each of the Contractor Parties to maintain, accurate and complete Records. The Contractor shall make all of its and the Contractor Parties' Records available at all reasonable hours for audit and inspection by the State and its agents.

- (c) The State shall make all requests for any audit or inspection in writing and shall provide the Contractor with at least twenty-four (24) hours' notice prior to the requested audit and inspection date. If the State suspects fraud or other abuse, or in the event of an emergency, the State is not obligated to provide any prior notice.
- (d) The Contractor shall keep and preserve or cause to be kept and preserved all of its and Contractor Parties' Records until three (3) years after the latter of (i) final payment under this Agreement, or (ii) the expiration or earlier termination of this Agreement, as the same may be modified for any reason. The State may request an audit or inspection at any time during this period. If any Claim or audit is started before the expiration of this period, the Contractor shall retain or cause to be retained all Records until all Claims or audit findings have been resolved.
- (e) The Contractor shall cooperate fully with the State and its agents in connection with an audit or inspection. Following any audit or inspection, the State may conduct, and the Contractor shall cooperate with an exit conference.
- (f) The Contractor shall incorporate this entire Section verbatim into any contract or other agreement that it enters into with any Contractor Party.

18. Campaign Contribution Restriction

Campaign Contribution Restriction. For all State contracts, defined in section 9-612 of the Connecticut General Statutes as having a value of \$50,000 or more, or a combination or series of such agreements or contracts having a value of \$100,000 or more in a calendar year, the authorized signatory to this Agreement represents that they have received the State Elections Enforcement Commission's notice advising state contractors of state campaign contribution and solicitation prohibitions, and will inform its principals of the contents of the notice.

19. Tangible Personal Property

- (a) The Contractor on its behalf and on behalf of its Affiliates, as defined below, shall comply with the provisions of Conn. Gen. Stat. §12-411b, as follows:
 - (1) For the term of the Contract, the Contractor and its Affiliates shall collect and remit to the State of Connecticut, Department of Revenue Services, any Connecticut use tax due under the provisions of Chapter 219 of the Connecticut General Statutes for items of tangible personal property sold by the Contractor or by any of its Affiliates in the same manner as if the Contractor and such Affiliates were engaged in the business of selling tangible personal property for use in Connecticut and had sufficient nexus under the provisions of Chapter 219 to be required to collect Connecticut use tax;
 - (2) A customer's payment of a use tax to the Contractor or its Affiliates relieves the customer of liability for the use tax;
 - (3) The Contractor and its Affiliates shall remit all use taxes they collect from customers on or before the due date specified in the Contract, which may not be later than the last day of the month next succeeding the end of a calendar quarter or other tax collection period during which the tax was collected;
 - (4) The Contractor and its Affiliates are not liable for use tax billed by them but not paid to them by a customer; and
 - (5) Any Contractor or Affiliate who fails to remit use taxes collected on behalf of its customers by the due date specified in the Contract shall be subject to the interest and penalties provided for persons required to collect sales tax under chapter 219 of the general statutes.

- (b) For purposes of this section of the Contract, the word “Affiliate” means any person, as defined in section 12-1 of the general statutes, that controls, is controlled by, or is under common control with another person. A person controls another person if the person owns, directly or indirectly, more than ten per cent of the voting securities of the other person. The word “voting security” means a security that confers upon the holder the right to vote for the election of members of the board of directors or similar governing body of the business, or that is convertible into, or entitles the holder to receive, upon its exercise, a security that confers such a right to vote. “Voting security” includes a general partnership interest.
- (c) The Contractor represents and warrants that each of its Affiliates has vested in the Contractor plenary authority to so bind the Affiliates in any agreement with the State of Connecticut. The Contractor on its own behalf and on behalf of its Affiliates shall also provide, no later than 30 days after receiving a request by the State’s contracting authority, such information as the State may require to ensure, in the State’s sole determination, compliance with the provisions of Chapter 219 of the Connecticut General Statutes, including, but not limited to, §12-411b.

20. Bid Rigging and/or Fraud – Notice to Contractor

The Connecticut Department of Transportation is cooperating with the U.S. Department of Transportation and the Justice Department in their investigation into highway construction contract bid rigging and/or fraud.

A toll-free “HOT LINE” telephone number 800-424-9071 has been established to receive information from contractors, subcontractors, manufacturers, suppliers or anyone with knowledge of bid rigging and/or fraud, either past or current. The “HOT LINE” telephone number will be available during normal working hours (8:00 am – 5:00 pm EST). Information will be treated confidentially, and anonymity respected.

21. Consulting Agreement Representation

Pursuant to section 4a-81 of the Connecticut General Statutes, the person signing this Contract on behalf of the Contractor represents, to their best knowledge and belief and subject to the penalty of false statement as provided in section 53a-157b of the Connecticut General Statutes, that the Contractor has not entered into any consulting agreements in connection with this Contract, except for the agreements listed below or in an attachment to this Contract. "Consulting agreement" means any written or oral agreement to retain the services, for a fee, of a consultant for the purposes of

(A) providing counsel to a contractor, vendor, consultant or other entity seeking to conduct, or conducting, business with the State, (B) contacting, whether in writing or orally, any executive, judicial, or administrative office of the State, including any department, institution, bureau, board, commission, authority, official or employee for the purpose of solicitation, dispute resolution, introduction, requests for information, or (C) any other similar activity related to such contracts. "Consulting agreement" does not include any agreements entered into with a consultant who is registered under the provisions of chapter 10 of the Connecticut General Statutes as of the date such contract is executed in accordance with the provisions of section 4a-81 of the Connecticut General Statutes.

 Consultant's Name and Title

 Name of Firm (if applicable)

 Start Date

 End Date

 Cost

The basic terms of the consulting agreement are: _____

Description of Services Provided: _____

Is the consultant a former State employee or former public official? ☐ YES

☐ NO If YES: _____

Name of Former State Agency

Termination Date of Employment

22. Cargo Preference Act Requirements (46 CFR 381.7(a)-(b)) – Use of United States Flag Vessels

The Contractor agrees to comply with the following:

(a) *Agreement Clauses.*

- (1) Pursuant to Pub. L. 664 ([43 U.S.C. 1241\(b\)](#)) at least 50 percent of any equipment, materials or commodities procured, contracted for or otherwise obtained with funds granted, guaranteed, loaned, or advanced by the U.S. Government under this agreement, and which may be transported by ocean vessel, shall be transported on privately owned United States-flag commercial vessels, if available.
- (2) Within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, 'on-board' commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (a)(1) of this section shall be furnished to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590.

(b) *Contractor and Subcontractor Clauses.* The contractor agrees—

- (1) To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels.
- (2) To furnish within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, 'on-board' commercial ocean

bill-of-lading in English for each shipment of cargo described in paragraph (b) (1) of this section to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590.

- (3) To insert the substance of the provisions of this clause in all subcontracts issued pursuant to this contract.

23. Sovereign Immunity

The parties acknowledge and agree that nothing in the Solicitation or the Contract shall be construed as a modification, compromise or waiver by the State of any rights or defenses of any immunities provided by Federal law or the laws of the State of Connecticut to the State or any of its officers and employees, which they may have had, now have or will have with respect to all matters arising out of the Contract. To the extent that this section conflicts with any other section, this section shall govern.

24. Large State Contract Representation for Contractor

Pursuant to section 4-252 of the Connecticut General Statutes and Acting Governor Susan Bysiewicz Executive Order No. 21-2, promulgated July 1, 2021, the Contractor, for itself and on behalf of all of its principals or key personnel who submitted a bid or proposal, represents:

- (1) That no gifts were made by (A) the Contractor, (B) any principals and key personnel of the Contractor, who participate substantially in preparing bids, proposals or negotiating State contracts, or (C) any agent of the Contractor or principals and key personnel, who participates substantially in preparing bids, proposals or negotiating State contracts, to (i) any public official or State employee of the State agency or quasi- public agency soliciting bids or proposals for State contracts, who participates substantially in the preparation of bid solicitations or requests for proposals for State contracts or the negotiation or award of State contracts, or (ii) any public official or State employee of any other State agency, who has supervisory or appointing authority over such State agency or quasi-public agency;
- (2) That no such principals and key personnel of the Contractor, or agent of the Contractor or of such principals and key personnel, knows of any action by the Contractor to circumvent such prohibition on gifts by providing for any other principals and key personnel, official, employee or agent of the Contractor to provide a gift to any such public official or State employee; and
- (3) That the Contractor is submitting bids or proposals without fraud or collusion with any person.

25. Large State Contract Representation for Official or Employee of State Agency

Pursuant to section 4-252 of the Connecticut General Statutes and Acting Governor Susan Bysiewicz Executive Order No. 21-2, promulgated July 1, 2021, the State agency official or employee represents that the selection of the person, firm or corporation was not the result of collusion, the giving of a gift or the promise of a gift, compensation, fraud or inappropriate influence from any person.

26. Iran Investment Energy Certification

(a) Pursuant to section 4-252a of the Connecticut General Statutes, the Contractor certifies that it has not made a direct investment of twenty million dollars or more in the energy sector of Iran on or after October 1, 2013, as described in Section 202 of the Comprehensive Iran Sanctions, Accountability and Divestment Act of 2010, and has not increased or renewed such investment on or after said date.

(b) If the Contractor makes a good faith effort to determine whether it has made an investment described in subsection (a) of this section, then the Contractor shall not be deemed to be in breach of the Contract or in violation of this section.

A "good faith effort" for purposes of this subsection includes a determination that the Contractor is not on the list of persons who engage in certain investment activities in Iran created by the Department of General Services of the State of California pursuant to Division 2, Chapter 2.7 of the California Public Contract Code. Nothing in this subsection shall be construed to impair the ability of the State agency or quasi-public agency to pursue a breach of contract action for any violation of the provisions of the Contract.

27. Access to Contract and State Data

The Contractor shall provide to the Client Agency access to any data, as defined in Conn. Gen Stat. Sec. 4e-1, concerning the Contract and the Client Agency that are in the possession or control of the Contractor upon demand and shall provide the data to the Client Agency in a format prescribed by the Client Agency and the State Auditors of Public Accounts at no additional cost.

28. Affirmative Action Policy Statement

The Contractor shall comply with the Affirmative Action Policy Statement, as applicable, attached at Exhibit E and hereby made part of this Contract.

29. Compliance with Consumer Data Privacy and Online Monitoring

Pursuant to section 4e-72a of the Connecticut General Statutes, Contractor shall at all times comply with all applicable provisions of sections 42-515 to 42-525, inclusive, of the Connecticut General Statutes, as the same may be revised or modified.

EXHIBIT A

FHWA-1273 – Revised October 23, 2023

**REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS**

- I. General
- II. Nondiscrimination
- III. Non-segregated Facilities
- IV. Davis-Bacon and Related Act Provisions
- V. Contract Work Hours and Safety Standards Act Provisions
- VI. Subletting or Assigning the Contract
- VII. Safety: Accident Prevention
- VIII. False Statements Concerning Highway Projects
- IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
- X. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion
- XI. Certification Regarding Use of Contract Funds for Lobbying
- XII. Use of United States-Flag Vessels:

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under title 23, United States Code, as required in 23 CFR 633.102(b) (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services). 23 CFR 633.102(e).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider. 23 CFR 633.102(e).

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services) in accordance with 23 CFR 633.102. The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in solicitation-for-bids or request-for-proposals documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract). 23 CFR 633.102(b).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work

performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract. 23 CFR 633.102(d).

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. 23 U.S.C. 114(b). The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors. 23 U.S.C. 101(a).

II. NONDISCRIMINATION (23 CFR 230.107(a); 23 CFR Part 230, Subpart A, Appendix A; EO 11246)

The provisions of this section related to 23 CFR Part 230, Subpart A, Appendix A are applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR Part 60, 29 CFR Parts 1625-1627, 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding \$10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR Part 60, and 29 CFR Parts 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR Part 230, Subpart A, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal Employment Opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (see 28 CFR Part 35, 29 CFR Part 1630, 29 CFR Parts 1625-1627, 41 CFR Part 60 and 49 CFR Part 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140, shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR Part 35 and 29 CFR Part 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract. 23 CFR 230.409 (g)(4) & (5).

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, sexual orientation, gender identity, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action or are substantially involved in such action, will be made fully cognizant of and will implement the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer or other knowledgeable company official.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to ensure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action

within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs (i.e., apprenticeship and on-the-job training programs for the geographical area of contract performance). In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. 23 CFR 230.409. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide

sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants /

Employees with Disabilities: The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established thereunder. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment:

The contractor shall not discriminate on the grounds of race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors, suppliers, and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurances Required:

a. The requirements of 49 CFR Part 26 and the State DOT's FHWA-approved Disadvantaged Business Enterprise (DBE) program are incorporated by reference.

b. The contractor, subrecipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate, which may include, but is not limited to:

- (1) Withholding monthly progress payments;
- (2) Assessing sanctions;
- (3) Liquidated damages; and/or
- (4) Disqualifying the contractor from future bidding as non-responsible.

c. The Title VI and nondiscrimination provisions of U.S. DOT Order 1050.2A at Appendixes A and E are incorporated by reference. 49 CFR Part 21.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women.

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on [Form FHWA-1391](#). The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of more than \$10,000. 41 CFR 60-1.5.

As prescribed by 41 CFR 60-1.8, the contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location under the contractor's control where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding \$2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size), in accordance with 29 CFR 5.5. The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. 23 U.S.C. 113. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. 23 U.S.C. 101. Where applicable law requires that projects be treated as a project on a Federal-aid highway, the provisions of this subpart will apply regardless of the location of the project. Examples include: Surface Transportation Block Grant Program projects funded under 23 U.S.C. 133 [excluding recreational trails projects], the Nationally Significant Freight and Highway

Projects funded under 23 U.S.C. 117, and National Highway Freight Program projects funded under 23 U.S.C. 167.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages (29 CFR 5.5)

a. *Wage rates and fringe benefits.* All laborers and mechanics employed or working upon the site of the work (or otherwise working in construction or development of the project under a development statute), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act ([29 CFR part 3](#))), the full amount of basic hourly wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. As provided in paragraphs (d) and (e) of 29 CFR 5.5, the appropriate wage determinations are effective by operation of law even if they have not been attached to the contract. Contributions made or costs reasonably anticipated for bona fide fringe benefits under the Davis-Bacon Act ([40 U.S.C. 3141\(2\)\(B\)](#)) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.e. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics must be paid the appropriate wage rate and fringe benefits on the wage determination for the classification(s) of work actually performed, without regard to skill, except as provided in paragraph 4. of this section. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided*, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classifications and wage rates conformed under paragraph 1.c. of this section) and the Davis-Bacon poster (WH-1321) must be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b. *Frequently recurring classifications.* (1) In addition to wage and fringe benefit rates that have been determined to be prevailing under the procedures set forth in [29 CFR part 1](#), a wage determination may contain, pursuant to § 1.3(f), wage and fringe benefit rates for classifications of laborers and mechanics for which conformance requests are regularly submitted pursuant to paragraph 1.c. of this section, provided that:

(i) The work performed by the classification is not performed by a classification in the wage determination for which a prevailing wage rate has been determined;

(ii) The classification is used in the area by the construction industry; and

(iii) The wage rate for the classification bears a reasonable relationship to the prevailing wage rates contained in the wage determination.

(2) The Administrator will establish wage rates for such classifications in accordance with paragraph 1.c.(1)(iii) of this section. Work performed in such a classification must be paid at no less than the wage and fringe benefit rate listed on the wage determination for such classification.

c. *Conformance.* (1) The contracting officer must require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract be classified in conformance with the wage determination. Conformance of an additional classification and wage rate and fringe benefits is appropriate only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is used in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) The conformance process may not be used to split, subdivide, or otherwise avoid application of classifications listed in the wage determination.

(3) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken will be sent by the contracting officer by email to DBAconformance@dol.gov. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(4) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer will, by email to DBAconformance@dol.gov, refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(5) The contracting officer must promptly notify the contractor of the action taken by the Wage and Hour Division

under paragraphs 1.c.(3) and (4) of this section. The contractor must furnish a written copy of such determination to each affected worker or it must be posted as a part of the wage determination. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph 1.c.(3) or (4) of this section must be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

d. *Fringe benefits not expressed as an hourly rate.* Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor may either pay the benefit as stated in the wage determination or may pay another bona fide fringe benefit or an hourly cash equivalent thereof.

e. *Unfunded plans.* If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided*, That the Secretary of Labor has found, upon the written request of the contractor, in accordance with the criteria set forth in § 5.28, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

f. *Interest.* In the event of a failure to pay all or part of the wages required by the contract, the contractor will be required to pay interest on any underpayment of wages.

2. Withholding (29 CFR 5.5)

a. *Withholding requirements.* The contracting agency may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for the full amount of wages and monetary relief, including interest, required by the clauses set forth in this section for violations of this contract, or to satisfy any such liabilities required by any other Federal contract, or federally assisted contract subject to Davis-Bacon labor standards, that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to Davis-Bacon labor standards requirements and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld. In the event of a contractor's failure to pay any laborer or mechanic, including any apprentice or helper working on the site of the work all or part of the wages required by the contract, or upon the contractor's failure to submit the required records as discussed in paragraph 3.d. of this section, the contracting agency may on its own initiative and after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

b. *Priority to withheld funds.* The Department has priority to funds withheld or to be withheld in accordance with paragraph

2.a. of this section or Section V, paragraph 3.a., or both, over claims to those funds by:

- (1) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;
- (2) A contracting agency for its procurement costs;
- (3) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;
- (4) A contractor's assignee(s);
- (5) A contractor's successor(s); or
- (6) A claim asserted under the Prompt Payment Act, [31 U.S.C. 3901–3907](#).

3. Records and certified payrolls (29 CFR 5.5)

a. *Basic record requirements* (1) *Length of record retention.* All regular payrolls and other basic records must be maintained by the contractor and any subcontractor during the course of the work and preserved for all laborers and mechanics working at the site of the work (or otherwise working in construction or development of the project under a development statute) for a period of at least 3 years after all the work on the prime contract is completed.

(2) *Information required.* Such records must contain the name; Social Security number; last known address, telephone number, and email address of each such worker; each worker's correct classification(s) of work actually performed; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in [40 U.S.C. 3141\(2\)\(B\)](#) of the Davis-Bacon Act); daily and weekly number of hours actually worked in total and on each covered contract; deductions made; and actual wages paid.

(3) *Additional records relating to fringe benefits.* Whenever the Secretary of Labor has found under paragraph 1.e. of this section that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in [40 U.S.C. 3141\(2\)\(B\)](#) of the Davis-Bacon Act, the contractor must maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits.

(4) *Additional records relating to apprenticeship.* Contractors with apprentices working under approved programs must maintain written evidence of the registration of apprenticeship programs, the registration of the apprentices, and the ratios and wage rates prescribed in the applicable programs.

b. *Certified payroll requirements* (1) *Frequency and method of submission.* The contractor or subcontractor must submit weekly, for each week in which any DBA- or Related Acts-covered work is performed, certified payrolls to the contracting

agency. The prime contractor is responsible for the submission of all certified payrolls by all subcontractors. A contracting agency or prime contractor may permit or require contractors to submit certified payrolls through an electronic system, as long as the electronic system requires a legally valid electronic signature; the system allows the contractor, the contracting agency, and the Department of Labor to access the certified payrolls upon request for at least 3 years after the work on the prime contract has been completed; and the contracting agency or prime contractor permits other methods of submission in situations where the contractor is unable or limited in its ability to use or access the electronic system.

(2) *Information required.* The certified payrolls submitted must set out accurately and completely all of the information required to be maintained under paragraph 3.a.(2) of this section, except that full Social Security numbers and last known addresses, telephone numbers, and email addresses must not be included on weekly transmittals. Instead, the certified payrolls need only include an individually identifying number for each worker (e.g., the last four digits of the worker's Social Security number). The required weekly certified payroll information may be submitted using Optional Form WH-347 or in any other format desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division website at <https://www.dol.gov/sites/dolgov/files/WHDLegacy/files/wh347.pdf> or its successor website. It is not a violation of this section for a prime contractor to require a subcontractor to provide full Social Security numbers and last known addresses, telephone numbers, and email addresses to the prime contractor for its own records, without weekly submission by the subcontractor to the contracting agency.

(3) *Statement of Compliance.* Each certified payroll submitted must be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor, or the contractor's or subcontractor's agent who pays or supervises the payment of the persons working on the contract, and must certify the following:

(i) That the certified payroll for the payroll period contains the information required to be provided under paragraph 3.b. of this section, the appropriate information and basic records are being maintained under paragraph 3.a. of this section, and such information and records are correct and complete;

(ii) That each laborer or mechanic (including each helper and apprentice) working on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in [29 CFR part 3](#); and

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification(s) of work actually performed, as specified in the applicable wage determination incorporated into the contract.

(4) *Use of Optional Form WH-347.* The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 will satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(3) of this section.

(5) *Signature.* The signature by the contractor, subcontractor, or the contractor's or subcontractor's agent must be an original handwritten signature or a legally valid electronic signature.

(6) *Falsification.* The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under [18 U.S.C. 1001](#) and [31 U.S.C. 3729](#).

(7) *Length of certified payroll retention.* The contractor or subcontractor must preserve all certified payrolls during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

c. *Contracts, subcontracts, and related documents.* The contractor or subcontractor must maintain this contract or subcontract and related documents including, without limitation, bids, proposals, amendments, modifications, and extensions. The contractor or subcontractor must preserve these contracts, subcontracts, and related documents during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

d. *Required disclosures and access* (1) *Required record disclosures and access to workers.* The contractor or subcontractor must make the records required under paragraphs 3.a. through 3.c. of this section, and any other documents that the contracting agency, the State DOT, the FHWA, or the Department of Labor deems necessary to determine compliance with the labor standards provisions of any of the applicable statutes referenced by § 5.1, available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and must permit such representatives to interview workers during working hours on the job.

(2) *Sanctions for non-compliance with records and worker access requirements.* If the contractor or subcontractor fails to submit the required records or to make them available, or refuses to permit worker interviews during working hours on the job, the Federal agency may, after written notice to the contractor, sponsor, applicant, owner, or other entity, as the case may be, that maintains such records or that employs such workers, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available, or to permit worker interviews during working hours on the job, may be grounds for debarment action pursuant to § 5.12. In addition, any contractor or other person that fails to submit the required records or make those records available to WHD within the time WHD requests that the records be produced will be precluded from introducing as evidence in an administrative proceeding under [29 CFR part 6](#) any of the required records that were not provided or made available to WHD. WHD will take into consideration a reasonable request from the contractor or person for an extension of the time for submission of records. WHD will determine the reasonableness of the request and may consider, among other things, the location of the records and the volume of production.

(3) *Required information disclosures.* Contractors and subcontractors must maintain the full Social Security number and last known address, telephone number, and email address

of each covered worker, and must provide them upon request to the contracting agency, the State DOT, the FHWA, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or other compliance action.

4. Apprentices and equal employment opportunity (29 CFR 5.5)

a. *Apprentices* (1) *Rate of pay.* Apprentices will be permitted to work at less than the predetermined rate for the work they perform when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship (OA), or with a State Apprenticeship Agency recognized by the OA. A person who is not individually registered in the program, but who has been certified by the OA or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice, will be permitted to work at less than the predetermined rate for the work they perform in the first 90 days of probationary employment as an apprentice in such a program. In the event the OA or a State Apprenticeship Agency recognized by the OA withdraws approval of an apprenticeship program, the contractor will no longer be permitted to use apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(2) *Fringe benefits.* Apprentices must be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringe benefits must be paid in accordance with that determination.

(3) *Apprenticeship ratio.* The allowable ratio of apprentices to journeyworkers on the job site in any craft classification must not be greater than the ratio permitted to the contractor as to the entire work force under the registered program or the ratio applicable to the locality of the project pursuant to paragraph 4.a.(4) of this section. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated in paragraph 4.a.(1) of this section, must be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under this section must be paid not less than the applicable wage rate on the wage determination for the work actually performed.

(4) *Reciprocity of ratios and wage rates.* Where a contractor is performing construction on a project in a locality other than the locality in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyworker's hourly rate) applicable within the locality in which the construction is being performed must be observed. If there is no applicable ratio or wage rate for the locality of the project, the ratio and wage rate specified in the contractor's registered program must be observed.

b. *Equal employment opportunity.* The use of apprentices and journeyworkers under this part must be in conformity with

the equal employment opportunity requirements of Executive Order 11246, as amended, and [29 CFR part 30](#).

c. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. 23 CFR 230.111(e)(2). The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract as provided in 29 CFR 5.5.

6. Subcontracts. The contractor or subcontractor must insert FHWA-1273 in any subcontracts, along with the applicable wage determination(s) and such other clauses or contract modifications as the contracting agency may by appropriate instructions require, and a clause requiring the subcontractors to include these clauses and wage determination(s) in any lower tier subcontracts. The prime contractor is responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this section. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and may be subject to debarment, as appropriate. 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract as provided in 29 CFR 5.5.

9. Disputes concerning labor standards. As provided in 29 CFR 5.5, disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility. a. By entering into this contract, the contractor certifies that neither it nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of [40 U.S.C. 3144\(b\)](#) or § 5.12(a).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of [40 U.S.C. 3144\(b\)](#) or § 5.12(a).

c. The penalty for making false statements is prescribed in the U.S. Code, Title 18 Crimes and Criminal Procedure, [18 U.S.C. 1001](#).

11. Anti-retaliation. It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

a. Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the DBA, Related Acts, this part, or [29 CFR part 1](#) or [3](#);

b. Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under the DBA, Related Acts, this part, or [29 CFR part 1](#) or [3](#);

c. Cooperating in any investigation or other compliance action, or testifying in any proceeding under the DBA, Related Acts, this part, or [29 CFR part 1](#) or [3](#); or

d. Informing any other person about their rights under the DBA, Related Acts, this part, or [29 CFR part 1](#) or [3](#).

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

Pursuant to 29 CFR 5.5(b), the following clauses apply to any Federal-aid construction contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchpersons and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek. 29 CFR 5.5.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph 1. of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages and interest from the date of the underpayment. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or

mechanic, including watchpersons and guards, employed in violation of the clause set forth in paragraph 1. of this section, in the sum currently provided in 29 CFR 5.5(b)(2)* for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph 1. of this section.

* \$31 as of January 15, 2023 (See 88 FR 88 FR 2210) as may be adjusted annually by the Department of Labor, pursuant to the Federal Civil Penalties Inflation Adjustment Act of 1990.

3. Withholding for unpaid wages and liquidated damages

a. *Withholding process.* The FHWA or the contracting agency may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for any unpaid wages; monetary relief, including interest; and liquidated damages required by the clauses set forth in this section on this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract subject to the Contract Work Hours and Safety Standards Act that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to the Contract Work Hours and Safety Standards Act and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld.

b. *Priority to withheld funds.* The Department has priority to funds withheld or to be withheld in accordance with Section IV paragraph 2.a. or paragraph 3.a. of this section, or both, over claims to those funds by:

- (1) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;
- (2) A contracting agency for its repurchase costs;
- (3) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;
- (4) A contractor's assignee(s);
- (5) A contractor's successor(s); or
- (6) A claim asserted under the Prompt Payment Act, [31 U.S.C. 3901](#)–3907.

4. Subcontracts. The contractor or subcontractor must insert in any subcontracts the clauses set forth in paragraphs 1. through 5. of this section and a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor is responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs 1. through 5. In the

event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and associated liquidated damages and may be subject to debarment, as appropriate.

5. Anti-retaliation. It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

- a. Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the Contract Work Hours and Safety Standards Act (CWHSSA) or its implementing regulations in this part;
- b. Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under CWHSSA or this part;
- c. Cooperating in any investigation or other compliance action, or testifying in any proceeding under CWHSSA or this part; or
- d. Informing any other person about their rights under CWHSSA or this part.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System pursuant to 23 CFR 635.116.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term "perform work with its own organization" in paragraph 1 of Section VI refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions: (based on longstanding interpretation)

- (1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
- (2) the prime contractor remains responsible for the quality of the work of the leased employees;

- (3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
- (4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract. 23 CFR 635.102.

2. Pursuant to 23 CFR 635.116(a), the contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. Pursuant to 23 CFR 635.116(c), the contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract. (based on long-standing interpretation of 23 CFR 635.116).

5. The 30-percent self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements. 23 CFR 635.116(d).

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR Part 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract. 23 CFR 635.108.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and

health standards (29 CFR Part 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704). 29 CFR 1926.10.

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR Part 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 11, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT (42 U.S.C. 7606; 2 CFR 200.88; EO 11738)

This provision is applicable to all Federal-aid construction contracts in excess of \$150,000 and to all related subcontracts. 48 CFR 2.101; 2 CFR 200.327.

By submission of this bid/proposal or the execution of this contract or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, subcontractor, supplier, or vendor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal Highway Administration and the Regional Office of the Environmental Protection Agency. 2 CFR Part 200, Appendix II.

The contractor agrees to include or cause to be included the requirements of this Section in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements. 2 CFR 200.327.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost \$25,000 or more – as defined in 2 CFR Parts 180 and 1200. 2 CFR 180.220 and 1200.220.

1. Instructions for Certification – First Tier Participants:

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction. 2 CFR 180.320.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default. 2 CFR 180.325.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances. 2 CFR 180.345 and 180.350.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900-180.1020, and 1200. "First Tier Covered Transactions" refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction. 2 CFR 180.330.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold. 2 CFR 180.220 and 180.300.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. 2 CFR 180.300; 180.320, and 180.325. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. 2 CFR 180.335. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (<https://www.sam.gov/>). 2 CFR 180.300, 180.320, and 180.325.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default. 2 CFR 180.325.

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.335;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property, 2 CFR 180.800;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification, 2 CFR 180.700 and 180.800; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default. 2 CFR 180.335(d).

(5) Are not a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(6) Are not a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability (USDOT Order 4200.6 implementing appropriations act requirements).

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal. 2 CFR 180.335 and 180.340.

* * * * *

3. Instructions for Certification - Lower Tier Participants:

(Applicable to all subcontracts, purchase orders, and other lower tier transactions requiring prior FHWA approval or estimated to cost \$25,000 or more - 2 CFR Parts 180 and 1200). 2 CFR 180.220 and 1200.220.

a. By signing and submitting this proposal, the prospective lower tier participant is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which

this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances. 2 CFR 180.365.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900 – 180.1020, and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. "First Tier Covered Transactions" refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contractor). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated. 2 CFR 1200.220 and 1200.332.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold. 2 CFR 180.220 and 1200.220.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (<https://www.sam.gov/>), which is compiled by the General Services Administration. 2 CFR 180.300, 180.320, 180.330, and 180.335.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily

excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment. 2 CFR 180.325.

* * * * *

4. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

a. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals:

(1) is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.355;

(2) is a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(3) is a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability. (USDOT Order 4200.6 implementing appropriations act requirements)

b. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed \$100,000. 49 CFR Part 20, App. A.

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or

cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.

XII. USE OF UNITED STATES-FLAG VESSELS:

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, or any other covered transaction. 46 CFR Part 381.

This requirement applies to material or equipment that is acquired for a specific Federal-aid highway project. 46 CFR 381.7. It is not applicable to goods or materials that come into inventories independent of an FHWA funded-contract.

When oceanic shipments (or shipments across the Great Lakes) are necessary for materials or equipment acquired for a specific Federal-aid construction project, the bidder, proposer, contractor, subcontractor, or vendor agrees:

1. To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels. 46 CFR 381.7.

2. To furnish within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, 'on-board' commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (b)(1) of this section to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Office of Cargo and Commercial Sealift (MAR-620), Maritime Administration, Washington, DC 20590. (MARAD requires copies of the ocean carrier's (master) bills of lading, certified onboard, dated, with rates and charges. These bills of lading may contain business sensitive information and therefore may be submitted directly to MARAD by the Ocean Transportation Intermediary on behalf of the contractor). 46 CFR 381.7.

**ATTACHMENT A - EMPLOYMENT AND MATERIALS
PREFERENCE FOR APPALACHIAN DEVELOPMENT
HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS
ROAD CONTRACTS (23 CFR 633, Subpart B, Appendix B)**

This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

EXHIBIT B
TITLE VI CONTRACTOR ASSURANCES
APPENDIX A

During the performance of this contract, the contractor, for itself, its assignees and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. **Compliance with Regulations:** The contractor (hereinafter includes consultants) will comply with the Regulations relative to Nondiscrimination in Federally assisted programs of the United States Department of Transportation Federal Highway Administration and Federal Transit Administration, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

2. **Nondiscrimination:** The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, national origin, sex, age, disability, income or Limited English Proficiency in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.

3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment:** In all solicitations, either by bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and Acts and the Regulations relative to Non-discrimination on the grounds of race, color, or national origin.

4. **Information and Reports:** The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the Federal Highway Administration or Federal Transit Administration to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information, the contractor will so certify to the Recipient or the Federal Highway Administration or the Federal Transit Administration, as appropriate, and will set forth what efforts it has made to obtain the information.

5. **Sanctions for Non-compliance:** In the event of the contractor's non-compliance with the non-discrimination provisions of this contract, the Recipient will impose such contract sanctions as it or the Federal Highway Administration or the Federal Transit Administration may determine to be appropriate, including, but not limited to:

- a. withholding contract payments to the contractor under the contract until the contractor complies; and/or
- b. cancelling, terminating, or suspending a contract, in whole or in part.

6. **Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the Recipient or the Federal Highway Administration or the Federal Transit Administration may direct as a means of enforcing such provisions including sanctions for non-compliance. Provided, that if the contractor becomes involved in, or is threatened with, litigation by a subcontractor, or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

APPENDIX B

TITLE VI CONTRACTOR ASSURANCES

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following nondiscrimination statutes and authorities; including but not limited to:

- Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. § 2000d et seq.), (prohibits discrimination on the basis of race, color, national origin), as implemented by 49 C.F.R. § 21.1 et seq. and 49 C.F.R. part 303;
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601) (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Federal-Aid Highway Act of 1973 (23 U.S.C. § 324 et seq.) (prohibits discrimination on the basis of sex);
- Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. § 794 et seq.) (prohibits discrimination on the basis of disability); and 49 C.F.R. part 27;
- The Age Discrimination Act of 1975, as amended (42 U.S.C. § 6101 et seq.) (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982 (Pub. L. 97-248 (1982)), as amended (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987 (102 Stat. 28) ("*... which restore[d] the broad scope of coverage and to clarify the application of Title IX of the Education Amendments of 1972, section 504 of the Rehabilitation Act of 1973, the Age Discrimination Act of 1975, and Title VI of the Civil Rights Act of 1964.*");
- Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131 --12189), as implemented by Department of Justice regulations at 28 C.F.R. parts 35 and 36, and Department of Transportation regulations at 49 C.F.R. parts 37 and 38;

- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures non-discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. § 1681 et seq).

EXHIBIT C

Health Insurance Portability and Accountability Act of 1996 (“HIPAA”).

- (a) If the Contactor is a Business Associate under the requirements of the Health Insurance Portability and Accountability Act of 1996 (“HIPAA”), the Contractor must comply with all terms and conditions of this Section of the Contract. If the Contractor is not a Business Associate under HIPAA, this Section of the Contract does not apply to the Contractor for this Contract.
- (b) The Contractor is required to safeguard the use, publication and disclosure of information on all applicants for, and all clients who receive, services under the Contract in accordance with all applicable federal and state law regarding confidentiality, which includes but is not limited to HIPAA, more specifically with the Privacy and Security Rules at 45 C.F.R. Part 160 and Part 164, subparts A, C, and E; and
- (c) The State of Connecticut Agency named on page 1 of this Contract (hereinafter the “Department”) is a “covered entity” as that term is defined in 45 C.F.R. § 160.103; and
- (d) The Contractor, on behalf of the Department, performs functions that involve the use or disclosure of “individually identifiable health information,” as that term is defined in 45 C.F.R. § 160.103; and
- (e) The Contractor is a “business associate” of the Department, as that term is defined in 45 C.F.R. § 160.103; and
- (f) The Contractor and the Department agree to the following in order to secure compliance with the HIPAA, the requirements of Subtitle D of the Health Information Technology for Economic and Clinical Health Act (hereinafter the HITECH Act), (Pub. L. 111-5, sections 13400 to 13423), and more specifically with the Privacy and Security Rules at 45 C.F.R. Part 160 and Part 164, subparts A, C, and E.
- (g) Definitions

- (1) "Breach shall have the same meaning as the term is defined in section 13400 of the HITECH Act (42 U.S.C. §17921(1))
 - (2) "Business Associate" shall mean the Contractor.
 - (3) "Covered Entity" shall mean the Department of the State of Connecticut named on page 1 of this Contract.
 - (4) "Designated Record Set" shall have the same meaning as the term "designated record set" in 45 C.F.R. § 164.501.
 - (5) "Electronic Health Record" shall have the same meaning as the term is defined in section 13400 of the HITECH Act (42 U.S.C. §17921(5))
 - (6) "Individual" shall have the same meaning as the term "individual" in 45 C.F.R. § 160.103 and shall include a person who qualifies as a personal representative as defined in 45 C.F.R. § 164.502(g).
 - (7) "Privacy Rule" shall mean the Standards for Privacy of Individually Identifiable Health Information at 45 C.F.R. part 160 and parts 164, subparts A and E.
 - (8) "Protected Health Information" or "PHI" shall have the same meaning as the term "protected health information" in 45 C.F.R. § 160.103, limited to information created or received by the Business Associate from or on behalf of the Covered Entity.
 - (9) "Required by Law" shall have the same meaning as the term "required by law" in 45 C.F.R. § 164.103.
 - (10) "Secretary" shall mean the Secretary of the Department of Health and Human Services or his designee.
 - (11) "More stringent" shall have the same meaning as the term "more stringent" in 45 C.F.R. § 160.202.
 - (12) "This Section of the Contract" refers to the HIPAA Provisions stated herein, in their entirety.
 - (13) "Security Incident" shall have the same meaning as the term "security incident" in 45 C.F.R. § 164.304.
 - (14) "Security Rule" shall mean the Security Standards for the Protection of Electronic Protected Health Information at 45 C.F.R. part 160 and parts 164, subpart A and C.
 - (15) "Unsecured protected health information" shall have the same meaning as the term as defined in section 13402(h)(1)(A) of HITECH. Act. (42 U.S.C. §17932(h)(1)(A)).
- (h) Obligations and Activities of Business Associates.
- (1) Business Associate agrees not to use or disclose PHI other than as permitted or required by this Section of the Contract or as Required by Law.

- (2) Business Associate agrees to use appropriate safeguards to prevent use or disclosure of PHI other than as provided for in this Section of the Contract.
- (3) Business Associate agrees to use administrative, physical and technical safeguards that reasonably and appropriately protect the confidentiality, integrity, and availability of electronic protected health information that it creates, receives, maintains, or transmits on behalf of the Covered Entity.
- (4) Business Associate agrees to mitigate, to the extent practicable, any harmful effect that is known to the Business Associate of a use or disclosure of PHI by Business Associate in violation of this Section of the Contract.
- (5) Business Associate agrees to report to Covered Entity any use or disclosure of PHI not provided for by this Section of the Contract or any security incident of which it becomes aware.
- (6) Business Associate agrees to ensure that any agent, including a subcontractor, to whom it provides PHI received from, or created or received by Business Associate, on behalf of the Covered Entity, agrees to the same restrictions and conditions that apply through this Section of the Contract to Business Associate with respect to such information.
- (7) Business Associate agrees to provide access, at the request of the Covered Entity, and in the time and manner agreed to by the parties, to PHI in a Designated Record Set, to Covered Entity or, as directed by Covered Entity, to an Individual in order to meet the requirements under 45 C.F.R. § 164.524.
- (8) Business Associate agrees to make any amendments to PHI in a Designated Record Set that the Covered Entity directs or agrees to pursuant to 45 C.F.R. § 164.526 at the request of the Covered Entity, and in the time and manner agreed to by the parties.
- (9) Business Associate agrees to make internal practices, books, and records, including policies and procedures and PHI, relating to the use and disclosure of PHI received from, or created or received by, Business Associate on behalf of Covered Entity, available to Covered Entity or to the Secretary in a time and manner agreed to by the parties or designated by the Secretary, for purposes of the Secretary determining Covered Entity's compliance with the Privacy Rule.
- (10) Business Associate agrees to document such disclosures of PHI and information related to such disclosures as would be required for Covered Entity to respond to a request by an Individual for an accounting of disclosures of PHI in accordance with 45 C.F.R. § 164.528 and section 13405 of the HITECH Act (42 U.S.C. § 17935) and any regulations promulgated thereunder.
- (11) Business Associate agrees to provide to Covered Entity, in a time and manner agreed to by the parties, information collected in accordance with clause h. (10) of this Section of the Contract, to permit Covered Entity to respond to a request by an Individual for an accounting of disclosures of PHI in accordance with 45 C.F.R. § 164.528 and section 13405 of the HITECH Act (42 U.S.C. § 17935) and any regulations promulgated

thereunder. Business Associate agrees at the Covered Entity's direction to provide an accounting of disclosures of PHI directly to an individual in accordance with 45 C.F.R. § 164.528 and section 13405 of the HITECH Act (42 U.S.C. § 17935) and any regulations promulgated thereunder.

- (12) Business Associate agrees to comply with any state or federal law that is more stringent than the Privacy Rule.
- (13) Business Associate agrees to comply with the requirements of the HITECH Act relating to privacy and security that are applicable to the Covered Entity and with the requirements of 45 C.F.R. sections 164.504(e), 164.308, 164.310, 164.312, and 164.316.
- (14) In the event that an individual requests that the Business Associate (a) restrict disclosures of PHI; (b) provide an accounting of disclosures of the individual's PHI; or (c) provide a copy of the individual's PHI in an electronic health record, the Business Associate agrees to notify the covered entity, in writing, within two business days of the request.
- (15) Business Associate agrees that it shall not, directly or indirectly, receive any remuneration in exchange for PHI of an individual without (1) the written approval of the covered entity, unless receipt of remuneration in exchange for PHI is expressly authorized by this Contract and (2) the valid authorization of the individual, except for the purposes provided under section 13405(d)(2) of the HITECH Act, (42 U.S.C. § 17935(d)(2)) and in any accompanying regulations
- (16) Obligations in the Event of a Breach
 - A. The Business Associate agrees that, following the discovery of a breach of unsecured protected health information, it shall notify the Covered Entity of such breach in accordance with the requirements of section 13402 of HITECH (42 U.S.C. 17932(b) and the provisions of this Section of the Contract.
 - B. Such notification shall be provided by the Business Associate to the Covered Entity without unreasonable delay, and in no case later than 30 days after the breach is discovered by the Business Associate, except as otherwise instructed in writing by a law enforcement official pursuant to section 13402 (g) of HITECH (42 U.S.C. 17932(g)). A breach is considered discovered as of the first day on which it is, or reasonably should have been, known to the Business Associate. The notification shall include the identification and last known address, phone number and email address of each individual (or the next of kin of the individual if the individual is deceased) whose unsecured protected health information has been or is reasonably believed by the Business Associate to have been, accessed, acquired, or disclosed during such breach.
 - C. The Business Associate agrees to include in the notification to the Covered Entity at least the following information:

1. A brief description of what happened, including the date of the breach and the date of the discovery of the breach, if known.
2. A description of the types of unsecured protected health information that were involved in the breach (such as full name, Social Security number, date of birth, home address, account number, or disability code).
3. The steps the Business Associate recommends that individuals take to protect themselves from potential harm resulting from the breach.
4. A detailed description of what the Business Associate is doing to investigate the breach, to mitigate losses, and to protect against any further breaches.
5. Whether a law enforcement official has advised either verbally or in writing the Business Associate that he or she has determined that notification or notice to individuals or the posting required under section 13402 of the HITECH Act would impede a criminal investigation or cause damage to national security and; if so, include contact information for said official.

D. Business Associate agrees to provide appropriate staffing and have established procedures to ensure that individuals informed by the Covered Entity of a breach by the Business Associate have the opportunity to ask questions and contact the Business Associate for additional information regarding the breach. Such procedures shall include a toll-free telephone number, an e-mail address, a posting on its Web site and a postal address. Business Associate agrees to include in the notification of a breach by the Business Associate to the Covered Entity, a written description of the procedures that have been established to meet these requirements. Costs of such contact procedures will be borne by the Contractor.

E. Business Associate agrees that, in the event of a breach, it has the burden to demonstrate that it has complied with all notification's requirements set forth above, including evidence demonstrating the necessity of a delay in notification to the Covered Entity.

(i) Permitted Uses and Disclosure by Business Associate.

- (1) General Use and Disclosure Provisions Except as otherwise limited in this Section of the Contract, Business Associate may use or disclose PHI to perform functions, activities, or services for, or on behalf of, Covered Entity as specified in this Contract, provided that such use or disclosure would not violate the Privacy Rule if done by

Covered Entity or the minimum necessary policies and procedures of the Covered Entity.

(2) Specific Use and Disclosure Provisions

(A) Except as otherwise limited in this Section of the Contract, Business Associate may use PHI for the proper management and administration of Business Associate or to carry out the legal responsibilities of Business Associate.

(B) Except as otherwise limited in this Section of the Contract, Business Associate may disclose PHI for the proper management and administration of Business Associate, provided that disclosures are Required by Law, or Business Associate obtains reasonable assurances from the person to whom the information is disclosed that it will remain confidential and used or further disclosed only as Required by Law or for the purpose for which it was disclosed to the person, and the person notifies Business Associate of any instances of which it is aware in which the confidentiality of the information has been breached.

(C) Except as otherwise limited in this Section of the Contract, Business Associate may use PHI to provide Data Aggregation services to Covered Entity as permitted by 45 C.F.R. § 164.504(e)(2)(i)(B).

(j) Obligations of Covered Entity.

(1) Covered Entity shall notify Business Associate of any limitations in its notice of privacy practices of Covered Entity, in accordance with 45 C.F.R. § 164.520, or to the extent that such limitation may affect Business Associate's use or disclosure of PHI.

(2) Covered Entity shall notify Business Associate of any changes in, or revocation of, permission by Individual to use or disclose PHI, to the extent that such changes may affect Business Associate's use or disclosure of PHI.

(3) Covered Entity shall notify Business Associate of any restriction to the use or disclosure of PHI that Covered Entity has agreed to in accordance with 45 C.F.R. § 164.522, to the extent that such restriction may affect Business Associate's use or disclosure of PHI.

(k) Permissible Requests by Covered Entity. Covered Entity shall not request Business Associate to use or disclose PHI in any manner that would not be permissible under the Privacy Rule if done by the Covered Entity, except that Business Associate may use and disclose PHI for data aggregation, and management and administrative activities of Business Associate, as permitted under this Section of the Contract.

(l) Term and Termination.

- (1) Term. The Term of this Section of the Contract shall be effective as of the date the Contract is effective and shall terminate when the information collected in accordance with clause h. (10) of this Section of the Contract is provided to the Covered Entity and all of the PHI provided by Covered Entity to Business Associate, or created or received by Business Associate on behalf of Covered Entity, is destroyed or returned to Covered Entity, or, if it is infeasible to return or destroy PHI, protections are extended to such information, in accordance with the termination provisions in this Section.
- (2) Termination for Cause Upon Covered Entity's knowledge of a material breach by Business Associate, Covered Entity shall either:
 - (A) Provide an opportunity for Business Associate to cure the breach or end the violation and terminate the Contract if Business Associate does not cure the breach or end the violation within the time specified by the Covered Entity; or
 - (B) Immediately terminate the Contract if Business Associate has breached a material term of this Section of the Contract and cure is not possible; or
 - (C) If neither termination nor cure is feasible, Covered Entity shall report the violation to the Secretary.
- (3) Effect of Termination
 - (A) Except as provided in (1)(2) of this Section of the Contract, upon termination of this Contract, for any reason, Business Associate shall return or destroy all PHI received from Covered Entity or created or received by Business Associate on behalf of Covered Entity. Business Associate shall also provide the information collected in accordance with clause h. (10) of this Section of the Contract to the Covered Entity within ten business days of the notice of termination. This provision shall apply to PHI that is in the possession of subcontractors or agents of Business Associate. Business Associate shall retain no copies of the PHI.
 - (B) In the event that Business Associate determines that returning or destroying the PHI is infeasible, Business Associate shall provide to Covered Entity notification of the conditions that make return or destruction infeasible. Upon documentation by Business Associate that return or destruction of PHI is infeasible, Business Associate shall extend the protections of this Section of the Contract to such PHI and limit further uses and disclosures of PHI to those purposes that make return or destruction infeasible, for as long as Business Associate maintains such PHI. Infeasibility of the return or destruction of PHI includes, but is not limited to, requirements under state or federal law that the Business Associate maintains or preserves the PHI or copies thereof.
- (m) Miscellaneous Provisions.

- (1) Regulatory References. A reference in this Section of the Contract to a section in the Privacy Rule means the section as in effect or as amended.
- (2) Amendment. The Parties agree to take such action as is necessary to amend this Section of the Contract from time to time as is necessary for Covered Entity to comply with requirements of the Privacy Rule and the Health Insurance Portability and Accountability Act of 1996, Pub. L. No. 104-191.
- (3) Survival. The respective rights and obligations of Business Associate shall survive the termination of this Contract.
- (4) Effect on Contract. Except as specifically required to implement the purposes of this Section of the Contract, all other terms of the Contract shall remain in force and effect.
- (5) Construction. This Section of the Contract shall be construed as broadly as necessary to implement and comply with the Privacy Standard. Any ambiguity in this Section of the Contract shall be resolved in favor of a meaning that complies, and is consistent with, the Privacy Standard.
- (6) Disclaimer. Covered Entity makes no warranty or representation that compliance with this Section of the Contract will be adequate or satisfactory for Business Associate's own purposes. Covered Entity shall not be liable to Business Associate for any claim, civil or criminal penalty, loss or damage related to or arising from the unauthorized use or disclosure of PHI by Business Associate or any of its officers, directors, employees, contractors or agents, or any third party to whom Business Associate has disclosed PHI contrary to the provisions of this Contract or applicable law. Business Associate is solely responsible for all decisions made, and actions taken, by Business Associate regarding the safeguarding, use and disclosure of PHI within its possession, custody or control.
- (7) Indemnification. The Business Associate shall indemnify and hold the Covered Entity harmless from and against any and all claims, liabilities, judgments, fines, assessments, penalties, awards and any statutory damages that may be imposed or assessed pursuant to HIPAA, as amended or the HITECH Act, including, without limitation, attorney's fees, expert witness fees, costs of investigation, litigation or dispute resolution, and costs awarded thereunder, relating to or arising out of any violation by the Business Associate and its agents, including subcontractors, of any obligation of Business Associate and its agents, including subcontractors, under this section of the contract, under HIPAA, the HITECH Act, the Privacy Rule and the Security Rule.

EXHIBIT D

AFFIRMATIVE ACTION POLICY STATEMENT (October 2023)

It is the policy of this firm to assure that applicants are employed, and that employees are treated during employment, without regard to an individual's race, color, religion, creed, sex, gender identity or expression, marital status, national origin, age, ancestry, status as a veteran, intellectual disability, mental disability, learning disability or physical disability, including but not limited to blindness, unless such disability prevents performance of the work involved and to promote the full realization of equal employment opportunity through positive and continuous affirmative efforts. Such action shall include employment, promotion, demotion or transfer, recruitment or recruitment advertising, layoff or terminations, rates of pay or other forms of compensation, selection for training/apprenticeship, pre-apprenticeship opportunities, and on-the-job training opportunities.

This firm will implement, monitor, enforce and achieve full compliance with this Affirmative Action Policy Statement in conjunction with the applicable Federal and State laws, regulations, executive orders, and contract provisions, including but not limited to those listed below:

Dissemination of Policy:

All members of the firm who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, this firm's Equal Employment Opportunity (EEO) policy and contractual responsibilities to provide EEO in each grade and classification of employment. These actions shall include:

1. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the firm's EEO policy and its implementation will be reviewed and explained. These meetings will be conducted by the EEO officer.
2. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.
3. All personnel who are engaged in direct recruitment for the firm will be instructed by the EEO Officer of the contractor's procedures for locating and hiring minority group employees.
4. Notices and posters setting forth the firm's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.
5. The firm's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.
6. Sexual Harassment Prevention Resources including training and remedies must be available to all employees. See Connecticut General Assembly Public Acts 19-16 and 19-93.

Recruitment:

When advertising for employees, the firm will include in all advertisements the notation; "An Affirmative Action/Equal Opportunity Employer." All such advertisements will be placed in

publications having a large circulation among minority groups in the area where the workforce would normally be derived.

1. The firm will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minority and female applicants. To meet this requirement, the firm will identify referral sources and establish procedures for recruitment to obtain the referral of minority and female applicants.
2. In the event the firm has a valid bargaining agreement providing for exclusive hiring referrals, he/she is expected to observe the provisions of that agreement to the extent that the system permits the contractor's compliance with EEO contract provisions. (The United States Department of Labor has held that where implementation of such agreements has had the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Executive Order 11246, as amended.)
3. The firm will encourage his/her present employees to refer minority group applicants for employment. Information and procedures with regard to referring minority group applicants will be discussed with employees.

Personnel Actions:

Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to an individual's race, color, religion, creed, sex, gender identity or expression, marital status, national origin, age, ancestry, status as a veteran, intellectual disability, mental disability, learning disability or physical disability, including but not limited to blindness, unless such disability prevents performance of the work involved. The following procedures shall be followed:

1. The firm will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of personnel.
2. The firm will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take correction action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.
3. The firm shall periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.
4. The firm will promptly investigate all complaints of alleged discrimination made to the firm and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective actions shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of his avenues of appeal.

Training and Promotion:

The firm will assist in locating, qualifying, and increasing the skills of minorities and women. The firm will utilize the following tools to identify training and promotional opportunities in the firm:

1. The firm will advise employees and applicants for employment of available training programs and the entrance requirements.
2. The firm will periodically review the training and promotion of minority group and female employees and will encourage eligible employees to apply for such training and promotion.

Unions:

If the firm relies in whole or in part upon unions as a source of employees, the contractor will use his/her best efforts to obtain the cooperation of such unions to increase opportunities for minority groups and women within the unions, and to effect referrals by such unions of minority and female employees. Actions by the firm either directly or through a contractor's association acting as agent will include the procedures set forth below:

1. The firm will use best efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minority group members and women for membership in the unions and increasing the skills of minority group employees and women so that they may qualify for higher paying employment.
2. The firm will use best efforts to incorporate an EEO clause into each union agreement to the extent that such union will be contractually bound to refer applicants without regard to their to an individual's race, color, religion, creed, sex, gender identity or expression, marital status, national origin, age, ancestry, status as a veteran, intellectual disability, mental disability, learning disability or physical disability, including but not limited to blindness, unless such disability prevents performance of the work involved.
3. The firm is to obtain information as to the referral practices and policies of the labor union except that to the extent that such information is within the exclusive possession of the labor union and such labor union refuses to furnish the information to the contractor, the contractor shall notify the Connecticut Department of Transportation (CTDOT) of the efforts made to obtain the information.
4. In the event the union is unable to provide the firm with a reasonable flow of minority and women referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies. (The United States Department of Labor has held that it shall be no excuse that the union with which the contractor has a collective bargaining agreement providing for exclusive referral failed to refer minority employees.) In the event the union referral practice prevents the contractor from meeting the obligations under Executive Order 11246 as amended, and in compliance with 23 CFR Part 230, the firm will notify CTDOT.

Selection of Subcontractors:

The firm will not discriminate on the grounds race, color, religion, sex, sexual orientation, gender identity or expression, marital status, national origin, ancestry, age, intellectual disability, learning disability, physical disability, including, but not limited to, blindness, or status as a veteran in the selection and retention of subcontractors, including procurement of materials and leases of equipment.

1. The firm shall use his/her best efforts to ensure subcontractor/subconsultant compliance with Federal and State Equal Opportunity (EO) and EEO requirements.

Records and Reports:

The Contractor shall keep records as necessary to document compliance with EO/EEO requirements. Such reports shall be retained for a period of three years following completion of the contract work and shall be available at reasonable times and places for inspection by authorized representatives of CTDOT and/or the United States Department of Transportation. The following records should be maintained:

6. The number of minority and non-minority group members and women employed in each work classification;
7. The progress and efforts being made in cooperation with unions, when applicable to increase the employment opportunities for minorities and women;
8. The documentation showing progress and efforts being made in locating, hiring, training, qualifying, and upgrading minority and female employees; and
9. Complaints of Discrimination.

In implementing this policy and ensuring that affirmative action is being provided, each time a hiring opportunity occurs this firm will contact and request referrals from minority and female organizations, referral sources, and media sources. All advertising will emphasize that the firm is “An Affirmative Action/Equal Opportunity Employer.”

In order to substantiate this firm’s efforts and affirmative actions to provide equal opportunity, the firm will maintain and submit, as requested, documentation such as referral request correspondence, copies of advertisements utilized and follow-up documentation to substantiate that efforts were made in good faith. This firm will maintain the necessary internal audit procedures and record keeping systems to report the firm’s affirmative action efforts.

It is understood by Owner/CEO/President of the firm and the firm’s Equal Employment Opportunity Officer and supervisory and managerial personnel that failure to effectively implement, monitor and enforce this firm’s affirmative action program and/or failure to adequately document and submit as required, the affirmative actions taken and efforts made to recruit and hire minority and female applicants in accordance with our affirmative action program in each instance of hire, will result in this firm being required to recommit itself to a modified and more stringent affirmative action program as a condition of approval. It is recognized that this policy is a contractual requirement and is a prerequisite for performing services for the contracting agency. This policy in addition to CTDOT’s EO/EEO contract provisions and requirements, shall constitute the CTDOT Affirmative Program requirements.

The ultimate responsibility for the full implementation of this firm’s Affirmative Action Program rests with the Chief Executive Officer of this firm.

EXHIBIT E

(Federal wage rate package will be inserted at the end after State wages for the final executed contract only. Refer to NTC – Federal Wage Determinations)

EXHIBIT F

State Wages and Other Related Information

Please refer to the Department of Labor website for the latest updates, annual adjusted wage rate increases, certified payroll forms and applicable statutes.

<http://www.ctdol.state.ct.us/wgwkstnd/prevailwage.htm>

Prevailing Wage Law Poster Language

**THIS IS A PUBLIC WORKS PROJECT Covered by the
PREVAILING WAGE LAW CT General Statutes Section 31-53 If**

you have QUESTIONS regarding your wages CALL (860) 263-6790

Section 31-55 of the CT State Statutes requires every contractor or subcontractor performing work for the state to post in a prominent place the prevailing wages as determined by the Labor Commissioner.

Informational Bulletin

THE 10-HOUR OSHA CONSTRUCTION SAFETY AND HEALTH COURSE (applicable to public building contracts entered into on or after July 1, 2007, where the total cost of all work to be performed is at least \$100,000)

- (1) This requirement was created by Public Act No. 06-175, which is codified in Section 31-53b of the Connecticut General Statutes (pertaining to the prevailing wage statutes);
- (2) The course is required for public building construction contracts (projects funded in whole or in part by the state or any political subdivision of the state) entered into on or after July 1, 2007;
- (3) It is required of private employees (not state or municipal employees) and apprentices who perform manual labor for a general contractor or subcontractor on a public building project where the total cost of all work to be performed is at least \$100,000;
- (4) The ten-hour construction course pertains to the ten-hour Outreach Course conducted in accordance with federal OSHA Training Institute standards, and, for telecommunications workers, a ten-hour training course conducted in accordance with federal OSHA standard, 29 CFR 1910.268;
- (5) The internet website for the federal OSHA Training Institute is http://www.osha.gov/fso/ote/training/edcenters/fact_sheet.html;

(6) The statutory language leaves it to the contractor and its employees to determine who pays for the cost of the ten-hour Outreach Course;

(7) Within 30 days of receiving a contract award, a general contractor must furnish proof to the Labor Commissioner that all employees and apprentices performing manual labor on the project will have completed such a course;

(8) Proof of completion may be demonstrated through either: (a) the presentation of a bona fide student course completion card issued by the federal OSHA Training Institute; or (2) the presentation of documentation provided to an employee by a trainer certified by the Institute pending the actual issuance of the completion card;

(9) Any card with an issuance date more than 5 years prior to the commencement date of the construction project shall not constitute proof of compliance;

(10) Each employer shall affix a copy of the construction safety course completion card to the certified payroll submitted to the contracting agency in accordance with Conn. Gen. Stat. § 31-53(f) on which such employee's name first appears;

(11) Any employee found to be in non-compliance shall be subject to removal from the worksite if such employee does not provide satisfactory proof of course completion to the Labor Commissioner by the fifteenth day after the date the employee is determined to be in non-compliance;

(12) Any such employee who is determined to be in noncompliance may continue to work on a public building construction project for a maximum of fourteen consecutive calendar days while bringing his or her status into compliance;

(13) The Labor Commissioner may make complaint to the prosecuting authorities regarding any employer or agent of the employer, or officer or agent of the corporation who files a false certified payroll with respect to the status of an employee who is performing manual labor on a public building construction project;

(14) The statute provides the minimum standards required for the completion of a safety course by manual laborers on public construction contracts; any contractor can exceed these minimum requirements; and

(15) Regulations clarifying the statute are currently in the regulatory process and shall be posted on the CTDOL website as soon as they are adopted in final form.

(16) Any questions regarding this statute may be directed to the Wage and Workplace Standards Division of the Connecticut Labor Department via the internet website of <http://www.ctdol.state.ct.us/wgwkstnd/wgmenu.htm>; or by telephone at (860)263-6790.

THE ABOVE INFORMATION IS PROVIDED EXCLUSIVELY AS AN EDUCATIONAL RESOURCE AND IS NOT INTENDED AS A SUBSTITUTE FOR LEGAL INTERPRETATIONS WHICH MAY ULTIMATELY ARISE CONCERNING THE CONSTRUCTION OF THE STATUTE OR THE REGULATIONS.

November 29, 2006

Notice

To All Mason Contractors and Interested Parties Regarding Construction Pursuant to Section 31-53 of the Connecticut General Statutes (Prevailing Wage)

The Connecticut Labor Department Wage and Workplace Standards Division is empowered to enforce the prevailing wage rates on projects covered by the above referenced statute. Over the past few years, the Division has withheld enforcement of the rate in effect for workers who operate a forklift on a prevailing wage rate project due to a potential jurisdictional dispute. The rate listed in the schedules and in our Occupational Bulletin (see enclosed) has been as follows:

Forklift Operator:

- **Laborers (Group 4) Mason Tenders** - operates forklift solely to assist a mason to a maximum height of nine feet only.

- **Power Equipment Operator (Group 9)** - operates forklift to assist any trade and to assist a mason to a height over nine feet.

The U.S. Labor Department conducted a survey of rates in Connecticut, but it has not been published and the rate in effect remains as outlined in the above Occupational Bulletin.

Since this is a classification matter and not one of jurisdiction, effective January 1, 2007, the Connecticut Labor Department will enforce the rate on each schedule in accordance with our statutory authority.

Your cooperation in filing appropriate and accurate certified payrolls is appreciated.

**CONNECTICUT DEPARTMENT OF LABOR
WAGE AND WORKPLACE STANDARDS DIVISION**

**CONTRACTORS WAGE CERTIFICATION FORM
Construction Manager at Risk/General Contractor/Prime Contractor**

I, _____ of _____
Officer, Owner, Authorized Rep. Company Name

do hereby certify that the _____
Company Name

Street

City

and all of its subcontractors will pay all workers on the

Project Name and Number

Street and City

the wages as listed in the schedule of prevailing rates required for such project (a copy of which is attached hereto).

Signed

Subscribed and sworn to before me this _____ day of _____, _____.

Notary Public

Return to: Connecticut Department of Labor Wage
& Workplace Standards Division 200 Folly Brook
Blvd., Wethersfield, CT 06109

Rate Schedule Issued (Date): _____

Information Bulletin

Occupational Classifications

The Connecticut Department of Labor has the responsibility to properly determine "job classification" on prevailing wage projects covered under C.G.S. Section 31-53(d).

Note: This information is intended to provide a sample of some occupational classifications for guidance purposes only. It is not an all-inclusive list of each occupation's duties. This list is being provided only to highlight some areas where a contractor may be unclear regarding the proper classification. If unsure, the employer should seek guidelines for CTDOL.

Below are additional clarifications of specific job duties performed for certain classifications:

☐ **ASBESTOS WORKERS**

Applies all insulating materials, protective coverings, coatings and finishes to all types of mechanical systems.

☐ **ASBESTOS INSULATOR**

Handle, install apply, fabricate, distribute, prepare, alter, repair, dismantle, heat and frost insulation, including penetration and fire stopping work on all penetration fire stop systems.

☐ **BOILERMAKERS**

Erects hydro plants, incomplete vessels, steel stacks, storage tanks for water, fuel, etc. Builds incomplete boilers, repairs heat exchanges and steam generators.

☐ **BRICKLAYERS. CEMENT MASONS. CEMENT FINISHERS. MARBLE MASONS. PLASTERERS. STONE MASONS. PLASTERERS. STONE MASONS. TERRAZZO WORKERS. TILE SETTERS**

Lays building materials such as brick, structural tile and concrete cinder, glass, gypsum, terra cotta block. Cuts, tools and sets marble, sets stone, finishes concrete, applies decorative steel, aluminum and plastic tile, applies cements, sand, pigment and marble chips to floors, stairways, etc.

☐ **CARPENTERS. MILLWRIGHTS. PILEDRIVERMEN. LATHERS. RESILEINT FLOOR LAYERS. DOCK BUILDERS. DIKERS. DIVER TENDERS**

Constructs, erects, installs and repairs structures and fixtures of wood, plywood and wallboard. Installs, assembles, dismantles, moves industrial machinery. Drives piling into ground to provide foundations for structures such as buildings and bridges, retaining walls for earth embankments, such as cofferdams. Fastens wooden, metal or rockboard lath to walls, ceilings and partitions of buildings, acoustical tile layer, concrete form builder. Applies firestopping materials on fire resistive joint systems only. Installation of curtain/window walls only where attached to wood or metal studs. Installation of insulated material of all types whether blown, nailed or attached in

other ways to walls, ceilings and floors of buildings. Assembly and installation of modular furniture/furniture systems. Free-standing furniture is not covered. This includes free standing: student chairs, study top desks, book box desks, computer furniture, dictionary stand, atlas stand, wood shelving, two-position information access station, file cabinets, storage cabinets, tables, etc.

☐ **LABORER, CLEANING**

- The clean up of any construction debris and the general (heavy/light) cleaning, including sweeping, wash down, mopping, wiping of the construction facility and its furniture, washing, polishing, and dusting.

☐ **DELIVERY PERSONNEL**

- If delivery of supplies/building materials is to one common point and stockpiled there, prevailing wages are not required. If the delivery personnel are involved in the distribution of the material to multiple locations within the construction site then they would have to be paid prevailing wages for the type of work performed: laborer, equipment operator, electrician, ironworker, plumber, etc.

- An example of this would be where delivery of drywall is made to a building and the delivery personnel distribute the drywall from one "stockpile" location to further sub-locations on each floor. Distribution of material around a construction site is the job of a laborer or tradesman, and not a delivery personnel.

☐ **ELECTRICIANS**

Install, erect, maintenance, alteration or repair of any wire, cable, conduit, etc., which generates, transforms, transmits or uses electrical energy for light, heat, power or other purposes, including the Installation or maintenance of telecommunication, LAN wiring or computer equipment, and low voltage wiring. *License required per Connecticut General Statutes: E-1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9.

☐ **ELEVATOR CONSTRUCTORS**

Install, erect, maintenance and repair of all types of elevators, escalators, dumb waiters and moving walks. *License required by Connecticut General Statutes: R-1, 2, 5, 6.

☐ **FORKLIFT OPERATOR**

Laborers Group 4) Mason Tenders - operates forklift solely to assist a mason to a maximum height of nine (9) feet only.

Power Equipment Operator Group 9 - operates forklift to assist any trade, and to assist a mason to a height over nine (9) feet.

☐ **GLAZIERS**

Glazing wood and metal sash, doors, partitions, and 2 story aluminum storefronts. Installs glass windows, skylights, store fronts and display cases or surfaces such as building fronts, interior

walls, ceilings and table tops and metal store fronts. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers, which require equal composite workforce.

☐ **IRONWORKERS**

Erection, installation and placement of structural steel, precast concrete, miscellaneous iron, ornamental iron, metal curtain wall, rigging and reinforcing steel. Handling, sorting, and installation of reinforcing steel (rebar). Metal bridge rail (traffic), metal bridge handrail, and decorative security fence installation. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers which require equal composite workforce.

☐ **INSULATOR**

- Installing fire stopping systems/materials for "Penetration Firestop Systems": transit to cables, electrical conduits, insulated pipes, sprinkler pipe penetrations, ductwork behind radiation, electrical cable trays, fire rated pipe penetrations, natural polypropylene, HVAC ducts, plumbing bare metal, telephone and communication wires, and boiler room ceilings.

☐ **LABORERS**

Acetylene burners, asphalt rakers, chain saw operators, concrete and power buggy operator, concrete saw operator, fence and guard rail erector (except metal bridge rail (traffic), decorative security fence (non-metal).

installation.), hand operated concrete vibrator operator, mason tenders, pipelayers (installation of storm drainage or sewage lines on the street only), pneumatic drill operator, pneumatic gas and electric drill operator, powermen and wagon drill operator, air track operator, block paver, curb setters, blasters, concrete spreaders.

☐ **PAINTERS**

Maintenance, preparation, cleaning, blasting (water and sand, etc.), painting or application of any protective coatings of every description on all bridges and appurtenances of highways, roadways, and railroads. Painting, decorating, hardwood finishing, paper hanging, sign writing, scenic artwork and drywall hhg for any and all types of building and residential work.

☐ **LEAD PAINT REMOVAL**

- Painter's Rate 1. Removal of lead paint from bridges. 2. Removal of lead paint as preparation of any surface to be repainted. 3. Where removal is on a Demolition project prior to reconstruction. • Laborer's Rate 1. Removal of lead paint from any surface NOT to be repainted. 2. Where removal is on a TOTAL Demolition project only.

☐ **PLUMBERS AND PIPEFITTERS**

Installation, repair, replacement, alteration or maintenance of all plumbing, heating, cooling and piping. ***License required per Connecticut General Statutes: P-1,2,6,7,8,9 J1,2,3,4 SP-1,2 S-**

1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4.

☐ POWER EQUIPMENT OPERATORS

Operates several types of power construction equipment such as compressors, pumps, hoists, derricks, cranes, shovels, tractors, scrapers or motor graders, etc. Repairs and maintains equipment.

***License required, crane operators only, per Connecticut General Statutes.**

☐ ROOFERS

Covers roofs with composition shingles or sheets, wood shingles, slate or asphalt and gravel to waterproof roofs, including preparation of surface. (Demolition or removal of any type of roofing and or clean-up of any and all areas where a roof is to be re-laid.)

☐ SHEETMETAL WORKERS

Fabricate, assembles, installs and repairs sheet metal products and equipment in such areas as ventilation, air-conditioning, warm air heating, restaurant equipment, architectural sheet metal work, Sheetmetal roofing, and aluminum gutters. Fabrication, handling, assembling, erecting, altering, repairing, etc. of coated metal material panels and composite metal material panels when used on building exteriors and interiors as soffits, fascia, louvers, partitions, canopies, cornice, column covers, awnings, beam covers, cladding, sunshades, lighting troughs, spires, ornamental roofing, metal ceilings, mansards, copings, ornamental and ventilation hoods, vertical and horizontal siding panels, trim, etc. The sheet metal classification also applies to the vast variety of coated metal material panels and composite metal material panels that have evolved over the years as an alternative to conventional ferrous and non-ferrous metals like steel, iron, tin, copper, brass, bronze, aluminum, etc. Fabrication, handling, assembling, erecting, altering, repairing, etc. of architectural metal roof, standing seam roof, composite metal roof, metal and composite bathroom/toilet partitions, aluminum gutters, metal and composite lockers and shelving, kitchen equipment, and walk-in coolers. To include testing and air –balancing ancillary to installation and construction.

☐ SPRINKLER FITTERS

Installation, alteration, maintenance and repair of fire protection sprinkler systems. ***License required per Connecticut General Statutes: F-1, 2, 3, 4.**

☐ TILE MARBLE AND TERRAZZO FINISHERS

Assists and tends the tile setter, marble mason and terrazzo worker in the performance of their duties.

☐ TRUCK DRIVERS

~How to pay truck drivers delivering asphalt is under REVISION~

Truck Drivers are required to be paid prevailing wage for time spent "working" directly on the site. These drivers remain covered by the prevailing wage for any time spent transporting between the

actual construction location and facilities (such as fabrication, plants, mobile factories, batch plant, borrow pits, job headquarters, tool yards, etc.) dedicated exclusively, or nearly so, to performance of the contract or project, which are so located in proximity to the actual construction location that it is reasonable to include them. ***License required, drivers only, per Connecticut General Statutes.**

For example:

- Material men and deliverymen are not covered under prevailing wage as long as they are not directly involved in the construction process. If, they unload the material, they would then be covered by prevailing wage for the classification they are performing work in: laborer, equipment operator, etc.
- Hauling material off site is not covered provided they are not dumping it at a location outlined above.
- Driving a truck on site and moving equipment or materials on site would be considered covered work, as this is part of the construction process.

□ Any questions regarding the proper classification should be directed to:

**Public Contract Compliance Unit
Wage and Workplace Standards Division
Connecticut Department of Labor
200 Folly Brook Blvd, Wethersfield, CT 06109
(860) 263-6543.**

**Connecticut Department of Labor
Wage and Workplace Standards Division
FOOTNOTES**

□ Please Note: If the “Benefits” listed on the schedule for the following occupations includes a letter(s) (+ a or + a+b for instance), refer to the information below.

Benefits to be paid at the appropriate prevailing wage rate for the listed occupation.

If the “Benefits” section for the occupation lists only a dollar amount, disregard the information below.

Bricklayers, Cement Masons, Cement Finishers, Concrete Finishers, Stone Masons
(Building Construction) and (Residential- Hartford, Middlesex, New Haven, New London and
Tolland Counties)

a. Paid Holiday: Employees shall receive 4 hours for Christmas Eve holiday provided the employee works the regularly scheduled day before and after the holiday. Employers may schedule work on Christmas Eve and employees shall receive pay for actual hours worked in addition to holiday pay.

Elevator Constructors: Mechanics

a. Paid Holidays: New Year’s Day, Memorial Day, Independence Day, Labor Day, Veterans’ Day, Thanksgiving Day, Christmas Day, plus the Friday after Thanksgiving.

b. Vacation: Employer contributes 8% of basic hourly rate for 5 years or more of service or 6% of basic hourly rate for 6 months to 5 years of service as vacation pay credit.

Glaziers

a. Paid Holidays: Labor Day and Christmas Day.

Power Equipment Operators
(Heavy and Highway Construction & Building Construction)

a. Paid Holidays: New Year’s Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, provided the employee works 3 days during the week in which the holiday falls, if scheduled, and if scheduled, the working day before and the working day after the holiday. Holidays falling on Saturday may be observed on Saturday, or if the employer so elects, on the preceding Friday.

Ironworkers

a. Paid Holiday: Labor Day provided employee has been on the payroll for the 5 consecutive work days prior to Labor Day.

Laborers (Tunnel Construction)

a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. No employee shall be eligible for holiday pay when he fails, without cause, to work the regular work day preceding the holiday or the regular work day following the holiday.

Roofers

a. Paid Holidays: July 4th, Labor Day, and Christmas Day provided the employee is employed 15 days prior to the holiday.

Sprinkler Fitters

a. Paid Holidays: Memorial Day, July 4th, Labor Day, Thanksgiving Day and Christmas Day, provided the employee has been in the employment of a contractor 20 working days prior to any such paid holiday.

Truck Drivers

(Heavy and Highway Construction & Building
Construction)

a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas day, and Good Friday, provided the employee has at least 31 calendar days of service and works the last scheduled day before and the first scheduled day after the holiday, unless excused.

Rev. 7/1/19

SEE BELOW FOR STATE WAGE RATES

EXHIBIT E

INSERT FEDERAL WAGES HERE
EXHIBIT F

Project: Removal of I-84 Eastbound Exit 21 Off-Ramp

Minimum Rates and Classifications for
Heavy/Highway Construction

ID#: 25-9469

Connecticut Department of Labor
Wage and Workplace Standards Division

By virtue of the authority vested in the Labor Commissioner under provisions of Section 31-53 of the General Statutes of Connecticut, as amended, the following are declared to be the prevailing rates and welfare payments and will apply only where the contract is advertised for bid within 20 days of the date on which the rates are established. Any contractor or subcontractor not obligated by agreement to pay to the welfare and pension fund shall pay this amount to each employee as part of his/her hourly wages.

Project Number: Project Town: Waterbury
State#: 0151-0340 FAP#: 0842(327)
Project: Removal of I-84 Eastbound Exit 21 Off-Ramp

CLASSIFICATION	Hourly Rate	Benefits
1) Boilermaker	48.21	30.01
1a) Bricklayer, Cement Masons, Cement Finishers, Plasterers, Stone Masons	43.14	34.74
2) Carpenters, Piledrivermen	42.03	29.19
2a) Diver Tenders	42.03	29.19
2b) Divers Effluent	67.52	29.19
3) Divers	50.49	29.19
03a) Millwrights	43.25	29.13
03b) Carpenter-Welder	42.53	29.19
03c) Carpenter: Working with creosote lumber or acid	43.03	29.19

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4) Painters: (Bridge Construction) Brush, Roller, Blasting (Sand, Water, etc.), Spray	59.7	26.65
4a) Painters: Brush and Roller	39.57	26.50
4b) Painters: Spray	42.57	26.50
4bc) Painters: Spray Helper	40.57	26.50
4c) Painters: Steel Only	41.57	26.50
4d) Painters: Blast	44.57	26.50
4de) Painter: Blast Helper	40.57	26.50
4e) Painters: Tanks, Tower and Swingstage etc.	41.57	26.50
4f) Elevated Tanks (60 feet and above)	48.57	26.50
5) Electrician (Trade License required: E-1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9)	47.4	35.32+3% of gross wage
6) Ironworkers: Ornamental, Reinforcing, Structural, and Precast Concrete Erection	45.25	43.62 + a
7) Plumbers (Trade License required: (P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2) and Pipefitters (Including HVAC Work) (Trade License required: S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4 G-1, G-2, G-8, G-9)	50.58	36.30
----LABORERS-----		
8) Group 1: General Laborers and concrete specialist	35.7	28.85

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8) Group 1a: Acetylene Burners (Hours worked with a torch)	36.7	28.85
9) Group 2: Chain saw operators, fence and guard rail erectors, pneumatic tool operators, powdermen	35.95	28.85
10) Group 3: Pipelayers	36.2	28.85
11) Group 4: Jackhammer/Pavement breaker (handheld); mason tenders (cement/concrete), catch basin builders, asphalt rakers, air track operators, block paver, curb setter and forklift operators	36.2	28.85
12) Group 5: Toxic waste removal (non-mechanical systems)	37.7	28.85
13) Group 6: Blasters	37.45	28.85
Group 7: Asbestos/lead removal, non-mechanical systems (does not include leaded joint pipe)	38.7	28.85
Group 8: Traffic control signalmen	21.42	28.85
Group 9: Hydraulic Drills	36.45	28.85
Group 10: Toxic Waste Removers A or B With PPE	38.7	28.85
----LABORERS (TUNNEL CONSTRUCTION, FREE AIR). Shield Drive and Liner Plate Tunnels in Free Air.----		
13a) Miners, Motormen, Mucking Machine Operators, Nozzle Men, Grout Men, Shaft & Tunnel Steel & Rodmen, Shield & Erector, Arm Operator, Cable Tenders	37.93	28.85 + a
13b) Brakemen, Trackmen, Miners' Helpers and all other men	36.96	28.85 + a

As of: September 15, 2025

----CLEANING, CONCRETE AND CAULKING TUNNEL----

14) Concrete Workers, Form Movers, and Strippers	36.96	28.85 + a

15) Form Erectors	37.29	28.85 + a

----ROCK SHAFT LINING, CONCRETE, LINING OF SAME AND TUNNEL IN FREE AIR:----

16) Brakemen, Trackmen, Tunnel Laborers, Shaft Laborers, Miners Helpers	36.96	28.85 + a

17) Laborers Topside, Cage Tenders, Bellman	36.85	28.85 + a

18) Miners	37.93	28.85 + a

----TUNNELS, CAISSON AND CYLINDER WORK IN COMPRESSED AIR: ---
-

18a) Blaster	44.42	28.85 + a

19) Brakemen, Trackmen, Groutman, Laborers, Outside Lock Tender, Gauge Tenders	44.22	28.85 + a

20) Change House Attendants, Powder Watchmen, Top on Iron Bolts	42.24	28.85 + a

21) Mucking Machine Operator, Grout Boss, Track Boss	45.01	28.85 + a

----TRUCK DRIVERS----(*see note below)

Block Truck	37.48	32.68 + a

2 Axle	36.16	32.68 + a
Helpers	34.66	32.68 + a
Three Axle Trucks; Two Axle Mixer	36.27	32.68 + a
Three Axle Mixer	36.33	32.68 + a
Four Axle Trucks	36.39	32.68 + a
Four Axle Mixer	37.19	32.68 + a
5 Axle	36.39	32.68 + a
5 Axle Mixer	37.19	32.68 + a
Heavy Duty Trailer (40 tons and over)	38.66	32.68 + a
Heavy Duty Trailer (up to 40 tons)	37.39	32.68 + a
Snorkle Truck	36.54	32.68 + a
Swivel Dump and Tack Truck	36.39	32.68 + a
Euclids and Semi Trailer	36.44	32.68 + a

----POWER EQUIPMENT OPERATORS----

Group 1: Crane Handling or Erecting Structural Steel or Stone, Hoisting Engineer (2 drums or over). (Trade License Required)	58.19	29.80 + a
Group 1a: Front End Loader (7 cubic yards or over); Work Boat 26 ft. and over.	53.33	29.80 + a
Group 2: Cranes (100 ton rate capacity and over); Bauer Drill/Caisson. (Trade License Required)	57.78	29.80 + a
Group 2a: Cranes (under 100 ton rated capacity).	56.79	29.80 + a
Group 2b: Excavator over 2 cubic yards; Pile Driver (\$3.00 premium when operator controls hammer).	52.92	29.80 + a
Group 3: Excavator; Gradall; Master Mechanic; Hoisting Engineer (all types of equipment where a drum and cable are used to hoist or drag material regardless of motive power of operation), Rubber Tire Excavator (Drott-1085 or similar); Grader Operator; Bulldozer Fine Grade (slopes, shaping, laser or GPS, etc.). (Trade License Required)	51.92	29.80 + a
Group 4: Trenching Machines; Lighter Derrick; CMI Machine or Similar; Koehring Loader (Skooper).	51.42	29.80 + a
Group 5: Specialty Railroad Equipment; Asphalt Paver; Asphalt Spreader; Asphalt Reclaiming Machine; Line Grinder; Concrete Pumps; Drills with Self Contained Power Units; Boring Machine; Post Hole Digger; Auger; Pounder; Well Digger; Milling Machine (over 24" mandrel)	50.63	29.80 + a
Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller.	50.63	29.80 + a
Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	50.22	29.80 + a
Group 7: Asphalt Roller; Concrete Saws and Cutters (ride on types); Vermeer Concrete Cutter; Stump Grinder; Scraper; Snooper; Skidder; Milling Machine (24" and under Mandrel)	49.77	29.80 + a

Group 8: Mechanic, Grease Truck Operator, Hydroblaster, Barrier Mover, Power Stone Spreader; Welder; Work Boat under 26 ft.; Transfer Machine.	49.25	29.80 + a
Group 9: Front End Loader (under 3 cubic yards), Skid Steer Loader regardless of attachments (Bobcat or Similar); Fork Lift, Power Chipper; Landscape Equipment (including hydroseeder), Vacuum Excavation Truck and Hydrovac Excavation Truck (27 HG pressure or greater).	48.67	29.80 + a
Group 10: Vibratory Hammer, Ice Machine, Diesel and Air Hammer, etc.	45.96	29.80 + a
Group 11: Conveyor, Earth Roller; Power Pavement Breaker (whiphammer), Robot Demolition Equipment.	45.96	29.80 + a
Group 12: Wellpoint Operator.	45.87	29.80 + a
Group 13: Compressor Battery Operator.	45.12	29.80 + a
Group 14: Elevator Operator; Tow Motor Operator (Solid Tire No Rough Terrain).	43.6	29.80 + a
Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	43.06	29.80 + a
Group 16: Maintenance Engineer.	42.2	29.80 + a
Group 17: Portable Asphalt Plant Operator; Portable Crusher Plant Operator; Portable Concrete Plant Operator., Portable Grout Plant Operator, Portable Water Filtration Plant Operator.	47.91	29.80 + a
Group 18: Power Safety Boat; Vacuum Truck; Zim Mixer; Sweeper; (minimum for any job requiring CDL license).	44.7	29.80 + a
Surveyor: Chief of Party	48.16	29.80 + a
Surveyor: Assistant Chief of Party	44.41	29.80 + a

As of: September 15, 2025

Surveyor: Instrument Man	42.73	29.80 + a

Surveyor: Rodman or Chairman	36.78	29.80 + a

**NOTE: SEE BELOW

----LINE CONSTRUCTION----(Railroad Construction and Maintenance)----

20) Lineman, Cable Splicer, Technician	57.6	32.85

21) Heavy Equipment Operator	51.84	29.95

22) Equipment Operator, Tractor Trailer Driver, Material Men	48.96	29.01

23) Driver Groundmen	43.2	26.84

23a) Groundman Experienced	31.68	13.91

----OUTSIDE LINE CONSTRUCTION----

24) Driver Groundmen	42.09	26.84

25) Groundmen	30.87	13.91

26) Heavy Equipment Operators	50.51	29.95

27) Linemen, Cable Splicers, Dynamite Men	56.12	32.85

28) Material Men, Tractor Trailer Drivers, Equipment Operators	47.7	29.01

29) Technician	56.12	32.85

----COMMUNICATION----

Sales & Service Technician: To include but not limited to: Installation, Repair, Splicing and Maintenance	48.84	18.07

----DREDGING----

Class A1: Mechanical Dredge Operator	45.26	17.22+a+b

Class B1: Maintenance Engineer	39.14	16.78+a+b

Class C1: Mate/Welder	35.83	16.54+a+b

Class D: Deckhand	28.81	16.03+a+b

Welders: Rate for craft to which welding is incidental.

Surveyors: Hazardous material removal: \$3.00 per hour premium.

*Note: Hazardous waste removal work receives additional \$1.25 per hour for truck drivers.

**Note: Hazardous waste premium \$3.00 per hour over classified rate.

Truck Drivers: Trainers Premium: \$3.00 over wage rate.

Truck Drivers: Night Premium - Mixer Drivers: \$2.00 over wage rate.

Crane with 150 ft. boom (including jib) - \$1.50 extra

Crane with 200 ft. boom (including jib) - \$2.50 extra

Crane with 250 ft. boom (including jib) - \$5.00 extra

Crane with 300 ft. boom (including jib) - \$7.00 extra

Crane with 400 ft. boom (including jib) - \$10.00 extra

All classifications that indicate a percentage of the fringe benefits must be calculated at the percentage rate times the "base hourly rate".

Apprentices duly registered under the Commissioner of Labor's regulations on "Work Training Standards for Apprenticeship and Training Programs" Section 31-51-d-1 to 12, are allowed to be paid the appropriate percentage of the prevailing journeymen hourly base and the full fringe benefit rate, providing the work site ratio shall not be less than one full-time journeyman instructing and supervising the work of each apprentice in a specific trade.

--Connecticut General Statute Section 31-55a: Annual Adjustments to wage rates by contractors doing state work
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The Prevailing wage rates applicable to this project are subject to annual adjustments each July 1st for the duration of the project.

Each contractor shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.

It is the contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's website.

The annual adjustments will be posted on the Department of Labor's Web page:
www.ct.gov/dol. For those without internet access, please contact the division listed below.

The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project.

All subsequent annual adjustments will be posted on our Web Site for contractor access.

Contracting Agencies are under no obligation pursuant to State labor law to pay any increase due to the annual adjustment provision.

Effective October 1, 2005 - Public Act 05-50: any person performing the work of any mechanic, laborer, or worker shall be paid prevailing wage

All Person who perform work ON SITE must be paid prevailing wage for the appropriate mechanic, laborer, or worker classification.

All certified payrolls must list the hours worked and wages paid to All Persons who perform work ON SITE regardless of their ownership i.e.: (Owners, Corporate Officers, LLC Members, Independent Contractors, et. al)

Reporting and payment of wages is required regardless of any contractual relationship alleged to exist between the contractor and such person.

--Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clause (29 CFR 5.5 (a) (1) (ii)).

Please direct any questions which you may have pertaining to classification of work and payment of prevailing wages to the Wage and Workplace Standards Division, telephone (860)263-6790.